

**Idaho – Northwest Up-rate
Hemingway – Boardman 500 kV Transmission Project**

Project Review Group Phase II Rating Report

Submitted to:

The Hemingway – Boardman 500 kV Transmission Project Review Group

Submitted by:

Idaho Power Company

August 21, 2012

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1. Executive Summary

This document is written following the methodology established in the WECC Overview of Policies and Procedures for Project Coordination Review, Project Rating Review, and Progress Reports.

The Hemingway – Boardman 500 kV project is a 300 mile, 500 kV transmission line from Hemingway substation, to a new substation in north-central Oregon. The northwest terminus options are: (1) the Grassland 500 kV substation, or (2) the Longhorn 500 kV substation.

The Hemingway – Boardman 500 kV transmission project will be treated as an addition to the Idaho – Northwest (Path 14) WECC rated path. Idaho Power is requesting an increase to the Idaho – Northwest Path 14 WECC Accepted Rating upon completion of the Hemingway-Boardman 500 kV transmission project. Below are the proposed ratings in the west-to-east direction and the east-to-west direction:

Table 1: Proposed ratings for Idaho-Northwest (Path 14) and Hemingway-Boardman 500 kV

WECC Path Name	Proposed Rating West-to-East	Proposed Rating East-to-West
Idaho-Northwest (Path 14)	2250	3400

In order to prove the proposed ratings are acceptable, this report studied Idaho-Northwest (Path 14) at its proposed ratings simultaneous with other relevant similarly situated Phase 2 projects, Phase 3 projects, and existing WECC rated paths at their proposed ratings. The following simultaneous interaction studies have been completed:

Table 2: Simultaneous Interaction Studies Completed

Idaho-Northwest (Path 14)	Hemingway-Boardman 500 kV	Simultaneous Path		
		Path Name	Path #	Simultaneous Path Flow
W-E, 2250 MW	W-E, 1407 MW	COI, N-S	66	4800 MW
W-E, 2250 MW	W-E, 1407 MW	Idaho-Sierra, N-S	16	500 MW
W-E, 2250 MW	W-E, 1407 MW	Montana-Idaho, N-S	18	337 MW
W-E, 2250 MW	W-E, 1407 MW	Montana Southeast, N-S	80	660 MW
W-E, 2250 MW	W-E, 1407 MW	North of John Day	73	7800 MW
W-E, 2250 MW	W-E, 1407 MW	PDCI, N-S	65	3100 MW
W-E, 2250 MW	W-E, 1301 MW	West of Hatwai	6	3400 MW
W-E, 2250 MW	W-E, 1407 MW	MSTI & SWIP, N-S	II-5, II-11	1500 MW, 1950 MW
E-W, 3400 MW	E-W, 1284 MW	Alturas Project, S-N	76	300 MW
E-W, 3400 MW	E-W, 1111 MW	Idaho-Sierra, N-S	16	500 MW
E-W, 3400 MW	E-W, 1284 MW	Montana-Idaho, S-N	18	256 MW
E-W, 3400 MW	E-W, 1284 MW	Montana-Northwest, E-W	8	2200 MW
E-W, 3400 MW	E-W, 1284 MW	Montana Southeast, S-N	80	600 MW
E-W, 3400 MW	E-W, 1284 MW	PG&E-Sierra, E-W	24	150 MW
E-W, 3400 MW	E-W, 1284 MW	TOT 2B1, N-S	78	560 MW
E-W, 3400 MW	E-W, 1284 MW	TOT 2C, N-S	35	600 MW

In addition to simultaneous interaction studies, several sensitivity studies were completed. These sensitivity studies are listed below:

Table 3: Sensitivity Studies Completed in Phase II

Idaho-Northwest (Path 14)	Hemingway- Boardman 500 kV	Sensitivity Name
W-E, 2250 MW	W-E, 1323 MW	Hemingway-Boardman Stand Alone
W-E, 2250 MW	W-E, 1374 MW	Walla Walla Area, 100 % Wind
W-E, 2250 MW	W-E, 1449 MW	High West of McNary & West of Slatt
W-E, 2250 MW	W-E, 1418 MW	Longhorn Terminus
W-E, 2250 MW	W-E, 1390 MW	NV Energy Updates

The simultaneous interaction studies prove that the Idaho-Northwest path does not have an interaction with any other studied paths. The sensitivity studies prove that the Idaho-Northwest path can be operated to its proposed rating regardless of the system configuration or northwestern terminus.

Additional information about the Idaho-Northwest Up-rate, Hemingway-Boardman 500 kV Transmission Project, and the study results are documented in the sections that follow.

2. Introduction

2.1 Project Description

The Hemingway-Boardman 500 kV Transmission Project website is:

<http://www.boardmantohemingway.com/>

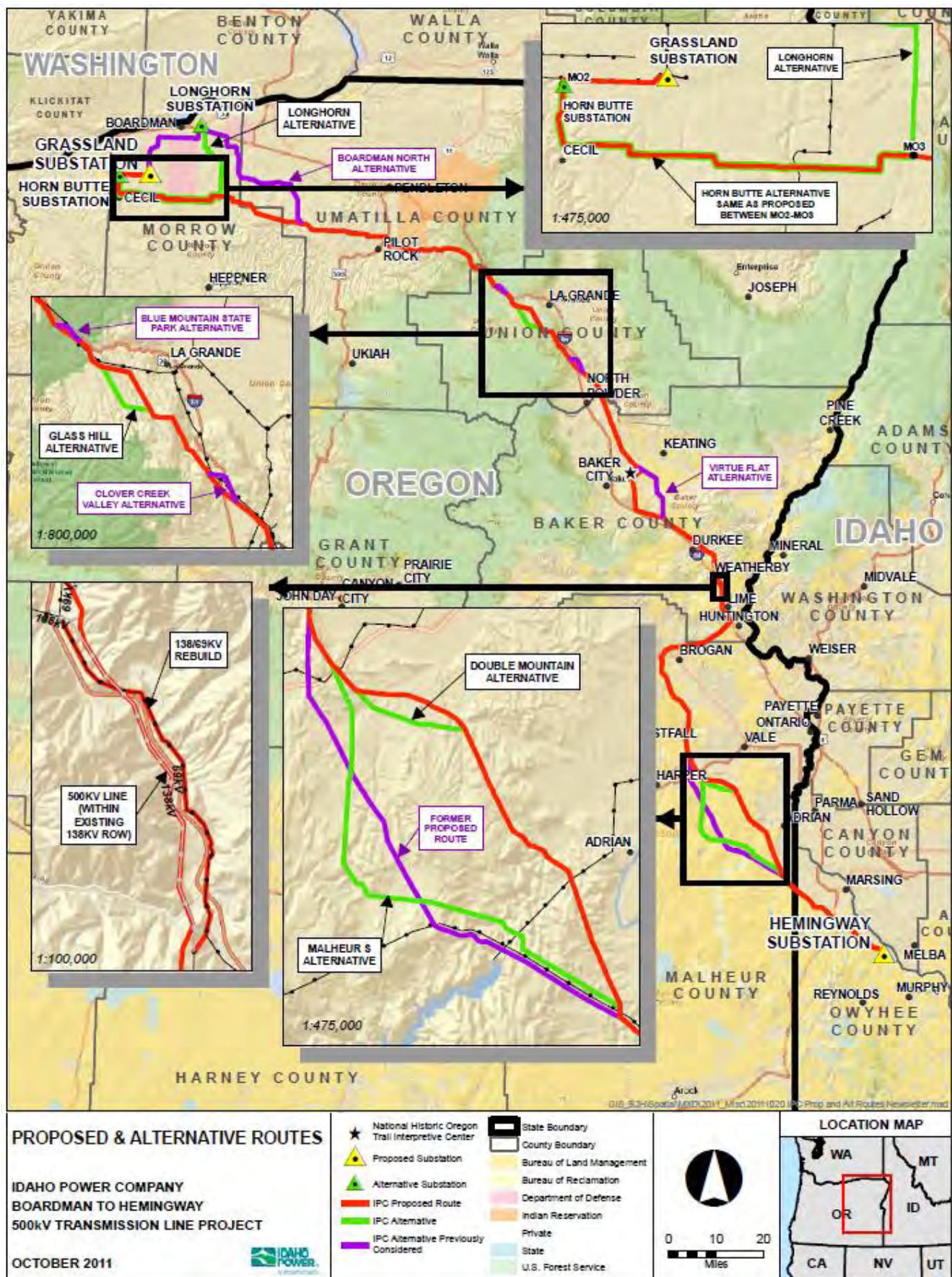
The project website has a great deal of information including a Project Overview, an “About the Project” page, and maps showing the proposed route of the Hemingway-Boardman 500 kV transmission line.

The Hemingway station is the southwestern Idaho transmission hub of the Gateway West Project and will be integrated into the Boise area 230 kV transmission system, as described in the Treasure Valley Electric Plan. Idaho Power’s partial ownership of the Boardman Power Plant, access to other Northwest resources, the coordination of northwest transmission projects, and the potential to combine multiple transmission needs into one project compelled Idaho Power to choose the Boardman area for the Oregon termination.

The Hemingway – Boardman 500 kV project is a 300 mile, 500 kV transmission line from Hemingway substation, to a new substation in north-central Oregon. The northwest terminus options are: (1) the Grassland 500 kV substation, or (2) the Longhorn 500 kV substation.

See Figure 1, on the following page, for a map showing proposed and alternate routes for the Hemingway-Boardman 500 kV transmission line.

Figure 1: Proposed & Alternate Routes for the Hemingway-Boardman 500 kV Transmission Project



2.2 Project Background

The Hemingway-Boardman 500 kV project achieved Phase II status in March 2009. The Phase I Comprehensive Progress Report demonstrated the ratings indicated in the table below.

Table 4: Phase I Ratings for Hemingway-Boardman 500 kV project

Hemingway-Boardman	Idaho-Northwest	Notes
1300 MW west-to-east	2050 MW west-to-east	without Gateway West
800 MW east-to-west	2600 MW east-to-west	without Gateway West
1400 MW east-to-west	3600 MW east-to-west	with Gateway West

The Phase I Comprehensive Progress Report focused on a solo-rating for the Hemingway-Boardman 500 kV Transmission Project. Recently, WECC revised the Overview of Policies and Procedures for Project Coordination Review, Project Rating Review, and Progress Reports to include a section on determining whether a new line is a subset of an existing path. Inserting the Hemingway-Boardman 500 kV line into a case with Idaho-Northwest stressed to its current 1200 MW rating resulted in ~70% of the Idaho-Northwest flow to shift over to the Hemingway-Boardman 500 kV line. This is an overwhelming indication that the Hemingway-Boardman 500 kV line should be added to the Idaho-Northwest path.

2.3 Transfer Capability & Report Objective

The Hemingway – Boardman 500 kV transmission project will be treated as an addition to the Idaho – Northwest (Path 14) WECC rated path. Idaho Power is requesting an increase to the Idaho – Northwest Path 14 WECC Accepted Rating upon completion of the Hemingway-Boardman 500 kV transmission project. Below are the requested ratings:

Table 5: Proposed ratings for Idaho-Northwest (Path 14) and Hemingway-Boardman 500 kV

	Rating West-to-East	Rating East-to-West
Idaho-Northwest (Path 14)	2250	3400

The objective of this Phase II study of the WECC 3-Phase Rating process is to: (1) Propose and confirm a 2250 MW west-to-east rating for the Idaho – Northwest (Path 14) including the Hemingway-Boardman 500 kV Transmission Project, and (2) Confirm the 3400 MW east-to-west rating for the Idaho – Northwest (Path 14) including the Hemingway-Boardman 500 kV Transmission Project. In order to confirm the 2250 MW west-to-east rating and the 3400 MW east-to-west rating, the Idaho-Northwest path was studied at its proposed rating, simultaneous with other paths that may be impacted at their proposed rating (Simultaneous Interaction Studies). Additionally, sensitivity cases were studied to ensure that Idaho-Northwest can be operated to 2250 MW west-to-east regardless of the system configuration or northwestern terminus. Table 2, in the Executive Summary, has a list of simultaneous interaction studies. Table 3, in the Executive Summary, has a list of sensitivity studies.

2.4 Plan of Service

The following is a list of system additions corresponding with the Hemingway-Boardman 500 kV project.

Hemingway – Boardman 500 kV Transmission Project

- 300 mile 500 kV series compensated (~50%) transmission line

Hemingway Substation 500 kV equipment (approximate)

- Two 120 MVAR Shunt Line Reactors on the Hemingway – Boardman 500 kV line
 - One Fixed (includes neutral reactor for single-pole switching)
 - One Switchable
- One 200 MVAR Shunt Capacitor (in addition to the existing 200 MVAR shunt capacitor)
- Series compensation for ~25% of the line reactance between Hemingway and Boardman

Boardman Area Substation 500 kV equipment

- One 150 MVAR shunt capacitor
- Two 120 MVAR Shunt Line Reactors on the Hemingway – Boardman 500 kV line
 - One Fixed (includes neutral reactor for single-pole switching)
 - One Switchable
- Series compensation for ~25% of the line reactance between Hemingway and Boardman

Peterson Substation

- One 31.7 MVAR 230 kV shunt capacitor

The following is a list of the projects added to each of the study cases, unless otherwise noted. These projects are not required to achieve the proposed ratings, with one exception, noted below.

Projects added to the base case:

- Stage One of Gateway West
 - New series compensated 500 kV line from Aeolus to Anticline to Populus
 - New series compensated 500 kV line from Populus to Cedar Hill to Hemingway
 - *Line required to achieve the Idaho-Northwest east-to-west proposed rating*
 - Convert Kinport-Midpoint 345 kV to Kinport-Borah 345 kV & Borah-Midpoint 500 kV
 - New 1500 MVA 500/345 kV transformer at Borah substation
- Bonneville Power Administration's Big Eddy-Knight 500 kV Project
- Cascade Crossings Transmission Project (single circuit)
- McNary-Wallula 230 kV line
- McNary-John Day 500 kV line
- Central Ferry Additions including the Central Ferry-Lower Monumental 500 kV line
- Southwest Intertie Project-South (SWIP South)
- Longhorn Substation & Associated Wind

Hemingway substation is set up to eventually be in a breaker-and-a-half configuration after the addition of more 500 kV lines into the station. Figure 2 depicts how Hemingway substation will look after the addition of the Hemingway-Boardman 500 kV line. Figure 3 depicts how Hemingway substation will look after the addition of the Hemingway-Boardman and Populus-Cedar Hill-Hemingway 500 kV lines.

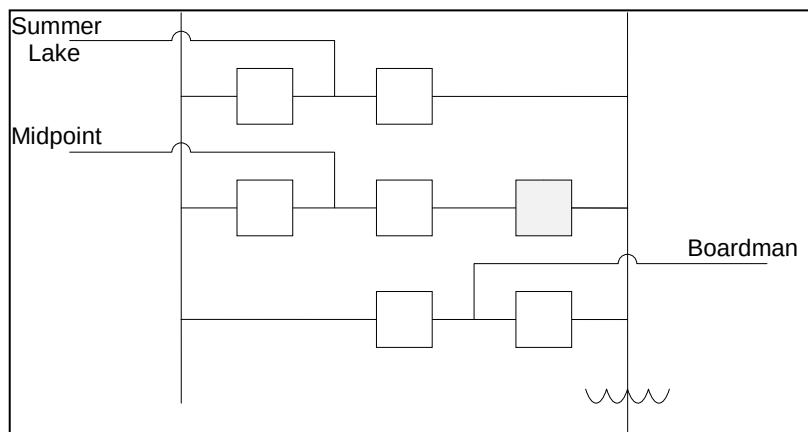


Figure 2: Hemingway 500 kV bus after the Hemingway-Boardman 500 kV line

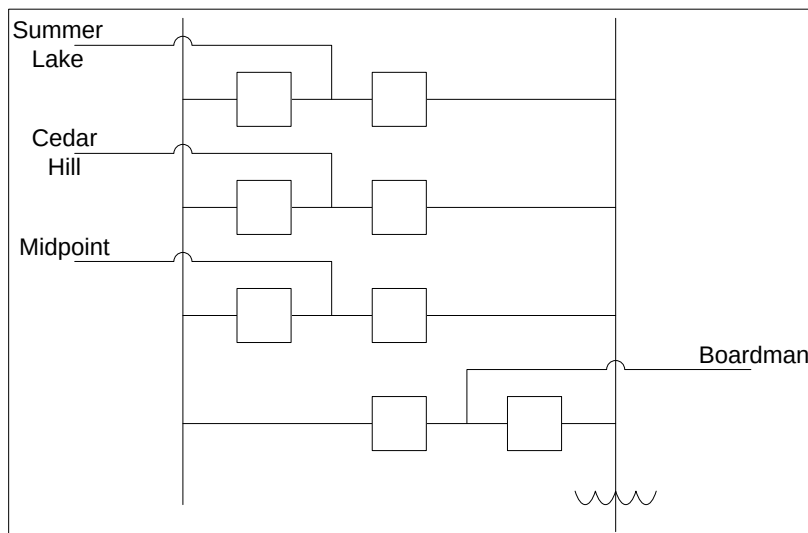


Figure 3: Hemingway 500 kV bus after Hemingway-Boardman & Cedar Hill-Hemingway 500 kV lines

In Figure 2, there is an extra breaker represented (slightly grayed) on the 500 kV rung next to the Midpoint 500 kV line terminal. This breaker is included in the plan of service because a breaker failure that results in the loss of the Midpoint 500 kV line and the Hemingway 500/230 kV transformer is unacceptable prior to the addition of Gateway West. Figure 3 does not depict this breaker after the addition of the Populus-Cedar Hill-Hemingway 500 kV line; a breaker failure that results in the loss of the Midpoint 500 kV line, and the Hemingway 500/230 kV transformer is acceptable, post-Gateway West.

2.5 Planned Operating Date

The Hemingway-Boardman 500 kV Transmission Project's expected in-service date is subject to siting, permitting, regulatory approvals, in-service date requirements of the parties electing to construct the line, the terms of any resulting joint construction agreements, and other conditions. Based on Idaho Power's assessment of those and other factors, as of the date of this report Idaho Power estimates that a project in-service date prior to 2018 is unlikely.

3. Study Methods & Standards

3.1 Steady State Case Stressing

In order to study the Hemingway-Boardman 500 kV Transmission Project and the new Idaho-Northwest path, two WECC base cases were modified to: (1) stress Idaho-Northwest to 2250 MW in the west-to-east direction, and (2) stress Idaho-Northwest to 3400 MW in the east-to-west direction. These cases were then further modified to stress additional paths to study potential simultaneous interactions with the Idaho-Northwest path. Details of how each study base case was developed can be found in the 'Steady State Case Stressing' section of each simultaneous interaction study.

3.2 Post-Transient

The power flow conditions generated above are modeled with single line (N-1) outages, credible double line (N-2) outages, and breaker failure outages to evaluate the NERC/WECC category B, C, and D performance. All modeled system bus voltages and line, transformer, and series capacitor current flows are monitored. Voltage deviations greater than 5% and significant overloaded elements are documented in the appendices associated with each study case.

Post-transient solution assumptions:

- a. Generator Voltage Control was set to control the generator terminal busses.
- b. Switched VAr Devices set to Disabled except:
 - Bridger 500 kV
 - Keeler 230 kV SVC
 - Maple Valley 230 kV SVC
 - Select SVD or Remedial Action Scheme devices detailed on a case-by-case basis
- c. Transformer LTCs locked except:
 - Intermountain 345/230 kV
- d. Phase Shifter Control: Disabled.
- e. Area Interchange: Disabled.
- f. Governor Blocking: Baseload Flag was used.

3.3 Voltage Stability

This study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis). PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at

least 105%, 102.5% and 102.5%, respectively, of the proposed rating. VQ Analysis determines the reactive power margin, following a contingency, at a specific electrical bus on the power system.

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses.

3.4 Transient Stability

Utilizing GE PSLF software, select single line (N-1), double line (N-2) and other outages were studied to evaluate transient stability performance. Relevant bus voltage and violations of the NERC/WECC allowed performance are documented in the appendices associated with each study case.

3.5 Remedial Action Schemes

Consistent with the NERC/WECC standards and WECC criteria, both Category B (single line events) and Category C (double line events including those double line events triggered by a breaker failure) outages are considered. Remedial actions associated with these outages were implemented with guidance from the study group. A list of outages and their associated remedial action schemes are documented in the appendices associated with each study case.

4. Idaho-Northwest, West-to-East Studies

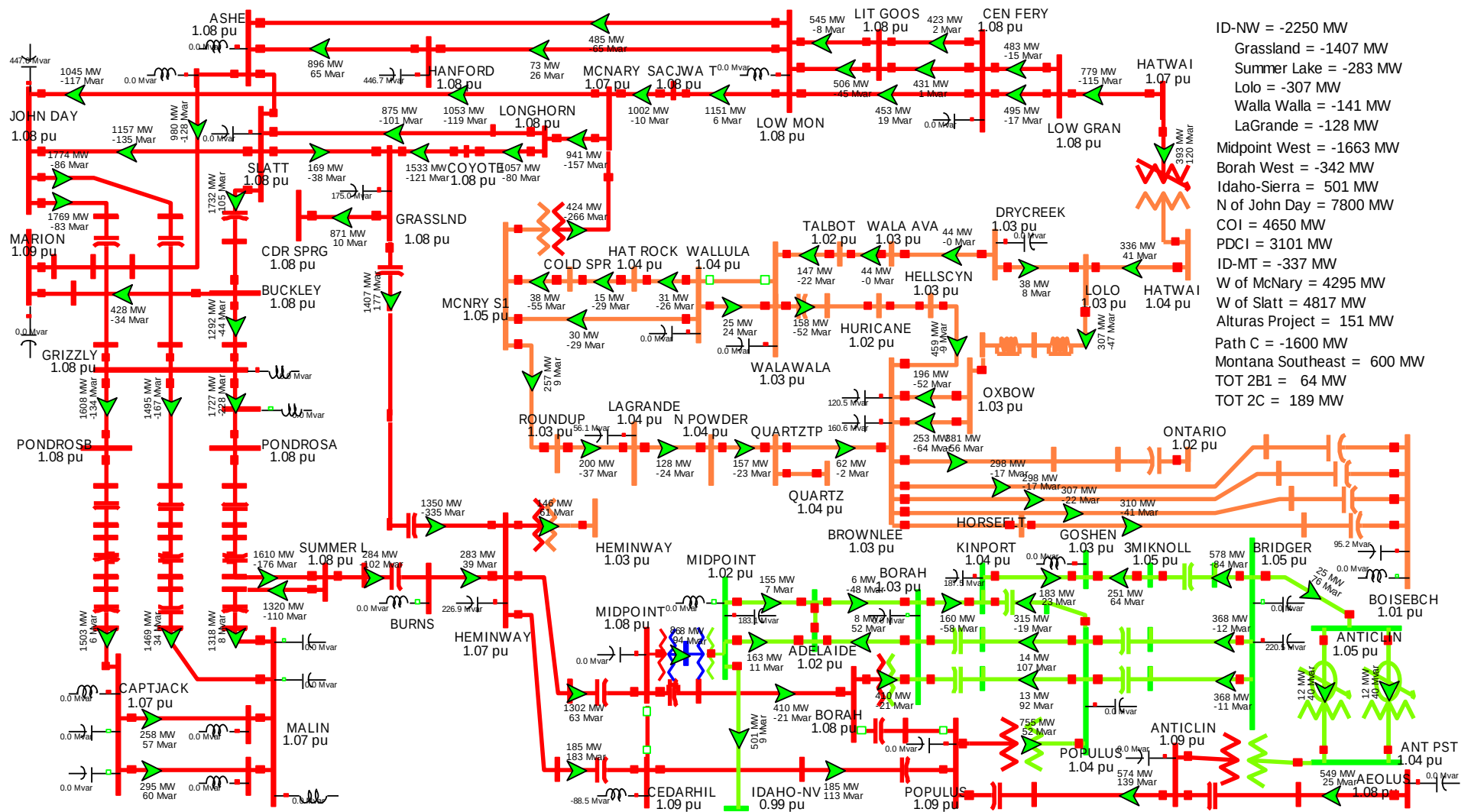


Figure 4: Idaho-Northwest (Path 14) 2250 MW, West to East, Base Case

4.1 Idaho – Northwest, West-to-East (Path 14) Base Case

4.1.1 Background

This is the main base case associated with the study of Idaho-Northwest in the west-to-east direction. In this case, Idaho-Northwest is stressed to its proposed 2250 MW west-to-east limit simultaneous with COI+NW-Sierra at its 4800 MW north-to-south limit, Idaho-Sierra at its 500 MW north-to-south limit, Montana-Idaho at its 337 MW north-to-south limit, Montana Southeast at its 600 MW north-to-south limit, North of John Day at its 7800 MW north-to-south limit, and PDCI at its 3100 MW north-to-south limit.

After completing the majority of the study work, including PV Analysis, QV Analysis, and Transient Stability analysis, a few modeling errors were discovered in this base case on the NV Energy system. A sensitivity case, with these errors corrected is documented in Section 4.14. These modeling errors were slight and made little to no difference on the results of the case.

4.1.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case names for these studies are: 16hs2a_2250idnw_N & 16hs2a_1200idnw_N.

Step-by-step development of the 16hs2a_2250idnw_N base case:

Step 1: Add the transmission facilities described in the Plan of Service (Section 2.4).

The 16hs2a_2250idnw_N base case includes all of the additions described in Section 2.4.

Step 2: Adjust the COI (Path 66) and PDCI (Path 65) to flow at 4800 MW & 3100 MW, respectively.

In the original 16hs2a base case downloaded from the WECC.biz website, flows on the COI & PDCI are approximately 3300 MW north-to-south and 2800 MW north-to-south, respectively. In order to increase COI to 4800 MW, and PDCI to 3100 MW, Northwest generation was increased and California generation was reduced. The Northwest hydro system was modified to match the 2011 NOPSG summer case created by BPA. Any additional generation required out of the Northwest came from northwest wind generation or northwest thermal plants. The California Operating Studies Subcommittee (OSS) Handbook was utilized to model the Northern California hydro system.

Step 3: Stress the Idaho-Northwest path to 2250 MW in the west-to-east direction.

The Idaho-Northwest path was stressed to 2250 MW in the west-to-east direction by reducing PacifiCorp East (PACE) and Idaho Power generation and replacing the generation with a schedule from the Northwest. Generation adjustments in the Northwest were limited to northwest wind generation or northwest thermal plants. The hydro system, adjusted in Step 2, was not modified.

Step 4: Stress simultaneous interaction study paths.

The following seven paths were stressed to their transfer limit in the 16hs2a_2250idnw_N base case simultaneous with Idaho-Northwest at 2250 MW west-to-east:

- 1) **COI (Path 66)+Alturas Project (Path76)** – Adjusted to the 4800 MW north-to-south limit in Step 2 (4650 MW on COI & 150 MW on Alturas).
- 2) **Idaho-Sierra (Path 16)** – Adjusted to the 500 MW north-to-south limit by reducing generation in Sierra, and increasing generation in Idaho.
- 3) **Montana-Idaho (Path 18)** – Adjusted to the 337 MW north-to-south limit utilizing the Mill Creek 230 kV phase shifter and the Jefferson 161 kV phase shifter.
- 4) **Montana Southeast (Path 80)** – Adjusted to 600 MW north-to-south limit by reducing generation at Yellowtail, and adjusting the Billings 230 kV, Rimrock 161 kV, and Crossover 230 kV phase shifters. Miles City DC was adjusted to be a sink, rather than a source.
- 5) **North of John Day (Path 73)** – Adjusted to 7800 MW north-to-south to match the current North of John Day/COI/PDCI nomogram.
- 6) **PDCI (Path 65)** – Adjusted to 3100 MW north-to-south.

Step 5: Adjusted other paths of concern.

Path C (Path 20) was stressed to 1600 MW north-to-south and Northern-Southern California (Path 26) was stressed to its 4000 MW north-to-south rating. Path C is not a potential simultaneous interaction, because loss of Hemingway-Boardman 500 kV acts to reduce the flow on Path C. Northern-Southern California is not a potential simultaneous interaction because loss of Hemingway-Boardman 500 kV only increases the path flow by approximately four percent. Although not a concern, these two paths are being studied in a simultaneous manner with Idaho-Northwest.

Step-by-step development of the 16hs2a_1200idnw_N case (“System Today” case):

This case was developed as a comparison/benchmark case to the 16hs2a_2250idnw_N base case for post-transient analysis. The 16hs2a_1200idnw_N base case is meant to represent the system as it is today, with 2016 loads and heavy west-to-east flow on the Idaho-Northwest path. Hemingway-Boardman, Gateway West, Cascade Crossing, and the Longhorn projects are not modeled in this base case.

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed earlier in this section of the report.

Step 2: Remove elements from the base case to create a “System Today” case

Remove the following elements from the 16hs2a_2250idnw_N case: (1) Hemingway-Boardman 500 kV, (2) Stage One of Gateway West, (3) Cascade Crossing, and (4) the Longhorn substation & associated wind projects.

Step 3: Reduce Idaho-Northwest transfers to 1200 MW west-to-east.

This is best accomplished by reducing Northwest generation and increasing Idaho area generation. By removing Longhorn, and the associated wind generation, Northwest generation was already reduced significantly. To replace Northwest generation, Idaho area peaking generation was switched in-service and scheduled to the Northwest.

Step 4: Re-stress adjacent paths

COI (Path 66) plus the Alturas Project (Path 76) was stressed to 4800 MW north-to-south (4650 COI, 150 Alturas), North of John Day (Path 73) was stressed to 7800 MW north-to-south to match the current North of John Day/COI/PDCI nomogram, PDCI (Path 65) was stressed to 3100 MW north-to-south and Montana-Idaho was stressed to the 337 MW north-to-south limit.

4.1.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

This is the limiting contingency for the Idaho-Northwest path in the west-to-east direction. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 112% of its 1237 Amp nominal rating (99.6% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line’s emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 6: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112% (1237 Amp Rating)	99.6% (1396 Amp Rating)
Oxbow – Lolo 230 kV	112% (920 Amp SOL)	98% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	101% (800 Amp Rating)	67% (1200 Amp Rating)

A breaker failure at Hemingway significantly stresses the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines. Section 2.4 considers different Hemingway 500 kV substation configurations to avoid severe breaker failures, however, at this time this breaker failure is considered to be credible.

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #2-BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kV

The contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 112% of its nominal rating (99.3% of emergency). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 7: Post-transient results – BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kV

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112% (1237 Amp Rating)	99.3% (1396 Amp Rating)
Oxbow – Lolo 230 kV	111% (920 Amp SOL)	98% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	117% (800 Amp Rating)	78% (1200 Amp Rating)

The table above is evidence that a breaker failure resulting in loss of the Hemingway to Grassland line and the Grassland-Cedar Springs line (Cascade Crossing Project) at the proposed Grassland station significantly stresses the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines to near their emergency limits. Although the system performance is acceptable for this breaker failure contingency in this case, the high West of McNary/high West of Slatt sensitivity study (section 4.12.2) resulted in overloads beyond the emergency ratings for the Brownlee-Hells Canyon 230 kV line and Oxbow-Lolo 230 kV line. The system stressing for this breaker failure contingency for the sensitivity study indicates that the Hemingway-Grassland line and the Grassland-Cedar Springs line should not share a common breaker in a substation. Refer to Section 4.12 of this report for more detail on the overloads for the high West of McNary/high West of Slatt study.

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #3 – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This is another limiting contingency for the Idaho-Northwest path in the west-to-east direction. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 111% of its nominal rating (98% of emergency). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency

rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 8: Post-transient results – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	111% (1237 Amp Rating)	98% (1396 Amp Rating)
Oxbow – Lolo 230 kV	110% (920 Amp SOL)	96% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	103% (800 Amp Rating)	69% (1200 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Conclusion

Several of the notable post transient contingencies resulting in more severe system stressing were noted above. All of these contingencies as well as all other post-transient contingencies result in acceptable performance. The results of contingencies associated with potential simultaneous interactions are in the sections that follow. Ultimately, the results indicate that Idaho-Northwest can achieve a 2250 MW west-to-east rating simultaneous with all other paths.

4.1.4 Voltage Stability

The Idaho-Northwest west-to-east base case study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest base case, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency, at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar)

VQ results for the 16hs2a_2250idnw_N base case can be found in Appendix A. Busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, Humboldt 345 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellowtail 230 kV. The tables below highlight a sample of the reactive margins at Brownlee and Hemingway. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 9: Brownlee 230 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: Double Palo Verde	0.84	-613	Worst VQ contingency
BF IPC MIDPOINT-HEM 500 KV & HEM 500/230 XFMR	0.88	-652	Worst VQ related to Idaho Power
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.87	-709	Worst VQ related to Idaho-NW

Table 10: Hemingway 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
BUS: SUMMER LAKE 500 KV	0.75	-1835	Worst VQ contingency
BF 4957 SUMMER LAKE-MALIN & SUMMER LAKE-HEM	0.75	-1865	Worst VQ contingency related to Idaho-NW
BF IPC HEM-SUMMER LAKE & HEM 500/230 XFMR	0.71	-1910	Worst VQ contingency related to Idaho Power

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, voltage stability is not an issue for the Idaho-Northwest path.

4.1.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A.

The 16hs2a_2250idnw_N base case was the basis for all transient stability study results for the Idaho-Northwest v COI, Idaho-Sierra, Montana-Idaho, Montana Southeast, North of John Day and PDCI simultaneous interaction studies.

The performance of transient stability contingencies are generally ranked based upon transient voltage dip. The worst N-1 contingency is the loss of the John Day-Grizzly #1 500 kV line. This contingency results in a voltage dip of approximately 13% on the Peterson 69 kV bus. 13% is well within the acceptable limits. The worst multi-element contingency is the N-2 loss of John Day-Grizzly #1 & #2 500 kV lines. This contingency results in a voltage dip of approximately 17% on the Peterson 69 kV bus. Again, 17% is well within the acceptable limits.

4.1.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

This contingency does not have any associated RAS.

Severe Post-Transient Contingency #2-BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kV

After the loss of these two lines, switched VAr devices modeled at Peterson 230 kV and Quartz 138 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service for this contingency.

Table 11: Shunt Capacitor Switching in BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Quartz 138 kV (60305)	0 MVar	22.5 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #3 – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This contingency does not have any associated RAS.

4.2 Simultaneous Interaction Study: COI, N-S (Path 66)

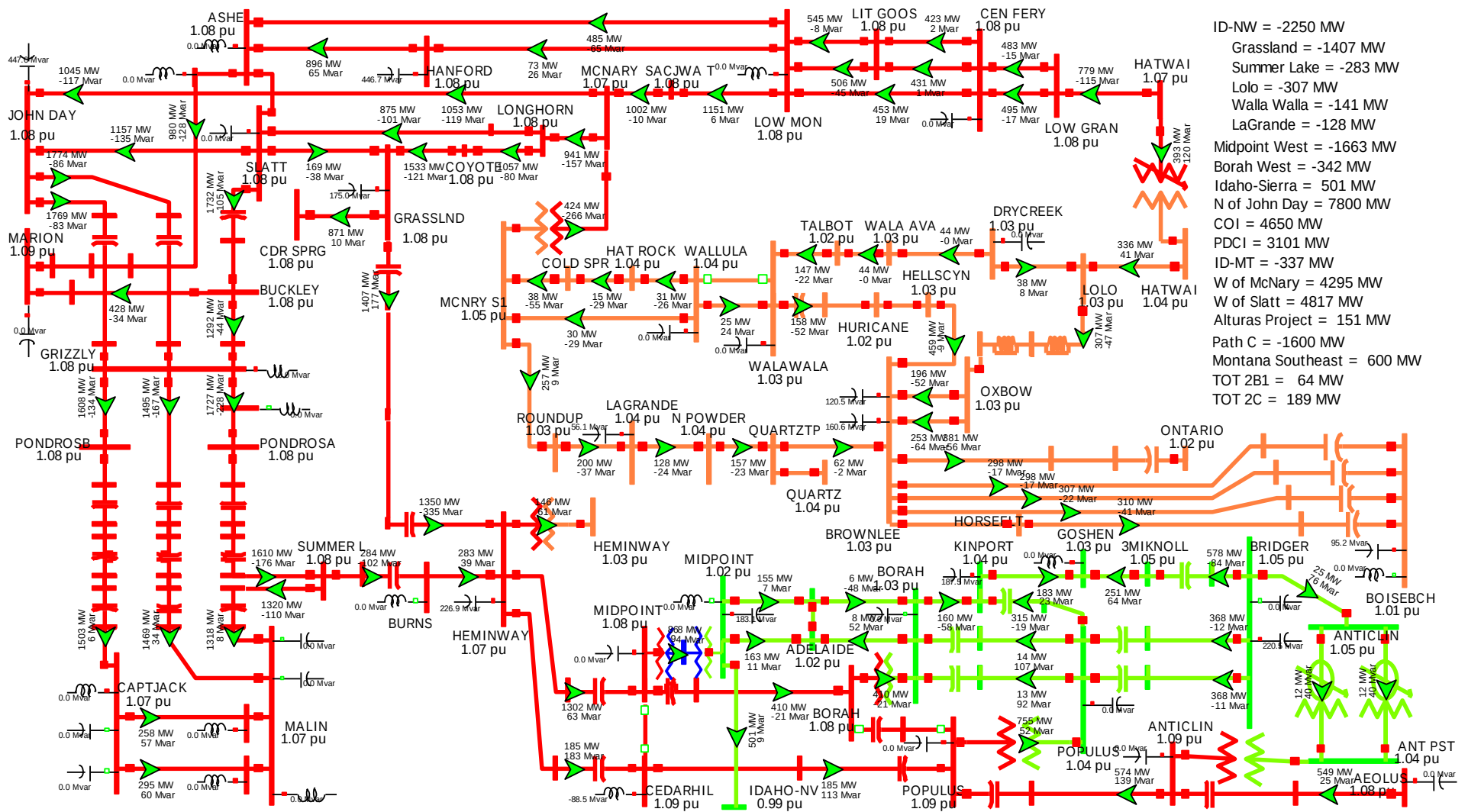


Figure 5: Idaho-Northwest (Path 14) 2250 MW, West to East v. COI (Path 66), North to South, Base Case

4.2.1 Background & Need for Simultaneous Interaction Studies

The COI path (Path 66) is made up of three 500 kV transmission lines, Malin-Round Mtn #1 & #2 and Captain Jack-Olinda. This path has a 4800 MW rating north-to-south.

COI (Path 66), Alturas Project (Path 76), North of John Day (Path 73), PDCI (Path 65), and Hemingway-Summer Lake (Path 75) are all interrelated through the North of John Day v COI+Alturas or PDCI nomogram. Historically, with higher west-to-east flow on the Hemingway-Summer Lake 500 kV line, this nomogram has limited the flow south of Malin on the COI/Alturas paths. By stressing COI/Alturas to 4800 MW, North of John Day to 7800 MW, and PDCI to 3100 MW in the same base case, this report will prove that these paths do not have a simultaneous interaction with the Idaho-Northwest path at its proposed 2250 MW west-to-east rating.

4.2.2 Steady State Case Stressing

The study of Idaho-Northwest v COI utilized the 16hs2a_2250idnw_N base case described in Section 4.1.2. Refer to Section 4.1.2 for a discussion on steady state case stressing.

In the base case, COI and Alturas Project path flows are stressed to 4650 MW north-to-south and 150 MW north-to-south, respectively. Combining the two path flow totals 4800 MW of north-to-south flow south of Malin matching the current North of John Day v COI+NW/Sierra or PDCI nomogram.

4.2.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. Details for the severe/notable contingencies can be found below.

Contingency #1 – Captain Jack-Olinda 500 kV

This contingency results in overloading the Cotwdwap-OlindaW 230 kV line to 108% of its nominal rating (92% of emergency). Since the overload is less than the emergency rating of the 230 kV line, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 12: Post-transient results – N-1: Captain Jack-Olinda 500 kV

Element	Nominal % Loading	Emergency % Loading
Cotwdwap-OlindaW 230 kV	108.2% (786 Amp Rating)	91.8% (926 Amp Rating)
Malin-Round Mtn 500 kV	103.4% (2442.0 Amp Rating)	78.0% (3236 Amp Rating)
Round Mtn-Table Mtn 500 kV	110.4% (2200 Amp Rating)	74.0% (3281 Amp Rating)
Table Mtn-Vaca Dixon 500 kV	106.0% (2478 Amp Rating)	65.7% (4000 Amp Rating)

Contingency #2 – N-1: Malin-Round Mtn #1 500 kV

This contingency results in overloading the Malin-Round Mtn #2 500 kV line to 130% of its nominal rating (88% of emergency). The overloaded line, Malin-Round Mtn #2, is made of four different line

segments: (1) a series capacitor at Malin, (2) a line segment north of the Oregon-California border, (3) a line segment south of the Oregon-California border, and (4) a series capacitor at Round Mtn. The line segment south of the Oregon-California border has the lowest nominal rating (2200 Amps) and the line segment north of the Oregon-California border has the lowest emergency rating (3236 Amps).

The table below compares the system today (Idaho-Northwest stressed to 1200 MW) to the system modeled in the base case (Idaho-Northwest stressed to 2250 MW). The base case includes the Hemingway-Boardman and Gateway West 500 kV lines, whereas the “system today” does not.

Table 13: Post-transient results – N-1: Malin-Round Mtn #1 500 kV

Element	Existing System (1200 Case)			Future System (2250 Case)		
	Pre-Cont. Loading	Post-Cont. Loading	Difference	Pre-Cont. Loading	Post-Cont. Loading	Difference
Malin-Round Mtn #2 500 kV	51.2% 1659 Amps	88.8% 2872 Amps	37.6% 1213 Amps	50.9% 1647 Amps	88.1% 2850 Amps	37.2% 1203 Amps

As can be seen from the table above, the Hemingway-Boardman 500 kV line improves the results of this contingency.

Contingency #3 – N-1: Round Mtn-Table Mtn #1 500 kV

This contingency results in overloading the Round Mtn-Table Mtn #2 500 kV line to 148% of its nominal rating (99% of emergency). Since the overload is less than the emergency rating of the 500 kV line, this contingency results in acceptable performance.

The table below compares the system today (Idaho-Northwest stressed to 1200 MW) to the system modeled in the base case (Idaho-Northwest stressed to 2250 MW). The base case includes the Hemingway-Boardman and Gateway West 500 kV lines, whereas the “system today” does not.

Table 14: Post-transient results – N-1: Round Mtn-Table Mtn #2 500 kV

Element	Existing System (1200 Case)			Future System (2250 Case)		
	Pre-Cont. Loading	Post-Cont. Loading	Difference	Pre-Cont. Loading	Post-Cont. Loading	Difference
RoundMtn-TableMtn #2 500 kV	55.2% 1811 Amps	99.4% 3262 Amps	44.2% 1451 Amps	55.0% 1803 Amps	98.9% 3244 Amps	43.9% 1441 Amps

As can be seen from the table above, the Hemingway-Boardman 500 kV line improves the results of this contingency.

Contingency #4 – N-2: Double Palo Verde

This contingency results in only minor overloads to the two sets of series capacitors in the Grizzly-Summer Lake 500 kV line, and the two Round Mtn-Table Mtn 500 kV lines. Overloads to each of these elements are much less than their respective emergency ratings.

The Hemingway-Boardman 500 kV project coupled with the Gateway West project reduces the impedance of the in-land parallel path, slightly reducing the severity of this contingency on the COI after Northwest generation responds to the 2500+ MW deficiency.

Contingency #5 – Malin-Round Mtn #1 & #2 500 kV

This contingency results in overloading the Captain Jack-Olinda 500 kV line to 140% of its nominal rating (97% of emergency). Since the overload is less than the emergency rating of the 500 kV line, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 15: Post-transient results – N-1: Malin-Round Mtn #1 & #2 500 kV

Element	Nominal % Loading	Emergency % Loading
Captain Jack-Olinda 500 kV	139.7% (2667 Amp Rating)	90.9% (4099 Amp Rating)
Olinda-Maxwell 500 kV	107.0% (2993 Amp Rating)	70.9% (4515 Amp Rating)
Maxwell-Tracy 500 kV	106.0% (2993 Amp Rating)	70.2% (4515 Amp Rating)

Conclusion

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 2250 MW west-to-east rating simultaneous with COI at 4800 MW north-to-south.

4.2.4 Voltage Stability

The Idaho-Northwest v COI study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v COI study, all studied contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating, simultaneous with the COI path flows at 4650 MW north-to-south. Alturas Project flows were at 150 MW in the case. The 4650 MW north-to-south COI flow was established based on the North of John Day v COI+NW/Sierra or PDCI nomogram.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_N base case can be found in Appendix A. Busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, Humboldt 345 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellowtail 230 kV. The tables below highlight a

sample of the reactive margins at Malin. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 16: Malin 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.88	-2002	Worst VQ contingency
N-1: CAPTAIN JACK-OLINDA 500 KV	0.82	-2324	Worst VQ related to COI
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.86	-2377	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the COI path at the flow levels studied.

4.2.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. A write up of these results can be found in Section 4.1.5. No transient stability violations were observed.

4.2.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A. Details for the severe/notable contingencies can be found below.

Contingency #1 – Captain Jack-Olinda 500 kV

This contingency does not have any associated RAS.

Contingency #2 – N-1: Malin-Round Mtn #1 500 kV

This contingency does not have any associated RAS.

Contingency #3 – N-1: Round Mtn-Table Mtn #1 500 kV

This contingency does not have any associated RAS.

Contingency #4 – N-2: Double Palo Verde

This contingency depresses the voltage at Malin, resulting in triggering operating of the FACRI. The FACRI RAS includes the insertion of the Fort Rock series capacitors in the 500 kV lines south of Grizzly, and insertion of shunt capacitor banks at Captain Jack 500 kV, Malin 500 kV, Olinda 500 kV, and Table Mtn 500 kV. FACRI will also remove shunt reactors at Captain Jack 500 kV, and Malin 500 kV.

See Appendix A for a list of actions taken in this contingency.

Contingency #5 – Malin-Round Mtn #1 & #2 500 kV

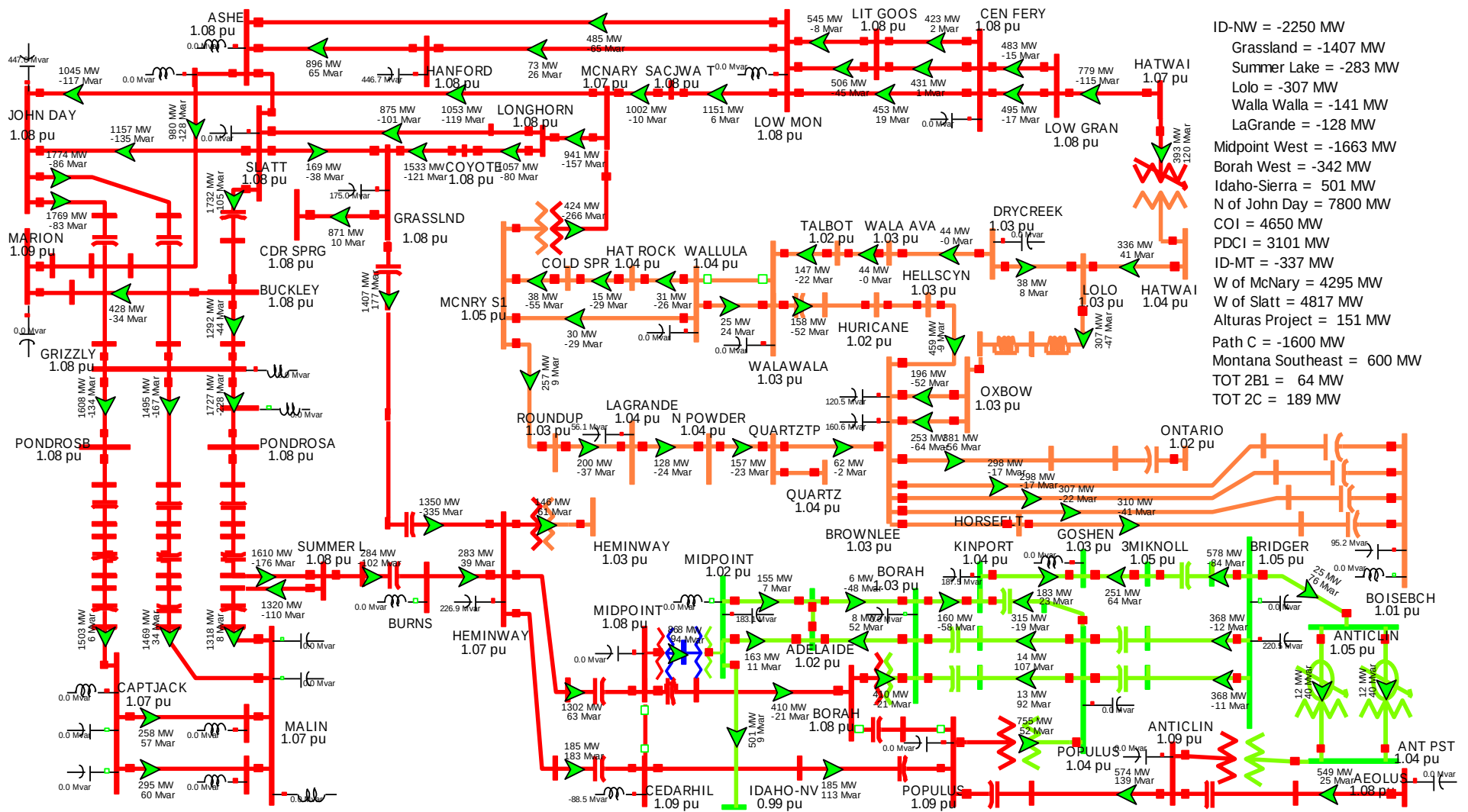
This double line loss is modeled according to the California Operating Studies Subcommittee Handbook.

RAS associated with this contingency includes:

- 1) Northwest High Gen Drop RAS tripping at least 2400 MW of hydro generation at places such as Chief Jo, Coulee, and John Day.
- 2) Drop San Luis and CDWR pumps, if pumping.

See Appendix A for a list of actions taken in this contingency.

4.3 Simultaneous Interaction Study: Idaho-Sierra, N-S (Path 16)



ID-NW = -2250 MW
Grassland = -1407 MW
Summer Lake = -283 MW
Lolo = -307 MW
Walla Walla = -141 MW
LaGrande = -128 MW
Midpoint West = -1663 MW
Borah West = -342 MW
Idaho-Sierra = 501 MW
N of John Day = 7800 MW
COI = 4650 MW
PDCI = 3101 MW
ID-MT = -337 MW
W of McNary = 4295 MW
W of Slatt = 4817 MW
Alturas Project = 151 MW
Path C = -1600 MW
Montana Southeast = 600 MW
TOT 2B1 = 64 MW
TOT 2C = 189 MW

4.3.1 Background & Need for Simultaneous Interaction Studies

The Idaho-Sierra transmission path (Path 16) is made up of single transmission line extending from Midpoint substation in southern Idaho, to Humboldt substation in northern Nevada.

The project review group was concerned that after the addition of the Hemingway-Boardman 500 kV transmission project, N-1 and N-2 contingencies on COI 500 kV lines south of Malin may result in post-transient flow on Idaho-Sierra greater than that seen on the system today. The concern was that this additional flow would cause post-transient overloads on the low-voltage system around Humboldt.

4.3.2 Steady State Case Stressing

The study of Idaho-Northwest v Idaho-Sierra utilized the 16hs2a_2250idnw_N base case. The Idaho-Northwest path is stressed to 2250 MW west-to-east simultaneous with the Idaho-Sierra path stressed to 500 MW north to south. The 16hs2a_2250idnw_N base case is described in Section 4.1.2. See Section 4.1.2 for the discussion on steady state case stressing.

4.3.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A.

There were not any contingencies that resulted in overloads or post-transient voltage deviation problems related to the Idaho-Sierra (Path 16) transmission path.

The following table illustrates two contingencies of concern in further depth, the N-1: Malin-Round Mtn #1 and the N-2: Malin-Round Mtn #1 & #2.

Table 17: COI contingencies impact on the Idaho-Sierra path

Contingency Name	Post-Transient Increase to Idaho-Sierra Flow	
	Existing System (1200 Case)	Future System (2250 Case)
N-1: Malin-Round Mtn #1	15 MW	16 MW
N-2: Malin-Round Mtn #1 & #2	47 MW	47 MW

A proper operation of the COI RAS is critical for such limited interaction with the Idaho-Sierra path, otherwise, the interaction would substantially increase.

Comparing today's Existing System to the Future System after the addition of the Hemingway-Boardman 500 kV transmission project, the loss of COI 500 kV lines do not result in a more severe impact to the Idaho-Sierra (Path 16) transmission path.

See Section 4.1.3 for more base case post-transient results.

4.3.4 Voltage Stability

The Idaho-Northwest v Idaho-Sierra study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Idaho-Sierra study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating, simultaneous with the Idaho-Sierra path flows at 500 MW north-to-south.

VQ Analysis determines the reactive power margin, in MVAR, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVAR is a superior reactive margin than -100 MVAR).

VQ results for the 16hs2a_2250idnw_N base case can be found in Appendix A. The busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, Humboldt 345 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellow Tail 230 kV. The tables below highlight a sample of the reactive margins at Humboldt. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 18: Humboldt 345 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVAR)	Comments
N-1: HUMBOLDT-COYOTE CK 345 KV	0.70	-208	Worst VQ contingency
BF IPC POPULUS-CHILL-HEMINGWAY 500 KV & HEM 500/230 XFMR	0.70	-457	Worst VQ related to Idaho Power
BF IPC HEMINGWAY-SUMMER L 500 KV & HEM 500/230 XFMR	0.70	-467	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVAR for critical 230 kV and 345 kV busses and 500 MVAR for critical 500 kV busses. For N-2 outages, the requirement is 200 MVAR for 230 kV and 345 kV busses and 400 MVAR for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the Idaho-Sierra path at the flow levels studied.

4.3.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. A write up of these results can be found in Section 4.1.5. No transient stability violations were observed.

4.3.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A.

No contingencies resulted in severe or noteworthy overloads or post-transient voltage deviation problems related to the Idaho-Sierra (Path 16) transmission path.

4.4 Simultaneous Interaction Study: Montana-Idaho, N-S (Path 18)

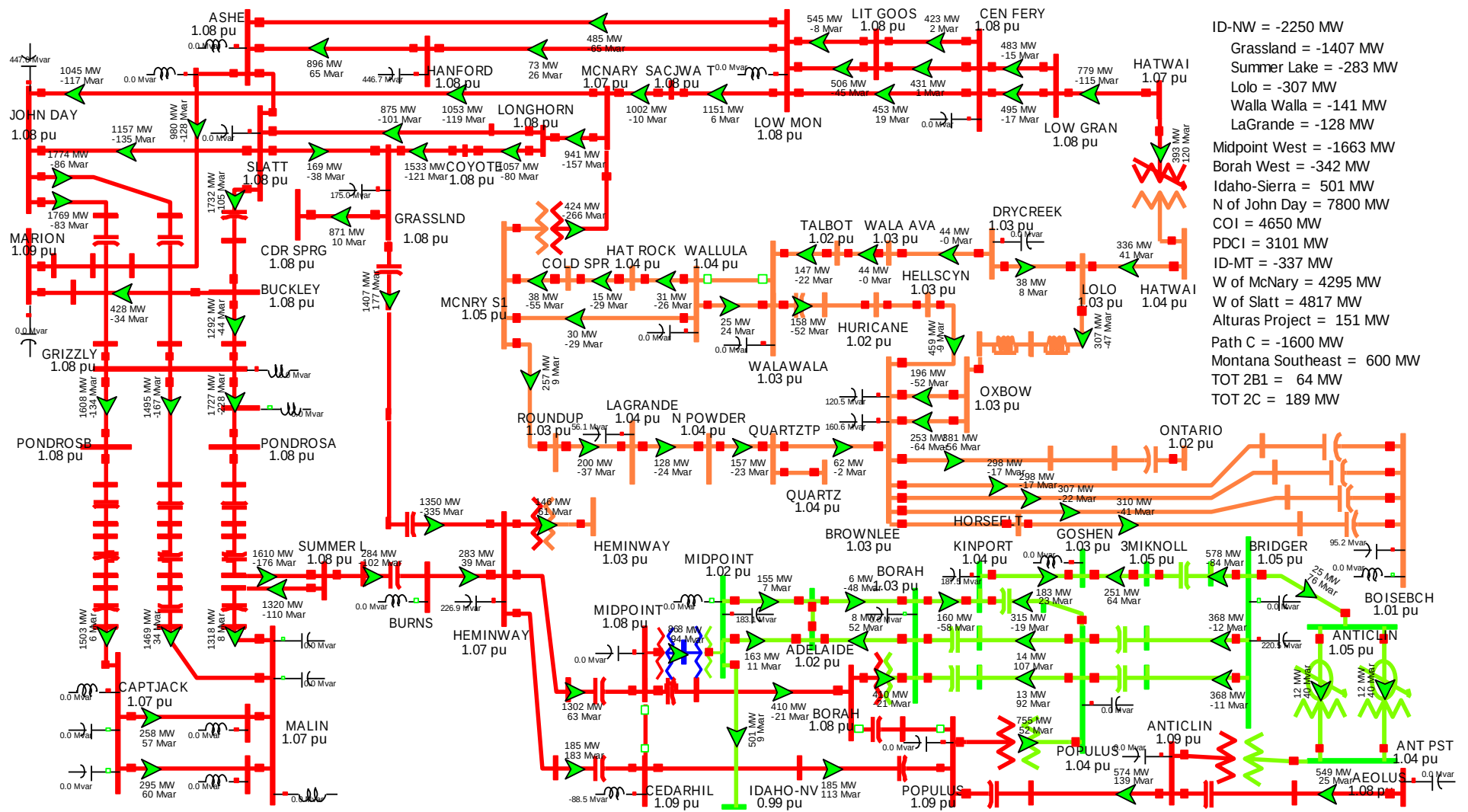


Figure 7: Idaho-Northwest (Path 14) 2250 MW, West to East v. Montana-Idaho (Path 18), North to South, Base Case

4.4.1 Background & Need for Simultaneous Interaction Studies

The Montana-Idaho transmission path (Path 18) is made up of two transmission lines: (1) a 230 kV line that extends between Brady-Antelope-Amps-Peterson-Mill Creek, otherwise known as the “Amps 230 kV line” and (2) a 161 kV line that extends between Jefferson-Big Grassy-Dillon, otherwise known as the “Dillon 161 kV line”. In the 16hs2a_2250idnw_N base case, the Amps 230 kV line is flowing at 250 MW and the Dillon 161 kV line is flowing at 86 MW, pre-contingency. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the Amps 230 kV line increases to 268 MW and the loading on the Dillon line increases to 106 MW, good for an 7.2 % and 23.3% increase, respectively. Due to this sizable increase in path transfers (11% of the total north-to-south path rating), the Idaho-Montana path may have a simultaneous interaction with the Idaho-Northwest path.

4.4.2 Steady State Case Stressing

The study of Idaho-Northwest v Montana-Idaho utilized the 16hs2a_2250idnw_N base case described in Section 4.1.2. In the base case, Montana-Idaho path flows are stressed to 337 MW north-to-south. Refer to Section 4.1.2 for more details on steady state case stressing.

4.4.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. Details for the severe/notable contingencies can be found below.

Contingency #1 – N-1: Hemingway-Grassland 500 kV

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 110% of its nominal rating (98% of emergency). Refer to the table below for additional overloads caused by this contingency. Since all overloads are less than the emergency ratings of the respective element, this contingency results in acceptable performance.

Table 19: Post-transient results – N-1: Hemingway-Grassland 500 kV

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	110% (1237 Amp Rating)	98% (1396 Amp Rating)
Oxbow – Lolo 230 kV	109% (920 Amp SOL)	96% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	103% (800 Amp Rating)	69% (1200 Amp Rating)

This contingency also results in post-transient voltage deviations greater than 5% at Amps and Peterson 230 kV busses. WECC System Performance Criteria does not allow post-transient voltage deviations of greater than 5% for N-1 contingencies. The plan of service for the Hemingway-Boardman 500 kV Transmission project, detailed in Section 2.4, includes a new 31.7 MVAR shunt capacitor connected to the Peterson 230 kV bus to be switched post-contingency (the existing 31.7 MVAR shunt capacitor is in-service pre-contingency). The contingency labeled “N-1: Hemingway-Grassland 500 kV + PTSN Shunt” switches this new Peterson 230 kV shunt capacitor, post-contingency, in response to low voltage on the

Peterson 230 kV bus. The table below details the performance comparison of the N-1: Hemingway-Grassland 500 kV outage with and without switching the additional shunt capacitor at Peterson.

Table 20: Post-transient voltage deviation comparison – N-1: Hemingway-Grassland 500 kV

Bus	N-1: Hemingway-Grassland 500 kV	N-1: Hemingway-Grassland 500 kV + PTSN
Peterson 230 kV	-7.4%	-3.6%
Amps 230 kV	-6.2%	-3.8%

The results indicate that switching a 31.7 MVar shunt capacitor, post contingency, at Peterson 230 kV bus allows this contingency to meet WECC System Performance Criteria.

Contingency #2 – N-1: Dworshak-Hatwai 500 kV + RAS

This contingency results in post-transient voltage deviations greater than 5% at Peterson 230 kV and 69 kV busses. The table below compares the system today (Idaho-Northwest stressed to 1200 MW) to the system modeled in the base case (Idaho-Northwest stressed to 2250 MW). The base case includes the Hemingway-Boardman and Gateway West 500 kV lines, whereas the “system today” does not.

Table 21: Post-transient voltage deviation – N-1: Dworshak-Hatwai 500 kV + RAS

Bus	1200 Case (System Today) % Voltage Deviation	2250 Case (Future System) % Voltage Deviation
Peterson 230 kV	-5.33%	-5.19%
Peterson 69 kV	-5.49%	-5.31%

The results indicate that system performance improves after the addition of the Hemingway-Boardman 500 kV line. As discussed in Section 2.4, the plan of service for the Hemingway-Boardman 500 kV Transmission project, detailed in Section 2.4, includes a new 31.7 MVar shunt capacitor connected to the Peterson 230 kV bus to be switched post-contingency (the existing 31.7 MVar shunt capacitor is in-service pre-contingency). The contingency “N-1: Dworshak-Hatwai 500 kV + RAS + PTSN” demonstrates that switching this new shunt capacitor fixes this pre-existing problem.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 2250 MW west-to-east rating simultaneous with Montana-Idaho at 337 MW north-to-south.

4.4.4 Voltage Stability

The Idaho-Northwest v Montana-Idaho study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed

rating. In the Idaho-Northwest v Idaho-Montana study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating, simultaneous with the Montana-Idaho path at its 337 MW north-to-south rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_N base case can be found in Appendix A. The busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, Humboldt 345 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellow Tail 230 kV. The tables below highlight a sample of the reactive margins at Mill Creek. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 22: Mill Creek 230 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.87	-274	Worst VQ contingency
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500 kV	0.80	-422	Worst VQ related to Northwest
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.80	-440	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the Montana-Idaho path at the flow levels studied.

4.4.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. A write up of these results can be found in Section 4.1.5. No transient stability violations were observed.

4.4.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A. Details for the notable contingencies can be found below.

Notable Contingency #1 – N-1: Hemingway-Grassland 500 kV

This contingency opens the Hemingway-Grassland 500 kV line. After the loss of this line and transformer, switched VAr devices modeled at Dillon 69 kV, and Peterson 230 kV would switch in-service

due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVAR shunt capacitor in service. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 23: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV

Shunt Device (Bus)	Initial MVAR	Post-Transient MVAR
Dillon 69 kV (62345)	15.9 MVAR	27.9 MVAR
Hemingway 500 kV (60155)	200 MVAR	400 MVAR
Peterson 230 kV (62030)	31.7 MVAR	63.4 MVAR

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Notable Contingency #2 – N-1: Dworshak-Hatwai 500 kV + RAS

The “+ RAS” designation in the contingency label refers to the RAS action take at Dworshak for this contingency. In this case, a contingency block “RAS Dworshak Open PCB XJ-7” was implemented to open the 13.8 kV breaker at Dworshak, which splits the DWOR 1 and DWOR 2 busses and associated generation at each bus.

The contingency also included the action to open the Garrison #s shunt reactor due to depressed voltages in the area. In reality, additional shunt devices may switch that are not modeled as part of this contingency.

4.5 Simultaneous Interaction Study: Montana Southeast, N-S (Path 80)

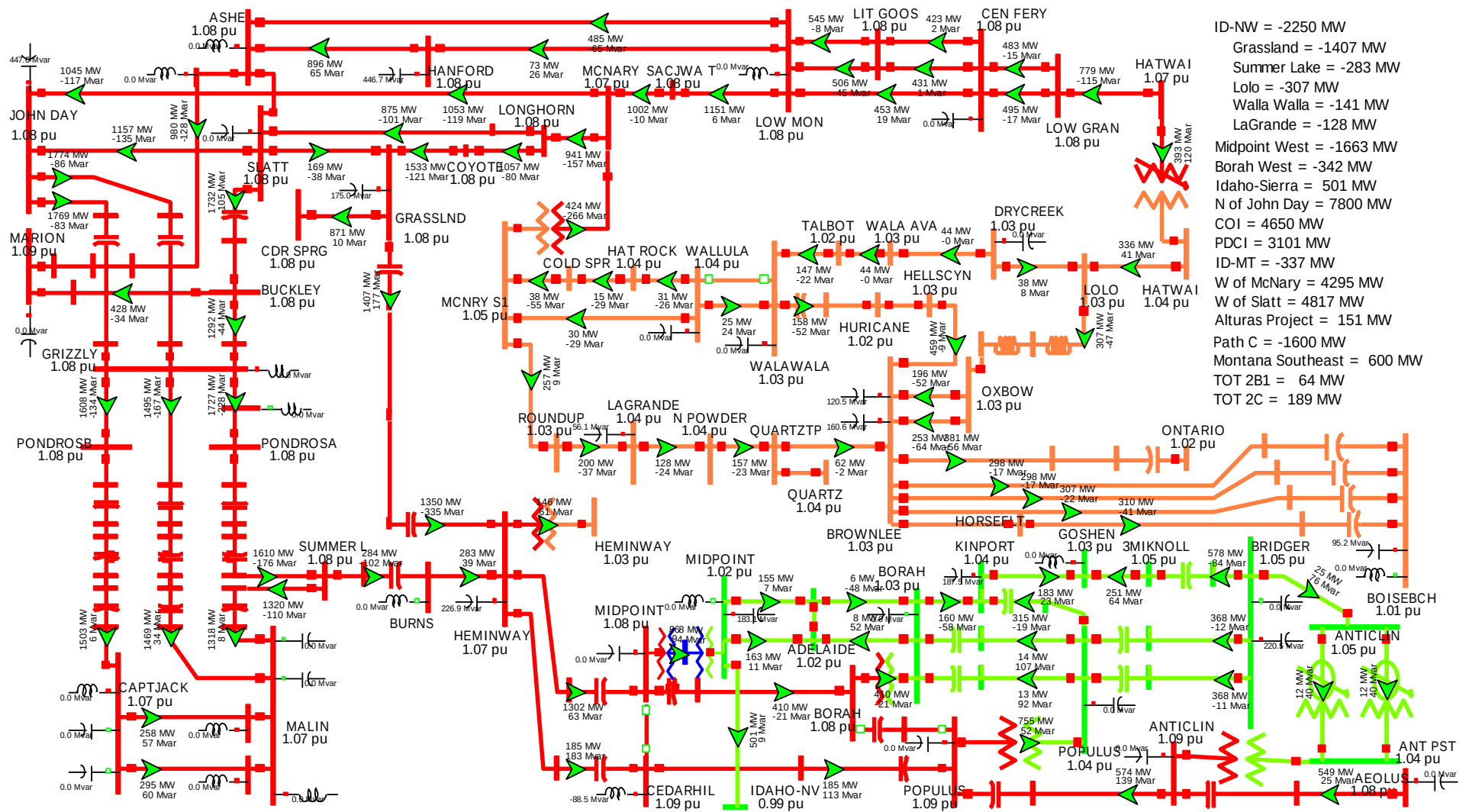


Figure 8: Idaho-Northwest (Path 14) 2250 MW, West to East v. Montana Southeast (Path 80), North to South, Base Case

4.5.1 Background & Need for Simultaneous Interaction Studies

The Montana Southeast path is made up of three 230 kV lines and one 161 kV line connecting the Montana transmission system to the northern Wyoming transmission system. In the 16hs2a_2250idnw_N base case, the flow on the Montana Southeast path is 600 MW north-to-south, pre-contingency. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the Montana Southeast path increases to 683 MW, a 14% increase on the path. Due to this sizable increase in path transfers, the Montana Southeast path may have a simultaneous interaction with the Idaho-Northwest path.

4.5.2 Steady State Case Stressing

The study of Idaho-Northwest v Montana Southeast utilized the 16hs2a_2250idnw_N base case described in Section 4.1.2. In the base case, Montana Southeast path flows are stressed to 600 MW north-to-south. Refer to Section 4.1.2 for more details on steady state case stressing.

4.5.3 Post Transient Results

There were not any contingencies that resulted in overloads or post-transient voltage deviation problems related to the Montana Southeast (Path 80) transmission path.

Some of the studied contingencies, such as the N-1 loss of Hemingway-Boardman 500 kV, did impact the voltage on the 230 kV busses along the Yellowtail-Frannie-Garland-OreBasin 230 kV line (3-4%), but none of the busses had a post-transient voltage deviation greater than 5%.

4.5.4 Voltage Stability

The Idaho-Northwest v Montana Southeast study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Montana Southeast study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its 2250 MW rating, simultaneous with the Montana Southeast path at its 600 MW north-to-south rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_N base case can be found in Appendix A. The busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, Humboldt 345 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellow Tail 230 kV. The tables below

highlight a sample of the reactive margins at Yellowtail. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 24: Yellowtail 230 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.78	-218	Worst VQ contingency
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.78	-234	Worst VQ related to Northwest
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.78	-239	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the Montana Southeast path at the flow levels studied.

4.5.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. A write up of these results can be found in Section 4.1.5. No transient stability violations were observed.

4.5.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A.

No contingencies resulted in overloads or post-transient voltage deviation problems related to the Montana Southeast (Path 80) transmission path.

4.6 Simultaneous Interaction Study: North of John Day (Path 73)

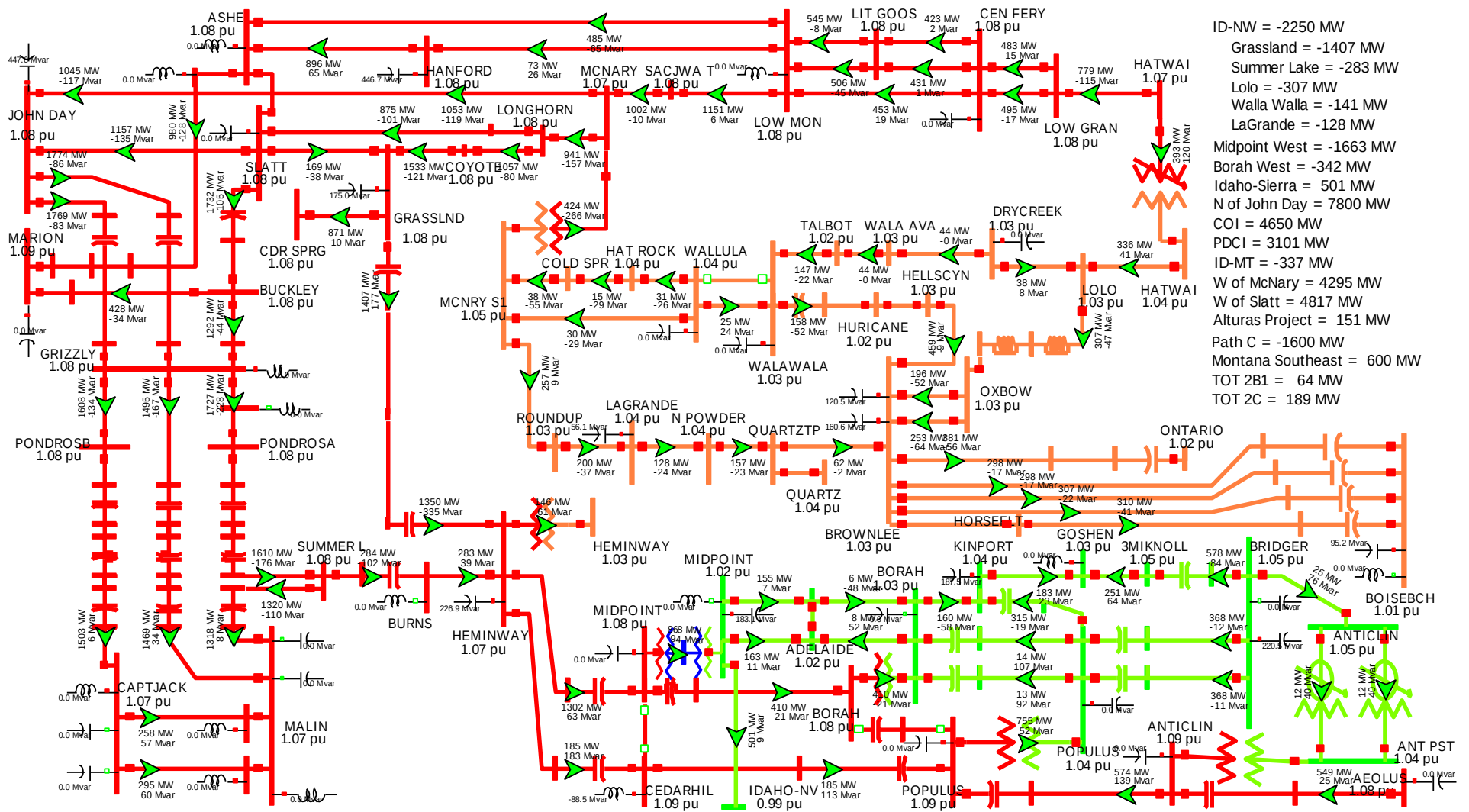


Figure 9: Idaho-Northwest (Path 14) 2250 MW, West to East v. North of John Day (Path 73), Base Case

4.6.1 Background & Need for Simultaneous Interaction Studies

The North of John Day path (Path 73) is made up of six 500 kV transmission lines: Sacajawea Tap-McNary, Ashe-Slatt, Ashe-Marion, Wautoma-Rock Creek, Wautoma-Big Eddy, and Raver-Paul. This path has a 7800 MW north-to-south rating.

COI (Path 66), Alturas Project (Path 76), North of John Day (Path 73), PDCI (Path 65), and Hemingway-Summer Lake (Path 75) are all interrelated through the North of John Day v COI+Alturas or PDCI nomogram. Historically, with higher west-to-east flow on the Hemingway-Summer Lake 500 kV line, this nomogram has limited the flow south of Malin on the COI/Alturas paths. By stressing COI/Alturas to 4800 MW, North of John Day to 7800 MW, and PDCI to 3100 MW in the same base case, this report will prove that these paths do not have a simultaneous interaction with the Idaho-Northwest path at its proposed 2250 MW west-to-east rating.

4.6.2 Steady State Case Stressing

The study of Idaho-Northwest v North of John Day utilized the 16hs2a_2250idnw_N base case described in Section 4.1.2. In the base case, North of John Day path flows are stressed to 7800 MW north-to-south. Refer to Section 4.1.2 for more details on steady state case stressing.

4.6.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. Details for the notable contingencies can be found below.

Critical Contingency – N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS

This contingency results in overloading the John Day-Grizzly #1 500 kV line to 101% of its nominal and emergency rating. The table below compares the system today (Idaho-Northwest stressed to 1200 MW) to the system modeled in the base case (Idaho-Northwest stressed to 2250 MW). The base case includes the Hemingway-Boardman and Gateway West 500 kV lines, whereas the “system today” does not.

Table 25: Post-transient results – N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS

Element	Existing System (1200 Case)			Future System (2250 Case)		
	Pre-Cont. % Emerg. Rating	Post-Cont. % Emerg. Rating	Difference	Pre-Cont. % Emerg. Rating	Post-Cont. % Emerg. Rating	Difference
John Day-Grizzly #1 500 kV	58%	115%	57%	54%	101%	47%

The performance for this contingency is acceptable since the overload appears to be the result of case stressing, not the addition Hemingway-Boardman 500 kV line. Performance for this contingency will improve (as shown in the table above) after the addition of Hemingway-Boardman; Boardman-Hemingway-Summer Lake acts as an additional parallel path to John Day-Grizzly #1 500 kV that did not exist prior to the addition of Hemingway-Boardman 500 kV.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 2250 MW west-to-east rating simultaneous with North of John Day at 7800 MW north-to-south.

See Section 4.1.3 for more base case post-transient results.

4.6.4 Voltage Stability

The Idaho-Northwest v North of John Day study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v North of John study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating, simultaneous with the North of John Day path flows at 7800 MW north-to-south.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_N base case can be found in Appendix A. The busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, Humboldt 345 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellow Tail 230 kV. The tables below highlight a sample of the reactive margins at Hanford and John Day. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 26: Hanford 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: DOUBLE PALO VERDE	0.96	-1699	Worst VQ contingency
N-2: NAPAIVINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.94	-1990	Worst VQ related to N of John Day
BF HEM-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.93	-3446	Worst VQ related to Idaho-Northwest

Table 27: John Day 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: NAPAIVINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.99	-1126	Worst VQ contingency
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.98	-1276	Worst VQ related to N of John Day
N-1: HEMINGWAY-GRASSLAND 500 KV	0.98	-1639	Worst VQ related to Idaho-Northwest

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the North of John Day path at the flow levels studied.

4.6.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. A write up of these results can be found in Section 4.1.5. No transient stability violations were observed.

4.6.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A. Details for the notable contingencies can be found below.

Critical Contingency – N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS

This double line loss results in triggering the “High Gen Drop” remedial action scheme in the Northwest. In this case, High Gen Drop is armed to trip at least 2400 MW of hydro generation at Chief Jo, Coulee, and John Day.

4.7 Simultaneous Interaction Study: PDCI, N-S (Path 65)

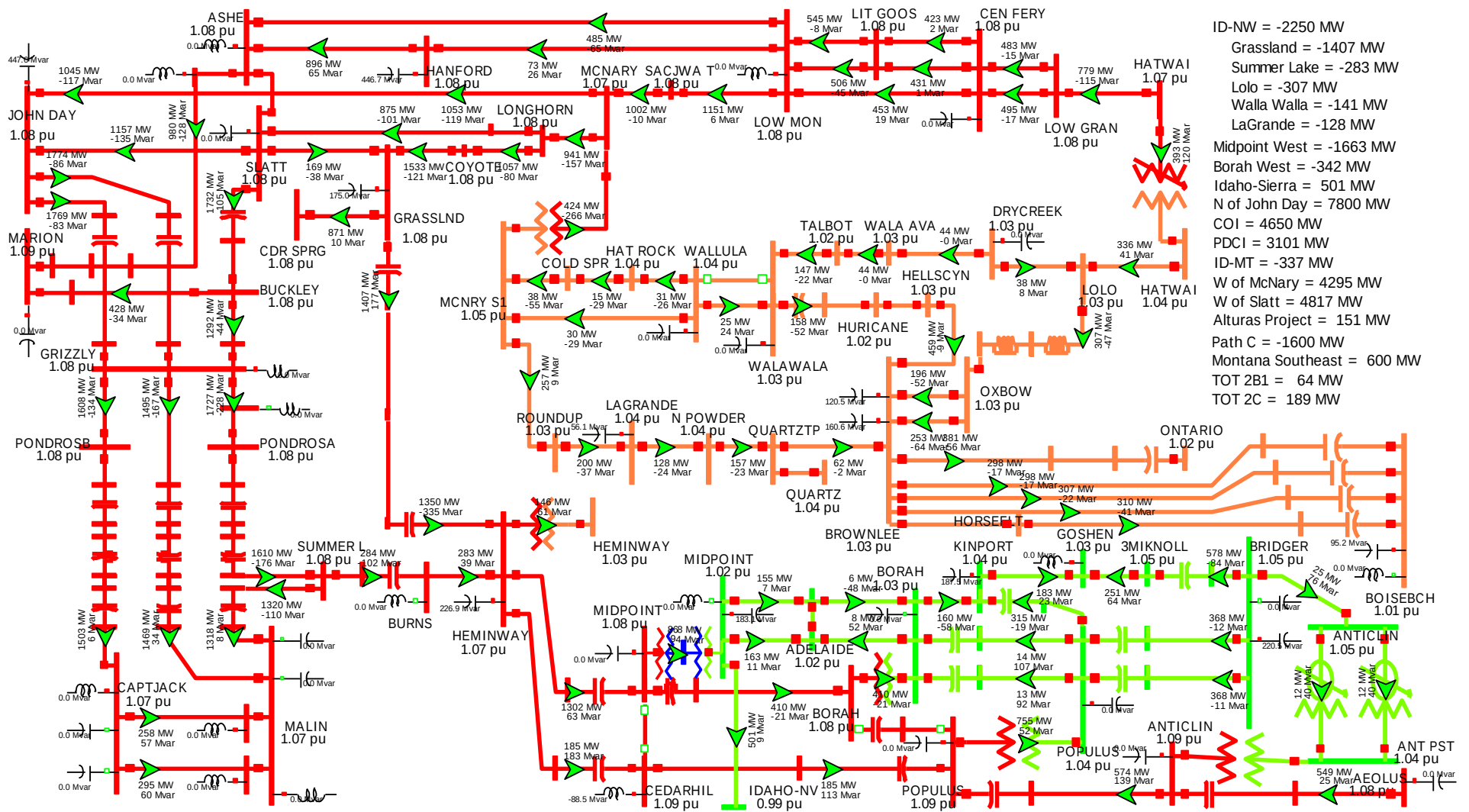


Figure 10: Idaho-Northwest (Path 14) 2250 MW, West to East v. PDCI (Path 65), North to South, Base Case

4.7.1 Background & Need for Simultaneous Interaction Studies

The Pacific DC Intertie (Path 65) is made up of a single +/-500 kV DC transmission line from Celilo substation, near The Dalles, Oregon, to Sylmar substation in the Los Angeles basin.

COI (Path 66), Alturas Project (Path 76), North of John Day (Path 73), PDCI (Path 65), and Hemingway-Summer Lake (Path 75) are all interrelated through the North of John Day v COI+Alturas or PDCI nomogram. Historically, with higher west-to-east flow on the Hemingway-Summer Lake 500 kV line, this nomogram has limited the flow south of Malin on the COI/Alturas paths. By stressing COI/Alturas to 4800 MW, North of John Day to 7800 MW, and PDCI to 3100 MW in the same base case, this report will prove that these paths do not have a simultaneous interaction with the Idaho-Northwest path at its proposed 2250 MW west-to-east rating.

4.7.2 Steady State Case Stressing

The study of Idaho-Northwest v PDCI utilized the 16hs2a_2250idnw_N base case described in Section 4.1.2. In the base case, PDCI path flow is stressed to 3100 MW north-to-south. Refer to Section 4.1.2 for more details on steady state case stressing.

4.7.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. Details for the notable contingencies can be found below.

Notable Contingency – N-2: DC Bipole

The table below presents the post transient results for the N-2: DC Bipole contingency. This contingency results in overloading the Ponderosa-Summer Lake 500 kV line to 117% of its nominal rating (88% of emergency). The table compares the system today (Idaho-Northwest stressed to 1200 MW) to the system modeled in the base case (Idaho-Northwest stressed to 2250 MW). The base case includes the Hemingway-Grassland and Gateway West 500 kV lines, whereas the “system today” does not.

Table 28: Post-transient results – N-2: DC-Bipole

Element	Existing System (1200 Case)			Future System (2250 Case)		
	Pre-Contingency % Emergency	Post-Contingency % Emergency	Difference	Pre-Contingency % Emergency	Post-Contingency % Emergency	Difference
Ponderosa-Summer Lake 500 kV	62%	99%	38%	54%	88%	34%
Round Mtn-Table Mtn 500 kV #1	55%	74%	19%	55%	74%	19%
Malin-Round Mtn 500 kV #2	51%	71%	21%	50%	71%	21%
Table Mtn - Vaca Dixon 500 kV #1	50%	66%	16%	49%	65%	15%

The results indicate that system performance either remains the same, or improves, after the addition of the Hemingway-Boardman 500 kV line. Since no elements are over their emergency ratings, performance is acceptable for this contingency.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 2250 MW west-to-east rating simultaneous with PDCI at 3100 MW north-to-south.

4.7.4 Voltage Stability

The study results indicate that the system has sufficient power margin and reactive margin for all contingencies. See the base case results Section 4.1.4, COI results Section 4.2.4, and North of John Day results Section 4.6.4 for voltage stability information related to the northwest.

VQ results for the 16hs2a_2250idnw_N case can be found in Appendix A.

Given the explanation in Sections 4.1.4, 4.2.4, and 4.6.4, there is not a voltage stability interaction between the Idaho-Northwest path and the PDCI path at the flow levels studied.

4.7.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_N case can be found in Appendix A. A write up of these results can be found in Section 4.1.5. No transient stability violations were observed.

4.7.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix A. Details for the notable contingencies can be found below.

Notable Contingency – N-2: DC Bipole

This contingency opens both poles of the PDCI line. Three contingency blocks, “PDCI LOSS GEN DROP,” “PDCI SCE SWITCHED SHUNT” and “PDCI NW Reactive Insert” were implemented in the contingency. These three contingency blocks were provided as part of the WECC Phase 2 study process to implement as part of this contingency.

The “PDCI LOSS GEN DROP” contingency block was implemented to reduce the injection group “RAS PDCI Gen Drop Units” by an amount associated with COI and PDCI flows, less 300 MW, in generator merit order by tripping. The “RAS PDCI Gen Drop Units” is comprised of 81 units in the Northwest. For this case, based on the given COI and PDCI flows, the RAS action initiated tripping of 2550 MW. The merit order is a generator tripping order established by Colombia Grid and/or BPA and implemented into the load flow software. In this case, all of the generation tripping occurred at Chief Jo and Coulee.

Details about the “PDCI SCE SWITCHED SHUNT”, and “PDCI NW Reactive Insert” contingency blocks are detailed in the tables below:

Table 29: “PDCI SCE SWITCHED SHUNT” Actions for N-2: DC Bipole

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Antelope 230 kV (24401)	79 MVar	158.4 MVar
Barre 230 kV (24016)	0 MVar	79.2 MVar
Chino 230 kV (24025)	0 MVar	79.2 MVar
El Nido 230 kV (24040)	0 MVar	79.2 MVar
Gould 230 kV (24059)	0 MVar	79.2 MVar
Lagubell 230 kV (24076)	0 MVar	158.4 MVar
Lcienea 230 kV (24082)	0 MVar	158.4 MVar
Mirage 230 kV (24806)	0 MVar	79.2 MVar
Miralome 230 kV (25656)	0 MVar	79.2 MVar
Miralomw 230 kV (24093)	0 MVar	79.2 MVar
Moorpark 230 kV (24099)	0 MVar	158.4 MVar
Olinda 230 kV (24100)	0 MVar	79.2 MVar
Padua 230 kV (24112)	0 MVar	158.4 MVar
Pardee 230 kV (24114)	0 MVar	79.2 MVar
Riohondo 230 kV (24126)	0 MVar	158.4 MVar
S. Clara 230 kV (24128)	0 MVar	158.4 MVar
Sanbrdno 230 kV (24132)	0 MVar	158.4 MVar
Valleysc 115 kV (24160)	93.6 MVar	187.2 MVar
Villa Pk 230 kV (24154)	0 MVar	158.4 MVar
Vincent 230 kV (24155)	0 MVar	158.4 MVar
Vsta 230 kV (24901)	0 MVar	79.2 MVar
Walnut 230 kV (24158)	0 MVar	79.2 MVar

Table 30: “PDCI NW Reactive Insert” Actions for N-2: DC Bipole

Bus	Device	Action
Malin 500 kV c1 & c2 (40687)	Shunt	2 x CLOSE (197.3 MVar)
Table Mountain 500 kV c1 & c2 (30015)	Shunt	2 x CLOSE (227 MVar)
CAPPON13 500 kV (90139)-CAPPON14 500 kV (90140)	Series Capacitor	IN SERVICE
GRIMAL23 500 kV (90070)-GRIMAL24 500 kV (90071)	Series Capacitor	IN SERVICE
PONSUM13 500 kV (90101)-PONSUM14 500 kV (90102)	Series Capacitor	IN SERVICE

Table 31: Shunt Capacitor Switching in N-2: DC Bipole

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
BIGEDDY2 230 kV (41342)	166 MVar	0 MVar
SYLMAR S 230 kV (24147)	1122 MVar	0 MVar
SYLMARLA 230 kV (26094)	1144 MVar	0 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

4.8 Simultaneous Interaction Study: West of Hatwai (Path 6)

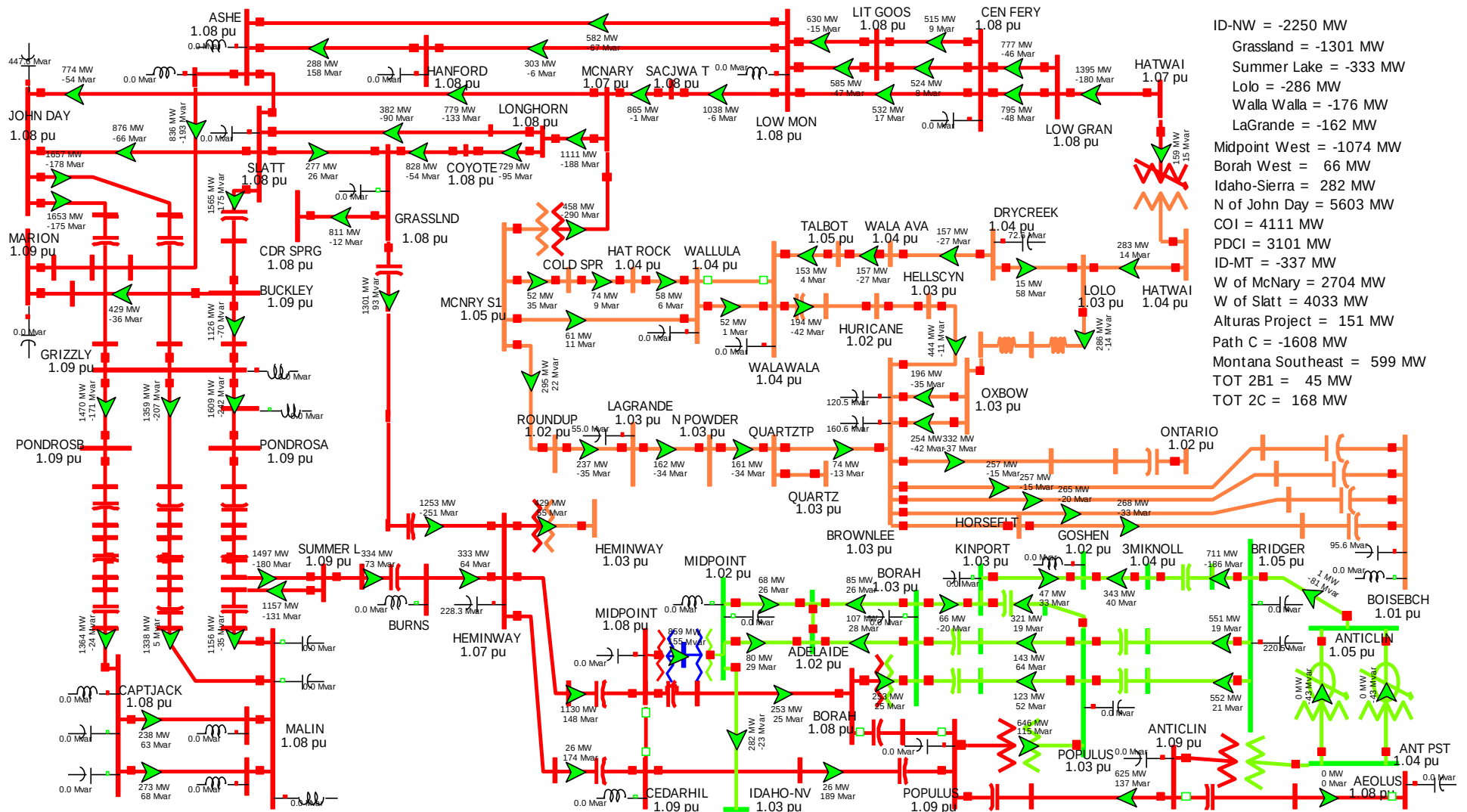


Figure 11: Idaho-Northwest (Path 14) 2250 MW, West to East v. West of Hatwai (Path 6), East to West, Base Case

4.8.1 Background & Need for Simultaneous Interaction Study

Background

The West of Hatwai transmission path (Path 6) is made up of two 500 kV lines, four 230 kV lines, four 115 kV lines, and a 115/69 kV transformer connecting northern Idaho and eastern Washington to the main Northwest system in central Washington and northern Oregon. The West of Hatwai path has an SOL rating of 4250 MW east-to-west year round.

The Idaho-Northwest and the West of Hatwai paths cannot be stressed to their limits simultaneously. When stressing the case, power is scheduled from Montana to the Northwest to stress Montana-Northwest and West of Hatwai paths, and then scheduled from the Northwest into Idaho and Utah to stress Idaho-Northwest path. This power scheduling is effectively causing a very large loop, putting angular pressure on the two other transmission paths out of Montana: Montana-Idaho (Path 18) and Montana Southeast (Path 80). The Montana-Idaho path is what limits the simultaneous capability of the Idaho-Northwest path and the West of Hatwai path. The 161 kV line, phase shifted at Jefferson, becomes the limiting element when 30 degrees is insufficient to hold back flow on the path, and the 161 kV line goes over its 87 MW rating.

Although the Montana-Idaho 161 kV line is the limiting element between the Idaho-Northwest and West of Hatwai paths, flow on West of Hatwai does not have a significant impact on the Montana-Idaho 161 kV line. Flow on the 161 kV line is associated with Idaho-Northwest path flows, and Montana area generation. Any nomogram developed between the Idaho-Northwest and West of Hatwai paths that is related to the Montana-Idaho 161 kV line would be ineffective, due to the lack of a correlation between West of Hatwai flow, and Montana-Idaho flow.

Historical Real-Life Flow Interaction between Idaho-Northwest & West of Hatwai

Since 1998, the West of Hatwai (WoH) path has never exceeded 3600 MW east-to-west. Below is a table illustrating the real-life interaction between the Idaho-Northwest path and the West of Hatwai path.

Table 32: Idaho-Northwest v West of Hatwai, Real-life interaction since 1998

Criteria	ID-NW (E-W)	WoH (E-W)
WoH Maximum	1066	3590
ID-NW Max with WoH>2800 MW	-276	2828
ID-NW Maximum	-1136	827
WoH Maximum with ID-NW>1000 MW	-1004	2048

At the West of Hatwai all-time peak, Idaho-Northwest was flowing 1066 MW east-to-west (not west-to-east as is being studied in this section). When West of Hatwai flows were greater than 2800 MW, Idaho-Northwest reached a maximum value of 276 MW west-to-east. At the Idaho-Northwest maximum, West of Hatwai was only flowing at 827 MW east-to-west. When Idaho-Northwest flows were greater than 1000 MW, West of Hatwai reached a maximum value of 2048 MW.

Since 1998, actual Idaho-Northwest east-to-west flow has ranged between -1136 MW and 2323 MW; actual West of Hatwai flow has ranged between -3590 MW and 1682 MW. The top 1000 hours for Idaho-Northwest range between -1136 MW & -853 MW; for West of Hatwai -3590 MW & -2357 MW. Figure 4 below depicts the top 1000 hours for each path verse the corresponding alternate path (2000 total points). The red square represents the point at which we are studying Idaho-Northwest v West of Hatwai in the benchmark case.

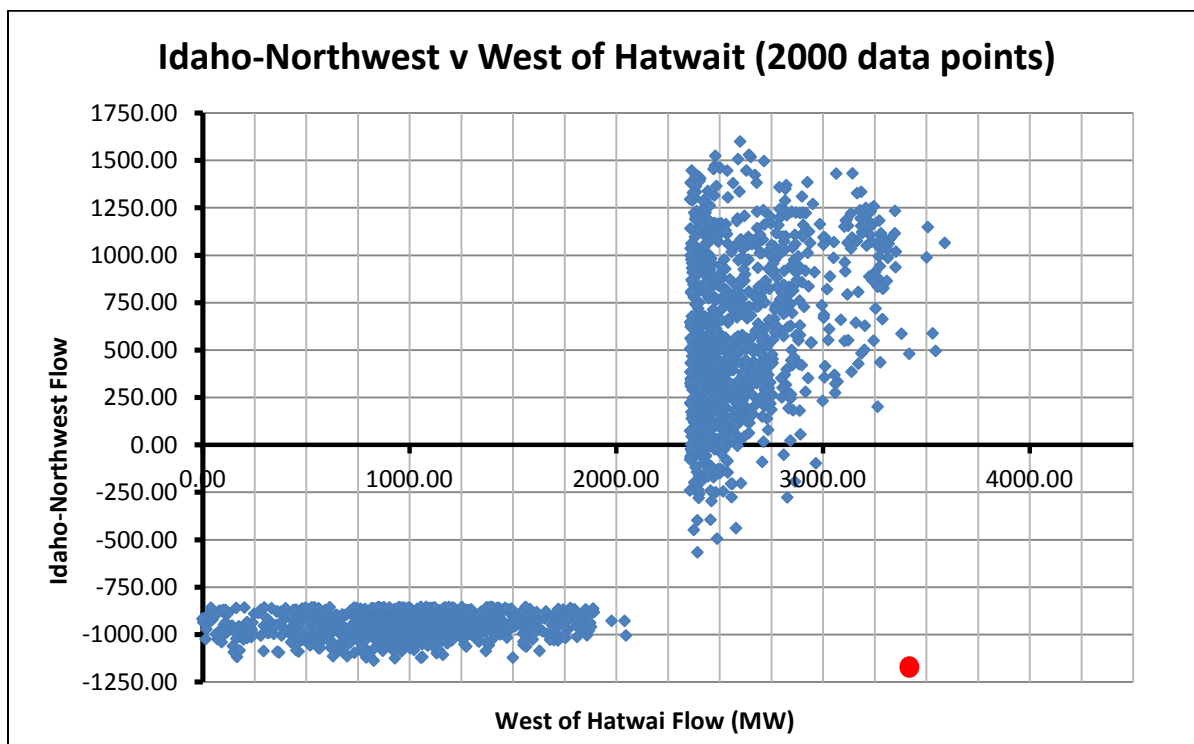


Figure 12: Idaho-Northwest v West of Hatwai, 2000 critical data points (hourly data since 1998)

Need for Simultaneous Interaction Studies

The Hemingway-Boardman 500 kV Project Review Group requested that a simultaneous interaction study be performed between the Idaho-Northwest path and the West of Hatwai path. As mentioned in previous paragraphs, it is not possible to stress Idaho-Northwest to 2250 MW, west-to-east, simultaneous with West of Hatwai at 4250 MW, east-to-west, due to the Montana-Idaho 161 kV line limitation. Historical flow data in Table 29, representing ~14 years of interaction between the paths and Figure 4 above, also indicate that the two paths do not interact in a manner where both paths would be at their simultaneous limit.

This Phase II rating study is required to prove that the Hemingway-Boardman 500 kV line, and the Idaho-Northwest 2250 MW up-rate, does not negatively impact the West of Hatwai path. In order to show that the Hemingway-Boardman 500 kV line improves the interaction between the Idaho-Northwest path, and the West Hatwai path, two cases were developed. The first case represents the system as it is today, with Idaho-Northwest stressed to 1200 MW, west-to-east, and West of Hatwai stressed to 3400 MW,

east-to-west. The second case represents the system after the addition of the Hemingway-Boardman 500 kV line, with Idaho-Northwest stressed to 2250 MW, west-to-east, and West of Hatwai stressed to the same 3400 MW, east-to-west.

4.8.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case names for this study are: 16hs2a_3400WoH_2250idnw_N & 16hs2a_3400WoH_1200idnw_N.

Step-by-step development of the 16hs2a WoH 2250idnw N base case:

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing. The West of Hatwai path is only flowing at 727 MW in this case.

Step 2: Reduce load in the Spokane area.

West of Hatwai is generally stressed during light load conditions, whereas the Idaho-Northwest path is generally stressed during heavy load (peak summer day) conditions. In order to stress West of Hatwai simultaneous with Idaho-Northwest, the load pattern in the Spokane area will have to match a light load condition, and Idaho/Utah will have to match a heavy load condition. The Avista and Spokane area load was modified to approximately match a 16 light autumn WECC base case (used in the export case).

Step 3: Increase generation in Western Montana, Northern Idaho, and Eastern Washington.

In order to stress the West of Hatwai path, generation around the Spokane area has to be maximized. Generators in the Avista and Spokane area, including Boundary and Dworshak, are set to their maximum allowable values in the powerflow case.

Step 4: Insert all series reactors into the Oxbow-Lolo 230 kV line.

Place in-service the Oxbow-Lolo 230 kV line 10 ohm series reactor and a 20 ohm series reactor.

Step 5: Reduce Coulee & Chief Jo Generation.

Reducing Coulee and Chief Jo generation helps to better spread the loading across the West of Hatwai path. Generation from Oregon and California is scheduled in to replace the central

Washington generation. Moving generation from central Washington to Oregon and California also reduces the angle between the Idaho system and the Montana system. This will allow more generation to be scheduled into the Northwest from Montana in the next step.

Step 6: Schedule power in from Montana.

The last step to stress the West of Hatwai path is to schedule power into the Northwest from Montana. Unfortunately, with Idaho-Northwest stressed to its proposed 2250 MW rating, attempting to stress West of Hatwai by scheduling power into the Northwest from Montana quickly results in overloading the Jefferson 161 kV path even with the Jefferson 161 kV phase shifter at its full 30 degree phase angle, hindering flow. The Jefferson 161 kV path is rated for 87 MW and extends from Mill Creek-Dillon-Big Grassy-Jefferson-Goshen. This line is metered at Big Grassy on the Dillon-Big Grassy section of 161 kV line. The Jefferson 161 kV line is at its rating when the West of Hatwai path reaches 3400 MW east-to-west, simultaneous with Idaho-Northwest at 2250 MW west-to-east.

Step-by-step development of the 16hs2a WoH 1200idnw N base case:

This base case was developed as a comparison/benchmark case to the 16hs2a_WoH_2250idnw_N base case. The 16hs2a_WoH_1200idnw_N base case is meant to represent the system as it is today with heavy West of Hatwai east-to-west flow simultaneous with heavy west-to-east flow on the Idaho-Northwest path. Hemingway-Boardman, Gateway West, and Cascade crossing are not modeled in this base case.

Step 1: Begin with the 16hs2a_WoH_2250idnw_N base case.

Utilize the base case developed earlier in this Section of the report.

Step 2: Remove elements from the base case to create a “System Today” case

Remove the following elements from the 16hs2a_WoH_2250idnw_N case: (1) Hemingway-Boardman 500 kV, (2) Stage One of Gateway West, (3) Cascade Crossing, and (4) the Longhorn substation & associated wind projects.

Step 3: Reduce Idaho-Northwest transfers to 1200 MW west-to-east.

This is best accomplished by reducing Northwest generation and increasing Idaho and PacifiCorp East (PACE) area generation. By removing Longhorn, and the associated wind generation, Northwest generation was already reduced significantly. To replace Northwest generation, PacifiCorp East (PACE) and Idaho area peaking generation was switched in-service and scheduled to the Northwest.

Step 4: Re-stress West of Hatwai

By significantly reducing transfers between the Northwest and Idaho in Step 3, West of Hatwai flow increases. Removing the Hemingway-Boardman 500 kV line from service, however,

significantly overloads the Jefferson 161 kV phase shifter. Adjusting the West of Hatwai path back to 3400 MW east-to-west (to match the 16hs2a_WoH_2250idnw_N case) and the Idaho-Northwest path to its 1200 MW west-to-east rating, resulted in the same flow through the Jefferson 161 kV line as the 16hs2a_WoH_2250idnw_N base case.

4.8.3 Post Transient Results

Post-transient contingency results for the 16hs2a_WoH_2250idnw_N & 16hs2a_WoH_1200idnw_N base cases can be found in Appendix C. Details for the notable contingencies can be found below.

Severe Post-Transient Contingency #1 – N-1: Hemingway-Grassland 500 kV +PTSN Shunt

This is the worst N-1 contingency associated with the Idaho-Northwest transmission path (Grassland & Boardman are the same substation). This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 106.1% of its nominal rating (94% of emergency). Since the overload is less than the emergency ratings of the Brownlee-Hells Canyon 230 kV line, this contingency results in acceptable performance.

Severe Post-Transient Contingency #2 – BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230

This is the limiting contingency for the Idaho-Northwest path in the west-to-east direction. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 117% of its nominal rating (104% of emergency). Since the overload is greater than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in unacceptable performance. This contingency also results in post-transient voltage deviations between 5-10% at Hemingway, LaGrande & Bowmont 230 kV and Bowmont, Chestnut & Happy Valley 138 kV. WECC System Performance Criteria allows for post-transient voltage deviations of up to 10% for N-2 contingencies. Refer to the table below for more information about the overloads caused by this contingency.

Table 33: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading (Limit A)	Emergency % Loading (Limit B)
Brownlee-Hells Canyon 230 kV	117% (1237 Amp Rating)	104%(1396 Amp Rating)
Oxbow – Lolo 230 kV	108% (920 Amp SOL)	95% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	101% (800 Amp Rating)	67% (1200 Amp Rating)

In order to avoid overloading the Oxbow-Lolo 230 kV line, both series reactors at Copperfield had to be inserted in the base case, pre-contingency. This contingency, resulting in post-transient overloads exceeding the Hells Canyon-Brownlee emergency rating, identifies the need to operate with the Walla Walla 230 kV series capacitor bypassed in this configuration (high West of Hatwai and Idaho-Northwest). Bypassing the Walla Walla series capacitor during spring conditions with high hydro generation in the Northwest is a common occurrence. Rerunning this contingency with the Walla Walla series capacitor bypassed results in acceptable post-transient performance.

Severe Post-Transient Contingency #3 – N-2: DC-BIPOLE

This contingency, after the addition of the Hemingway-Boardman 500 kV line, results in similar performance to the system today. See Section 4.7.3 for a more detailed discussion on this contingency.

Severe Post-Transient Contingency #4 – N-2: Double Palo Verde

This contingency, after the addition of the Hemingway-Boardman 500 kV line, results in similar performance to the system today. See Section 4.2.3 for a more detailed discussion on this contingency

Montana-Northwest & West of Hatwai Contingencies

The Hemingway-Boardman 500 kV project has little effect on the contingencies related to the Montana-Northwest path and the West of Hatwai path. See the results in the Appendix for additional details.

Conclusions

The post transient analysis indicated that a breaker failure at Hemingway substation resulting in loss of the Midpoint-Hemingway 500 kV transmission line and the Hemingway 500/230 kV transformer results in an unacceptable overload on the Hells Canyon-Brownlee 230 kV line. This issue can be solved by operating the system with the Walla Walla series capacitor bypassed (as the system is operated today during most spring seasons).

Aside from the breaker failure contingency at Hemingway substation, historic flow levels and post-transient contingency results do not indicate that the Idaho-Northwest path and the West of Hatwai path have a simultaneous interaction at the flow levels studied.

4.8.4 Voltage Stability

The Idaho-Northwest v West of Hatwai study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v West of Hatwai study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2362.5MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating simultaneous with West of Hatwai at 3400 MW.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_3400WoH_2250idnw_N base case can be found in Appendix C. The busses studied utilizing VQ Analysis are: Bell 500 kV, Brownlee 230 kV, Hatwai 500 kV, Hemingway 500 kV, and

Taft 500 kV. The tables below highlight a sample of the reactive margins at these busses. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 34: 16hs2a_3400WoH_2250idnw_N base case reactive margin results (sample)

	Contingencies	V @ Qmin	Margin (MVar)	Comments
Bell	N-1: BELL-COULEE 500 KV	0.88	-918	Worst VQ contingency
	N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.89	-1569	Worst VQ related to Idaho Power
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.89	-1671	Worst VQ related to Idaho-NW
Brownlee	BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.89	-350	Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.89	-491	2 nd Worst VQ contingency
	BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.88	-552	3 rd Worst VQ contingency
Hatwai	N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV + RAS OPEN 69 KV	0.78	-1059	Worst VQ contingency
	N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.85	-1746	Worst VQ related to Idaho Power
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.85	-1796	Worst VQ related to Idaho-NW
Hemingway	N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.86	-1193	Worst VQ contingency
	BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.82	-1394	2nd Worst VQ contingency
	BUS: SUMMER LAKE 500 KV	0.82	-1441	3 rd Worst VQ contingency
Taft	N-2: TAFT-BELL & TAFT-DWORSKAK 500 KV + RAS	0.98	-471	Worst VQ contingency
	N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.95	-1122	Worst VQ related to Idaho Power
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.95	-1152	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the West of Hatwai path at the flow levels studied.

4.8.5 Transient Stability

Transient stability contingency results for the 16hs2a_3400WoH_2250idnw_N case can be found in Appendix C.

The 16hs2a_3400WoH_2250idnw_N base case was the basis for all transient stability study results for this Hemingway-Boardman v West of Hatwai Simultaneous Interaction Study. All contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria.

4.8.6 Remedial Action Schemes

For the 16hs2a_3400WoH_2250idnw_N case, each contingency, and the associated switching (RAS), is documented in Appendix C. Details for the notable contingencies can be found below.

Severe Post-Transient Contingency #1 – N-1: Hemingway-Grassland 500 kV +PTSN Shunt

After the loss of this line, switched VAr devices modeled at Dillon 69 kV, OreBasin 34.5 kV and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVar shunt capacitor in service. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 35: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV + PTSN Shunt

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Hemingway 500 kV (60155)	200 MVar	400 MVar
OreBasin 34.5 kV (66146)	0 MVar	20 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #2 – BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230

After the loss of this line and transformer, switched VAr devices modeled at Peterson 230 kV, Dillon 69 kV, Harney 115 kV, Quartz 138 kV, Midpoint 500 kV and North Powder 34.5 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 36: Shunt Capacitor Switching in BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Harney 115 kV (40507)	0 MVar	13 MVar
Midpoint 500 kV (60240)	0 MVar	200 MVar
North Powder 34.5 kV (60313)	0 MVar	27 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar
Quartz 138 kV (60305)	0 MVar	22.5 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #3 – N-2: DC-BIPOLE

See Section 4.7.6 for a write up on the RAS associated with the loss of the PDCI.

Severe Post-Transient Contingency #4 – N-2: Double Palo Verde

This contingency depresses the voltage at Malin, resulting in triggering operating of the FACRI. FACRI includes the insertion of the Fort Rock series capacitors in the 500 kV lines south of Grizzly, and insertion of shunt capacitor banks at Captain Jack 500 kV, Malin 500 kV, Olinda 500 kV, and Table Mtn 500 kV. FACRI will also remove shunt reactors at Captain Jack 500 kV, and Malin 500 kV.

See Appendix C for a list of actions taken in this contingency.

4.9 Simultaneous Interaction Study: MSTI & SWIP (SWIP South – 1500 MW)

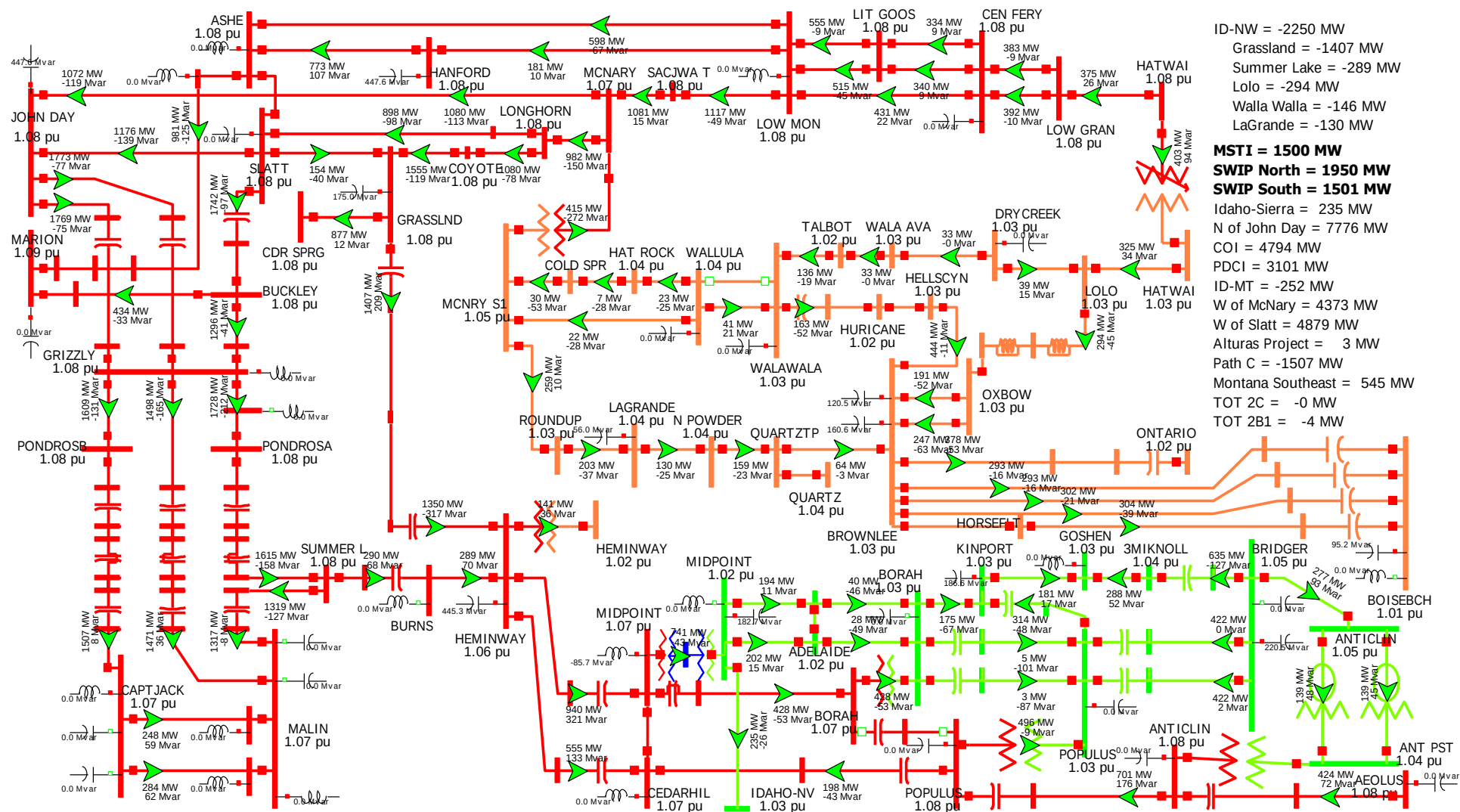


Figure 13: Idaho-Northwest (Path 14) 2250 MW, West to East, MSTI & SWIP Case

4.9.1 Background & Need for Simultaneous Interaction Studies

The Mountain States Transmission Intertie (MSTI) and the Southwest Intertie Project (SWIP) are proposed projects similarly situated in Phase 2 of the WECC path rating process. The MSTI project extends from Townsend substation, in western Montana, to Midpoint substation, in southern Idaho. The SWIP project is made up of a northern segment and a southern segment. SWIP North extends from Midpoint substation to Robinson substation, near Ely, Nevada. SWIP South, otherwise known as the One Nevada Line, extends from Robinson substation to Harry Allen substation in the Las Vegas area. SWIP South is scheduled to be energized in late 2012, and has been modeled in all base cases.

The report assumes that the Idaho terminus of the SWIP North will change to Cedar Hill with the addition of Gateway West and an additional 500 kV line will be constructed from Cedar Hill to Midpoint.

Due to the Hemingway-Boardman, MSTI and SWIP projects being similarly situated in the rating process, and the large impact the MSTI and SWIP projects will have on the Idaho Power transmission system, a simultaneous interaction study between Idaho-Northwest and MSTI/SWIP is prudent and necessary. The MSTI and SWIP North project are not included in any of the other base cases. Absent other projects, such as the Overland DC line, MSTI and SWIP work best when studied together.

4.9.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case names for this study are: 16hs2a_2250idnw_ms.

Step-by-step development of the 16hs2a 2250idnw ms case:

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing.

Step 2: Add the MSTI and SWIP projects and stress each line.

MSTI was stressed to its 1,500 MW north-to-south rating, SWIP North was stressed to 1,950 MW north-to-south, and SWIP South was stressed to 1500 MW north-to-south. MSTI & SWIP path flows were modified by increasing generation in Montana and reducing generation in Nevada and Arizona and using the phase shifters at Townsend 500 kV and Robinson 345 kV.

Step 3: Re-stress the Idaho-Northwest path to 2250 MW in the west-to-east direction.

The Idaho-Northwest path was stressed to 2250 MW in the west-to-east direction by reducing southern generation and replacing the generation with a schedule from the Northwest.

4.9.3 Post Transient Results

Post-transient contingency results for the MSTI & SWIP (SWIP South – 1500 MW) case can be found in Appendix D. The case name is 16hs2a_2250idnw_ms. Details for the notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF PGE Grassland-Cedar Sp 500 kV&Grassland-Hem 500 kV

This breaker failure is the most limiting contingency in the study of Idaho-Northwest v MSTI & SWIP. This contingency results in overloading the Townsend 500 kV phase shifter to 112% of its assumed nominal rating (1550 MVA) and 97% of the assumed emergency rating (1782.5 MVA). Refer to the table below for more information about the overloads caused by this contingency.

Table 37: Post-transient results – BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kV

Element	Nominal % Loading	Emergency % Loading
Townsend Phase Shifter 500 kV	111.8% (1790 Amp Rating)	97.2% (2058 Amp Rating)
Brownlee-Hells Canyon 230 kV	106% (1237 Amp Rating)	94% (1396 Amp Rating)
Oxbow – Lolo 230 kV	101% (920 Amp SOL)	89% (1047 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Severe Post-Transient Contingency #2 – N-1: Hemingway-Grassland 500 kV + PTSN Shunt

This is the second most limiting contingency in the study of Idaho-Northwest v MSTI & SWIP. This contingency results in overloading the Townsend 500 kV phase shifter to 111% of its assumed nominal rating (1550 MVA) and 97% of its assumed emergency rating (1782.5 MVA). Refer to the table below for more information about the overloads caused by this contingency.

Table 38: Post-transient results – N-1: Hemingway-Grassland 500 kV + PTSN Shunt

Element	Nominal % Loading	Emergency % Loading
Townsend 500 kV Phase Shifter	111.2% (1528 Amp Rating)	96.7% (1782 Amp Rating)
Brownlee-Hells Canyon 230 kV	104% (1237 Amp Rating)	92% (1396 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency.

Notable Contingency #1 – N-1: Midpoint-Townsend 500 kV (MSTI)

This contingency results in overloading the Oxbow-Lolo 230 kV line to 107.8% of its SOL rating (94.8% of emergency). Refer to the table below for more information about the overloads caused by this contingency.

Table 39: Post-transient results – N-1: Midpoint-Townsend 500 kV (MSTI) + PTSN Shunt

Element	Nominal % Loading	Emergency % Loading
Oxbow – Lolo 230 kV	107.8% (920 Amp SOL)	94.8% (1047 Amp Rating)
Brownlee-Hells Canyon 230 kV	102% (1237 Amp Rating)	90% (1396 Amp Rating)
Midpoint-Hemingway 500 kV	109% (1183 Amp Rating)	80% (1877 Amp Rating)

Switching a new 31.7 MVar shunt capacitor at Peterson 230 kV is required to avoid post-transient voltage deviation issues.

Notable Contingency #2 – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This contingency results in overloading the Townsend phase shifting transformer to 111.3% of its assumed nominal rating (96.8% of assumed emergency). Refer to the table below for more information about the overloads caused by this contingency.

Table 40: Post-transient results – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Townsend Phase Shifter 500 kV	111.3% (1528 Amp Rating)	96.8% (1782 Amp Rating)
Brownlee-Hells Canyon 230 kV	105% (1237 Amp Rating)	90% (1396 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 2250 MW west-to-east rating simultaneous with MSTI at 1500 MW north-to-south, and SWIP at 1950 MW north-to-south.

4.9.4 Voltage Stability

The Idaho-Northwest v MSTI & SWIP study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v MSTI & SWIP study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW west-to-east rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating, simultaneous with the MSTI and SWIP lines at their proposed ratings.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_ms case can be found in Appendix D. Busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, McNary 500 kV, Mill Creek 230 kV and Yellowtail 230 kV. The tables below highlight a sample of the reactive margins at Hemingway, Robinson, and Townsend. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 41: Hemingway 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: Double Palo Verde	0.86	-1436	Worst VQ contingency
BF IPC HEM-Grassland 500 kV & HEM 500/230 XFMR	0.77	-1990	Worst VQ related to Idaho Power
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.81	-1940	Worst VQ related to Idaho-Northwest

Table 42: Townsend 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: Double Palo Verde	0.96	-390	Worst VQ contingency
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.93	-431	Worst VQ related to Montana
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.94	-551	Worst VQ related to Idaho-Northwest

Table 43: Robinson 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: ROBINSON-HARRY ALLEN 500 KV	0.70	-1283	Worst VQ contingency
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR	0.70	-1874	Worst VQ related to Idaho Power
BUS: SUMMER LAKE 500 KV	0.70	-2215	Worst VQ related to Idaho-Northwest

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the MSTI or SWIP projects at the flow levels studied.

4.9.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_ms case can be found in Appendix D.

The 16hs2a_2250idnw_ms base case was the basis for all transient stability study results for this Hemingway-Boardman v MSTI & SWIP Simultaneous Interaction Study. All contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria.

FACRI was modeled in the base case dynamic data base file and triggered for loss of the Hemingway-Boardman 500 kV line.

4.9.6 Remedial Action Schemes

For the 16hs2a_2250idnw_ms case, each contingency, and the associated switching (RAS), is documented in Appendix D. Details for the notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF PGE Grassland-Cedar Sp 500 kV&Grassland-Hem 500 kV

After the loss of these two lines, switched VAR devices in the area would switch in due to depressed voltages at the busses that the devices would be controlling. The contingency included capacitor switching of 31.7 MVAR at Peterson 230 kV and 22.5 MVAR at Quartz 138 kV. In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #2 – N-1: Hemingway-Grassland 500 kV

After the loss of this line, switched VAR devices modeled at Peterson 230 kV, and Dillon 69 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVAR shunt capacitor in service. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 44: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV

Shunt Device (Bus)	Initial MVAR	Post-Transient MVAR
Dillon 69 kV (62345)	15.9 MVAR	27.9 MVAR
Hemingway 500 kV (60155)	200 MVAR	400 MVAR
Peterson 230 kV (62030)	31.7 MVAR	63.4 MVAR

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Notable Contingency #1 – N-1: Midpoint-Townsend 500 kV (MSTI)

After the loss of this line, switched VAr devices in Montana, Wyoming and Idaho would switch in due to depressed voltages at the busses that the devices would be controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 45: Shunt Capacitor Switching in N-1: Midpoint-Townsend 500 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar
Riverton 230 kV (66305)	0 MVar	32.4 MVar
Garland 1 34.5 (67147)	0 MVar	5 MVar
Garland 2 34.5 (67148)	0 MVar	5 MVar
Dillon 69 kV (62345)	12 MVar	24 MVar
Big Grassy 69 kV (65156)	19.6 MVar	29.4 MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Frannie 34.5 kV (67144)	0 MVar	4 MVar
Frannie 2 34.5 kV (67145)	0 MVar	4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Notable Contingency #2 – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This contingency opens the Hemingway-Grassland 500 kV line and the Hemingway 500/230 kV transformer. This contingency does not have any associated RAS.

4.10 Sensitivity Study: Hemingway-Boardman Stand Alone

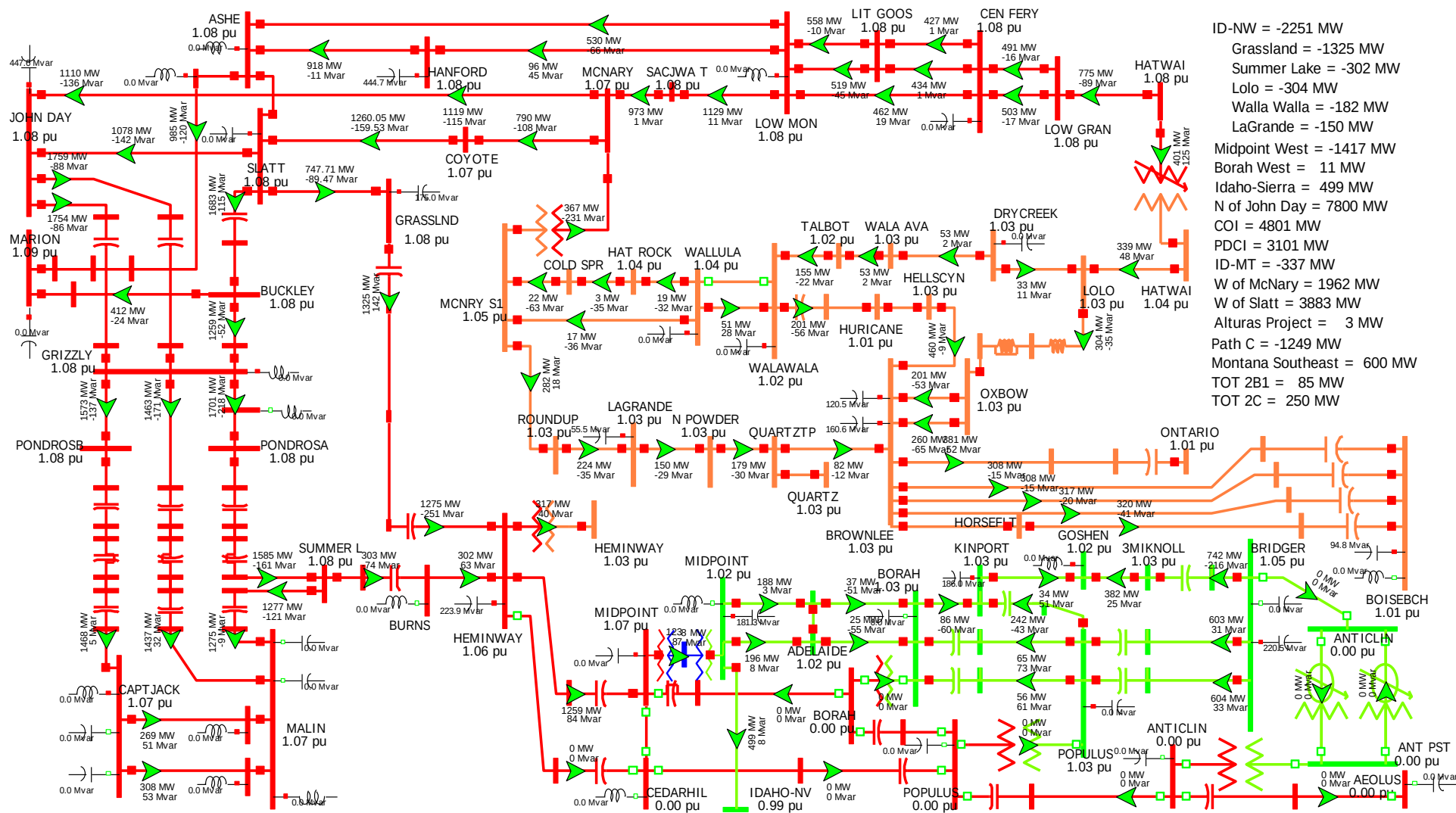


Figure 14: Idaho-Northwest (Path 14) 2250 MW, West to East, Stand Alone Case

4.10.1 Background & Need for Simultaneous Interaction Studies

The Hemingway-Boardman 500 kV transmission project may be constructed and put into service prior to the addition of many of the other projects listed in the Plan of Service (Section 2.4). This sensitivity study will prove that the Idaho-Northwest is capable of 2250 MW in the west-to-east direction without (1) Stage One of Gateway West, (2) the Cascade Crossing Transmission Project, and (3) Longhorn substation & associated wind. Projects listed in Section 2.4, other than the three above, are modeled in the base case due to their certainty; both from a timing prospective and a project complete ability prospective (most have completed permitting and are under construction).

In this case, Idaho-Northwest is studied at its 2250 MW west-to-east rating simultaneous with COI (4800 MW north-to-south), Idaho-Sierra (500 MW north-to-south), Montana-Idaho (337 MW north-to-south), Montana Southeast (600 MW north-to-south), North of John Day (7800 MW north-to-south) and PDCI (3100 MW north-to-south).

4.10.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is: 16hs2a_2250idnw_solo.

Step-by-step development of the 16hs2a_2250idnw solo base case:

Step 1: Begin with the 16hs2a_2250idnw_N case

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing.

Step 2: Remove elements from the base case to create a “Hemingway-Boardman Stand Alone” case

Remove the following elements from the 16hs2a_2250idnw_N case: (1) Stage One of Gateway West, (2) Cascade Crossing, and (3) the Longhorn substation & associated wind projects.

Step 3: Re-stress the Idaho-Northwest path to 2250 MW.

After removing the elements in Step 2, flow goes up on Idaho-Northwest, west-to-east. In order to reduce Idaho-Northwest flow, Northwest generation was reduced and Idaho area generation was increased.

Step 4: Re-stress the Simultaneous Interaction Study Paths.

Re-stress the following paths: (1) COI to 4800 MW north-to-south, (2) Idaho-Sierra to 500 MW north-to-south, (3) Montana-Idaho to 337 MW north-to-south, (4) Montana Southeast to 600 MW north-to-south, (5) North of John Day to 7800 MW north-to-south and (6) PDCI to 3100 MW north-to-south.

4.10.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_solo case can be found in Appendix E. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Midpoint-Hem & Hem 500/230 kV Xfmr (non-credible)

This contingency is unsolved in the base case.

The Hemingway 500 kV bus will be constructed so that the Midpoint-Hemingway 500 kV line and the Hemingway 500/230 kV transformer do not share a common breaker, otherwise, the rating of the Idaho-Northwest path will have to be reduced. The Hemingway bus will be set up as depicted in the figure below (note the slightly grayed out breaker) if the Hemingway-Boardman 500 kV line is completed prior to the addition of the Populus-Cedar Hill-Hemingway 500 kV line.

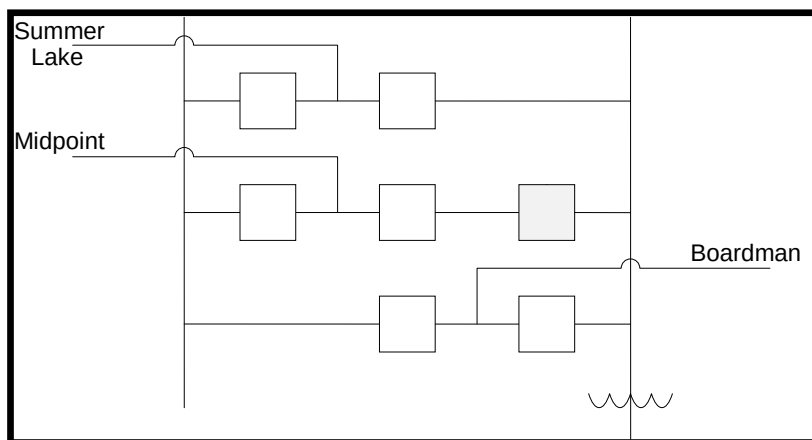


Figure 15: Hemingway 500 kV bus after the Hemingway-Boardman 500 kV line

Severe Post-Transient Contingency #2 – BF IPC Hemingway-Grassland & Hem 500/230 kV Xfmr

This is the limiting contingency for the Idaho-Northwest path in the west-to-east direction in this sensitivity case. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 113% of its nominal rating (99.7% of emergency). Since the overload is less than the Brownlee-Hells Canyon 230 kV lines emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 46: Post-transient results – BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

Element	Nominal % Loading (Limit A)	Emergency % Loading (Limit B)
Brownlee-Hells Canyon 230 kV	112.5% (1237 Amp Rating)	99.7% (1396 Amp Rating)
Oxbow-Lolo 230 kV	109.7% (920 Amp SOL)	96.4% (1047 Amp Rating)
Mill Creek-Peterson 230 kV	102.7% (800 Amp Rating)	68.5% (1200 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Severe Post-Transient Contingency #3 – N-1: Midpoint-Hemingway 500 kV

This contingency results in only minor nominal rating overloads on the Brownlee-Hells Canyon 230 kV line, and the Mill Creek-Peterson 230 kV line. The main concern with this contingency is severe post-transient voltage deviations across the Montana-Idaho (Path 18) transmission path at Peterson, an Idaho Power bus, and Amps, a PacifiCorp bus. For this N-1, the Peterson 230 kV bus voltage falls to 0.86 pu, a voltage drop of 9.7% and the Amps 230 kV bus voltage falls to ~0.88 pu, a voltage drop of 8.4%. Peterson and Amps 230 kV busses experience post-transient voltage deviations of ~6% following the loss of the Hemingway-Summer Lake 500 kV line today.

The table below highlights the performance of the voltage at Peterson 230 kV and Amps 230 kV following the loss of the Midpoint-Hemingway 500 kV line for varying levels of shunt capacitor switching.

Table 47: Post-transient voltage deviation results for Peterson & Amps 230 kV busses

Post-Transient Shunt Switching						MVar Change						Voltage Deviation	
HMWY	Dillon	Ore Basin	PTSN	Borah	Mill Creek	HMWY	Dillon	Ore Basin	PTSN	Borah	Mill Creek	Peterson 230	Amps 230
X	X	X				200	12	20	0	0	0	9.7%	8.4%
X	X	X	X			200	12	20	31.7	0	0	6.1%	6.2%
X	X	X	X	X		200	12	20	31.7	175	0	5.8%	5.6%
X	X	X	X		X	200	12	20	31.7	0	37.5	5.4%	5.8%
X	X	X	X	X	X	200	12	20	31.7	175	37.5	5.3%	5.3%

In all cases, shunt capacitors are inserted post-contingency at Hemingway 500 kV (based on a capacitor insertion scheme at Hemingway), Dillon 69 kV (based on depressed voltages post-contingency at Dillon), and Ore Basin 34.5 kV (based on depressed post-contingency voltages at Ore Basin) totaling 200 MVar, 12 MVar, and 20 MVar, respectively. Inserting the new Peterson 31.7 MVar capacitor, detailed in the Plan of Service in Section 2.4, results in significantly improved performance approximately matching the performance of the system today. This report assumes that the new Peterson 230 kV shunt capacitor

will be sufficient to avoid a simultaneous interaction between the Idaho-Northwest path and the Montana-Idaho path. This contingency is modeled as N-1: Midpoint-Hemingway 500 kV + PTSN Shunt.

If Idaho Power or PacifiCorp require superior performance at Peterson or Amps, shunt capacitors at Borah and/or Mill Creek could be inserted. Idaho Power has an existing remedial action scheme connecting Midpoint and Borah substations that could be utilized to switch the Borah shunt capacitor. At Mill Creek, Northwestern has two shunt capacitors (18.8 MVAR and 18.7 MVAR) connected to the tertiary of their respective 230/161 kV transformers that could potentially be switched based on 230 kV bus voltage levels at Mill Creek.

Severe Post-Transient Contingency #4 – N-1: Hemingway-Grassland 500 kV + PTSN Shunt

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 109% of its nominal rating (97% of emergency). Since the overload is less than the Brownlee-Hells Canyon 230 kV lines emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 48: Post-transient results – N-1: Hemingway-Grassland 500 kV + PTSN Shunt

Element	Nominal % Loading (Limit A)	Emergency % Loading (Limit B)
Brownlee-Hells Canyon 230 kV	112.5% (1237 Amp Rating)	96.7% (1396 Amp Rating)
Oxbow-Lolo 230 kV	109.7% (920 Amp SOL)	93.0% (1047 Amp Rating)
Mill Creek-Peterson 230 kV	102.7% (800 Amp Rating)	68.6% (1200 Amp Rating)

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption (the Idaho-Northwest path could be operating at 2250 MW west-to-east, with low flow on the COI). The table below shows the overloads following the loss of Hemingway-Boardman 500 kV with FACRI insertion of the Fort Rock series capacitors.

Table 49: Post-transient results – N-1: Hemingway-Grassland 500 kV + FACRI

Element	Nominal % Loading (LimitA)	Emergency % Loading (LimitB)
Brownlee-Hells Canyon 230 kV	100.6% (1237 Amp Rating)	89.2% (1396 Amp Rating)
Oxbow-Lolo 230 kV	95.6% (920 Amp SOL)	84.0% (1047 Amp Rating)
Mill Creek-Peterson 230 kV	96.2% (800 Amp Rating)	64.1% (1200 Amp Rating)
Grizzly-Summer Lake Fort Rock Series Cap	122.0% (2400 Amp Rating)	91.5% (3199 Amp Rating)

The new Peterson 230 kV shunt capacitor does not switch assuming FACRI operation.

The results show a large reduction to the overloads on the Idaho-Northwest 230 kV lines, however, the Grizzly-Summer Lake line Fort Rock series capacitor overloads to 122% of its nominal rating (92% of emergency). Overall, FACRI improves the performance of this contingency.

Severe Post-Transient Contingency #5 – N-2: Bridger-Populus #1 & #2 345 kV

This contingency results in overloading the Midpoint 500/345 kV transformer to 109% of its nominal 1500 MVA rating (99% of its emergency 1650 MVA rating). Since the overload is less than the Midpoint 500/345 kV transformer's emergency rating, this contingency results in acceptable performance. Post-transient voltage deviations are within WECC System Performance Criteria allowable 10% for N-2 contingencies.

Severe Post-Transient Contingency #6 – N-1: Round Mtn-Table Mtn #1 500 kV

This contingency results in overloading the Round Mtn-Table Mtn #2 500 kV line to 148% of its nominal rating (99% of emergency). Since the overload is less than the emergency rating of the 500 kV line, this contingency results in acceptable performance.

The table below compares the system today (Idaho-Northwest stressed to 1200 MW) to the system modeled in the base case (Idaho-Northwest stressed to 2250 MW). The base case includes the Hemingway-Boardman and Gateway West 500 kV lines, whereas the "system today" does not.

Table 50: Post-transient results – N-1: Round Mtn-Table Mtn #2 500 kV

Element	Existing System (1200 Case)			Future System (2250 Case)		
	Pre-Cont. Loading	Post-Cont. Loading	Difference	Pre-Cont. Loading	Post-Cont. Loading	Difference
RoundMtn-TableMtn #2 500 kV	55.2% 1811 Amps	99.4% 3262 Amps	44.2% 1451 Amps	55.4% 1819 Amps	99.3% 3259 Amps	43.9% 1440 Amps

As can be seen from the table above, the Hemingway-Boardman 500 kV line improves the results of this contingency.

Conclusion

Post transient analysis indicated that a Hemingway substation breaker failure resulting in the loss of the Midpoint-Hemingway 500 kV line and the Hemingway 500/230 kV transformer results in unacceptable system performance (contingency doesn't solve). The Hemingway 500 kV bus will be constructed so that the Midpoint-Hemingway 500 kV line and the Hemingway 500/230 kV transformer do not share a common breaker. The Hemingway bus will be configured as depicted in Figure 2 of Section 2.4 (note the slightly grayed out breaker) if the Hemingway-Boardman 500 kV line is completed prior to the addition of the Populus-Cedar Hill-Hemingway 500 kV line.

With the Hemingway breaker failure addressed as part of the plan of service, all other post-transient results indicate that Idaho-Northwest path can achieve a 2250 MW west-to-east rating, absent other projects in the Plan of Service.

4.10.4 Voltage Stability

The Hemingway-Boardman Stand Alone study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Hemingway-Boardman Stand Alone study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2362.5MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating with only the Hemingway-Boardman 500 kV line in service.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_N_solo base case can be found in Appendix E. Busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV, and Yellowtail 230 kV. The tables below highlight a sample of the reactive margins at Hanford, Hemingway, John Day and Malin. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 51: **Hanford 500 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: DOUBLE PALO VERDE	0.95	-1007	Worst VQ
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV + RAS	0.95	-1495	2nd Worst VQ
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.95	-1502	3rd Worst VQ

Table 52: **Hemingway 500 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
BUS: SUMMER LAKE 500 KV	0.79	-1046	Worst VQ
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.86	-1069	2 nd Worst VQ
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.79	-1076	3rd Worst VQ

Table 53: **John Day 500 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.99	-940	Worst VQ
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.99	-1074	2 nd Worst VQ
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.99	-1084	3rd Worst VQ

Table 54: **Malin 500 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.86	-1835	Worst VQ
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.93	-1922	2 nd Worst VQ
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.88	-1928	3rd Worst VQ

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, voltage stability is not an issue for the Idaho-Northwest path at the flow levels studied.

4.10.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_solo case can be found in Appendix E.

The 16hs2a_2250idnw_solo base case was the basis for all transient stability study results for this Hemingway-Boardman Stand Alone Sensitivity Study. All contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria.

FACRI was modeled in the base case dynamic data base file and triggered for loss of the Hemingway-Boardman 500 kV line.

4.10.6 Remedial Action Schemes

For the 16hs2a_2250idnw_solo base case, each contingency, and the associated switching (RAS), is documented in Appendix E. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Midpoint-Hem & Hem 500/230 kV Xfmr (non-credible)

As documented in the Post-Transient section, this contingency is not credible.

Severe Post-Transient Contingency #2 – BF IPC Hemingway-Grassland & Hem 500/230 kV Xfmr

After the loss of this line and transformer, switched VAr devices modeled at Dillon 69 kV and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVar shunt capacitor in service. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 55: Shunt Capacitor Switching in BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Hemingway 500 kV (60155)	200 MVar	400 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #3 – N-1: Midpoint-Hemingway 500 kV + PTSN Shunt

After the loss of this line and transformer, switched VAr devices modeled at Dillon 69 kV, re Basin 34.5 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVar shunt capacitor in service. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 56: Shunt Capacitor Switching in N-1: Midpoint-Hemingway 500 kV + PTSN Shunt

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Hemingway 500 kV (60155)	200 MVar	400 MVar
Orebasin 34.5 kV (66146)	0 MVar	20 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #4 – N-1: Hemingway-Grassland 500 kV + PTSN Shunt

After the loss of this line and transformer, switched VAr devices modeled at Dillon 69 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVar shunt capacitor in service. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 57: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV + PTSN Shunt

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Hemingway 500 kV (60155)	200 MVar	400 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #5 – N-2: Bridger-Populus #1 & #2 345 kV

This contingency is monitored by the WECC RASRS accepted Bridger West Remedial Action Scheme (RAS). After this double line loss, given the flow levels modeled in the case, the Bridger RAS will trip two Bridger units totaling ~1100 MW (in this case). The Bridger RAS will also insert the Borah 345 kV 175 MVar shunt capacitor. Flow reduction on the Bridger West path, following the unit trip, will result in bypassing of portions of the series capacitors on the Bridger West 345 kV lines. Finally, Dillon 69 kV and Peterson 230 kV shunt capacitors will switch in due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 58: Shunt Capacitor Switching in N-2: Bridger-Populus #1 & #2 345 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Borah 345 kV (60060)	0 MVar	175 MVar
Hemingway 500 kV (60155)	15.9 MVar	27.9 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

4.11 Sensitivity Study: Walla Walla Area, 100% Wind

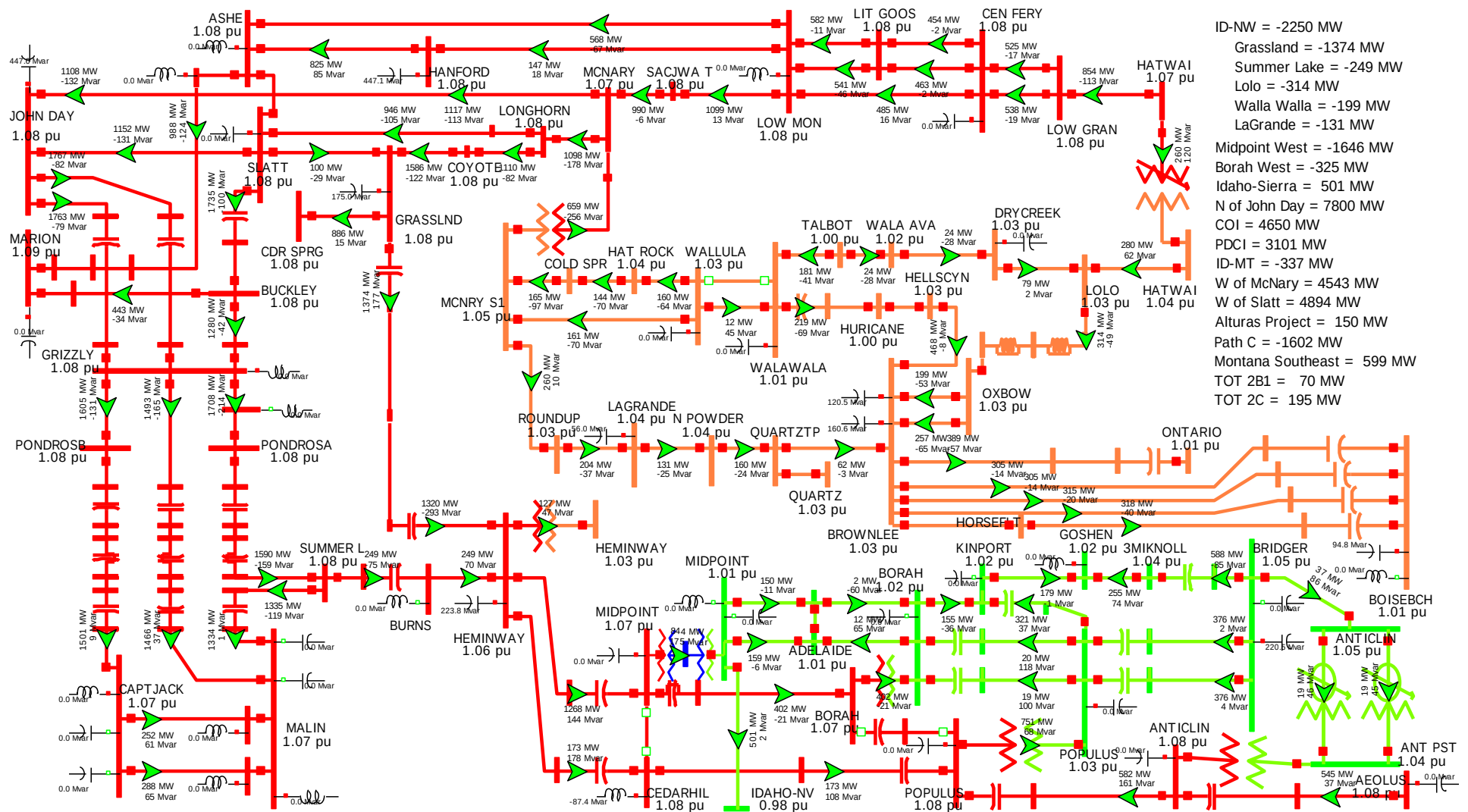


Figure 16: Idaho-Northwest (Path 14) 2250 MW, West to East, Walla Walla Area, 100% Wind, Base Case

4.11.1 Background & Need for Simultaneous Interaction Studies

With the influx of wind in the Pacific-Northwest, the Hemingway to Boardman Phase II study review group requested that the impacts of the Hemingway to Boardman project be evaluated with heavy wind modeled in the Walla Walla area.

4.11.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_2250idnw_nww.

Step-by-step development of the 16hs2a_2250idnw_N_nww case:

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing.

Step 2: Increase wind in the Walla Walla area (Southeast Washington).

Incorporate 100% wind output for the wind generators listed in the table below. Previously, Walla Walla area wind output was at 50% in the 16hs2a_2250idnw_N base case.

Table 59: Wind Modeled at 100% in Walla Walla Area, 100% Wind Case

Owner	BUS Name	Output (MW)
Avista	FWEGEN	100
BPA	DDGJN W1	190.9
	PHLNG W1	151.8
	9MILE W2	100
PacifiCorp	ECHOWIND	64.6
	FPL_LT	98.9
	CMBHL W1	41
	MARENG 1	141.6
	MARENG2LT	70.8
	STATL W2	210
	VANSY W1	25
	VNSCL3LT	98.9
Puget Sound Energy	HOPKR W1	75
	HOPKR W2	75

Step 3: Re-stress the Idaho-Northwest path to 2250 MW in the west-to-east direction.

With the wind generators noted in the table above at 100% output, TE Roach complex (Brownlee, Oxbow, and Hells Canyon hydroelectric dams) generation had to be curtailed by approximately 30 MW to avoid overloading the Oxbow-Lolo and Hells Canyon-Walla Walla lines. Idaho-Northwest flows were maintained at 2250 MW, west-to-east. No other paths were significantly altered.

4.11.3 Post Transient Results

Post-transient contingency results for the Walla Walla Area, Wind 100% study can be found in Appendix F. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF PGE Grassland-Cedar Sp 500 kV&Grassland-Hem 500 kV

The breaker failure is the most limiting contingency for the Walla Walla Area, 100% Wind sensitivity study. The contingency results in loading the Hells Canyon 230 kV line to 112.7% of its nominal rating (99.9% of the assumed emergency rating). Refer to the table below for more information about the overloads caused by this contingency.

Table 60: Post-transient results – BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kV

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112.7% (1237 Amp Rating)	99.9% (1396 Amp Rating)
Oxbow – Lolo 230 kV	112.9% (920 Amp SOL)	99.2% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	104.1% (800 Amp Rating)	70% (1200 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Severe Contingency #2: BF IPCO Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 112% of its nominal rating (99% of its emergency rating). Refer to the table below for more information about the overloads caused by this contingency.

Table 61: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112% (1237 Amp Rating)	99.1% (1396 Amp Rating)
Oxbow – Lolo 230 kV	112% (920 Amp SOL)	98.6% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	100.4%(800 Amp Rating)	67% (1200 Amp Rating)

Severe Contingency #3: BF IPCO Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 111% of its nominal rating (99% of its emergency rating). Refer to the table below for more information about the overloads caused by this contingency.

Table 62: Post-transient results – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	111% (1237 Amp Rating)	98.6% (1396 Amp Rating)
Oxbow – Lolo 230 kV	111% (920 Amp SOL)	97.6% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	103% (800 Amp Rating)	69% (1200 Amp Rating)

As evidenced in the tables above, a breaker failure at Hemingway significantly stresses the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines to near their emergency limits. Section 2.4 considers different Hemingway 500 kV substation configurations to avoid severe breaker failures; however, for this study, this breaker failure is considered to be credible.

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Notable Contingency #1: N-1: Hemingway-Grassland 500 kV

The system performance of the Walla Walla Area, 100% Wind case for the N-1 loss of the Hemingway-Grassland 500 kV line is similar to the performance for the Idaho-Northwest, west-to-east, base case study (Section 4.1.3). This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 112% of its nominal rating (98% of emergency). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 63: Post-transient loading – N-1: Hemingway-Grassland 500 kV

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112% (1237 Amp Rating)	98% (1396 Amp Rating)
Oxbow – Lolo 230 kV	111% (920 Amp SOL)	97% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	103% (800 Amp Rating)	69% (1200 Amp Rating)

This contingency also results in post-transient voltage deviations greater than 5% at Amps and Peterson 230 kV busses. WECC System Performance Criteria does not allow post-transient voltage deviations of greater than 5% for N-1 contingencies. The plan of service for the Hemingway-Boardman 500 kV Transmission project, detailed in Section 2.4, includes a new 31.7 MVar shunt capacitor connected to

the Peterson 230 kV bus to be switched post-contingency (the existing 31.7 MVar shunt capacitor is in-service pre-contingency). The contingency labeled “N-1: Hemingway-Grassland 500 kV + PTSN Shunt” switches this new Peterson 230 kV shunt capacitor, post-contingency, in response to low voltage on the Peterson 230 kV bus. The additional shunt bank switching solves the post-transient voltage deviation issue.

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Conclusion

The performance of the most severe contingencies for Walla Walla Area, 100% Wind study was similar to the performance of the same contingencies in the Base Case Study. No contingencies resulted in unacceptable performance. In summary, the post-transient results indicate that high wind generation in the Walla Walla area does not negatively impact the proposed Idaho-Northwest 2250 MW rating.

4.11.4 Voltage Stability

The Walla Walla 100% wind sensitivity study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Walla Walla 100% wind case, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that real power margin exists to operate the Idaho-Northwest path at the proposed 2250 MW rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_nww case can be found in Appendix F. The busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, Mill Creek 230 kV and Yellowtail 230 kV. The tables below highlight a sample of the reactive margins at these busses. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 64: 16hs2a_2250idnw_nww case reactive margin results (sample)

	Contingencies	Voltage @ Qmin	Margin (MVar)	Comments
Brownlee	N-2: DOUBLE PALO VERDE	0.85	-563	Worst VQ contingency
	BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.89	-592	Worst VQ related to Idaho Power
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.90	-638	Worst VQ related to Idaho-Northwest
Hanford	N-2: DOUBLE PALO VERDE	0.96	-1815	Worst VQ contingency
	N-2: NAPA VINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.94	-2023	2nd Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.93	-2889	Worst VQ related to Idaho-Northwest
Hemingway	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.81	-1693	Worst VQ contingency
	BUS: SUMMER LAKE 500 KV	0.77	-1697	2nd Worst VQ contingency
	BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.76	-1731	3rd Worst VQ contingency
John Day	N-2: NAPA VINE-ALLSTON & PAUL-ALLSTON #2 500 kv + RAS	1.00	-1035	Worst VQ contingency
	N-2: PAUL-NAPA VINE & PAUL _ALLSTON #2 500 kv + RAS	1.00	-1069	2nd Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV+PTSN	0.98	-1270	Worst VQ related to Idaho-Northwest
Malin	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.88	-2025	Worst VQ contingency
	N-2: DOUBLE PALO VERDE	0.92	-2200	2nd Worst VQ contingency
	N-1: CAPTAIN JACK-OLINDA 500 KV	0.83	-2299	3rd Worst VQ contingency
Marion	N-2: NAPA VINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.93	-1299	Worst VQ contingency
	N-2: PAUL-NAPA VINE & PAUL-ALLSTON #2 500 KV + RAS	0.93	-1339	2nd Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.90	-1457	Worst VQ related to Idaho-Northwest
Mill Creek	N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.86	-283	Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.80	-431	2nd Worst VQ contingency
	N-2: DOUBLE PALO VERDE	0.80	-440	3rd Worst VQ contingency
Yellowtail	N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.78	-221	Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.77	-239	2nd Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.77	-249	3rd Worst VQ contingency

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, voltage stability is not an issue for the Walla Walla Area, 100% Wind case.

4.11.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_nww case can be found in Appendix F.

The 16hs2a_2250idnw_nww base case was the basis for all transient stability study results for this Hemingway-Boardman v West of Hatwai Simultaneous Interaction Study. All contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria.

FACRI was modeled in the base case dynamic data base file and triggered for loss of the Hemingway-Boardman 500 kV line.

4.11.6 Remedial Action Schemes

For the 16hs2a_2250idnw_nww case, each contingency, and the associated switching (RAS), is documented in Appendix F. Details for the notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF PGE Grassland-Cedar Sp 500 kV&Grassland-Hem 500 kV

After the loss of these two lines, switched VAr devices modeled at Hopkins Ridge Wind2 34.5 kV, Peterson 230 kV, and Quartz 138 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVAR shunt capacitor in service. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 65: Shunt Capacitor Switching in BF PGE Grassland-Cedar Sp 500 kV&Grassland-Hem 500 kV

Shunt Device (Bus)	Initial MVAR	Post-Transient MVAR
Hemingway 500 kV (60155)	200 MVAR	400 MVAR
Hopkins Ridge Wind2 34.5 kV (47802)	9.4 MVAR	14.5 MVAR
Peterson 230 kV (62030)	31.7 MVAR	63.4 MVAR
Quartz 138 kV (60305)	0 MVAR	22.5 MVAR

In reality, additional capacitors may switch that are not modeled as part of this contingency

Severe Contingencies #2: BF IPCO Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

After the loss of this line and transformer, switched VAr devices modeled at Hopkins Ridge Wind2 34.5 kV would switch from 9 MVAR to 14.5 MVAR due to depressed voltage on the bus that the device is controlling.

Severe Contingencies #3: BF IPCO Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

After the loss of this line and transformer, switched VAr devices modeled at Hopkins Ridge Wind2 34.5 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200

MVAR shunt capacitor in service. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 66: Shunt Capacitor Switching in BF IPCO Midpoint-Grassland 500 kV & Hem 500/230 Xfmr

Shunt Device (Bus)	Initial MVAR	Post-Transient MVAR
Hemingway 500 kV (60155)	200 MVAR	400 MVAR
Hopkins Ridge Wind2 34.5 kV (47802)	9.4 MVAR	14.5 MVAR
Peterson 230 kV (62030)	31.7 MVAR	63.4 MVAR

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Notable Contingency #1: N-1: Hemingway-Grassland 500 kV

After the loss of this line and transformer, switched VAr devices modeled at Dillon 69 kV, Hopkins Ridge Wind2 34.5 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVAR shunt capacitor in service. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 67: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV

Shunt Device (Bus)	Initial MVAR	Post-Transient MVAR
Dillon 69 kV (62345)	15.9 MVAR	27.9 MVAR
Hemingway 500 kV (60155)	200 MVAR	400 MVAR
Hopkins Ridge Wind2 34.5 kV (47802)	9.4 MVAR	14.5 MVAR
Peterson 230 kV (62030)	31.7 MVAR	63.4 MVAR

In reality, additional capacitors may switch that are not modeled as part of this contingency.

4.12 Sensitivity Study: High West of McNary & West of Slatt

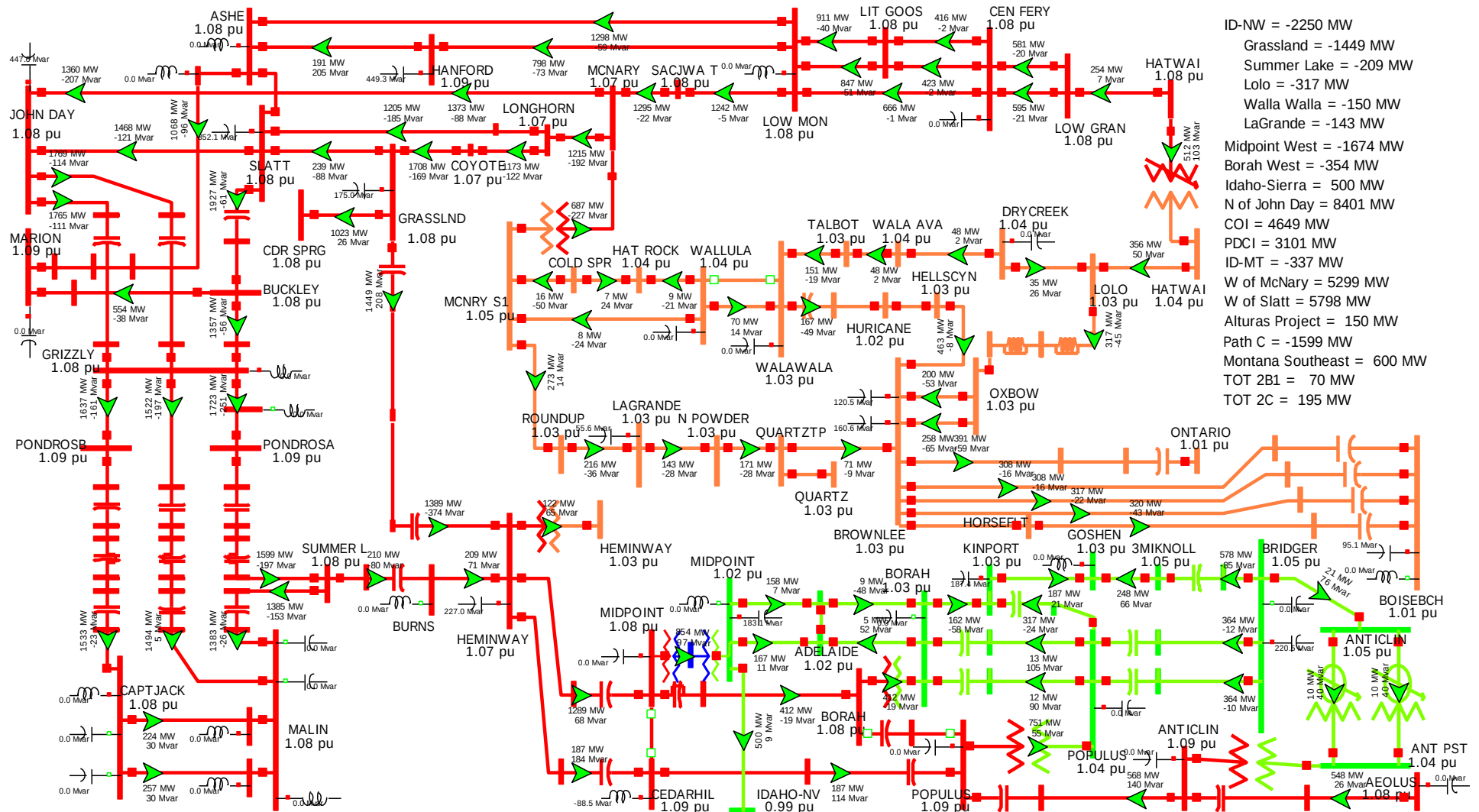


Figure 17: Idaho-Northwest (Path 14) 2250 MW, West to East, High West of McNary & West of Slatt Base Case

4.12.1 Background & Need for Simultaneous Interaction Studies

The Hemingway to Boardman Phase II study review group requested that the impacts of the Hemingway to Boardman project be evaluated with high flow on West of McNary and West of Slatt. West of McNary and West of Slatt are not WECC rated paths.

The West of McNary path is made up of the following lines: (1) Longhorn-Slatt 500 kV, (2) McNary-John Day 500 kV, (3) Coyote-Grassland 500 kV, (4) McNary-Ross 345 kV, (5) Jones Canyon-Tumble Creek 230 kV and (6) Harvalum-Big Eddy 230 kV. The Coyote-Grassland 500 kV line was added to the path for this base case due to the addition of the Cascade Crossings project.

The West of Slatt path is made up of the following lines: (1) Slatt-John Day 500 kV, (2) McNary-John Day 500 kV, (3) Slatt-Buckley 500 kV and (4) Grassland-Cedar Spring 500 kV. The Grassland-Cedar Spring 500 kV line was added to the path for this base case due to the addition of the Cascade Crossings project.

4.12.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_2250idnw_wom.

Step-by-step development of the 16hs2a_2250idnw_N wom base case:

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing.

Step 2: Stress the West of McNary and West of Slatt paths.

Generation east of McNary and Slatt was increased to stress the West of McNary and West of Slatt paths to approximately 5,300 MW and 5,800 MW, respectively. The path flows were increased by modifying generation in the Pacific Northwest, mostly in Southeast Washington, Lower Columbia Basin and Boardman generation. The generation modification resulted a 600 MW increase in North of John Day flows (to 8,400 MW).

Step 3: Re-stress Idaho-Northwest

The Idaho-Northwest path was re-stressed to 2250 MW in the west-to-east direction by reducing PacifiCorp East (PACE) and Idaho Power generation and replacing the generation with a schedule from the Northwest. No other paths were significantly altered.

4.12.3 Post Transient Results

Post-transient contingency results for high West of McNary and West of Slatt case can be found in Appendix G. The case name is 16hs2a_2250idnw_wom. Details for the severe/notable contingencies can be found below.

Most Severe Contingency: BF PGE Grassland-Cedar Springs 500 kV&Grasslnd-Hemingway 500 kV+CAPS

The breaker failure is the most limiting contingency for the High West of McNary/Slatt sensitivity study. This contingency results in loading the Oxbow-Lolo 230 kV line to 113.8% of its nominal rating (100.0% of emergency). Refer to the table below for more information about the overloads caused by this contingency.

Table 68: Post-transient results – PGE Grassland-Cedar Springs 500 kV & Grassland-Hemingway 500 kV

Element	Nominal % Loading	Emergency % Loading
Oxbow – Lolo 230 kV	113.8%	100.0%
Brownlee-Hells Canyon 230 kV	112.8%	99.9%

Without shunt capacitor switching at Dillon 69 kV, Hemingway 500 kV, North Powder 34.5 kV, Quartz 138 kV, and Peterson 230 kV, the Oxbow-Lolo 230 kV line, and Brownlee-Hells Canyon 230 kV line would have been overloaded slightly above their emergency ratings. Although very close to going over the emergency ratings of these two lines, additional post-transient actions could be taken to quickly reduce the loading on the lines. These actions include: (1) reducing Hells Canyon generation, and (2) inserting a Copperfield 230 kV series reactor in the Oxbow-Lolo 230 kV line.

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Severe Contingency #2: BF IPCO Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

This contingency results in loading the Oxbow-Lolo 230 kV line to 113.7% of its nominal rating (99.9% of emergency). Refer to the table below for more information about the overloads caused by this contingency.

Table 69: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Oxbow – Lolo 230 kV	113.7% (920 Amp SOL)	99.9% (1047 Amp Rating)
Brownlee-Hells Canyon 230 kV	112.4% (1237 Amp Rating)	99.6% (1396 Amp Rating)

Severe Contingency #3: BF IPCO Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This contingency results in loading the Brownlee-Hells Canyon 230 kV line to 111% of its nominal rating (99% of emergency). Refer to the table below for more information about the overloads caused by this contingency.

Table 70: Post-transient results – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	111% (1237 Amp Rating)	98.7% (1396 Amp Rating)
Oxbow – Lolo 230 kV	112% (920 Amp SOL)	98.5% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	103% (800 Amp Rating)	69% (1200 Amp Rating)

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

The performance of these contingencies is very similar to the performance of the same contingencies in the base case. The fact that the performance is similar indicates that high West of McNary/Slatt flow does not impact the performance of the Idaho-Northwest transmission path.

Severe Post-Transient Contingency #4 – N-1: Hemingway-Grassland 500 kV

The system performance of this High West of McNary/Slatt base case for the N-1 loss of the Hemingway-Grassland 500 kV line is very similar to the performance for the Idaho-Northwest, west-to-east, base case study (Section 4.1.3). This contingency results in overloading the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines to approximately 99% of their emergency ratings. Since the overloads are less than each line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 71: Post-transient loading – N-1: Hemingway-Grassland 500 kV

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112% (1237 Amp Rating)	99% (1396 Amp Rating)
Oxbow – Lolo 230 kV	113% (920 Amp SOL)	99% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	103% (800 Amp Rating)	69% (1200 Amp Rating)

This contingency also results in post-transient voltage deviations greater than 5% at Amps and Peterson 230 kV busses. WECC System Performance Criteria does not allow post-transient voltage deviations of greater than 5% for N-1 contingencies. The plan of service for the Hemingway-Boardman 500 kV Transmission project, detailed in Section 2.4, includes a new 31.7 MVAR shunt capacitor connected to the Peterson 230 kV bus to be switched post-contingency (the existing 31.7 MVAR shunt capacitor is in-

service pre-contingency). The contingency labeled “N-1: Hemingway-Grassland 500 kV + PTSN Shunt” switches this new Peterson 230 kV shunt capacitor, post-contingency, in response to low voltage on the Peterson 230 kV bus and solves the post-transient voltage deviation issue.

If COI transfers are heavy in the north-to-south direction, as modeled in this base case, FACRI will trigger the insertion of the Fort Rock series capacitors, significantly improving the Idaho-Northwest path performance for this contingency. Inserting the Fort Rock series capacitors in the Grizzly-Captain Jack, Grizzly-Malin & Grizzly-Summer Lake 500 kV lines is not modeled in this post-transient contingency analysis as a conservative study assumption.

Conclusion

The performance of the most severe contingencies for the High West of McNary/Slatt study was similar to the performance of the same contingencies in the Base Case Study. No contingencies resulted in unacceptable performance. In summary, the post-transient results indicate that high flow on West of McNary and West of Slatt does not negatively impact the proposed Idaho-Northwest 2250 MW west-to-east rating.

4.12.4 Voltage Stability

The High West of McNary and West of Slatt sensitivity study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest High West of McNary & West of Slatt sensitivity study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 2363 MW, 105% of the proposed 2250 MW rating. This PV Analysis verifies that real power margin exists to operate the Idaho-Northwest path at its proposed 2250 MW rating, simultaneous with the high West of McNary/Slatt flows.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16hs2a_2250idnw_N_wom case can be found in Appendix G. The busses studied utilizing VQ Analysis are: Brownlee 230 kV, Hanford 500 kV, Hemingway 500 kV, John Day 500 kV, Malin 500 kV, Marion 500 kV, McNary 500 kV, Mill Creek 230 kV and Yellowtail 230 kV. The tables below highlight a sample of the reactive margins at these busses. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 72: 16hs2a_2250idnw_N_wom case reactive margin results (sample)

	Contingencies	Voltage @ Qmin	Margin (MVar)	Comments
Brownlee	BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.89	--615	Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.88	-664	Worst VQ related to Idaho-Northwest
	N-2: DOUBLE PALO VERDE	0.84	-666	Worst VQ external to Idaho Power
Hanford	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.93	-3412	Worst VQ contingency
	N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.88	-3418	2nd Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.89	-4096	Worst VQ related to Idaho-Northwest
Hemingway	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.81	-1826	Worst VQ contingency
	N-1: ALLSTON-KEELER 500 KV + RAS	0.74	-1848	2nd Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500 KV & GRASSLAND-HEM 500 KV	0.70	-1826	Worst VQ related to Idaho Power
John Day	N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.98	-1395	Worst VQ contingency
	N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.98	-1733	2nd Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.97	-1917	Worst VQ related to Idaho-Northwest
Malin	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.86	-2258	Worst VQ contingency
	N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.79	-2501	2nd Worst VQ contingency
	N-1: ALVERY-DIXONVILLE 500 KV	0.87	-2528	3 rd Worst VQ contingency
Marion	N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.79	-1416	Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.89	-1585	Worst VQ related to Idaho-Northwest
	BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.83	-2771	Worst VQ related to Idaho Power
McNary	N-2: GRASSLAND-COYOTE 500KV & SLATT-LONGHORN 500KV	0.91	-1451	Worst VQ contingency
	BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.86	-2101	2nd Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.92	-2422	Worst VQ related to Idaho-Northwest
Mill Creek	N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.86	-300	Worst VQ contingency
	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.80	-433	2nd Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.80	-452	3 rd Worst VQ contingency
Yellowtail	BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.75	-228	Worst VQ contingency
	N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.77	-237	2nd Worst VQ contingency
	BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.78	-238	3 rd Worst VQ contingency

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, voltage stability is not an issue for the High West of McNary & West of Slatt base case.

4.12.5 Transient Stability

Transient stability contingency results for the 16hs2a_2250idnw_wom case can be found in Appendix G.

The 16hs2a_2250idnw_wom base case was the basis for all transient stability study results for this High West of McNary/Slatt Sensitivity Study. All contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria.

FACRI was modeled in the base case dynamic data base file and triggered for loss of the Hemingway-Boardman 500 kV line.

4.12.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N_wom case, each contingency, and the associated switching (RAS), is documented in Appendix G. Details for the notable contingencies can be found below.

Most Severe Contingency: BF PGE Grassland-Cedar Springs 500 kV & Grassland-Hemingway 500 kV

After the loss of these two lines, switched VAr devices modeled at Dillon 69 kV, North Powder 34.5 kV, Peterson 230 kV, and Quartz 138 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVar shunt capacitor in service. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 73: Shunt Capacitor Switching in BF PGE Grassland-Cedar Sp 500 kV&Grassland-Hem 500 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Hemingway 500 kV (60155)	200 MVar	400 MVar
North Powder 34.5 kV (60313)	0 MVar	18 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar
Quartz 138 kV (60305)	0 MVar	22.5 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency

Severe Contingency #2: BF IPCO Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

This contingency does not have any associated RAS.

Severe Contingency #3: BF IPCO Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This contingency does not have any associated RAS.

Severe Post-Transient Contingency #4 – N-1: Hemingway-Grassland 500 kV

After the loss of this line, switched VAr devices modeled at Dillon 69 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. On the

Hemingway 500 kV bus, a capacitor insertion scheme will switch a 200 MVar shunt capacitor in service. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 74: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 69 kV (62345)	15.9 MVar	27.9 MVar
Hemingway 500 kV (60155)	200 MVar	400 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

4.13 Sensitivity Study: Longhorn Terminus

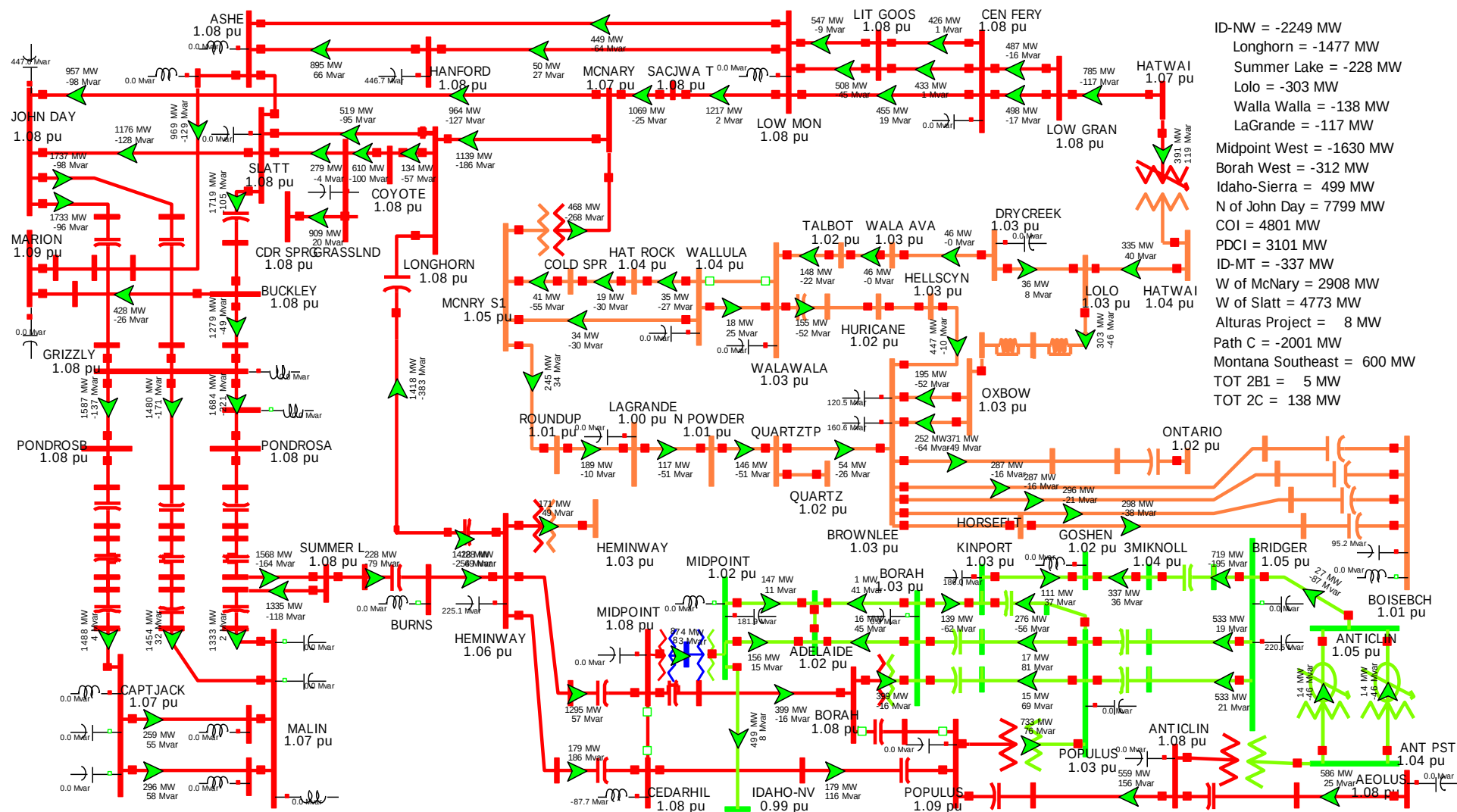


Figure 18: Idaho-Northwest (Path 14) 2250 MW, West to East, Longhorn Sensitivity Case

4.13.1 Background & Need for Sensitivity Study

The Boardman area terminus of the Hemingway to Boardman project has not been finalized. Grassland Substation and Longhorn Substation are the two terminus alternatives presently being evaluated. All previous studies assumed a Grassland terminus. This sensitivity study was conducted to determine if a Longhorn termination would adversely impact the proposed 2250 MW, west-to-east rating.

4.13.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_2250idnw_lh.

Step-by-step development of the 16hs2a_2250idnw_N_lh base case:

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing.

Step 2: Create a Hemingway-Longhorn 500 kV line and remove the Hemingway-Grassland 500 kV line.

The line impedance was modified based on the proposed Longhorn substation location. The series capacitor impedance values in the Hemingway-Longhorn were modified based on the new line impedance.

Step 3: Re-stress the Idaho-Northwest path to 2250 MW in the west-to-east direction.

Idaho-Northwest flows were re-stressed to 2,250 MW, west-to-east. This required minimal case modification. No other paths were significantly altered.

4.13.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_N_lh case can be found in Appendix K. The results are comparable to Grassland terminus studied in the base case. All contingencies result in acceptable post-transient performance.

The following tables compare the post transient results for the Grassland terminus versus Longhorn terminus for several of the notable contingencies discussed in preceding sections.

Table 75: Post-Tran. Results Comparison–BF IPC Hem-Grassland/Longhorn 500 kV & Hem 500/230 Xfmr

Element	Grassland Terminus	Longhorn Terminus
Brownlee-Hells Canyon 230 kV	98.1% (1396 Amp Rating)	97.2% (1396 Amp Rating)
Oxbow – Lolo 230 kV	96.2% (1047 Amp Rating)	96.7% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	68.8% (1200 Amp Rating)	69.5% (1200 Amp Rating)

Table 76: Post-Tran. Results Comparison – N-1: Hemingway-Grassland/Longhorn 500 kV +PTSN Shunt

Element	Grassland Terminus	Longhorn Terminus
Brownlee-Hells Canyon 230 kV	97.5% (1396 Amp Rating)	96.4% (1396 Amp Rating)
Oxbow – Lolo 230 kV	95.6% (1047 Amp Rating)	95.9% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	68.9% (1200 Amp Rating)	68.8% (1200 Amp Rating)

Table 77: Post-Tran. Results Comparison–BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Grassland Terminus	Longhorn Terminus
Brownlee-Hells Canyon 230 kV	99.6% (1396 Amp Rating)	99.0% (1396 Amp Rating)
Oxbow – Lolo 230 kV	98.4% (1047 Amp Rating)	99.5% (1047 Amp Rating)
Mill Creek – Peterson 230 kV	67.2% (1200 Amp Rating)	67.2% (1200 Amp Rating)

The tables above indicate that a Longhorn northwest terminus has comparable performance to the Grassland northwest terminus studied in previous sections.

The Longhorn terminus location results in several potential breaker failures that could result depending on the eventual layout of the Longhorn station. The potential breaker failures are listed below:

- 1) BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr
- 2) BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV
- 3) BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV
- 4) BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV
- 5) BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr
- 6) BF LH Longhorn-Coyote & Longhorn-Slatt 500 kV
- 7) BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr
- 8) BF LH McNary-Longhorn & Longhorn 500/230 Xfmr
- 9) BF LH McNary-Longhorn & Longhorn-Coyote 500 kV
- 10) BF LH McNary-Longhorn & Longhorn-Slatt 500 kV

All Longhorn breaker failure contingencies result in acceptable post-transient performance.

Conclusion

The post-transient results indicate that a Longhorn 500 kV substation termination will not negatively impact the proposed Idaho-Northwest 2250 MW west-to-east rating.

4.13.4 Voltage Stability

Real Power Margin Assessment (PV Analysis) and Reactive Power Margin Assessment (VQ Analysis) were not conducted for this sensitivity study due to the close proximity of the Longhorn substation in relation to the Grassland substation studied in previous sections. It was assumed that the results for a Longhorn termination location would be nearly identical to the results for the Grassland termination. Refer to Section 4.1.4 and Appendix A for the voltage stability results associated with the Hemingway to Boardman (Grassland termination) base case study.

4.13.5 Transient Stability

Transient stability analysis was not conducted for the Longhorn Sensitivity study due to the close proximity of the Longhorn substation in relation to the Grassland substation studied in previous sections. It was assumed that the results for a Longhorn termination location would be nearly identical to the results for the Grassland termination. Refer to Section 4.1.4 and Appendix A for the transient stability results associated with the Hemingway to Boardman (Grassland termination) base case study.

4.13.6 Remedial Action Schemes

For the 16hs2a_2250idnw_N_lh case, each contingency, and the associated switching (RAS), is documented in Appendix K. Details for the notable contingencies can be found below.

BF IPC Hemingway-Longhorn 500 kV & Hem 500/230 Xfmr

After the loss of this line and transformer, switched VAr devices modeled at LaGrande 230 kV and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 78: Shunt Capacitor Switching in BF IPC Hemingway-Longhorn 500 kV & Hem 500/230 Xfmr

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
LaGrande 230 kV (40621)	0 MVar	52.2 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency

N-1: Hemingway-Longhorn 500 kV

After the loss of this line, switched VAr devices modeled at LaGrande 230 kV and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 79: Shunt Capacitor Switching in N-1: Hemingway-Longhorn 500 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
LaGrande 230 kV (40621)	0 MVar	52.2 MVar
Peterson 230 kV (62030)	31.7 MVar	63.4 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency

BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

This breaker failure contingency opens the Midpoint-Hemingway 500 kV line and the Hemingway 500/230 kV transformer. After the loss of this line and transformer, switched VAr devices modeled at Peterson 230 kV would switch in-service due to depressed voltages on the bus that the device would be controlling.

In reality, additional capacitors may switch that are not modeled as part of this contingency

4.14 Sensitivity Study: NV Energy Updates

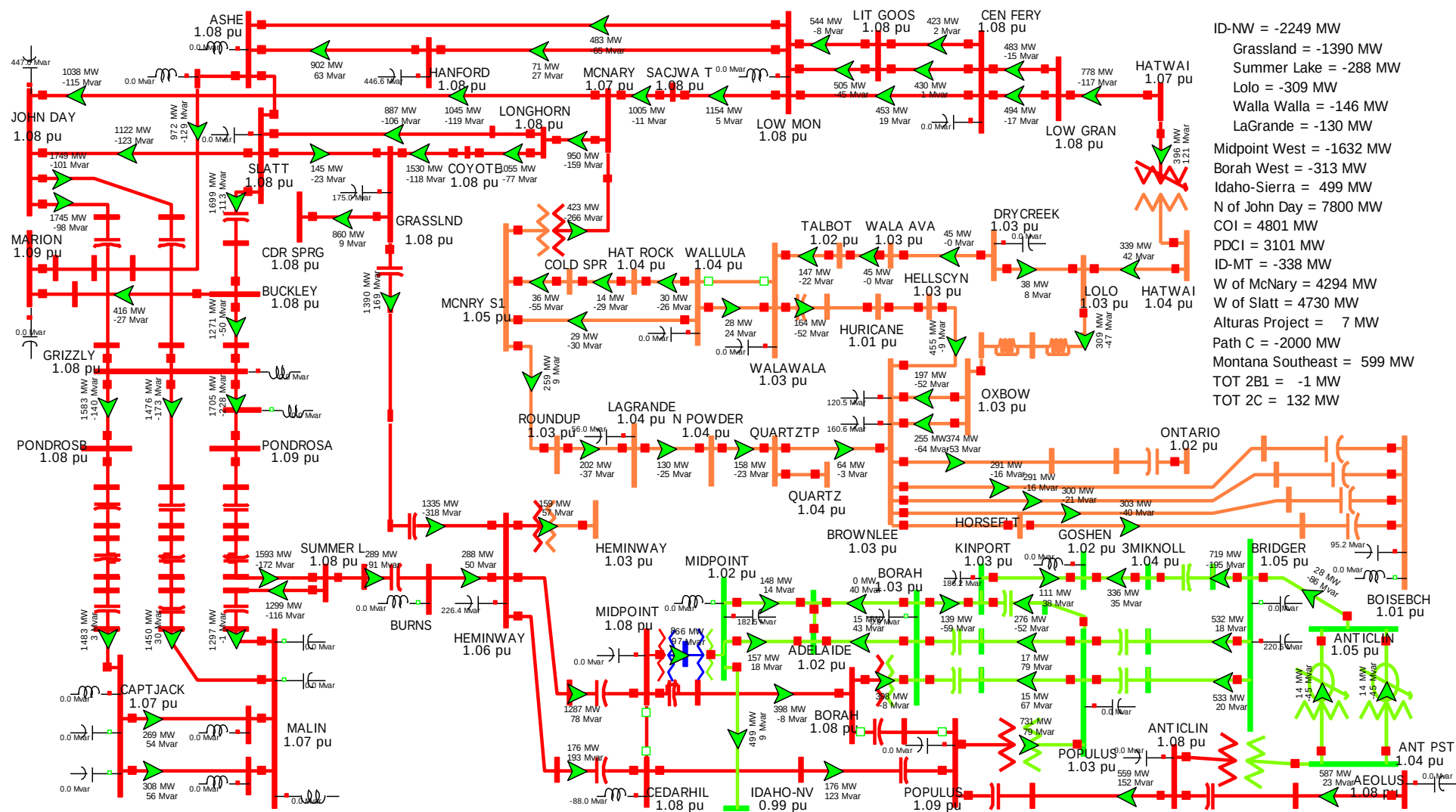


Figure 19: Idaho-Northwest (Path 14) 2250 MW, West to East, NV Energy Updates Sensitivity Case

4.14.1 Background & Need for Sensitivity Study

After completing the majority of the study work, including Post-Transient Analysis, PV/QV Analysis, and Transient Stability analysis, a few modeling errors were discovered in the base case in Area 64.

Modeling errors in the base case are: (1) the Hilltop 345 kV phase shifter is actually located at Bordertown, (2) the Bordertown-Cal Sub 138 kV line does not exist, and (3) the Robinson-Falcon 345 kV line should have two in-service series capacitors. In Sections 4.1-4.8, 4.11 & 4.12, these errors are present. The errors were corrected in the cases in 4.9, 4.10, 4.13, 4.14, and all of the Idaho-Northwest east-to-west cases (Section 5). As a sensitivity study, this section looks at the post-transient response of the system with these minor modifications. In the end, these modeling errors were slight and made little to no difference on the results of the case.

4.14.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_2250idnw_nvmod.

Step-by-step development of the 16hs2a_2250idnw_N_nvmod base case:

Step 1: Begin with the 16hs2a_2250idnw_N base case.

Utilize the base case developed in Section 4.1.2 Steady State Case Stressing.

Step 2: Incorporate modifications in Area 64

- Hilltop 345 kV phase shifter moved to Bordertown 345 kV.
- Bordertown-Cal Sub 138 kV switched out of service.
- Added two series capacitors to the Robinson-Falcon 345 kV line.

Step 3: Modify the COI and Alturas Project path flows

As suggested by the review group, COI was stressed to 4800 MW, and Alturas Project was reduced to 0 MW.

Step 4: Re-stress the Idaho-Northwest path to 2250 MW in the west-to-east direction.

Idaho-Northwest flows were re-stressed to 2,250 MW, west-to-east. This required minimal case modification. No other paths were significantly altered.

4.14.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_nvmod case can be found in Appendix L. Contingencies of note resulted in similar post-transient performance.

This case did not result in any post-transient violations. The minor base case modifications to Area 64 had insubstantial impact on the results for the original base case. Any change in the post-transient flows on the system were more likely to be due to COI flow changes, pre-contingency, than the slight modifications to the NV Energy system.

4.14.4 Voltage Stability

Real Power Margin Assessment (PV Analysis) and Reactive Power Margin Assessment (VQ Analysis) were not conducted for this sensitivity study due to the similarity to the base case. Refer to earlier sections for PV and QV Analysis results.

4.14.5 Transient Stability

Due to the similarity between the 16hs2a_2250idnw_N base case and the 16hs2a_2250idnw_nvmod base case, and the almost identical post-transient results, a transient stability study is unnecessary for this case.

4.14.6 Remedial Action Schemes

For the 16hs2a_2250idnw_nvmod case, each contingency, and the associated switching (RAS), is documented in Appendix L.

4.15 Simultaneous Interaction Study: MSTI & SWIP (SWIP South – 1770 MW)

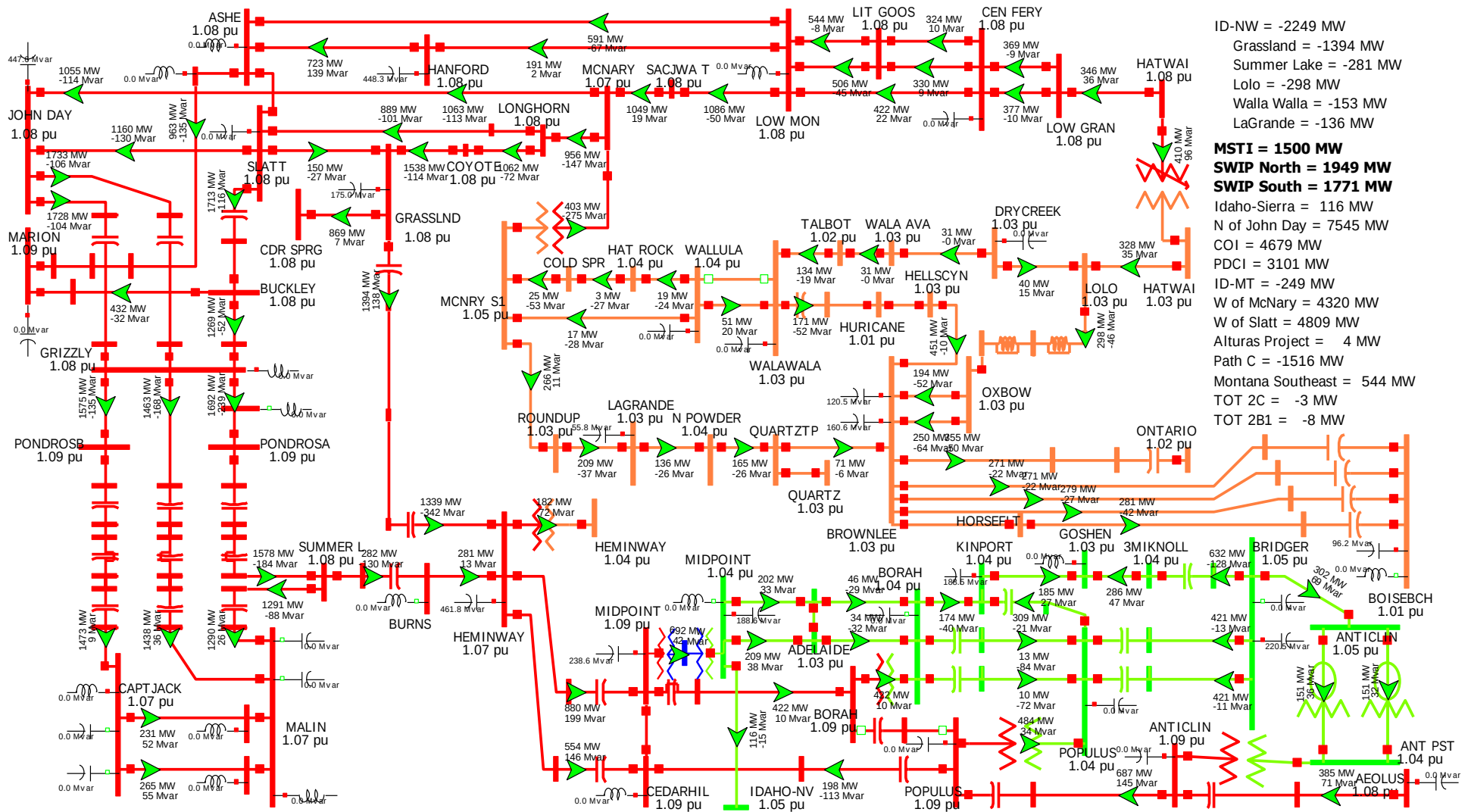


Figure 20: Idaho-Northwest (Path 14) 2250 MW, West to East, MSTI & SWIP Case

4.15.1 Background & Need for Simultaneous Interaction Studies

In the previous MSTI and SWIP study, Section 4.9, the SWIP South was flowing at 1500 MW north-to-south. In this section, the previous study case was modified such that SWIP South flow is 1770 MW north-to-south. This section was added to memorialize the post-transient contingency results of this new case.

4.15.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case names for this study are: 16hs2a_2250idnw_ms_swips.

Step-by-step development of the 16hs2a_2250idnw_ms case:

Step 1: Begin with the 16hs2a_2250idnw_ms base case.

Utilize the base case developed in Section 4.9.

Step 2: Stress the SWIP South path to at least 1750 MW in the north-to-south direction.

In order to stress SWIP South to greater than 1750 MW, while maintaining 1950 MW of flow on SWIP North, the phase shifters at Robinson on the 345 kV system were adjusted, and additional power was scheduled from northern areas (Sierra, California, Idaho and the Northwest) to Southern Nevada.

4.15.3 Post Transient Results

Post-transient contingency results for the MSTI & SWIP (SWIP South 1770 MW) case can be found in Appendix M. The case name is 16hs2a_2250idnw_ms_swips.

No additional post-transient overloads of concern were discovered in this second base case studying MSTI and SWIP. In this case, SWIP South was stressed to 1770 MW north-to-south pre-contingency, rather than the 1500 MW north-to-south stressing in the original base case in Section 4.9.

5. Idaho-Northwest, East-to-West Studies

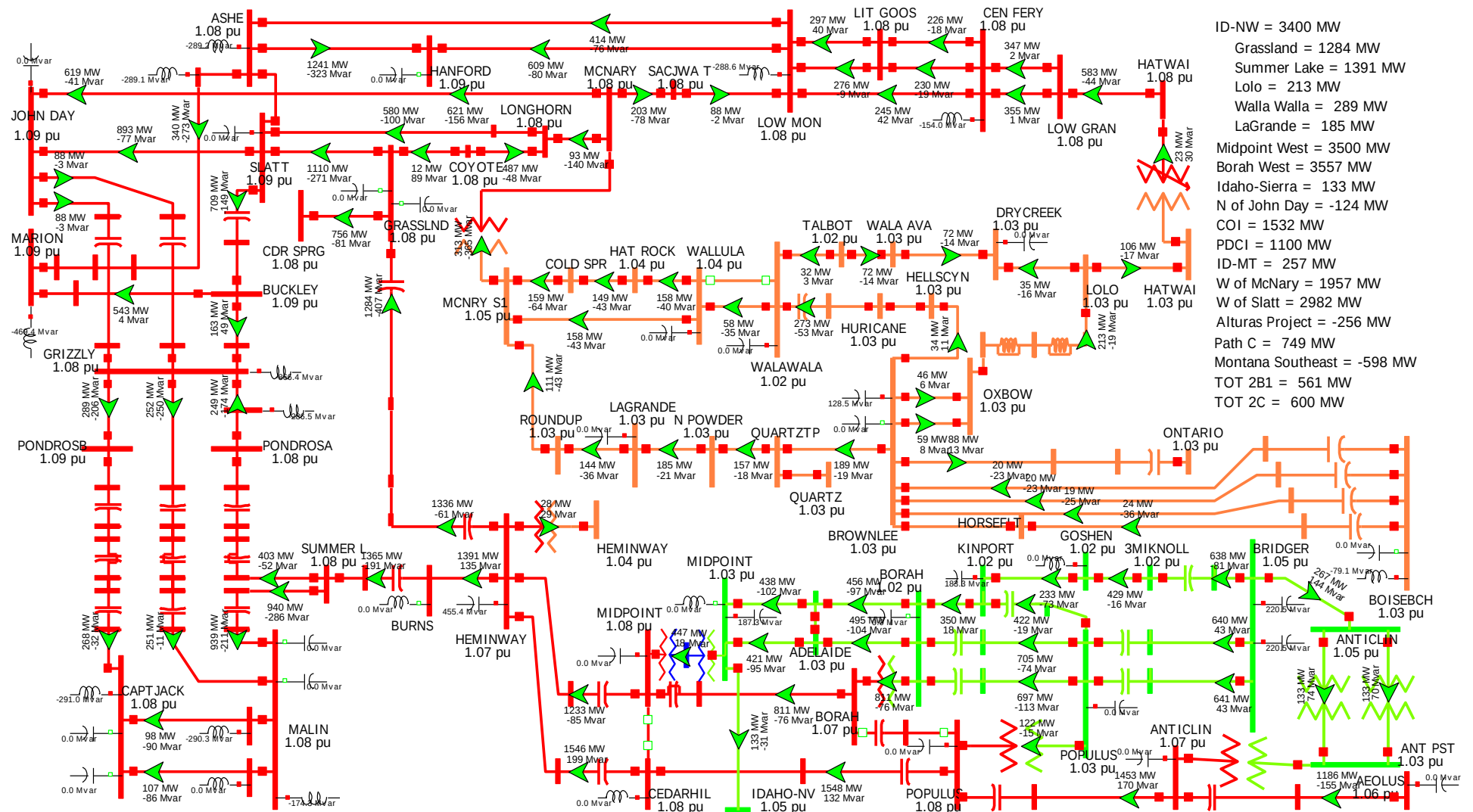


Figure 21: Idaho-Northwest (Path 14) 3400 MW, East to West, Base Case

5.1 Idaho – Northwest, East-to-West (Path 14) Base Case

5.1.1 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is: 16la1sa_3400idnw_N.

Step-by-step development of the 16la1sa 3400idnw N base case:

Step 1: Add the transmission facilities described in the Plan of Service in Section 2.4.

The 16la1sa_3400idnw_N case includes all of the additions described in Section 2.4. The Populus to Cedar Hill to Hemingway 500 kV line is required to achieve the Idaho-Northwest proposed rating for all cases in Section 5 (Idaho-Northwest east-to-west base cases).

Step 2: Adjust the COI (Path 66) and PDCI (Path 65) to flow in the north-to-south direction.

The original 16la1sa base case, downloaded from WECC.biz, has COI & PDCI each flowing at approximately 1800 MW south-to-north. COI & PDCI rarely flow in the south-to-north direction. South-to-north flow on COI reduces the loading on Hemingway-Summer Lake, and increases the loading on Hemingway-Boardman. Studying the Idaho-Northwest path with COI flowing south-to-north would result in a higher rating than the 3400 MW east-to-west rating proposed in this report. By modifying generation patterns in the Northwest and Southwest, COI & PDCI flows were adjusted to flow in the north-to-south direction, reasonably corresponding with actual flows seen while Idaho-Northwest path transfers are high in the east-to-west direction.

Step 3: Stress the Idaho-Northwest path to 3400 MW in the east-to-west direction.

The Idaho-Northwest path was stressed to 3400 MW in the east-to-west direction by increasing PacifiCorp East (PACE) and Idaho Power generation and scheduling it to the Northwest. Generation in the Northwest was reduced as a sink for the new generation coming out of Wyoming, Utah, and Idaho. Generation adjustments in the Northwest were limited to combined cycle power plants that could be switched in or out, and wind generation. Only minor changes were made to the Northwest hydro generation pattern modeled in the base 16la1sa case.

Step 4: Stress simultaneous interaction study paths.

The following paths were stressed to their transfer limit in the 16la1sa_3400idnw_N base case simultaneous with Idaho-Northwest at 3400 MW east-to-west:

- 1) **Montana-Idaho (Path 18)** – Adjusted to the 256 MW south-to-north limit utilizing the Mill Creek 230 kV phase shifter and the Jefferson 161 kV phase shifter.
- 2) **Montana-Northwest (Path 8)** – Adjusted to 2200 MW east-to-west by increasing Montana area generation, and reducing Northwest area generation.
- 3) **Montana Southeast (Path 80)** – Adjusted to the 600 MW south-to-north limit by increasing generation at Yellowtail, and adjusting the Billing, Rimrock, and Crossover phase shifters.
- 4) **TOT 2B1 (Path 78)** – Adjusted to the 560 MW north-to-south limit utilizing the Pinto 345 kV phase shifters.
- 5) **TOT 2C (Path 35)** – Adjusted to the 600 MW north-to-south limit utilizing the Harry Allen 345 kV phase shifters.

Step 5: Adjusted other paths of concern.

The proposed Idaho-Northwest path rating increase is 1000 MW over the 2400 MW east-to-west rating that exists today. Borah West (2557 MW 2012 rating) and Midpoint West (2500 MW 2012 internal rating) were stressed to 3557 MW and 3500 MW, respectively.

5.1.2 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

This is the limiting contingency for the Idaho-Northwest path in the east-to-west direction. This contingency results in overloading the Burns 500 kV series capacitor to 133% of its nominal rating (99% of emergency). To prevent exceeding the emergency rating of the Burns series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. Since the overload is less than the Burns series capacitors emergency rating, this contingency results in acceptable performance. Refer to the table below for additional overloads caused by this contingency:

Table 80: Post-transient results – BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

Element	Nominal % Loading	Emergency % Loading
Burns 500 kV Series Capacitor	133%	99%
Harry Allen 345/230 kV Xfmrs	111%	90%
Jefferson 161 kV Phase Shifter	110%	84%
Pinto 345 kV Phase Shifter	102%	81%

Severe Post-Transient Contingency #2 – N-2: Double Palo Verde

Following the loss of two Palo Verde units, Northwest generation responds to the generation deficiency; Hemingway-Boardman and Gateway West offer a low impedance parallel path between the Northwest and Southwest that ends up having to flow through Utah and Colorado lines to go south. The addition of

Hemingway-Boardman and Gateway West causes the 2PV contingency to become slightly more severe across the Gladstone-Springer 115 kV transmission line, TOT 2A, TOT 2B, and TOT 2C.

The table below compares the existing system to the future system. The existing system is a representation of the system as it stands in 2012. The future system is the study base case and includes the Hemingway-Boardman and Gateway West 500 kV lines.

Table 81: Post-transient results – N-2: Double Palo Verde

Element	Existing System (2400 Case)			Future System (3400 Case)		
	Pre-Cont. % Limit B	Post-Cont. % Limit B	Difference	Pre-Cont. % Limit B	Post-Cont. % Limit B	Difference
Gladstone-Springer 115 kV	62.5%	99.1%	36.6%	62.0%	98.8%	36.8%
Pinto 345 kV Phase Shifter	73.9%	91.7%	17.8%	73.8%	93.0%	19.2%
H. Allen 345 kV Phase Shifters	79.9%	98.2%	18.3%	79.9%	99.7%	19.8%

This contingency results in acceptable performance. The difference columns in the table above illustrate the increase in flow after the 2PV on the Existing System and the Future System. The change in flow on the Gladstone-Springer 115 kV line, Pinto 345 kV phase shifters, and Harry Allen 345 kV phase shifters is 0.2%, 1.2%, and 1.6% higher, respectively, on the Future System after the addition of the Hemingway-Boardman and Gateway West 500 kV lines.

Severe Post-Transient Contingency #3 – Bus: Summer Lake 500 kV

The Summer Lake 500 kV bus outage includes the loss of the Hemingway-Summer Lake 500 kV line. This contingency results in the Hemingway and Boardman 500 kV series capacitors exceeding their nominal ratings. The emergency rating of the Hemingway and Boardman 500 kV series capacitors will be designed for approximately 150% of nominal so the post-transient loading will be below emergency ratings.

Table 82: Post-transient results – Bus: Summer Lake 500 kV

Element	Nominal % Loading	Emergency % Loading
Boardman & Hemingway 500 kV Series Cap	112%	75%
Bordertown 345 kV Phase Shifter	102%	83%
Hines 138/115 kV Xfmr	103%	94%
Harry Allen 345 kV Phase Shifters	112%	91%
Pinto 345 kV Phase Shifters	102%	82%

Severe Post-Transient Contingency #4 – BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

This is the most severe contingency across the Idaho Power internal transmission system. For this contingency, RAS action is required to (1) bypass a portion of the Midpoint 500 kV series capacitor, and (2) insert 400 MVAR of shunt capacitors on the Midpoint 500 kV bus. This contingency also results in

post-transient voltage deviations between 5-10% at Amps 69 kV. WECC System Performance Criteria allows for post-transient voltage deviations of up to 10% for N-2 or breaker failure contingencies. Refer to the table below for overloads caused by this contingency:

Table 83: Post-transient results – BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Element	Nominal % Loading	Emergency % Loading
Bordertown 345 kV Phase Shifter	100%	81%
Harry Allen 345 kV Phase Shifters	116%	94%
Jefferson 161 kV Phase Shifter	109%	83%
Pinto 345 kV Phase Shifters	105%	84%
Populus-Borah 345 kV #1	106%	86%
Populus-Borah 345 kV #2	109%	80%

Conclusions

Several of the notable post transient contingencies resulting in more severe system stressing were noted above. All of these contingencies as well as all other post-transient contingencies result in acceptable performance. The results of contingencies associated with potential simultaneous interactions are in the sections that follow. Ultimately, the results indicate that Idaho-Northwest can achieve a 3400 MW east-to-west rating simultaneous with all other paths.

5.1.3 Voltage Stability

The Idaho-Northwest base case utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest base case, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_N base case can be found in Appendix B. Busses studied utilizing VQ Analysis are: Harry Allen 345 kV, Hemingway 500 kV, Midpoint 500 kV, Mill Creek 230 kV, Pinto 345 kV, Populus 500 kV, Taft 500 kV, and Yellowtail 230 kV. The tables below highlight a sample of the reactive margins at Hemingway, Midpoint and Populus. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 84: Hemingway 500 kV bus reactive margin results (sample)

Contingency Name (Hemingway)	Voltage @ Qmin	Margin (MVar)	Comments
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR + RAS	0.70	-964	Worst VQ Contingency
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.70	-1148	
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.85	-1198	

Table 85: Midpoint 500 kV bus reactive margin results (sample)

Contingency Name (Midpoint)	Voltage @ Qmin	Margin (MVar)	Comments
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.73	-992	Worst VQ Contingency
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.83	-1205	
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.81	-1236	

Table 86: Populus 500 kV bus reactive margin results (sample)

Contingency Name (Populus)	Voltage @ Qmin	Margin (MVar)	Comments
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.84	-861	Worst VQ Contingency
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.86	-1030	
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.83	-1082	

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Voltage stability is not an issue for the Idaho-Northwest path.

5.1.4 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B.

The 16la1sa_3400idnw_N base case was the basis for all transient stability study results for the Idaho-Northwest v Montana-Idaho, Montana-Northwest, Montana Southeast, TOT 2B1, and TOT 2C simultaneous interaction studies.

The performance of transient stability contingencies are generally ranked based upon transient voltage dip. The worst N-1 contingency is the loss of the Populus-Cedar Hill-Hemingway 500 kV line (part of the Gateway West upgrades). This contingency results in a voltage dip of approximately 13% on the Midpoint 500 kV bus. 13% is well within the acceptable limits. The worst multi-element contingency is a breaker failure at Hemingway substation resulting in the loss of the Populus-Cedar Hill-Hemingway 500 kV line & Hemingway 500/230 kV transformer. This contingency results in a voltage dip of approximately 14% on the Midpoint 500 kV bus. Again, 14% is well within the acceptable limits.

5.1.5 Remedial Action Schemes

For the 16la1sa_3400idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix B. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

This contingency opens the Hemingway-Grassland 500 kV line, and the Hemingway 500/230 kV transformer. To prevent exceeding the emergency rating of the Burns series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. After the loss of this line and transformer, switched VAr devices modeled at Amps 69 kV, Dillon 69 kV, LaGrande 230 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 87: Shunt Capacitor Switching in BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Dillon 69 kV (62345)	3.9 MVar	15.9 MVar
LaGrande 230 kV (40621)	0 MVar	52.2 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #2 – N-2: Double Palo Verde

This contingency opens two Palo Verde generators operating at approximately 1400 MW each. After this generation loss, switched VAr devices modeled at Durango 115 kV, Pinto 138 kV, and York Canyon 115 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 88: Shunt Capacitor Switching in N-2: Double Palo Verde

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Durango 115 kV (79023)	20 MVar	40 MVar
Pinto 138 kV (66230)	32 MVar	64 MVar
York Canyon 115 kV (12091)	0 MVar	15 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #3 – Bus: Summer Lake 500 kV

This contingency does not have any associated RAS.

For the existing Idaho-Northwest system, rated at 2400 MW east-to-west, this contingency would have required the tripping of ~1000 MW at Jim Bridger Power Plant.

Severe Post-Transient Contingency #4 – BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

This contingency opens the Populus-Cedar Hill-Hemingway 500 kV line, and the Hemingway 500/230 kV transformer. To prevent exceeding the emergency rating of the Midpoint 500 kV series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. After the loss of this line and transformer, switched VAr devices modeled at Amps 69 kV, Midpoint 500 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 89: Shunt Capacitor Switching in BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Midpoint 500 kV (60240)	0 MVar	400 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

5.2 Simultaneous Interaction Study: Alturas Project, S-N (Path 76)

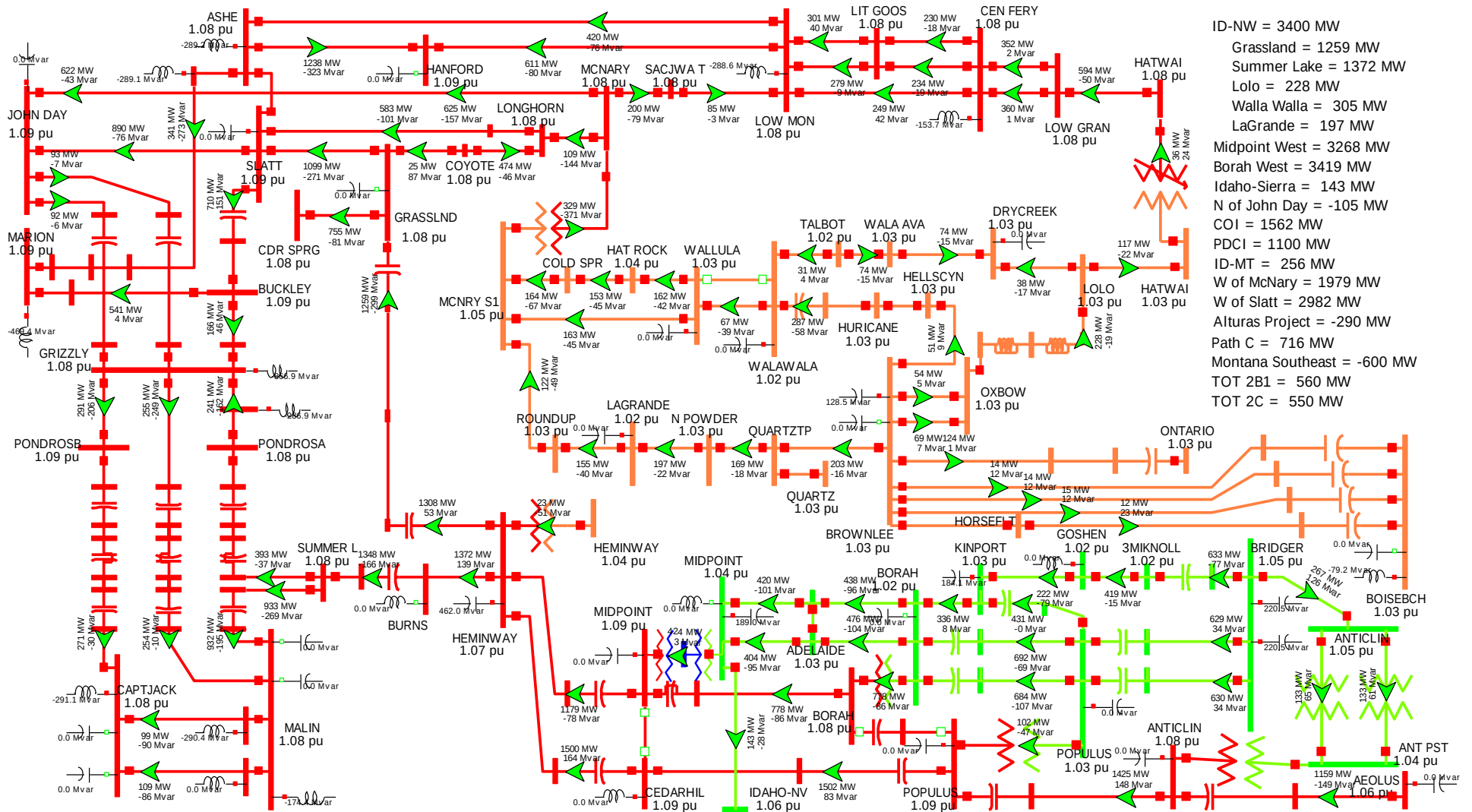


Figure 22: Idaho-Northwest (Path 14) 3400 MW, East to West v. Alturas Project (Path 76), South to North, Base Case

5.2.1 Background & Need for Simultaneous Interaction Study

The Alturas Project transmission path (Path 76) is made up of single transmission line extending from western Nevada to northeast California. The metering point for this line is the Hilltop substation. In the 16la1sa_3400idnw_Path76 base case, the flow measured at Hilltop is 290 MW, just shy of the 300 MW limit. The path was limited to 290 MW in the simultaneous interaction due to VAr flow through the Bordertown 345 kV phase shifter, rated at 300 MVA, and losses between Bordertown and Hilltop. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the Alturas Project increases to 320 MW, a 10% increase on the path. Due to this sizable increase in path transfers, the Alturas Project path may have a simultaneous interaction with the Idaho-Northwest path.

In order to stress the Alturas Project path to ~300 MW, the Bordertown 345 kV phase shifter was adjusted to be loaded to its nominal rating in the 16la1sa_3400idnw_Path76 base case. Many of the studied contingencies resulted in nominal overloads on this 345 kV phase shifter; however, no contingency resulted in overloading the phase shifter beyond its 370 MVA emergency rating.

5.2.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is: 16la1sa_3400idnw_N_Path76.

Information about the case, such as area generation/load patterns, and path transfers is located in Appendix H.

Step-by-step development of the 16la1sa 3400idnw Path76 base case:

Step 1: Begin with the 16la1sa_3400idnw_N base case

Utilize the base case developed in Section 5.1.1 Steady State Case Stressing.

Step 2: Stress the Alturas Project transmission path (Path 76) to 300 MW south-to-north

Utilize the Bordertown 345 kV phase shifting transformer.

5.2.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_Path76 case can be found in Appendix H. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency – N-1: Robinson-Harry Allen 500 kV

The pre-contingency flow on the Robinson-Harry Allen 500 kV line is ~412 MW north-to-south. This contingency results in overloading the Bordertown 345 kV phase shifter to 120% of its nominal rating (97% of emergency). Since the overload is less than the Bordertown 345 kV phase shifting transformers emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 90: Post-transient results – N-1: Robinson-Harry Allen 500 kV

Element	Nominal % Loading	Emergency % Loading
Bordertown 345 kV Phase Shifter	119.5%	96.9%
Cal Sub 120 kV Phase Shifter	108.6%	90.5%
Harry Allen 345 kV Phase Shifter	102.5%	83.1%

Most Severe Idaho-Northwest Contingency – Bus: Summer Lake 500 kV

This contingency results in overloading the Bordertown 345 kV phase shifter to 113% of its nominal rating (92% of emergency). Since the overload is less than the Bordertown 345 kV phase shifting transformers emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 91: Post-transient results – Bus: Summer Lake 500 kV

Element	Nominal % Loading	Emergency % Loading
Bordertown 345 kV Phase Shifter	113.0%	91.7%
Harry Allen 345 kV Phase Shifter	103.7%	84.1%
Hines 138/115 kV Transformer	105.3%	95.7%

Other Notable Contingencies related to Alturas Project

N-1: Cal Sub 120 kV Phase Shifter – The pre-contingency flow through the Cal Sub 120 kV phase shifter is ~106 MW. This contingency results in overloading the Bordertown 345 kV phase shifter to 109% of its nominal rating (89% of emergency). This contingency could be much more severe if the Cal Sub 120 kV phase shifter were loaded closer to its rating, simultaneous with Path 76 at its rating.

BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr – This contingency results in overloading the Midpoint 500 kV series capacitor to 101% of its emergency rating. A RAS to bypass a portion of this series capacitor will be required in order to avoid this overload. This RAS action was also discussed in Section 5.1.2 for the same contingency.

N-1: Midpoint-Humboldt 345 kV Line – This contingency can be a problem when the Alturas Project path is at its maximum flow levels, however, in this case the Midpoint-Humboldt line was only flowing at 143 MW north-to-south. Loss of Midpoint-Humboldt in this configuration would actually act to reduce the flow on the Alturas project path.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with Alturas Project at 300 MW south-to-north.

5.2.4 Voltage Stability

The Idaho-Northwest v Alturas Project study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Alturas Project study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the Alturas Project path at its 300 MW south-to-north rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_Path76 base case can be found in Appendix H. Busses studied utilizing VQ Analysis are: Bordertown 345 kV, Hemingway 500 kV, Hilltop 230 kV, Humboldt 345 kV, Malin 500 kV, Midpoint 500 kV, Populus 500 kV, and Valley Road 345 kV. The tables below highlight a sample of the reactive margins at Bordertown, Hilltop and Valley Road. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 92: **Bordertown 345 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: ROBINSON-HARRY ALLEN 500 KV	0.70	-741	Worst VQ contingency
BF PGE GRASSLAND-CEDAR SPRING & HEM-GRASSLAND 500	0.70	-767	Second Worst VQ contingency
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.70	-768	Worst VQ contingency related to ID-NW

Table 93: **Hilltop 230 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: MALIN-HILLTOP 230 KV	0.70	-181	Worst VQ contingency
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.70	-249	Second Worst VQ Contingency
BF PGE GRASSLAND-CEDAR SPRING & HEM-GRASSLAND 500	0.70	-319	Worst VQ N-1 contingency

Table 94: **Valley Road 345 kV** bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: ROBINSON-HARRY ALLEN 500 KV	0.70	-850	Worst VQ contingency
N-1: CAL SUB 120 KV PHASE SHIFTER	0.70	-871	Worst VQ contingency related to ID-NW
BF PGE GRASSLAND-CEDAR SPRING & HEM-GRASSLAND 500	0.70	-879	Worst VQ N-1 contingency

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. Idaho Power busses have sufficient reactive margin for all contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the Alturas Project path at the flow levels studied.

5.2.5 Transient Stability

A separate transient stability study for the 16la1sa_3400idnw_Path76 case was not completed due to the extreme similarities between the 16la1sa_3400idnw_N case and the 16la1sa_3400idnw_Path76 base case. A separate transient stability study would yield equivalent results. Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B.

5.2.6 Remedial Action Schemes

For the 16la1sa_3400idnw_Path76 base case, each contingency, and the associated switching (RAS), is documented in Appendix H. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency – N-1: Robinson-Harry Allen 500 kV

This contingency does not have any associated RAS.

Most Severe Idaho-Northwest Contingency – Bus: Summer Lake 500 kV

This contingency does not have any associated RAS.

Notable Contingency – N-1: Cal Sub 120 kV Phase Shifter

This contingency does not have any associated RAS.

Notable Contingency – BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr

This contingency opens the Populus-Cedar Hill-Hemingway 500 kV line, and the Hemingway 500/230 kV transformer. To prevent exceeding the emergency rating of the Midpoint 500 kV series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. Post-contingency, switched VAR devices modeled at Amps 69 kV, Midpoint 500 kV, and Peterson 230 kV would switch in-service due to

depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 95: Shunt Capacitor Switching in BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Midpoint 500 kV (60240)	0 MVar	400 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

5.3 Simultaneous Interaction Study: Idaho – Sierra, N-S (Path 16)

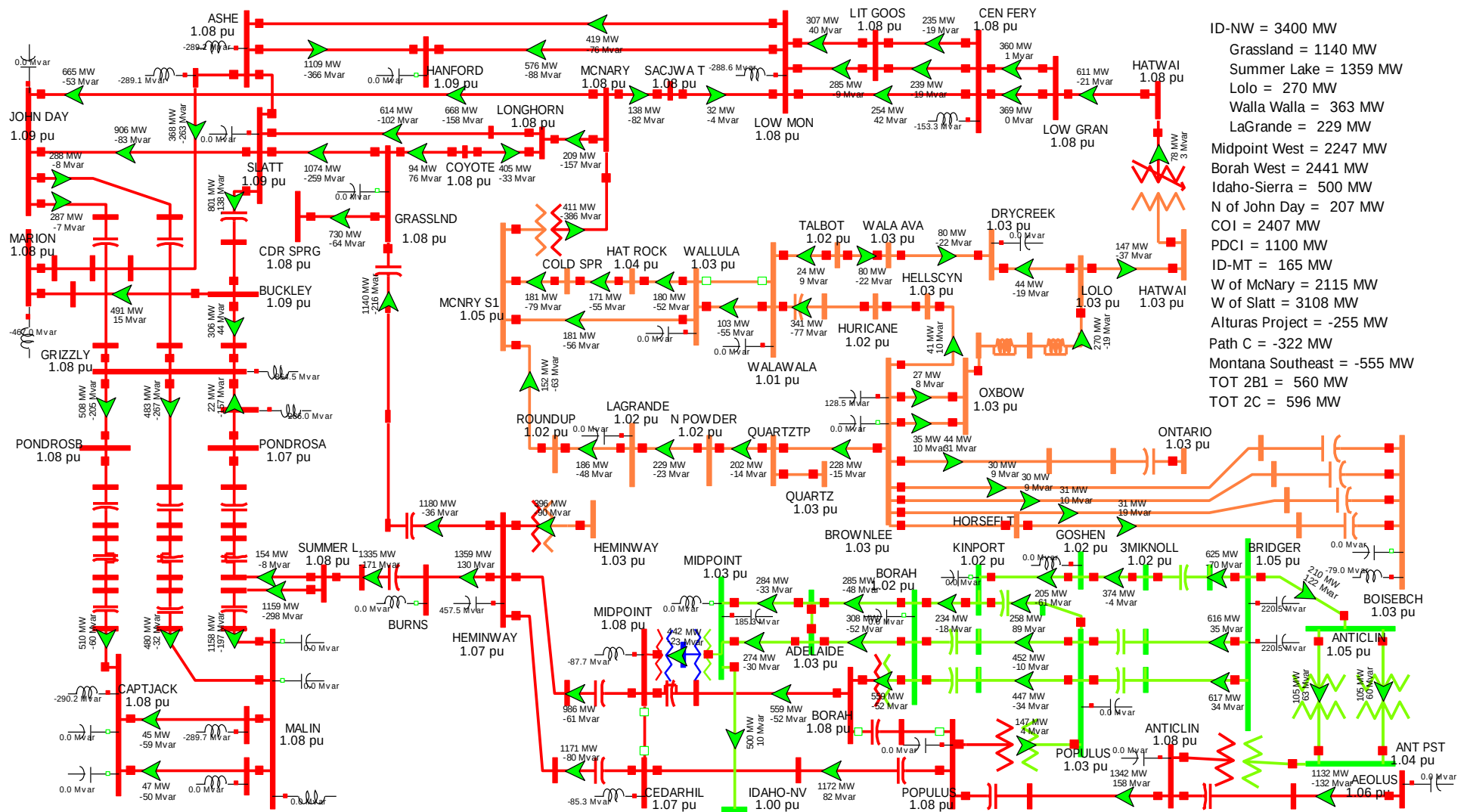


Figure 23: Idaho-Northwest (Path 14) 3400 MW, East to West v. Idaho-Sierra (Path 16), North to South, Base Case

5.3.1 Background & Need for Simultaneous Interaction Studies

The Idaho-Sierra transmission path (Path 16) is made up of single transmission line extending from Midpoint substation in southern Idaho, to Humboldt substation in northern Nevada. In the 16la1sa_3400idnw_nv base case, the flow measured at the Idaho-Nevada border is 500 MW, pre-contingency. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the Idaho-Sierra path increases to 568 MW, a 14% increase on the path. Due to this sizable increase in path transfers, the Idaho-Sierra path may have a simultaneous interaction with the Idaho-Northwest path.

5.3.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is: 16la1sa_3400idnw_nv.

Step-by-step development of the 16la1sa_3400idnw_nv base case:

Step 1: Begin with the 16la1sa_3400idnw_N base case

Utilize the base case developed in Section 5.1.1 Steady State Case Stressing.

Step 2: Stress Idaho-Sierra to 500 MW north-to-south

Schedule generation from the Northwest and Idaho to Sierra and the Southwest (southern California and Arizona).

Step 3: Un-stress Phase Shifters

If phase shifters were being utilized to stress a path, such as the Mill Creek phase shifter stressing the Montana-Idaho path, the phase shifter was moved to zero degrees.

5.3.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_nv case can be found in Appendix I. Details for the severe/notable contingencies can be found below.

Severe Post-Trans Contingency #1 – BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr

This contingency results in overloading the Hines 138/115 kV transformer to 110% of its nominal rating (99% of emergency). Since the overload is less than the Hines 138/115 kV transformers emergency rating, this contingency results in acceptable performance.

Severe Post-Transient Contingency #2 – N-2: Double Palo Verde

This contingency results in overloading the Harry Allen 345 kV phase shifters to 123% of their nominal rating (99.6% of emergency). Since the contingency does not overload the Harry Allen 345 kV phase shifters beyond their emergency rating, this contingency results in acceptable performance.

Severe Post-Transient Contingency #3 – N-1: Huntington-Pinto-Four Corners 345 kV

This contingency results in overloading the Harry Allen 345 kV phase shifters to 119% of its nominal rating (97% of emergency). Since the overload is less than the Harry Allen 345 kV phase shifters emergency rating, this contingency results in acceptable performance.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with Idaho-Sierra at 500 MW north-to-south.

5.3.4 Voltage Stability

The Idaho-Northwest v Idaho-Sierra study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Idaho-Sierra study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the Idaho-Sierra path at its 500 MW north-to-south rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_nv base case can be found in Appendix I. Busses studied utilizing VQ Analysis are: Bordertown 345 kV, Hemingway 500 kV, Hilltop 230 kV, Humboldt 345 kV, Malin 500 kV, Midpoint 500 kV, Populus 500 kV, and Valley Road 345 kV. The table below highlights a sample of the reactive margins at Humboldt. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 96: Humboldt 345 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: HUMBOLDT-COYOTE CK 345 KV	0.70	-215	Worst VQ contingency
BF IPC MIDPOINT-HEM 500 KV & HEM 500/230 XFMR	0.70	-408	Worst VQ contingency related to Idaho Power
BUS: SUMMER LAKE 500 KV	0.70	-420	Worst VQ contingency related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the Idaho-Sierra path at the flow levels studied.

5.3.5 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_nv case can be found in Appendix I.

The 16la1sa_3400idnw_nv base case was the basis for all transient stability study results for the Idaho-Northwest v Idaho-Sierra (Path 16) simultaneous interaction study.

The performance of transient stability contingencies are generally ranked based upon transient voltage dip. The worst N-1 contingency is the loss of the Hemingway-Summer Lake 500 kV line. This contingency results in a voltage dip of approximately 9% on the West John Day 138 kV bus. 9% is well within the acceptable limits. The worst multi-element contingency is a breaker failure at Hemingway substation resulting in the loss of the Midpoint-Hemingway 500 kV line & Hemingway 500/230 kV transformer. This contingency results in a voltage dip of approximately 13% on the West John Day 138 kV bus. Again, 13% is well within the acceptable limits.

5.3.6 Remedial Action Schemes

For the 16la1sa_3400idnw_nv base case, each contingency, and the associated switching (RAS), is documented in Appendix I. Details for the severe/notable contingencies can be found below.

Severe Post-Trans Contingency #1 – BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr

This contingency opens the Hemingway-Summer Lake 500 kV line, and the Hemingway 500/230 kV transformer. After the loss of this line and transformer, switched VAr devices modeled at Harney 115 kV, LaGrande 230 kV and Walla Walla 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 97: Shunt Capacitor Switching in BF IPC Hemingway-Summer Lake 500 kV & Hem 500/230 Xfmr

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Harney 115 kV (40507)	-8.5 MVar	0 MVar
LaGrange 230 kV (40621)	0 MVar	52.2 MVar
Walla Walla 230 kV (45327)	0 MVar	40 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #2 – N-2: Double Palo Verde

This contingency opens two Palo Verde generators operating at approximately 1400 MW each. After this generation loss, switched VAr devices modeled at Durango 115 kV, Peigan 4 240 kV, Pinto 138 kV, and York Canyon 115 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 98: Shunt Capacitor Switching in N-2: Double Palo Verde

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Durango 115 kV (79023)	20 MVar	40 MVar
Peigan 4 240 kV (54165)	-201 MVar	0 MVar
Pinto 138 kV (66230)	32 MVar	64 MVar
York Canyon 115 kV (12091)	0 MVar	15 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #3 – N-1: Huntington-Pinto-Four Corners 345 kV

This contingency does not have any associated RAS.

5.4 Simultaneous Interaction Study: Montana-Idaho, S-N (Path 18)

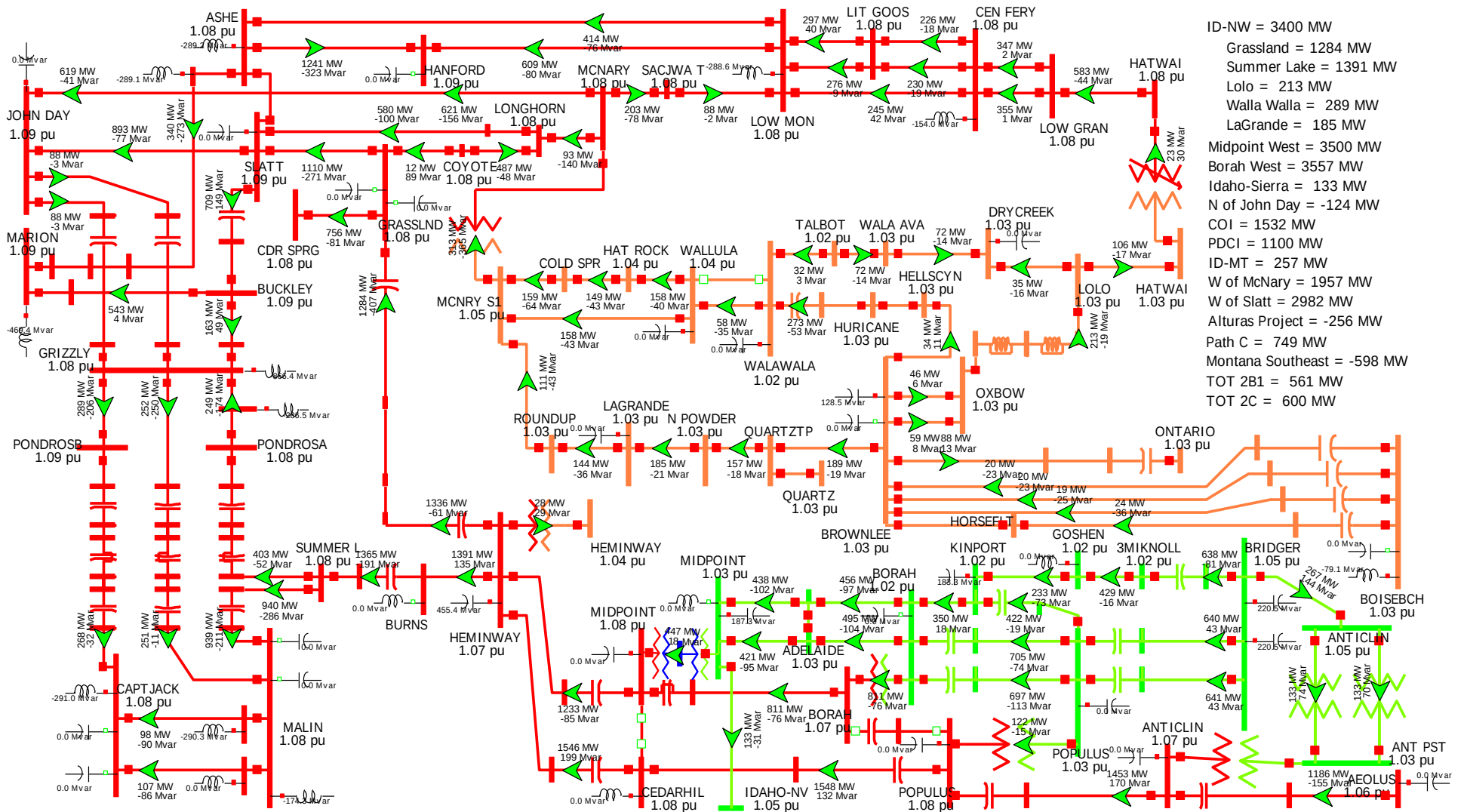


Figure 24: Idaho-Northwest (Path 14) 3400 MW, East to West v. Montana-Idaho (Path 18), South to North, Base Case

5.4.1 Background & Need for Simultaneous Interaction Studies

The Montana-Idaho transmission path (Path 18) has a 256 MW south-to-north rating and consists of two transmission lines: (1) a 230 kV line that extends between Mill Creek, Amps and Brady and (2) a 161 kV line that extends between Dillon, Big Grassy, and Jefferson. In the base case, the path is flowing at 257 MW. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the path increases to 329 MW, a 28% increase. Due to this sizable increase in path transfers, the Idaho-Montana path may have a simultaneous interaction with the Idaho-Northwest path.

5.4.2 Steady State Case Stressing

The study of Idaho-Northwest v Montana-Idaho utilized the 16la1sa_3400idnw_N base case. This base case is described in Section 5.1.1. See Section 5.1.1 for the discussion on steady state case stressing.

5.4.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency: N-2: Broadview-Garrison #1 and #2 500 kV + RAS

This contingency results in overloading the Jefferson 161 kV phase shifter to 113% of its nominal rating (112 MVA) and 86% of its emergency rating (146.7 MVA). Since the overload is less than the Jefferson 161 kV phase shifters emergency rating, this contingency results in acceptable performance. Post-transient voltage deviations are within WECC System Performance Criteria allowable 10% for N-2 contingencies.

Although the most severe, this contingency results in acceptable performance.

Most Severe Idaho-Northwest Contingency: BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

This contingency results in overloading the Jefferson 161 kV phase shifter to 110% of its nominal rating (84% of emergency). This contingency results in acceptable performance

Other Notable Contingencies related to Montana (all result in acceptable performance):

BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 kV Xfmr + RAS – This contingency results in post-transient voltage deviations between 5-10% at Peterson 230 kV and Amps 230 kV.

N-1: Hemingway-Grassland 500 kV – This contingency results in overloading the Jefferson 161 kV phase shifter to 109% of its nominal rating (83% of emergency).

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with Montana-Idaho at 256 MW south-to-north.

5.4.4 Voltage Stability

The Idaho-Northwest v Montana-Idaho study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Idaho-Montana study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the Montana-Idaho path at its 256 MW south-to-north rating.

VQ Analysis determines the reactive power margin, in MVAR, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVAR is a superior reactive margin than -100 MVAR).

VQ results for the 16la1sa_3400idnw_N base case can be found in Appendix B. Busses studied utilizing VQ Analysis are: Harry Allen 345 kV, Hemingway 500 kV, Midpoint 500 kV, Mill Creek 230 kV, Pinto 345 kV, Populus 500 kV, Taft 500 kV, and Yellowtail 230 kV. The table below highlights a sample of the reactive margins at Mill Creek. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 99: Mill Creek 230 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVAR)	Comments
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.83	-296	Worst VQ contingency
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR+RAS	0.82	-380	Worst VQ related to Idaho Power
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR + RAS	0.80	-443	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVAR for critical 230 kV and 345 kV busses and 500 MVAR for critical 500 kV busses. For N-2 outages, the requirement is 200 MVAR for 230 kV and 345 kV busses and 400 MVAR for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability interaction between the Idaho-Northwest path and the Montana-Idaho path at the flow levels studied.

5.4.5 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. A write up of these results can be found in Section 5.1.4.

5.4.6 Remedial Action Schemes

For the 16la1sa_3400idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix B. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency: N-2: Broadview-Garrison #1 and #2 500 kV + RAS

For this contingency, given the associated flows on the Montana-Northwest path, the Colstrip ATR would be expected to trip three Colstrip units (the two big units, and a little unit). After the loss of this line and transformer, switched VAr devices would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in/out of service in this post-transient contingency run.

Table 100: Shunt Capacitor Switching in N-2: Broadview-Garrison #1 & #2 500 kV + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
BZ EGALL 50 kV (62348)	0 MVar	20.4 MVar
Dillon 69 kV (62345)	3.9 MVar	27.9 MVar
JackRabb 50 kV (62349)	0 MVar	19.7 MVar
Mill Ck T1 13.8 kV (62332)	-25 MVar	0 MVar
Mill Ck T2 13.8 kV (62333)	-25 MVar	0 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar
Taft 500 kV (41057)	0 MVar	-186 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Most Severe Idaho-Northwest Contingency: BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

For this contingency, to prevent exceeding the emergency rating of the Burns series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. After the loss of this line and transformer, switched VAr devices modeled at Amps 69 kV, Dillon 69 kV, Peterson 230 kV, and LaGrande 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 101: Shunt Capacitor Switching in BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Dillon 69 kV (62345)	3.9 MVar	15.9 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar
LaGrande 230 kV (40621)	0 MVar	52.2 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Notable Contingency: BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 kV Xfmr + RAS

This contingency opens the Populus-Cedar Hill-Hemingway 500 kV line, and the Hemingway 500/230 kV transformer. To prevent exceeding the emergency rating of the Midpoint 500 kV series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. After the loss of this line and transformer, switched VAr devices modeled at Amps 69 kV, Midpoint 500 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 102: Shunt Capacitor Switching in BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Midpoint 500 kV (60240)	0 MVar	400 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Notable Contingency: N-1: Hemingway-Grassland 500 kV

This contingency opens the Hemingway-Grassland 500 kV line. After the loss of this line and transformer, switched VAr devices modeled at Dillon 161 kV, Harney 115 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 103: Shunt Capacitor Switching in N-1: Hemingway-Grassland 500 kV

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Dillon 161 kV (62084)	3.9 MVar	27.9 MVar
Harney 115 kV (40507)	0 MVar	13 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

5.5 Simultaneous Interaction Study: Montana-Northwest, E-W (Path 8)

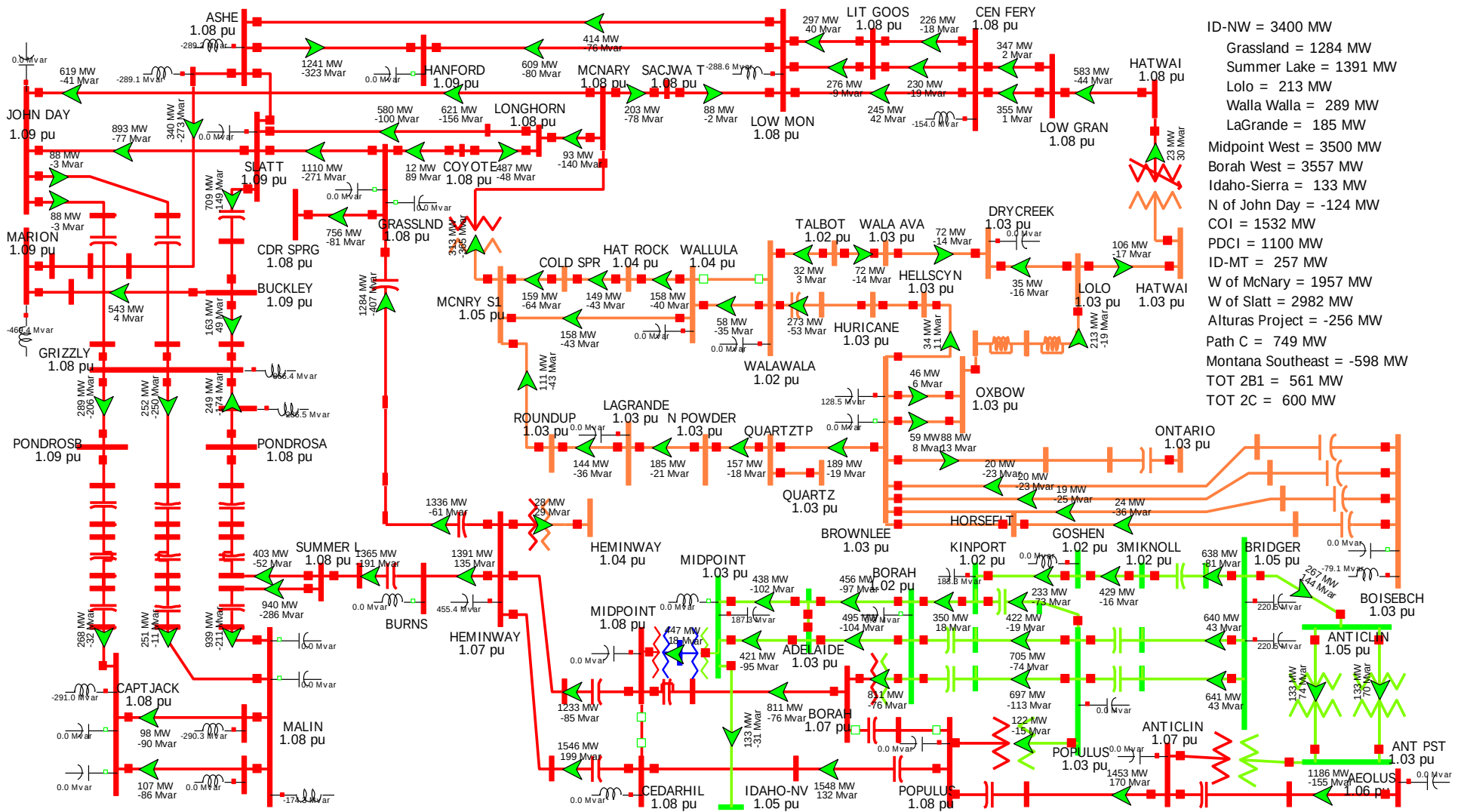


Figure 25: Idaho-Northwest (Path 14) 3400 MW, East to West v. Montana-Northwest (Path 8), East to West, Base Case

5.5.1 Background & Need for Simultaneous Interaction Studies

The Montana-Northwest path is made up of two 500 kV lines, four 230 kV lines, three 115 kV lines, and a 230/115 kV transformer connecting the Montana transmission system to the Northwest transmission system. In the 16la1sa_3400idnw_N base case, the flow on the Montana-Northwest path is 2200 MW, pre-contingency. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the Montana-Northwest path increases to 2332 MW, a 6% increase on the path. Although 6% is less than the 10% threshold, the project review group asked that a simultaneous interaction study be performed between the Idaho-Northwest path and the Montana-Northwest path.

5.5.2 Steady State Case Stressing

The study of Idaho-Northwest v Montana-Northwest utilized the 16la1sa_3400idnw_N base case. The 16la1sa_3400idnw_N base case is described in Section 5.1.1. See Section 5.1.1 for the discussion on steady state case stressing.

5.5.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. Details for the severe/notable contingencies can be found below.

Post-Transient Contingencies

See Section 5.4.3 for a detailed discussion on contingencies that impact the Montana area.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with Montana-Northwest at 2200 MW east-to-west.

5.5.4 Voltage Stability

The Idaho-Northwest v Montana-Northwest study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Montana-Northwest study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the Montana-Northwest path at its 2200 MW rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_N base case can be found in Appendix B. Busses studied utilizing VQ Analysis are: Harry Allen 345 kV, Hemingway 500 kV, Midpoint 500 kV, Mill Creek 230 kV, Pinto 345 kV, Populus 500 kV, Taft 500 kV and Yellowtail 230 kV. The table below highlights a sample of the reactive margin at Taft. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 104: Taft 500 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.91	-368	Worst VQ contingency
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.95	-736	Worst VQ related to Idaho Power
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR + RAS	0.84	-856	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the Montana-Northwest path at the flow levels studied.

5.5.5 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. A write up of these results can be found in Section 5.1.4.

5.5.6 Remedial Action Schemes

See Section 5.4.6 for a detailed discussion on RAS associated with contingencies that impact the Montana area.

5.6 Simultaneous Interaction Study: Montana Southeast, S-N (Path 80)

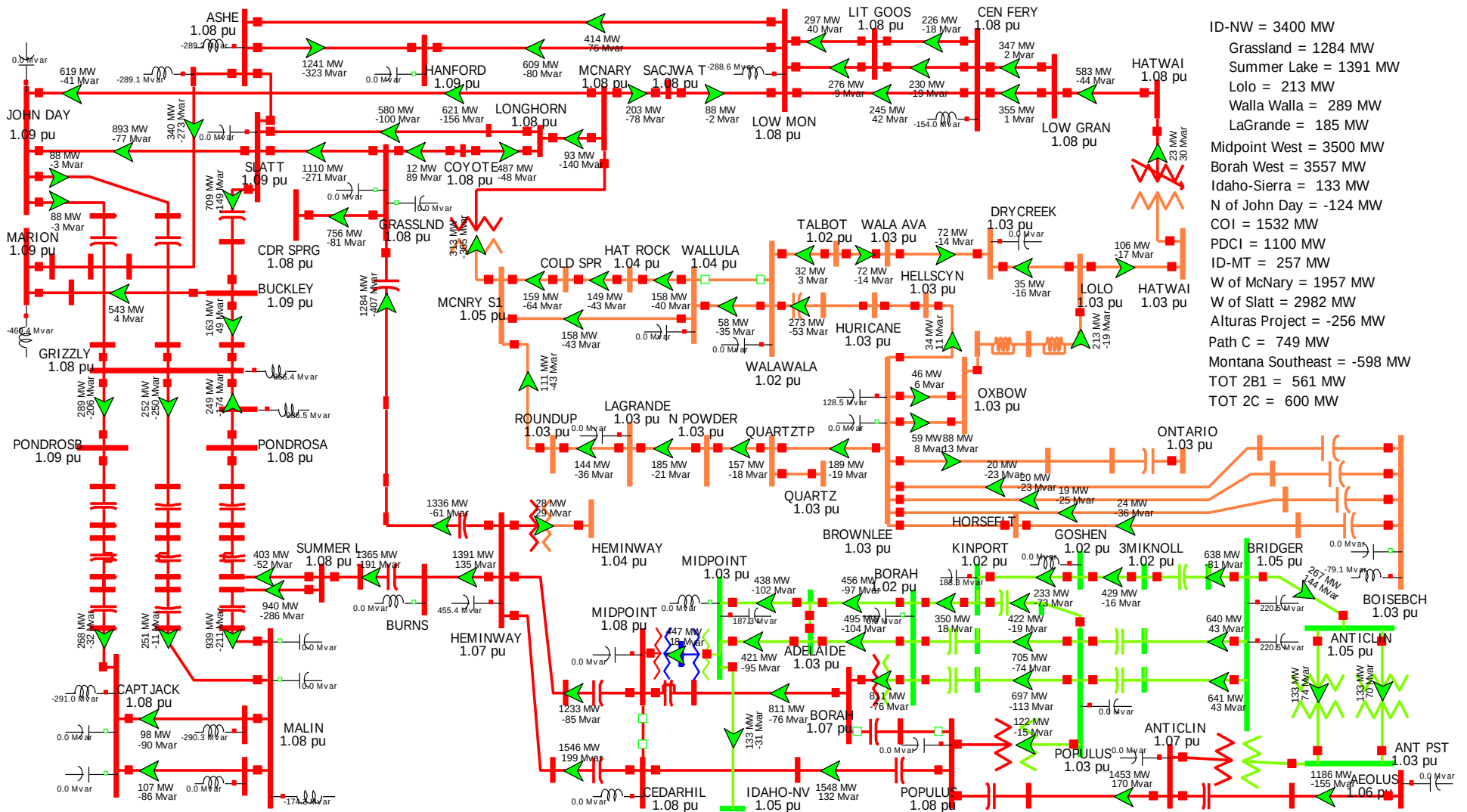


Figure 26: Idaho-Northwest (Path 14) 3400 MW, East to West v. Montana Southeast (Path 80), South to North, Base Case

5.6.1 Background & Need for Simultaneous Interaction Studies

The Montana Southeast path is made up of three 230 kV lines and one 161 kV line connecting the Montana transmission system to the northern Wyoming transmission system. In the 16la1sa_3400idnw_N base case, the flow on the Montana Southeast path is 600 MW south-to-north, pre-contingency. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the Montana Southeast path increases to 677 MW, a 13% increase on the path. Due to this sizable increase in path transfers, the Montana Southeast path may have a simultaneous interaction with the Idaho-Northwest path.

5.6.2 Steady State Case Stressing

The study of Idaho-Northwest v Montana Southeast utilized the 16la1sa_3400idnw_N base case. The 16la1sa_3400idnw_N base case is described in Section 5.1.1. See Section 5.1.1 for the discussion on steady state case stressing.

5.6.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B.

Post-Transient Contingencies

See Section 5.4.3 for a detailed discussion on contingencies that impact the Montana area.

None of the studied contingencies had an impact on the transmission system around Billings and Yellowtail.

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with Montana Southeast at 600 MW south-to-north.

5.6.4 Voltage Stability

The Idaho-Northwest v Montana Southeast study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v Montana Southeast study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its 3400 MW rating, simultaneous with the Montana Southeast path at its 600 MW south-to-north rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_N base case can be found in Appendix B. Busses studied utilizing VQ Analysis are: Harry Allen 345 kV, Hemingway 500 kV, Midpoint 500 kV, Mill Creek 230 kV, Pinto 345 kV, Populus 500 kV, Taft 500 kV, and Yellowtail 230 kV. The table below highlights a sample of the reactive margins at Yellowtail. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 105: Yellowtail 230 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.92	-140	Worst VQ contingency
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.77	-330	Worst VQ related to Idaho Power
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR + RAS	0.75	-378	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the Montana Southeast path at the flow levels studied.

5.6.5 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. A write up of these results can be found in Section 5.1.4.

5.6.6 Remedial Action Schemes

See Section 5.4.6 for a detailed discussion on RAS associated with contingencies that impact the Montana area.

5.7 Simultaneous Interaction Study: PG&E – Sierra, E-W (Path 24)

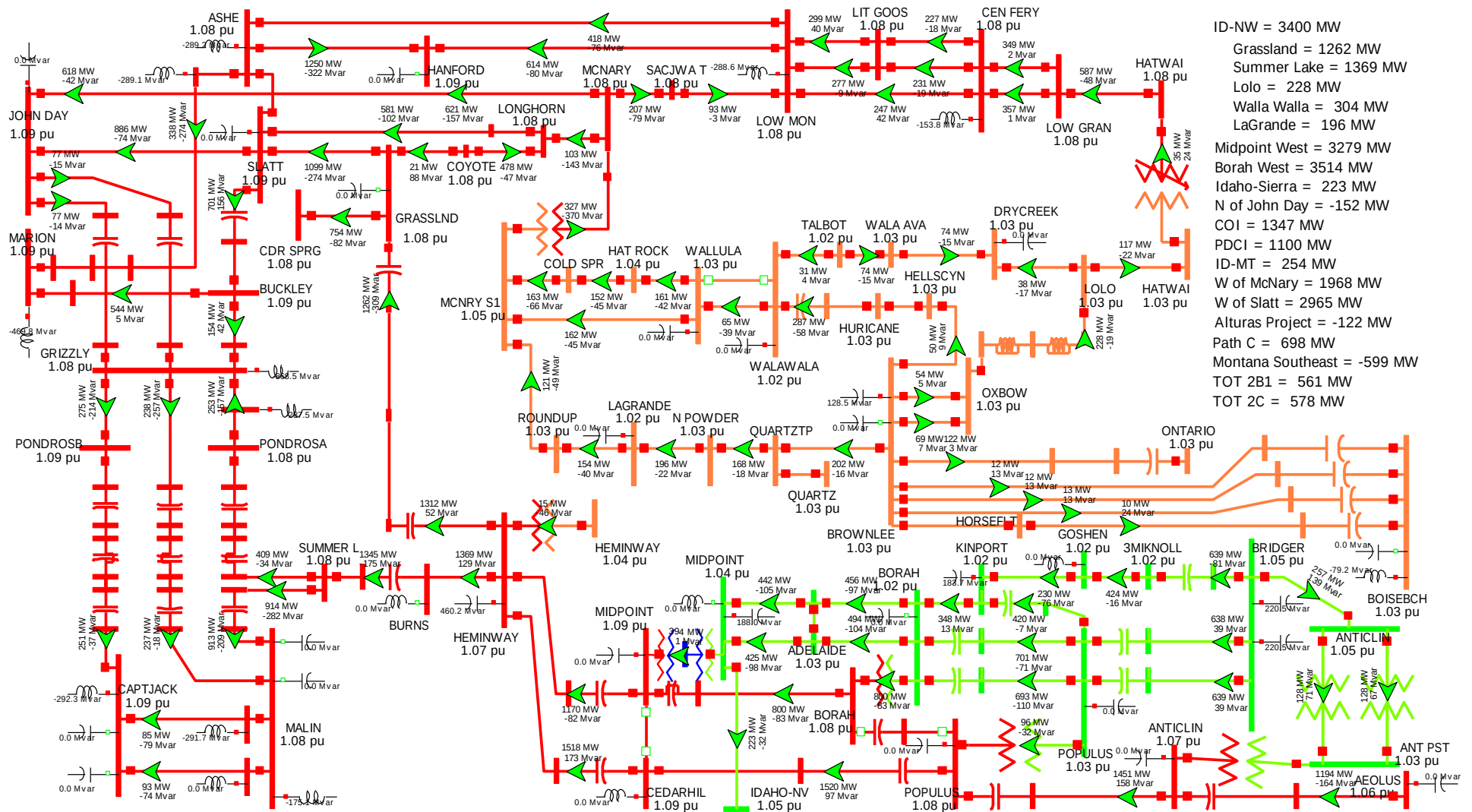


Figure 27: Idaho-Northwest (Path 14) 3400 MW, East to West v. PG&E-Sierra (Path 24), East to West, Base Case

5.7.1 Background & Need for Simultaneous Interaction Studies

The PG&E-Sierra transmission path (Path 24) is made up of two 115 kV transmission lines and a 60 kV transmission line connecting western Nevada to northeast California. The majority of the power flowing through the PG&E-Sierra path begins at California Substation, and flows through the Cal Sub 120 kV phase shifter. In the 16la1sa_3400idnw_N base case, the flow through the Cal Sub 120 kV phase shifter is 147 MW, and the flow through the PG&E-Sierra path is 149 MW. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the PG&E-Sierra path increases to 171 MW, a 15% increase on the path. Due to this sizable increase in path transfers, the PG&E-Sierra path may have a simultaneous interaction with the Idaho-Northwest path.

In order to stress the PG&E-Sierra path to ~150 MW, the Cal Sub 120 kV phase shifter has to be loaded to its nominal rating, pre-contingency. Of the 329 studied contingencies, 98 resulted in overloading the Cal Sub 120 kV phase shifter beyond its nominal rating, of which none of those resulted in overloads beyond the emergency rating.

5.7.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is: 16la1sa_3400idnw_Path24.

Step-by-step development of the 16la1sa_3400idnw_Path24 base case:

Step 1: Begin with the 16la1sa_3400idnw_N base case

Utilize the base case developed in Section 5.1.1 Steady State Case Stressing.

Step 2: Stress the PG&E-Sierra (Path 24) to 150 MW east-to-west

Utilize the Cal Sub 120 kV phase shifting transformer.

5.7.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_Path24 case can be found in Appendix J. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency – N-1: Hilltop 345/230 Xfmr

The pre-contingency flow through the Hilltop 345/230 kV transformer is ~123 MW. This contingency results in overloading the Cal Sub 120 kV phase shifter to 119.2% of its nominal rating (99.3% of emergency). Since the overload is less than the Cal Sub 120 kV phase shifting transformers emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 106: Post-transient results – N-1: Hilltop 345/230 kV Transformer

Element	Nominal % Loading	Emergency % Loading
Cal Sub 120 kV Phase Shifter	119.2%	99.3%
Drum-Dtch Fl1 115 kV	105.1%	90.4%

Most Severe Idaho-Northwest Contingency – BF 4957 Summer L-Malin & Summer L-Hemingway 500kV

This contingency results in overloading the Cal Sub 120 kV phase shifter to 116% of its nominal rating (97% of emergency). Since the overload is less than the Cal Sub 120 kV phase shifting transformers emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 107: Post-transient results – BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV

Element	Nominal % Loading	Emergency % Loading
Cal Sub 120 kV Phase Shifter	119.2%	99.3%
Drum-Dtch Fl1 115 kV	103.1%	88.7%
Harry Allen 345 kV Phase Shifters	108.2%	87.7%
Hemingway-Grassland 500 kV	110.6%	73.7%
Hines 138/115 kV Xfmr	103.9%	94.5%
Pinto 345 kV Phase Shifters	102.0%	81.6%

Other Notable Contingencies related to PG&E-Sierra

N-1: Robinson-Harry Allen 500 kV – This contingency results in overloading the Cal Sub 120 kV phase shifter to 119.0% of its nominal rating (99.2% of emergency).

N-2: Round Mtn-Table Mtn #1 & #2 500 kV – This contingency results in overloading the Cal Sub 120 kV phase shifter to 118.5% of its nominal rating (98.8% of emergency).

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with PG&E-Sierra at 150 MW east-to-west.

5.7.4 Voltage Stability

The Idaho-Northwest v PG&E-Sierra study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. For the Idaho-Northwest v PG&E-Sierra study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the PG&E-Sierra path at its 150 MW east-to-west rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_Path24 base case can be found in Appendix J. Busses studied utilizing VQ Analysis are: Bordertown 345 kV, Cal Sub 120 kV, Hemingway 500 kV, Hilltop 230 kV, Humboldt 345 kV, Midpoint 500 kV, Populus 500 kV, and Valley Road 345 kV. The tables below highlight a sample of the reactive margins at Bordertown, Cal Sub and Valley Road. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 108: Bordertown 345 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: HILL TOP 345/230 XFMR	0.70	-777	Worst VQ contingency
N-1: MALIN-HILLTOP 230 KV	0.70	-785	Second Worst VQ contingency
BF PGE GRASSLAND-CEDAR SPRING & HEM-GRASSLAND 500	0.70	-825	Worst VQ contingency related to ID-NW

Table 109: Cal Sub 120 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: CAL SUB 120 KV PHASE SHIFTER	0.70	-463	Worst VQ contingency
BF PGE GRASSLAND-CEDAR SPRING & HEM-GRASSLAND 500	0.70	-535	Worst VQ contingency related to ID-NW

Table 110: Valley Road 345 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: HILL TOP 345/230 XFMR	0.70	-887	Worst VQ contingency
BF IPC POP-CHILL-HEM 500 KV & HEM 500/230 XFMR+RAS	0.72	-911	Worst VQ related to Idaho Power
BF PGE GRASSLAND-CEDAR SPRING & HEM-GRASSLAND	0.72	-912	Worst VQ contingency related to ID-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400

MVAR for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the PG&E-Sierra path at the flow levels studied.

5.7.5 Transient Stability

A separate transient stability study for the 16la1sa_3400idnw_Path24 case was not completed due to the similarities between the 16la1sa_3400idnw_N case and the 16la1sa_3400idnw_Path24 base case. A separate transient stability study would yield equivalent results. Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B.

5.7.6 Remedial Action Schemes

For the 16la1sa_3400idnw_Path76 base case, each contingency, and the associated switching (RAS), is documented in Appendix J. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency – N-1: Hilltop 345/230 Xfmr

This contingency does not have any associated RAS.

Most Severe Idaho-Northwest Contingency – BF 4957 Summer L-Malin & Summer L-Hemingway 500kV

This contingency does not have any associated RAS.

Notable Contingency - N-1: Robinson-Harry Allen 500 kV

This contingency does not have any associated RAS.

Notable Contingency - N-2: Round Mtn-Table Mtn #1 & #2 500 kV

This contingency does not have any associated RAS.

5.8 Simultaneous Interaction Study: TOT 2B1, N-S (Path 78)

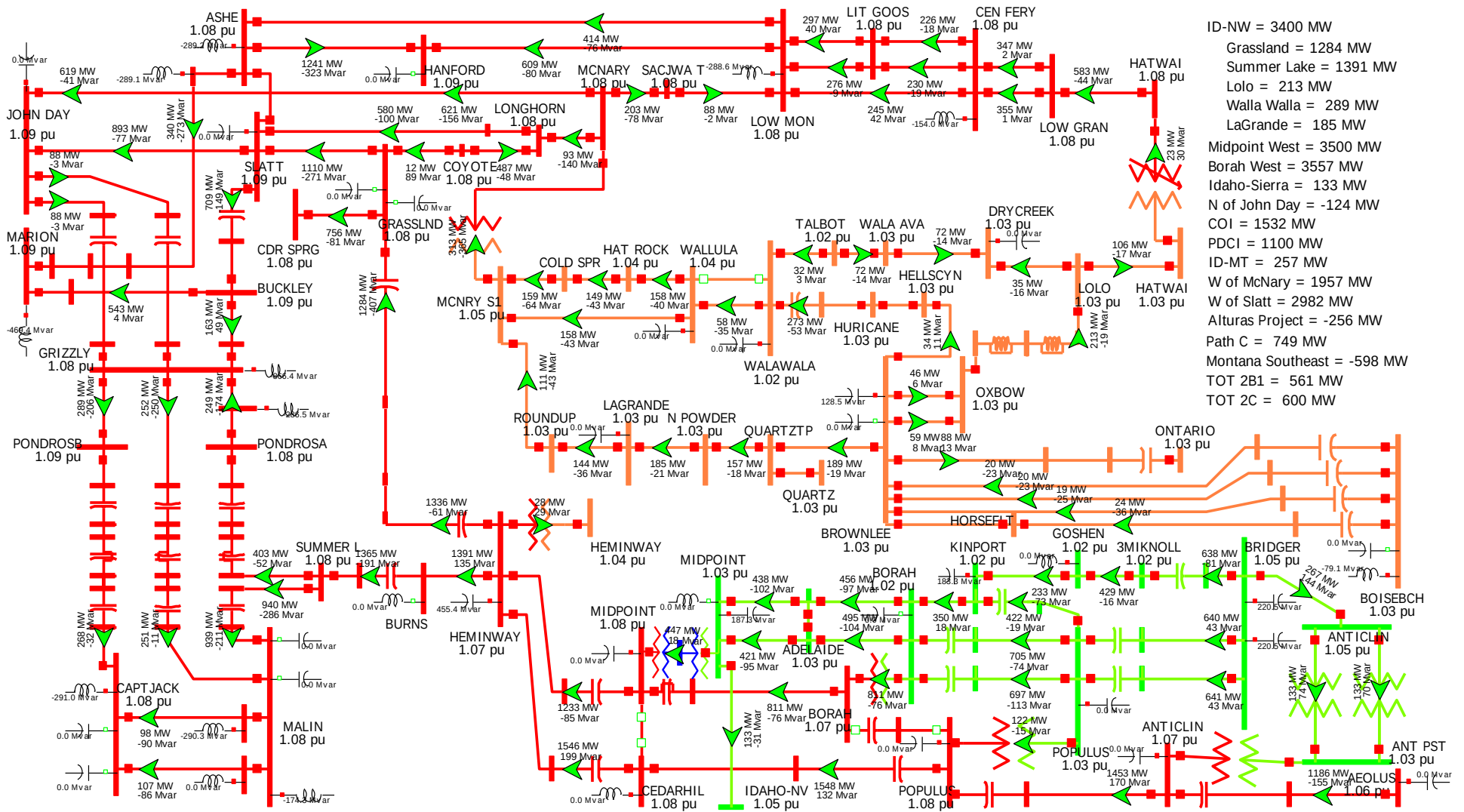


Figure 28: Idaho-Northwest (Path 14) 3400 MW, East to West v. TOT 2B1, North to South, Base Case

Background & Need for Simultaneous Interaction Studies

The TOT 2B1 transmission path (Path 78) is made up of a single 345 kV transmission line connecting Pinto substation in southeast Utah to Four Corners substation in northwest New Mexico. In the base case, the flow through TOT 2B1 is 561 MW. Following the N-1 loss of the Hemingway-Boardman 500 kV, the loading on the TOT 2B1 path increases to 611 MW, a 9% increase on the path.

5.8.1 Steady State Case Stressing

The study of Idaho-Northwest v TOT 2B1 utilized the 16la1sa_3400idnw_N base case. The 16la1sa_3400idnw_N base case is described in Section 5.1.1.

5.8.2 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – N-2: Double Palo Verde

This contingency results in overloading the Pinto 345 kV phase shifters to 116% of their nominal rating (93% of emergency). Since the overloads are less than the phase shifters emergency ratings, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table 111: Post-transient results – N-2: Double Palo Verde

Element	Nominal % Loading	Emergency % Loading
Gladston-Springer 115 kV	99%	99%
Harry Allen 345 kV Phase Shifters	123%	99.7%
Pinto 345 kV Phase Shifters	116%	93%

Severe Post-Transient Contingency #2 – N-1: Red Butte-Harry Allen 345 kV

This contingency results in overloading the Pinto 345 kV phase shifters to 111% of their nominal ratings (89% of emergency). Since the overload is less than the Pinto 345 kV phase shifters emergency ratings, this contingency results in acceptable performance.

Most Severe Idaho-Northwest Contingency – Bus: Summer Lake 500 kV

This contingency results in overloading the Pinto 345 kV phase shifters to 102% of their nominal ratings (82% of emergency).

Notable Contingency - BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

This contingency results in overloading the Pinto 345 kV phase shifters to 105% of their nominal ratings (84% of emergency).

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with TOT 2B1 at 560 MW north-to-south.

5.8.3 Voltage Stability

The Idaho-Northwest v TOT 2B1 study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v TOT 2B1 study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the TOT 2B1 path at its 560 MW north-to-south rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_N base case can be found in Appendix B. Busses studied utilizing VQ Analysis are: Harry Allen 345 kV, Hemingway 500 kV, Midpoint 500 kV, Mill Creek 230 kV, Pinto 345 kV, Populus 500 kV, Taft 500 kV and Yellowtail 230 kV. The table below highlights a sample of the reactive margins at Pinto. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 112: Pinto 345 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-2: DOUBLE PALO VERDE	0.70	-575	Worst VQ contingency
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.70	-635	Worst VQ related to Idaho Power
BUS: SUMMER LAKE 500 KV	0.70	-658	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the TOT 2B1 path at the flow levels studied.

5.8.4 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. A write up of these results can be found in Section 5.1.4.

5.8.5 Remedial Action Schemes

For the 16la1sa_3400idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix B. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – N-2: Double Palo Verde

This contingency opens two Palo Verde generators operating at approximately 1400 MW each. After this generation loss, switched VAr devices modeled at Durango 115 kV, Pinto 138 kV, and York Canyon 115 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 113: Shunt Capacitor Switching in N-2: Double Palo Verde

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Durango 115 kV (79023)	20 MVar	40 MVar
Pinto 138 kV (66230)	32 MVar	64 MVar
York Canyon 115 kV (12091)	0 MVar	15 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #2 – N-1: Red Butte-Harry Allen 345 kV

This contingency opens the Red Butte-Harry Allen 345 kV transmission line. After the loss of this line, a discrete switched VAr device modeled at Red Butte 345 kV would switch out due to high voltages on the bus that the device is controlling.

Most Severe Idaho-Northwest Contingency – Bus: Summer Lake 500 kV

This contingency does not have any associated RAS.

For the existing Idaho-Northwest system, rated at 2400 MW east-to-west, this contingency would have required the tripping of ~1000 MW at Jim Bridger Power Plant.

Notable Contingency - BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

This contingency opens the Populus-Cedar Hill-Hemingway 500 kV line, and the Hemingway 500/230 kV transformer. To prevent exceeding the emergency rating of the Midpoint 500 kV series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. After the loss of this line and transformer, switched VAr devices modeled at Amps 69 kV, Midpoint 500 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The

table below illustrates the amount and location of VArS switched in-service in this post-transient contingency run.

Table 114: Shunt Capacitor Switching in BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Midpoint 500 kV (60240)	0 MVar	400 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

5.9 Simultaneous Interaction Study: TOT 2C, N-S (Path 35)

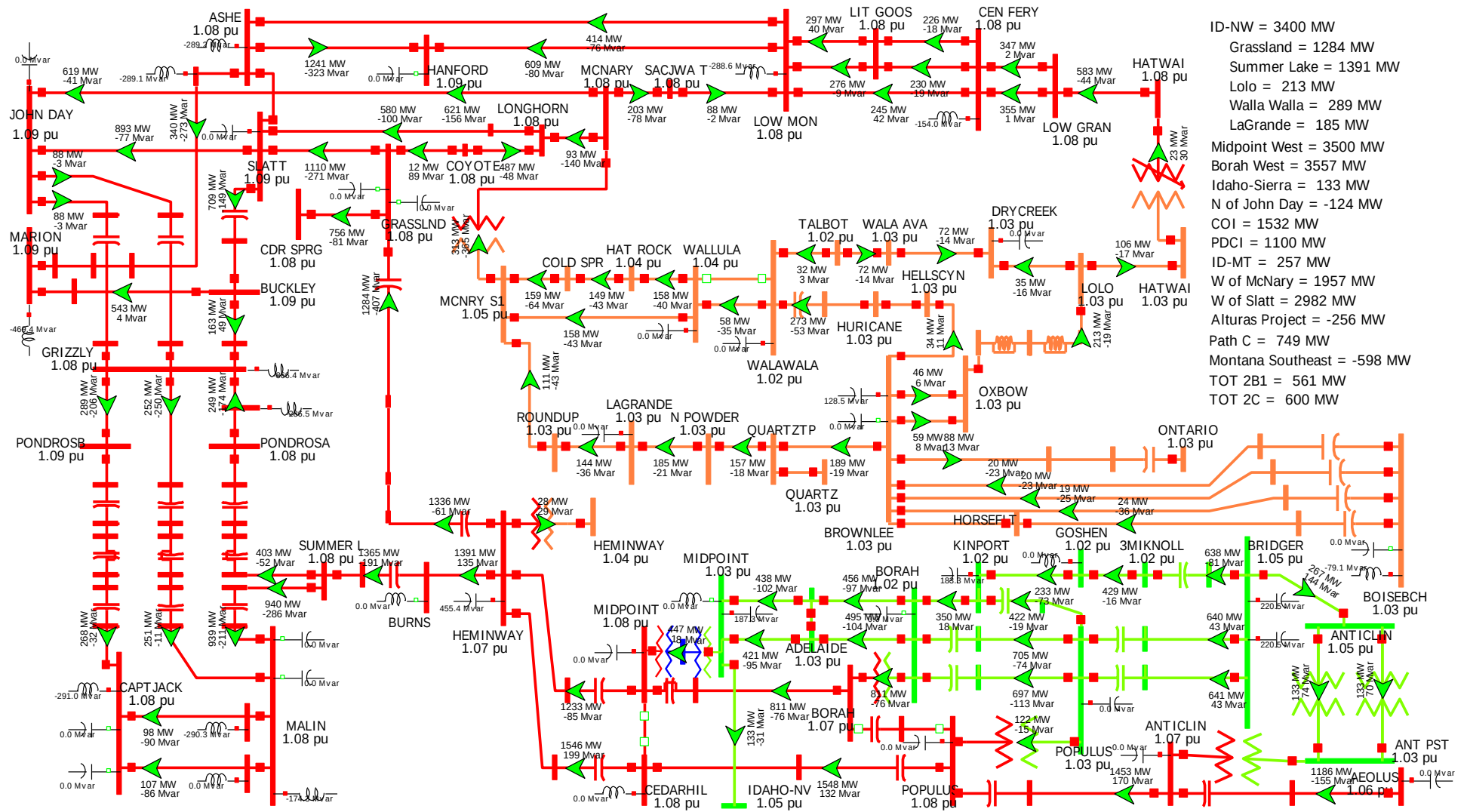


Figure 29: Idaho-Northwest (Path 14) 3400 MW, East to West v. TOT 2C (Path 35), North to South, Base Case

5.9.1 Background & Need for Simultaneous Interaction Studies

TOT 2C (Path 35) is made up of one 345 kV transmission line connecting Red Butte substation in southwest Utah to Harry Allen 345 kV substation in the Las Vegas area. In the base case, the flow through TOT 2C is 600 MW. Following the N-1 loss of the Hemingway-Boardman 500 kV line, the loading on the TOT 2C path increases to 671 MW, a 12% increase on the path. Due to this sizable increase in path transfers, the TOT 2C path may have a simultaneous interaction with the Idaho-Northwest path.

5.9.2 Steady State Case Stressing

The study of Idaho-Northwest v TOT 2C utilized the 16la1sa_3400idnw_N base case. The 16la1sa_3400idnw_N base case is described in Section 5.1.1.

5.9.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – N-2: Double Palo Verde

This contingency results in overloading the Harry Allen 345 kV phase shifters to 123% of their nominal rating (99.7% of emergency). Refer to the table below for more information about the overloads caused by this contingency.

Table 115: Post-transient results – N-2: Double Palo Verde

Element	Nominal % Loading	Emergency % Loading
Gladston-Springer 115 kV	99%	99%
Harry Allen 345 kV Phase Shifters	123%	99.7%
Pinto 345 kV Phase Shifters	116%	93%

Severe Post-Transient Contingency #2 – N-1: Harry Allen 345/230 kV Xfmr

This contingency results in overloading the remaining Harry Allen 345/230 kV transformer to 155% of its nominal rating (133% of emergency). Due to this overload, this contingency would ultimately result in back-tripping the Redbutte-Harry Allen 345 kV line. After including the loss of the Redbutte-Harry Allen 345 kV line, this contingency results in overloading the Pinto 345 kV phase shifters to 111% of their nominal ratings (89% of emergency). Since the overload is less than the Pinto 345 kV phase shifters emergency ratings, this contingency results in acceptable performance.

Severe Post-Transient Contingency #3 – N-1: Pinto-Four Corners 345 kV

This contingency results in overloading the remaining Harry Allen 345 phase shifters to 119% of their nominal rating (97% of emergency). Since the overload is less than the Harry Allen 345 kV phase shifters emergency ratings, this contingency results in acceptable performance.

Most Severe Idaho Power Contingency: BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

This contingency results in overloading the Harry Allen 345 kV phase shifters to 116% of their nominal rating (94% of emergency).

Most Severe Idaho-Northwest Contingency: Bus: Summer Lake 500 kV

This contingency results in overloading the Harry Allen 345 kV phase shifters to 112% of their nominal rating (91% of emergency).

Conclusions

No violations of the NERC/WECC standards and local reliability criteria were observed. The Idaho-Northwest path can achieve a 3400 MW east-to-west rating simultaneous with TOT 2C at 600 MW north-to-south.

5.9.4 Voltage Stability

The Idaho-Northwest v TOT 2C study utilizes two methods to verify voltage stability: (1) Real Power Margin Assessment (PV Analysis) and (2) Reactive Power Margin Assessment (VQ Analysis).

PV Analysis requires N-1, N-2, and breaker failure contingencies to have a post-transient solution with the path under study stressed to at least 105%, 102.5% and 102.5%, respectively, of the proposed rating. In the Idaho-Northwest v TOT 2C study, all contingencies have a post-transient solution with Idaho-Northwest stressed to 3570 MW, 105% of the proposed 3400 MW rating. This PV Analysis verifies that sufficient real power margin exists to operate the Idaho-Northwest path at its proposed 3400 MW rating, simultaneous with the TOT 2C path at its 600 MW north-to-south rating.

VQ Analysis determines the reactive power margin, in MVar, following a contingency at a specific electrical bus. In this study, reactive margin is represented by a negative number. The larger the negative number, the more reactive margin (-500 MVar is a superior reactive margin than -100 MVar).

VQ results for the 16la1sa_3400idnw_N base case can be found in Appendix B. Busses studied utilizing VQ Analysis are: Harry Allen 345 kV, Hemingway 500 kV, Midpoint 500 kV, Mill Creek 230 kV, Pinto 345 kV, Populus 500 kV, Taft 500 kV and Yellowtail 230 kV. The table below highlights a sample of the reactive margins at Harry Allen. The study results indicate that all studied busses have sufficient reactive margin for all studied contingencies.

Table 116: Harry Allen 345 kV bus reactive margin results (sample)

Contingency Name	Voltage @ Qmin	Margin (MVar)	Comments
N-1: HATWAI 500/230 KV XFMR	0.70	-805	Worst VQ contingency
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR +RAS	0.70	-1039	Worst VQ related to Idaho Power
BUS: SUMMER LAKE 500 KV	0.70	-1066	Worst VQ related to Idaho-NW

Idaho Power has special reactive margin criteria for Idaho Power busses. For N-1 outages, Idaho Power's reactive margin requirement is 250 MVar for critical 230 kV and 345 kV busses and 500 MVar for critical 500 kV busses. For N-2 outages, the requirement is 200 MVar for 230 kV and 345 kV busses and 400 MVar for 500 kV busses. The study results indicate that Idaho Power busses have sufficient reactive margin for all studied contingencies.

Given the explanation in this section, there is not a voltage stability type interaction between the Idaho-Northwest path and the TOT 2C path at the flow levels studied.

5.9.5 Transient Stability

Transient stability contingency results for the 16la1sa_3400idnw_N case can be found in Appendix B. A write up of these results can be found in Section 5.1.4.

5.9.6 Remedial Action Schemes

For the 16la1sa_3400idnw_N base case, each contingency, and the associated switching (RAS), is documented in Appendix B. Details for the severe/notable contingencies can be found below.

Most Severe Post-Transient Contingency – N-2: Double Palo Verde

This contingency opens two Palo Verde generators operating at approximately 1400 MW each. After this generation loss, switched VAr devices modeled at Durango 115 kV, Pinto 138 kV, and York Canyon 115 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VArS switched in-service in this contingency.

Table 117: Shunt Capacitor Switching in N-2: Double Palo Verde

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Durango 115 kV (79023)	20 MVar	40 MVar
Pinto 138 kV (66230)	32 MVar	64 MVar
York Canyon 115 kV (12091)	0 MVar	15 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Severe Post-Transient Contingency #2 – N-1: Harry Allen 345/230 kV Xfmr

If loss of a single Harry Allen 345/230 kV transformer results in severe overloads on the remaining Harry Allen 345/230 kV transformer, as it does in this study, the Redbutte-Harry Allen 345 kV line is tripped to relieve this overload.

Severe Post-Transient Contingency #3 – N-1: Pinto-Four Corners 345 kV

This contingency does not have any associated RAS.

Most Severe Idaho-Power Contingency – BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

This contingency opens the Populus-Cedar Hill-Hemingway 500 kV line, and the Hemingway 500/230 kV transformer. To prevent exceeding the emergency rating of the Midpoint 500 kV series capacitor, RAS action to bypass half of the Midpoint 500 kV series capacitor is required. Post-contingency, switched VAR devices modeled at Amps 69 kV, Midpoint 500 kV, and Peterson 230 kV would switch in-service due to depressed voltages on the busses that the devices are controlling. The table below illustrates the amount and location of VARs switched in-service in this post-transient contingency run.

Table 118: Shunt Capacitor Switching in BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Shunt Device (Bus)	Initial MVar	Post-Transient MVar
Amps 69 kV (65026)	20 MVar	30 MVar
Midpoint 500 kV (60240)	0 MVar	400 MVar
Peterson 230 kV (62030)	0 MVar	31.7 MVar

In reality, additional capacitors may switch that are not modeled as part of this contingency.

Most Severe Idaho-Northwest Contingency – Bus: Summer Lake 500 kV

This contingency does not have any associated RAS.

6. Conclusion

The objective of this Phase II Rating Study was to evaluate the addition of the proposed Hemingway – Boardman 500 kV transmission project into the existing WECC transmission system. The Hemingway – Boardman 500 kV transmission project will be treated as an addition to the Idaho – Northwest (Path 14) WECC rated path. Idaho Power is requesting an increase to the Idaho – Northwest Path 14 WECC Accepted Rating upon completion of the Hemingway-Boardman 500 kV transmission project. Below are the proposed ratings in the west-to-east direction and the east-to-west direction:

Table 119: Proposed ratings for Idaho-Northwest (Path 14) and Hemingway-Boardman 500 kV

WECC Path Name	Rating West-to-East	Rating East-to-West
Idaho-Northwest (Path 14)	2250	3400

Simultaneous Interaction Studies Summary

In order to prove the proposed ratings are acceptable, this report studied Idaho-Northwest at its proposed ratings simultaneous with other relevant similarly situated Phase 2 projects, Phase 3 projects, and existing WECC rated paths at their proposed ratings. The following simultaneous interaction studies have been completed:

Table 120: Simultaneous Interaction Studies Completed

Idaho-Northwest (Path 14)	Hemingway-Boardman 500 kV	Simultaneous Path		
		Path Name	Path #	Path Rating
W-E, 2250 MW	-1407 MW	COI	66	4800 MW
W-E, 2250 MW	-1407 MW	Idaho-Sierra	16	500 MW
W-E, 2250 MW	-1407 MW	Montana-Idaho	18	337 MW
W-E, 2250 MW	-1407 MW	Montana Southeast	80	660 MW
W-E, 2250 MW	-1407 MW	North of John Day	73	7800 MW
W-E, 2250 MW	-1407 MW	PDCI	65	3100 MW
W-E, 2250 MW	-1301 MW	West of Hatwai	6	3400 MW
W-E, 2250 MW	-1407 MW	MSTI & SWIP	II-5, II-11	1500 MW, 1950 MW
E-W, 3400 MW	1284 MW	Alturas Project	76	300 MW
E-W, 3400 MW	1111 MW	Idaho-Sierra	16	500 MW
E-W, 3400 MW	1284 MW	Montana-Idaho	18	256 MW
E-W, 3400 MW	1284 MW	Montana-Northwest	8	2200 MW
E-W, 3400 MW	1284 MW	Montana Southeast	80	600 MW
E-W, 3400 MW	1284 MW	PG&E-Sierra	24	150 MW
E-W, 3400 MW	1284 MW	TOT 2B1	78	560 MW
E-W, 3400 MW	1284 MW	TOT 2C	35	600 MW

The Plan of Service in Section 2.4 of this report lists the system additions corresponding with the Hemingway-Boardman 500 kV Project. All simultaneous interaction studies included the system additions described in Section 2.4.

For all simultaneous interaction studies, Idaho Power completed Post-Transient, Voltage Stability, and Transient Stability studies.

Simultaneous Interaction Studies Summary – Post-Transient Contingency Results

Three breaker failure contingencies limited the transfer capability in this report:

- 1) Breaker Failure: Hemingway-Grassland 500 kV Line & Hemingway 500/230 kV transformer
- 2) Breaker Failure: Midpoint-Hemingway 500 kV Line & Hemingway 500/230 kV transformer
- 3) Breaker Failure: Hemingway-Grassland & Grassland-Cedar Spring 500 kV Lines

Each of these breaker failure contingencies are avoidable by setting up the Hemingway and Grassland 500 kV busses in different manners, however, the N-1 loss of Hemingway-Grassland 500 kV is almost as severe as each of these breaker failure contingencies. These contingencies result in thermal loading approaching the emergency rating on the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines, and post-transient voltage deviation issues at Peterson 230 kV and Amps 230 kV substations. A new shunt capacitor on the Peterson 230 kV bus, switchable based on a voltage set point, is required to arrest the post-transient voltage deviations issues associated with these critical contingencies.

Given proper remediation, all contingencies in the simultaneous interaction studies resulted in acceptable post-transient performance. Post-transient performance indicates that the Idaho-Northwest path is capable of a 2250 MW west-to-east rating and a 3400 MW east-to-west rating simultaneous with all other studied paths.

Simultaneous Interaction Studies Summary – Voltage Stability Results

All contingencies resulted in adequate Real Power Margin (PV) and Reactive Power Margin (QV) in each of the simultaneous interaction studies. PV/QV analysis indicates that the Idaho-Northwest path is capable of a 2250 MW west-to-east rating and a 3400 MW east-to-west rating simultaneous with all other studied paths.

Simultaneous Interaction Studies Summary – Transient Stability Results

All studied contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria. Transient stability analysis indicates that the Idaho-Northwest path is capable of a 2250 MW west-to-east rating and a 3400 MW east-to-west rating simultaneous with all other studied paths.

Sensitivity Studies Summary

In addition to simultaneous interaction studies, several sensitivity studies were completed. These sensitivity studies are listed below:

Table 121: Sensitivity Studies Completed in Phase II

Idaho-Northwest (Path 14)	Hemingway- Boardman 500 kV	Sensitivity Name
W-E, 2250 MW	-1323 MW	Hemingway-Boardman Stand Alone
W-E, 2250 MW	-1374 MW	Walla Walla Area, 100 % Wind
W-E, 2250 MW	-1449 MW	High West of McNary & West of Slatt
W-E, 2250 MW	-1418 MW	Longhorn Terminus
W-E, 2250 MW	-1390 MW	NV Energy Updates

Sensitivity Studies Summary – Post-Transient Contingency Results

The Hemingway-Boardman Stand Alone sensitivity case offered one particular contingency that must be avoided if the Hemingway-Boardman 500 kV line is completed prior to the Populus-Cedar Hill-Hemingway 500 kV line:

- 1) Breaker Failure: Midpoint-Hemingway 500 kV Line & Hemingway 500/230 kV transformer

If this contingency were to occur, Hemingway-Boardman 500 kV and Hemingway-Summer Lake 500 kV would be disconnected from the Idaho-Power transmission system, and the remaining lower voltage 230 kV system connecting Idaho Power to the Northwest would not be able to support the increased transfers.

Hemingway substation will be configured in such a way as to prevent the possibility of this contingency prior to the addition of the Populus-Cedar Hill-Hemingway 500 kV Gateway West transmission line.

Other than the aforementioned contingency, given proper remediation, all contingencies in the sensitivity studies resulted in acceptable post-transient performance. Post-transient performance results indicate that the Idaho-Northwest path is capable of a 2250 MW west-to-east rating and a 3400 MW east-to-west rating regardless of the system configuration or northwestern terminus.

Sensitivity Studies Summary – Voltage Stability Results

All contingencies resulted in adequate Real Power Margin (PV) and Reactive Power Margin (QV) in each of the simultaneous interaction studies. PV/QV analysis indicates that the Idaho-Northwest path is capable of a 2250 MW west-to-east rating and a 3400 MW east-to-west rating regardless of the system configuration or northwestern terminus.

Sensitivity Studies Summary – Transient Stability Results

All studied contingencies resulted in stable and damped performance with no violations to the WECC Performance Criteria. Transient stability analysis indicates that the Idaho-Northwest path is capable of a 2250 MW west-to-east rating and a 3400 MW east-to-west rating regardless of the system configuration or northwestern terminus.

Appendix A

16hs2a_2250idnw_N Base Case (Idaho-Northwest West-to-East)

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

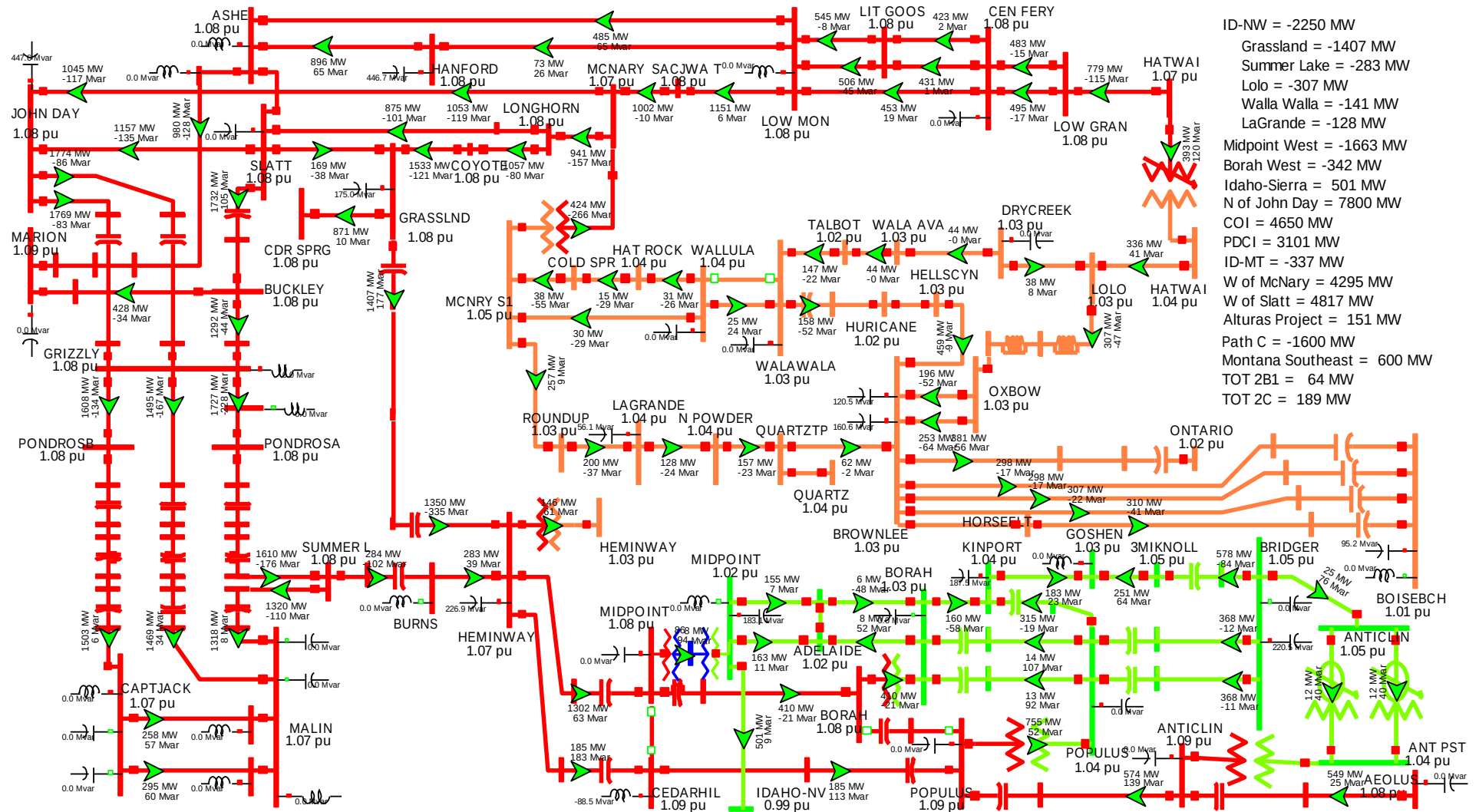


Figure A1: 16hs2sa_2250idnw_N Base Case **Pre-Contingency**

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

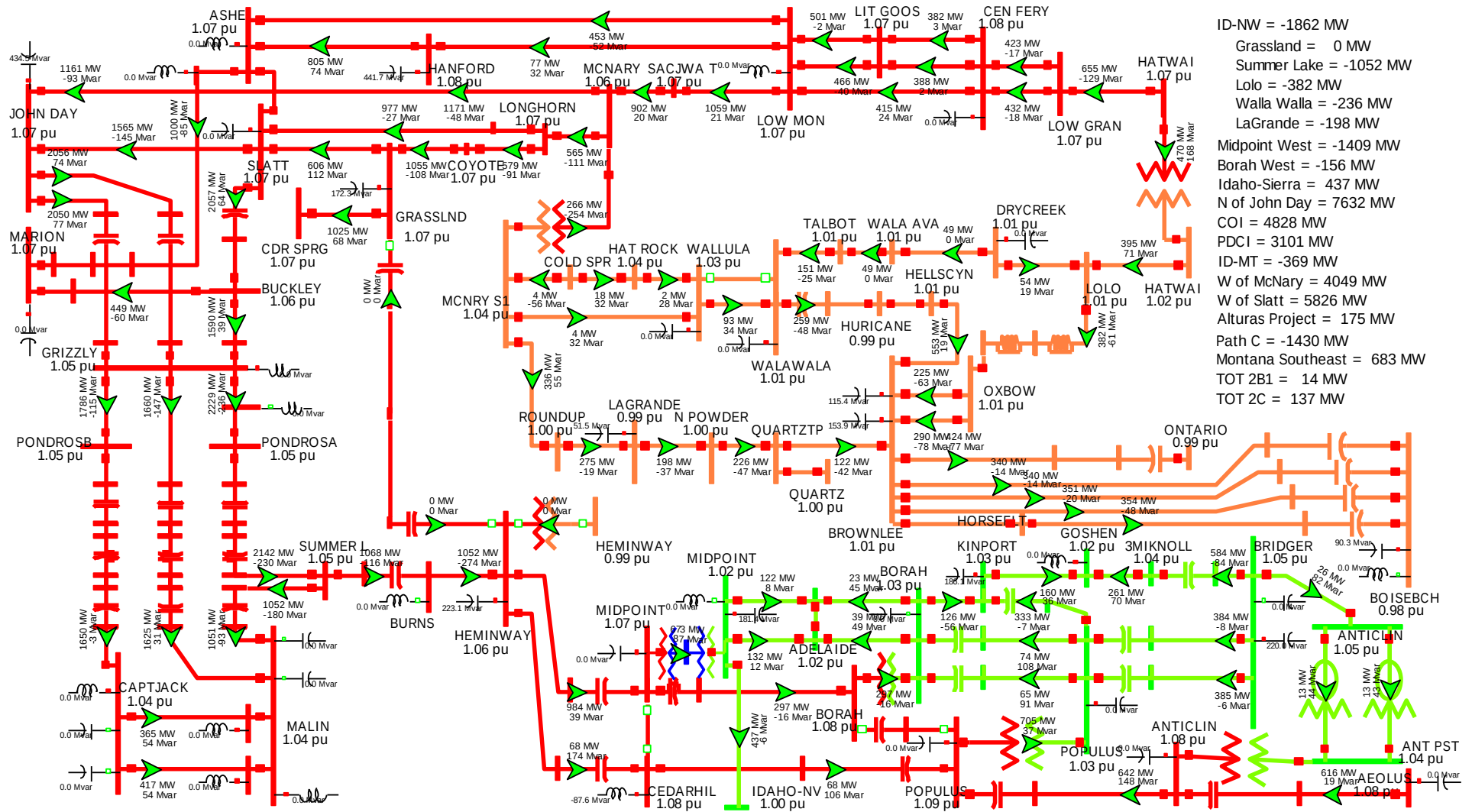


Figure A2: 16hs2sa_2250idnw_N Base Case after the contingency BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

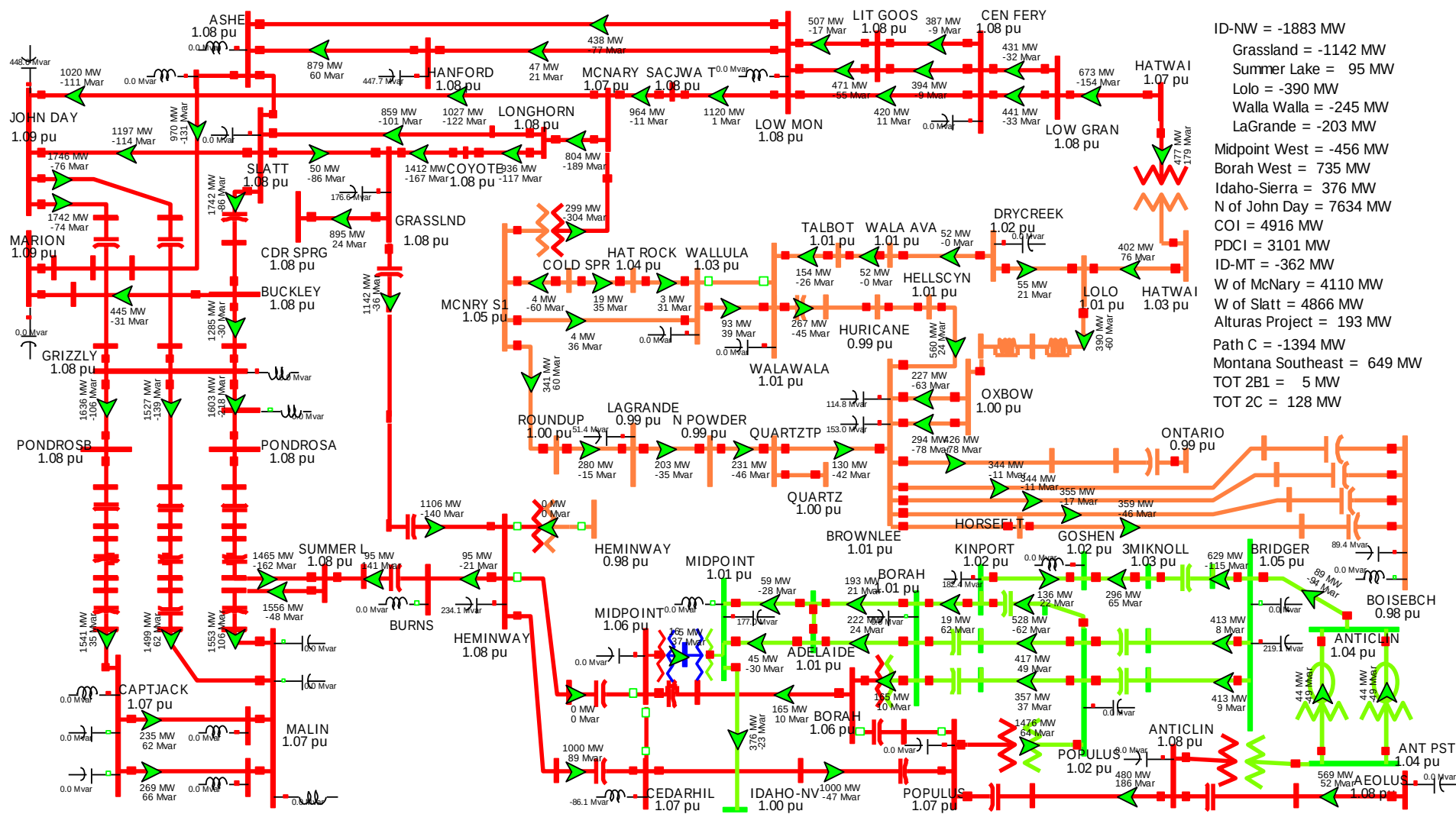


Figure A3: 16hs2sa 2250idnw N Base Case after the contingency **BF IPC Hemingway-Midpoint 500 kV & Hemingway 500/230 Xfmr**

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

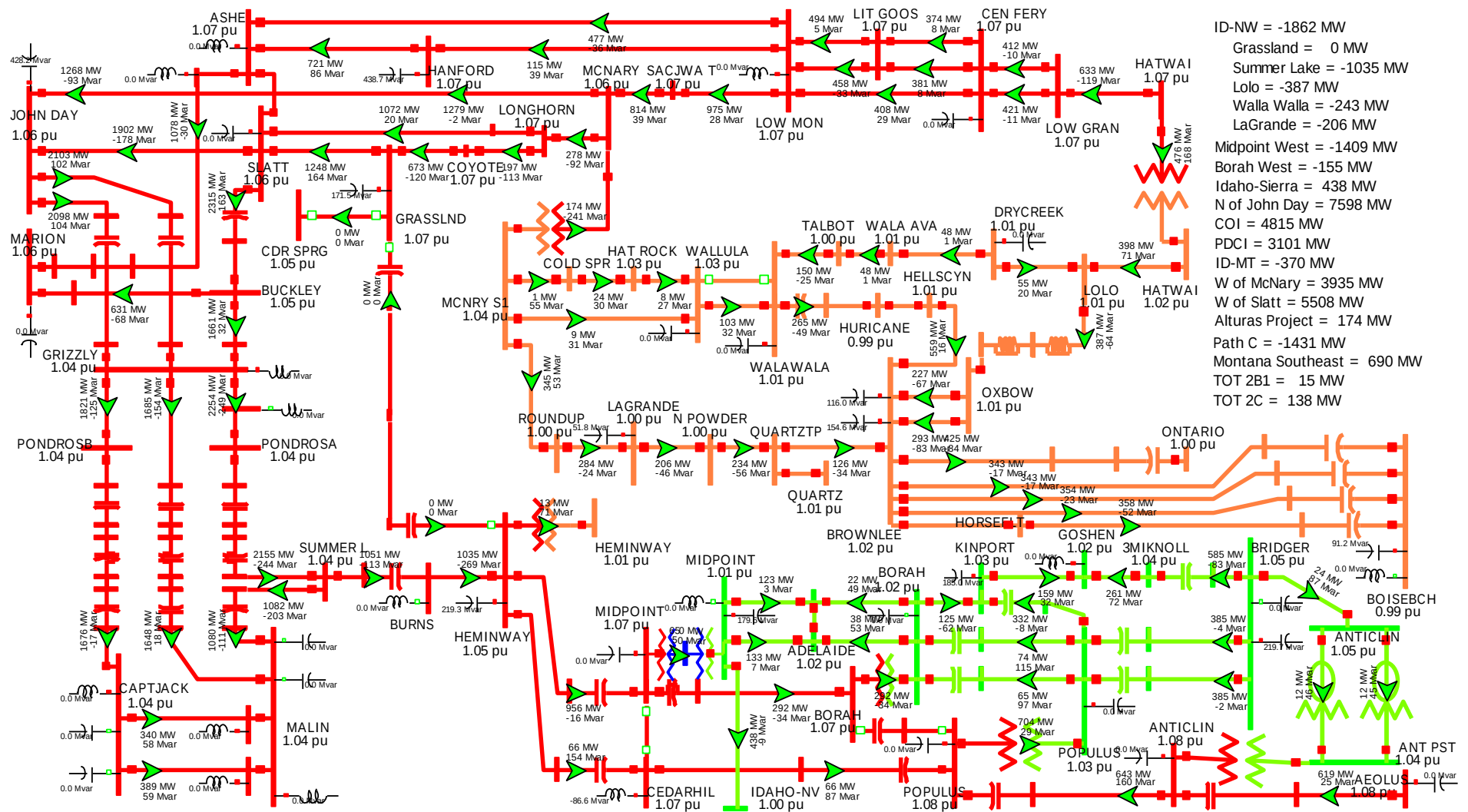


Figure A4: 16hs2sa_2250idnw_N Base Case after the contingency BF PGE Grassland-Cedar Springs 500 kV & Grassland-Hemingway 500 kV

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

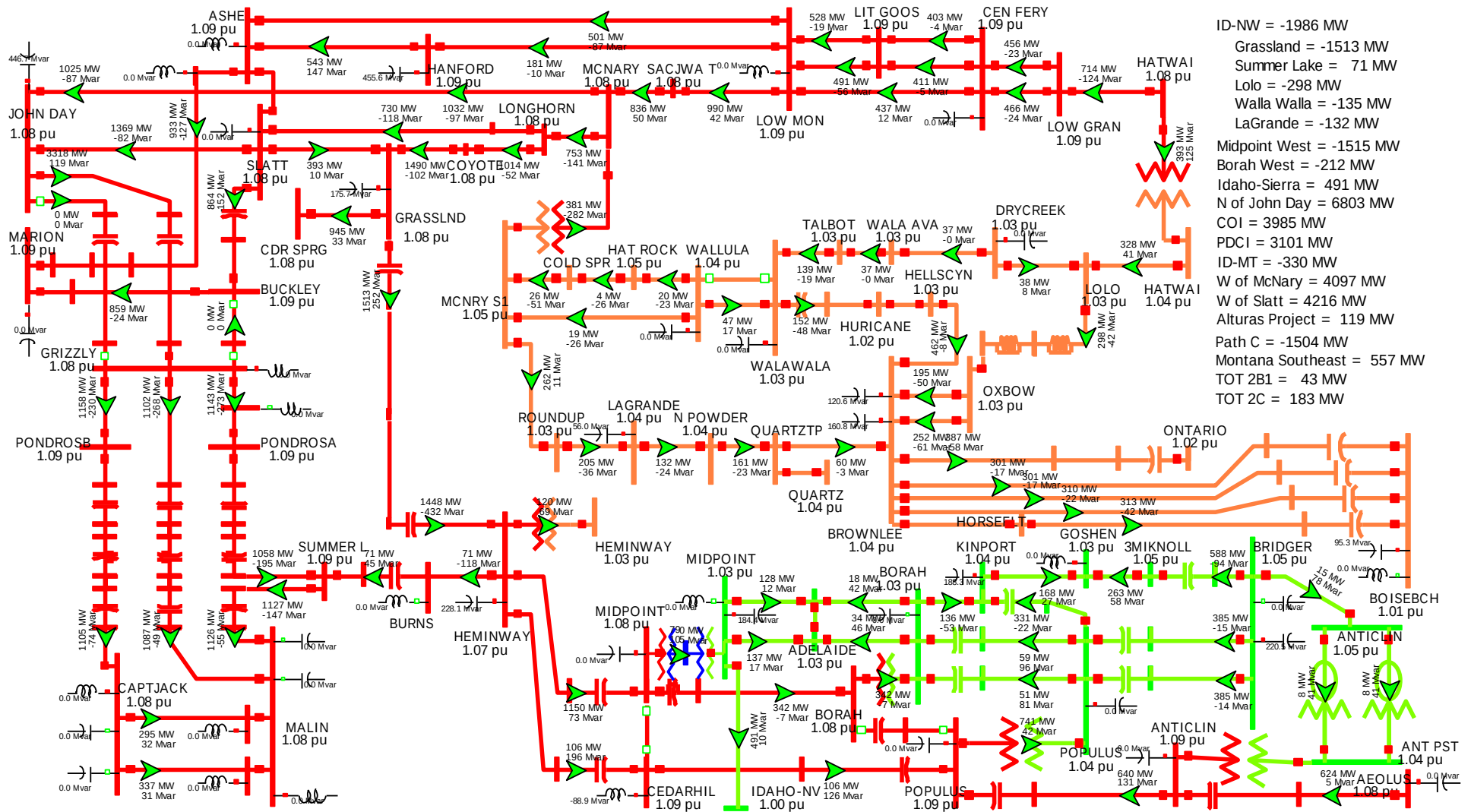


Figure A5: 16hs2sa_2250idnw_N Base Case after the contingency N-2 John Day-Grizzly#2 500 kV & Buckley-Grizzly 500 kV

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

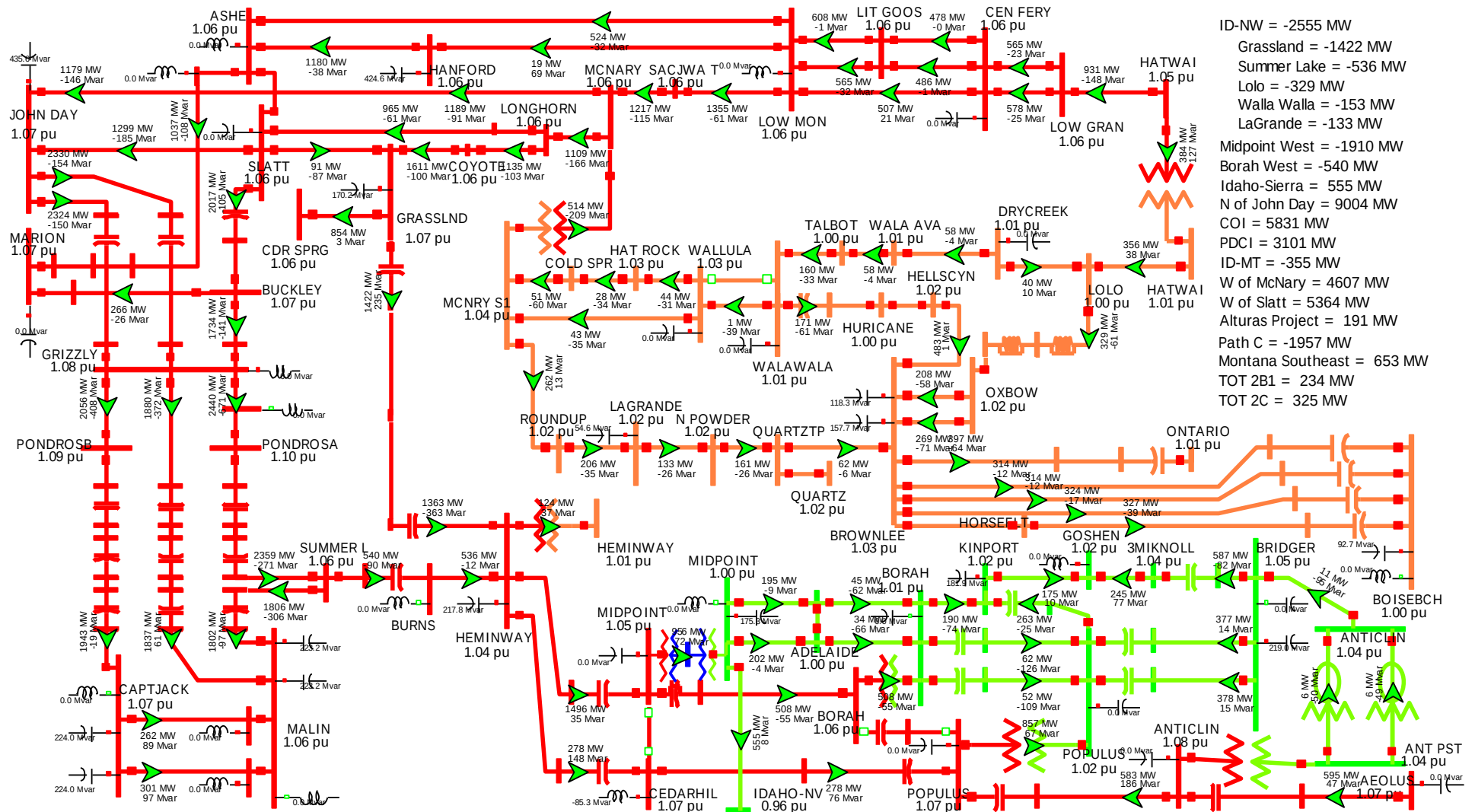


Figure A6: 16hs2sa_2250idnw_N Base Case after the contingency N-2: Double Palo Verde

Appendix A – 16hs2sa_2250idnw_N Base Case Post-Transient Contingency Results

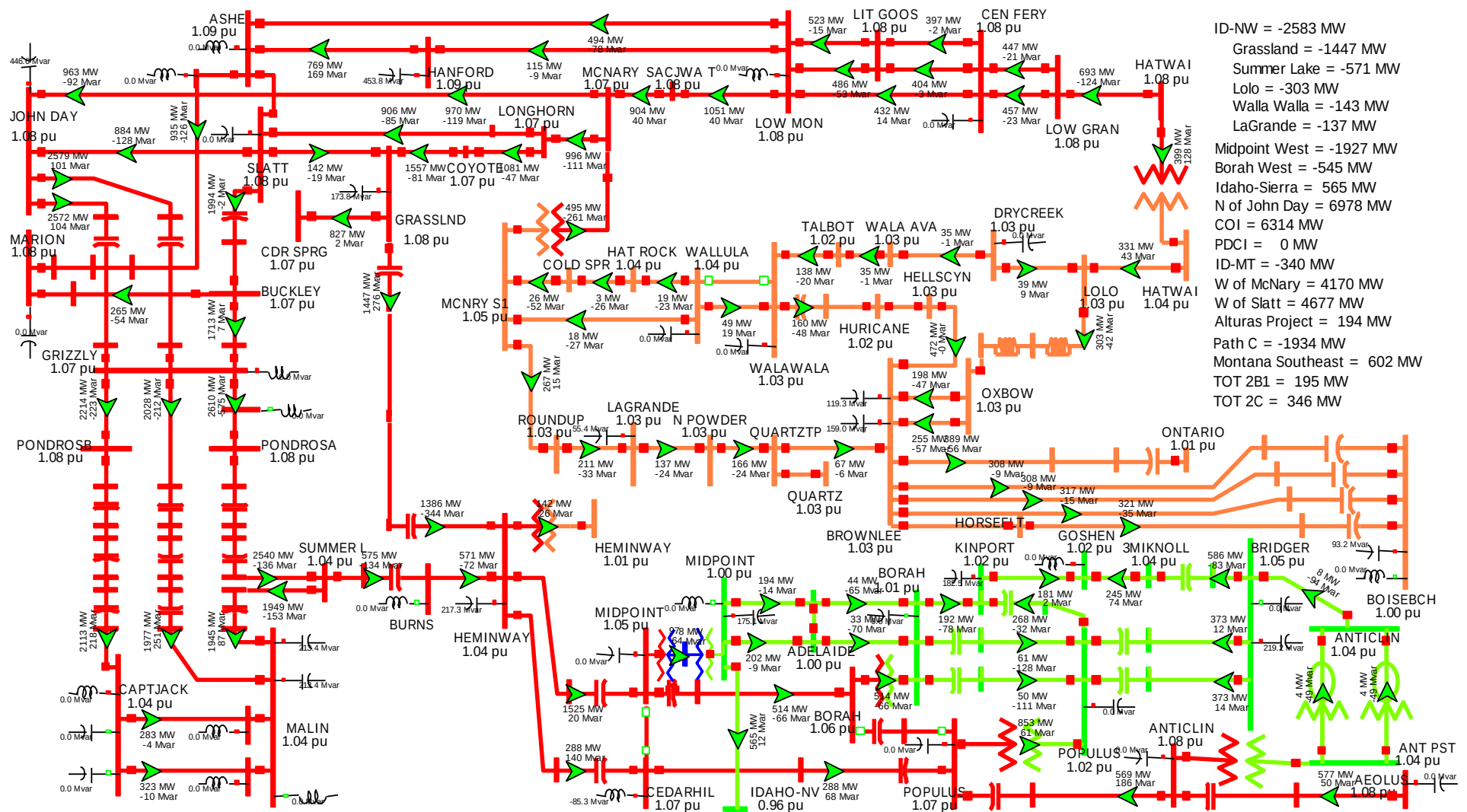


Figure A7: 16hs2sa_2250idnw_N Base Case after the contingency N-2: DC Bi-pole

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

[illegible]

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	275.2	338.8	105.9%	91.6%	270.1	328.6	102.7%	88.8%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	653.3	1094.6	115.2%	85.1%	650.5	1044.3	109.9%	81.2%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	275.2	348.8	109.0%	94.3%	270.1	335.6	104.9%	90.7%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	653.3	1115.8	117.5%	86.8%	650.5	1057.2	111.3%	82.2%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations											
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations											
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations											
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations											
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1163.6	115.3%	90.5%	901.8	1036.0	102.7%	80.6%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations											
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations											
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations											
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations											
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations											
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations											
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations											
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations											
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations											
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations											
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations											
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations											
BF 4542 Paul-Allston 500 kV & Center G2	No Violations											
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations											
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations											
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations											
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations											
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations											
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations											
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations											
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations											
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations											
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations											
BF 4708 Hatwai 500 kV Bus	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	813.0	101.6%	67.8%	715.0	810.6	101.3%	67.6%
BF 4708 Hatwai 500 kV Bus	AMPS (65025)	% Δ Volts			0.963	0.911		-5.40%	0.970	0.920		-5.15%
BF 4708 Hatwai 500 kV Bus	PTRSNFLT (62030)	% Δ Volts			0.957	0.895		-6.48%	0.963	0.904		-6.13%
BF 4708 Hatwai 500 kV Bus	PTRSNFUR (62386)	% Δ Volts			0.966	0.902		-6.63%	0.980	0.918		-6.33%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations											
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations											
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	970.5	105.5%	92.7%	775.1	965.6	105.0%	92.2%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations											
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations											
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations											
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations											
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations											

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	2400.0	3800.0	1724.7	2493.1	103.9%	65.6%	No Violations			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1709.0	2482.9	103.5%	65.3%	No Violations			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1378.5	111.4%	98.8%	No Violations			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	1026.7	111.6%	98.1%	No Violations			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	827.7	103.5%	69.0%	No Violations			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	2476.2	103.2%	65.2%	No Violations			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1709.0	2463.3	102.6%	64.8%	No Violations			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1388.9	112.3%	99.5%	No Violations			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	1038.1	112.8%	99.2%	No Violations			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	833.7	104.2%	69.5%	No Violations			
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations											
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations											
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations											
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations											
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations											
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	2900.0	4350.0	2217.4	2906.7	100.2%	66.8%	No Violations			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	2435.4	101.5%	64.1%	No Violations			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1709.0	2416.3	100.7%	63.6%	No Violations			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1311.8	106.0%	94.0%	No Violations			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1069.7	106.0%	83.2%	No Violations			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	969.8	105.4%	92.6%	No Violations			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	807.6	101.0%	67.3%	No Violations			
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	GRIJOH22 (90067) -> GRIJOH21 (90066) CKT 2 at GRIJOH21	Branch Amp	3000.0	4050.0	2030.1	3196.9	106.6%	78.9%	No Violations			
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations											
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations											
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations											
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations											
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations											
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations											
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations											
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations											
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations											
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations											
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations											
BF 5266 Slatt-Buckly 500 kV	No Violations											
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations											
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations											
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	Contingency Unavailable				1118.5	1370.0	110.7%	98.1%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	Contingency Unavailable				775.1	1007.4	109.5%	96.2%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				715.0	825.6	103.2%	68.8%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts			Contingency Unavailable				0.970	0.909		-6.29%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts			Contingency Unavailable				0.963	0.890		-7.58%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts			Contingency Unavailable				0.980	0.903		-7.86%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1321.1	106.8%	94.6%	No Violations			

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	974.5	105.9%	93.1%	No Violations			
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	804.9	100.6%	67.1%	No Violations			
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1313.1	106.1%	94.1%	1118.5	1389.7	112.3%	99.6%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	965.8	105.0%	92.3%	775.1	1029.8	111.9%	98.4%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	No Violations				715.0	806.1	100.8%	67.2%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts			0.963	0.909		-5.61%	0.970	0.916		-5.57%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts			0.957	0.898		-6.17%	0.963	0.902		-6.33%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts			0.966	0.906		-6.21%	0.980	0.916		-6.53%
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations											
BF Lolo 230kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1270.7	102.7%	91.0%	1118.5	1257.8	101.7%	90.1%
BF McNary 230 kV SECT 1	No Violations											
BF McNary 230 kV SECT 2	No Violations											
BF McNary 230 kV SECT 3	FRANKLIN (40443)	% Δ Volts			1.005	0.946		-5.87%	1.005	0.943		-6.17%
BF PGE Grassland - Slatt 500 kV & Boardman Plant	No Violations											
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	Contingency Unavailable				1118.5	1385.9	112.0%	99.3%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	Contingency Unavailable				775.1	1021.2	111.0%	97.6%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	Contingency Unavailable				901.8	1009.8	100.1%	78.6%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				715.0	934.7	116.8%	77.9%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	Contingency Unavailable				1744.6	2431.5	101.3%	64.0%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	BIGGRASS (65155)	% Δ Volts			Contingency Unavailable				0.988	0.937		-5.16%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	DILLON S (62084)	% Δ Volts			Contingency Unavailable				0.983	0.931		-5.29%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	AMPS (65025)	% Δ Volts			Contingency Unavailable				97.0%	0.9		-7.22%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	PTRSNFLT (62030)	% Δ Volts			Contingency Unavailable				96.3%	0.882		-8.41%
BF PGE Grassland-Cedar Sp 500 kV & Grassland - Hem 500 kV	PTRSNFUR (62386)	% Δ Volts			Contingency Unavailable				98.0%	0.894		-8.78%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	Contingency Unavailable				1118.5	1383.6	111.8%	99.1%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	Contingency Unavailable				775.1	1018.4	110.7%	97.3%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	Contingency Unavailable				901.8	1009.4	100.0%	78.5%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				715.0	832.3	104.0%	69.4%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	Contingency Unavailable				1744.6	2426.8	101.1%	63.9%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	PTRSNFUR (62386)	% Δ Volts			Contingency Unavailable				0.980	0.930		-5.10%
BF PGE Grassland-Cedar Sp 500 kV & Grassland-Hem 500 kv + PTSN	AMPS (65025)	% Δ Volts			Contingency Unavailable				0.970	0.920		-5.15%
BF PGE Grassland-Coyote Springs 500 kV & Carty Plant	No Violations											
Bus: Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1142.9	113.3%	88.9%	901.8	1015.3	100.6%	79.0%
Bus: Bell BPA 500 kV	No Violations											
Bus: Buckley 500 kV	No Violations											
Bus: Dixonville 500 kV	No Violations											
Bus: Hot Springs 500 kV	No Violations											
Bus: Keeler 500 kV + RAS	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	94.0	139.0	82.1	97.9	104.2%	70.4%	No Violations			
Bus: Rock Creek 500 kV	No Violations											
Bus: Sickler 500 kV	No Violations											
Bus: Summer Lake 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	2478.2	103.3%	65.2%	No Violations			
Bus: Summer Lake 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1709.0	2465.3	102.7%	64.9%	No Violations			
Bus: Summer Lake 500 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1388.6	112.3%	99.5%	No Violations			

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
Bus: Summer Lake 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	1036.5	112.7%	99.0%	No Violations			
Bus: Summer Lake 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	833.1	104.1%	69.4%	No Violations			
N-1: Allston-Keeler 500 kV + RAS	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	94.0	139.0	82.1	97.9	104.1%	70.4%	No Violations			
N-1: Allston-Napavine 500 kV	No Violations											
N-1: Allston-Paul #2 500 kV	No Violations											
N-1: Alvery-Dixonville 500 kV	No Violations											
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1212.4	120.1%	94.3%	901.8	1082.7	107.3%	84.2%
N-1: Ashe-Hanford 500 kV	No Violations											
N-1: Ashe-Low Mon 500 kV	No Violations											
N-1: Ashe-Marion 500 kV	No Violations											
N-1: Ashe-Slatt 500 kV	No Violations											
N-1: Bell-Coulee 500 kV	No Violations											
N-1: Bell-Taft 500 kV	No Violations											
N-1: Big Eddy-Celilo 500 kV	No Violations											
N-1: Big Eddy-John Day 500 kV	No Violations											
N-1: Big Eddy-Knight 500 kV	No Violations											
N-1: Big Eddy-Ostrander 500 kV	No Violations											
N-1: Boise Bench-Brownlee #3 230 kV	No Violations											
N-1: Brady-Antelope 230 kV	No Violations											
N-1: Broadview-Garrison #1 500 kV	No Violations											
N-1: Brownlee-Ontario 230 kV	QUARTZ (60305) -> NELSN TP (61055) CKT 1 at QUARTZ	Branch Amp	400.0	491.2	217.4	408.5	102.1%	83.2%	No Violations			
N-1: Buckley-Grizzly 500 kV	No Violations											
N-1: Buckley-Marion 500 kV	No Violations											
N-1: Buckley-Slatt 500 kV	No Violations											
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	785.7	926.3	267.2	837.8	106.6%	90.4%	281.9	850.5	108.2%	91.8%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	785.7	926.3	267.2	837.8	106.6%	90.4%	281.9	850.5	108.2%	91.8%
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	2442.0	3235.5	1658.5	2552.8	104.5%	78.9%	1646.9	2524.5	103.4%	78.0%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3280.0	1658.1	2552.8	116.0%	77.8%	1646.9	2524.5	114.8%	77.0%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	2199.9	3280.5	1810.8	2449.3	111.3%	74.7%	1802.9	2428.8	110.4%	74.0%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	2199.9	3280.5	1795.5	2428.6	110.4%	74.0%	1787.6	2408.3	109.5%	73.4%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2477.9	4000.0	2011.7	2676.2	108.0%	66.9%	1971.2	2626.5	106.0%	65.7%
N-1: Captain Jack-Olinda 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	2667.0	4000.0	2011.7	2676.2	100.3%	66.9%	No Violations			
N-1: CaptJack-Kfalls 500 kV	No Violations											
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	Contingency Unavailable				901.8	1018.2	100.9%	79.2%
N-1: Chief Jo-Coulee 500 kV	No Violations											
N-1: Chief Jo-Monroe 500 kV	No Violations											
N-1: Chief Jo-Sickler 500 kV	No Violations											
N-1: Coulee-Hanford 500 kV	No Violations											
N-1: Coulee-Schultz 500 kV	No Violations											
N-1: Covington4-Raver 500 kV	No Violations											
N-1: Covington5-Raver 500 kV	No Violations											
N-1: Coyote-Longhorn 500 kV	No Violations											
N-1: CusterW-Monroe 500 kV	No Violations											
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	979.0	1287.7	654.6	1193.7	121.9%	92.7%	639.8	1170.4	119.6%	90.9%

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: Dixonville-Meridian 500 kV	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	722.9	1265.2	302.3	741.3	102.5%	58.6%	310.5	736.3	101.8%	58.2%
N-1: Drycreek-Lolo 230 kV	No Violations											
N-1: Drycreek-N Lewiston 230 kV	No Violations											
N-1: Drycreek-Wala Ava 230 kV	No Violations											
N-1: Dworshak-Hatwai 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	816.0	102.0%	68.0%	715.0	814.1	101.8%	67.8%
N-1: Dworshak-Hatwai 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts			0.957	0.906		-5.33%	0.963	0.913		-5.19%
N-1: Dworshak-Hatwai 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts			0.966	0.913		-5.49%	0.980	0.928		-5.31%
N-1: Dworshak-Hatwai 500 kV + RAS + PTSN	No Violations											
N-1: Dworshak-Taft 500 kV	No Violations											
N-1: Echo Lake-Maple Valley 500 kV	No Violations											
N-1: Echo Lake-Raver 500 kV	No Violations											
N-1: Echo Lake-Schultz 500 kV	No Violations											
N-1: Echo Lake-Snok Tap 500 kV	No Violations											
N-1: Garrison-Taft #2 500 kV	No Violations											
N-1: Goldhill-Placer 115 kV	No Violations											
N-1: Grassland-Coyote 500 kV	No Violations											
N-1: Grassland-Slatt 500 kV	No Violations											
N-1: Grizzly-John Day #2 500 kV	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	3000.0	4050.0	2035.4	3182.8	106.1%	78.6%	No Violations			
N-1: Grizzly-Malin 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1974.4	2723.4	113.5%	71.7%	1744.6	2404.9	100.2%	63.3%
N-1: Grizzly-Malin 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	2453.0	102.2%	64.6%	No Violations			
N-1: Grizzly-Malin 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1709.0	2439.3	101.6%	64.2%	No Violations			
N-1: Grizzly-Ponderosa A-Summer L 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	2534.1	105.6%	66.7%	No Violations			
N-1: Grizzly-Ponderosa A-Summer L 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1709.0	2518.9	105.0%	66.3%	No Violations			
N-1: Grizzly-Ponderosa A-Summer L 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1261.4	102.0%	90.4%	No Violations			
N-1: Grizzly-Ponderosa A-Summer L 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	924.4	100.5%	88.3%	No Violations			
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1974.4	2720.2	113.3%	71.6%	1744.6	2402.9	100.1%	63.2%
N-1: Grizzly-Round Bu 500 kV	No Violations											
N-1: Hanford-Low Mon 500 kV	No Violations											
N-1: Hanford-Vantage 500 kV	No Violations											
N-1: Hanford-Wautoma 500 kV	No Violations											
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations											
N-1: Hatwai-Lolo 230 kV	No Violations											
N-1: Hatwai-Low Gran 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	970.1	105.4%	92.7%	775.1	965.2	104.9%	92.2%
N-1: Hatwai-N Lewiston 230 kV	No Violations											
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	1009.2	109.7%	96.4%	775.1	980.1	106.5%	93.6%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations											
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	Contingency Unavailable				1118.5	1366.1	110.4%	97.9%
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	Contingency Unavailable				775.1	1004.8	109.2%	96.0%
N-1: Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				715.0	825.6	103.2%	68.8%
N-1: Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts			Contingency Unavailable				0.970	0.910		-6.19%
N-1: Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts			Contingency Unavailable				0.963	0.892		-7.37%
N-1: Hemingway-Grassland 500 kV	PTRSNFUR (62386)	% Δ Volts			Contingency Unavailable				0.980	0.905		-7.65%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	2400.0	3200.0	Contingency Unavailable				1737.7	2925.7	121.9%	91.4%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	Contingency Unavailable				1744.6	2945.5	122.7%	77.5%

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099)	% Δ Volts			Contingency Unavailable				1.101	1.191		8.17%
N-1: Hemingway-Grassland 500 kV + FACRI	CAPPON16 (90142)	% Δ Volts			Contingency Unavailable				1.099	1.169		6.37%
N-1: Hemingway-Grassland 500 kV + FACRI	GRIMAL21 (90068)	% Δ Volts			Contingency Unavailable				1.098	1.161		5.74%
N-1: Hemingway-Grassland 500 kV + FACRI	CAPPON14 (90140)	% Δ Volts			Contingency Unavailable				1.078	1.134		5.19%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	Contingency Unavailable				1118.5	1360.9	110.0%	97.5%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	Contingency Unavailable				775.1	1000.4	108.7%	95.6%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				715.0	826.8	103.3%	68.9%
N-1: Hemingway-Summer Lake 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1329.3	107.5%	95.2%	No Violations			
N-1: Hemingway-Summer Lake 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	983.0	106.8%	93.9%	No Violations			
N-1: Hemingway-Summer Lake 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	801.7	100.2%	66.8%	No Violations			
N-1: Hemingway-Summer Lake 500 kV	AMPS (65025)	% Δ Volts			0.963	0.914		-5.09%	No Violations			
N-1: Hemingway-Summer Lake 500 kV	PTRSNFUR (62386)	% Δ Volts			0.966	0.907		-6.11%	No Violations			
N-1: Hemingway-Summer Lake 500 kV	PTRSNFLT (62030)	% Δ Volts			0.957	0.900		-5.96%	No Violations			
N-1: Hill Top 345/230 Xfmr	No Violations											
N-1: Horse Hv-McNary 230 kV	No Violations											
N-1: Hot Springs-Taft 500 kV	No Violations											
N-1: Humboldt-Coyote Ck 345 kV	No Violations											
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations											
N-1: Ing500-CusterW 500 kV	No Violations											
N-1: John Day-Marion 500 kV	No Violations											
N-1: John Day-Rock Ck 500 kV	No Violations											
N-1: John Day-Slatt 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	2900.0	4350.0	2217.4	2906.7	100.2%	66.8%	No Violations			
N-1: Kfalls-Meridian 500 kV	No Violations											
N-1: Knight-Wautoma 500 kV	No Violations											
N-1: LaGrande-North Powder 230 kV	No Violations											
N-1: Lanes-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1083.7	107.4%	84.3%	No Violations			
N-1: Lit Goose-Central Ferry 500 kV	No Violations											
N-1: Lit Goose-Low Mon 500 kV	No Violations											
N-1: Low Gran-Central Ferry 500 kV	No Violations											
N-1: Low Mon-Sac Tap 500 kV	No Violations											
N-1: Malin 500/230 Xfmr	No Violations											
N-1: Malin-Hilltop 230 kV	No Violations											
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	2442.0	3235.5	1658.5	2877.3	117.8%	88.9%	1646.9	2850.2	116.7%	88.1%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3280.0	1658.1	2877.3	130.8%	87.7%	1646.9	2850.2	129.6%	86.9%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	2666.9	4000.0	1658.5	2871.6	107.7%	71.8%	1646.1	2843.3	106.6%	71.1%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	2667.0	4000.0	1647.4	2858.8	107.2%	71.5%	1637.4	2833.0	106.2%	70.8%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	2699.7	4000.0	1614.4	2852.1	105.6%	71.3%	1602.4	2823.7	104.6%	70.6%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at ROUND MT	Branch Amp	2699.7	4000.0	1604.6	2836.6	105.1%	70.9%	1595.2	2810.9	104.1%	70.3%
N-1: Malin-Summer Lake 500 kV	No Violations											
N-1: Maple Vly-Rocky RH 345 kV	No Violations											
N-1: Marion-Pearl 500 kV	No Violations											
N-1: Marion-Santiam 500 kV	No Violations											
N-1: McLouglin-Ostrander 230 kV	No Violations											
N-1: McNary 500/230 kV Xfmr	No Violations											

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: McNary S2-McNary S3 230 kV	No Violations											
N-1: McNary-Board T1 230 kV	No Violations											
N-1: McNary-John Day 500 kV	No Violations											
N-1: McNary-Longhorn 500 kV	No Violations											
N-1: McNary-Ross 345 kV	No Violations											
N-1: McNary-Roundup 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1251.2	101.1%	89.6%	No Violations			
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations											
N-1: Midpoint-Hemingway 500 kV	No Violations											
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	No Violations											
N-1: Midpoint-Humboldt 345 kV	No Violations											
N-1: Napavine-Paul 500 kV	No Violations											
N-1: Olympia-Paul 500 kV	No Violations											
N-1: Ontario-Caldwell 230 kV	No Violations											
N-1: Ostrander-Knight 500 kV	No Violations											
N-1: Ostrander-Pearl 500 kV	No Violations											
N-1: Ostrander-Troutdale 500 kV	No Violations											
N-1: Oxbow-Brownlee #2 230 kV	No Violations											
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1275.0	103.1%	91.3%	1118.5	1262.0	102.0%	90.4%
N-1: Paul-Satsop 500 kV	No Violations											
N-1: Pearl-Keeler 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	275.2	363.4	113.6%	98.2%	270.1	351.8	109.9%	95.1%
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	653.3	1240.8	130.6%	96.5%	650.5	1185.6	124.8%	92.2%
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	275.2	339.1	106.0%	91.6%	270.1	327.4	102.3%	88.5%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	653.3	1094.7	115.2%	85.1%	650.5	1040.3	109.5%	80.9%
N-1: Pinto-Four Corner 345 kV	No Violations											
N-1: Ponderosa A 500/230 kV Xfmr	No Violations											
N-1: Ponderosa B 500/230 kV Xfmr	No Violations											
N-1: Raver-Paul 500 kV	No Violations											
N-1: Raver-Tacoma 500 kV	No Violations											
N-1: Red Butte-Harry Allen 345 kV	No Violations											
N-1: Robinson-Harry Allen 500 kV	No Violations											
N-1: Rock Ck-Wautoma 500 kV	No Violations											
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	2199.9	3280.5	1810.8	3262.0	148.3%	99.4%	1802.9	3244.0	147.5%	98.9%
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUTAB21	Branch Amp	2667.0	4000.0	1810.8	3262.0	122.3%	81.5%	1802.9	3244.0	121.6%	81.1%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	2667.0	4000.0	1799.4	3246.7	121.7%	81.2%	1793.3	3230.5	121.1%	80.8%
N-1: Roundup-Lagrande 230 kV	No Violations											
N-1: Schultz-Sickler 500 kV	No Violations											
N-1: Schultz-Vantage 500 kV	No Violations											
N-1: Schultz-Wautoma 500 kV	No Violations											
N-1: Sigurd-Glen Canyon 230 kV	No Violations											
N-1: Slatt 500/230 kV Xfmr	No Violations											
N-1: Slatt-Longhorn 500 kV	No Violations											
N-1: Snok Tap-Snoking 500 kV	No Violations											
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	2667.0	4000.0	2011.7	2981.7	111.8%	74.5%	1971.2	2954.1	110.8%	73.9%
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2477.9	4000.0	2011.7	2981.7	120.3%	74.5%	1971.2	2954.1	119.2%	73.9%

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at TABVAC12	Branch Amp	2667.0	4000.0	1984.8	2960.1	111.0%	74.0%	1945.3	2934.0	110.0%	73.4%
N-1: Table Mtn-Tesla 500 kV	VACTES11 (30044) -> TESLA (30040) CKT 1 at VACTES11	Branch Amp	2230.0	3555.9	No Violations				1388.1	2293.8	102.9%	64.5%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	2230.0	3555.9	1480.0	2673.3	119.9%	75.2%	1500.9	2664.4	119.5%	74.9%
N-1: Table Mtn-Vaca Dixon 500 kV	TABLE MT (30015) -> TABTES11 (30041) CKT 1 at TABTES11	Branch Amp	2667.0	4000.0	1480.0	2673.3	100.2%	66.8%	No Violations			
N-1: Vantage 500/230 kV Xfmr #1	No Violations											
N-1: Vantage 500/230 kV Xfmr #2	No Violations											
N-1: Walla Walla-Talbot 230 kV	No Violations											
N-1: Walla Walla-Wallula 230 kV	No Violations											
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations											
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations											
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations											
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations											
N-2: Ashe-Marion & Slatt-John Day 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	2900.0	4350.0	2217.4	3260.5	112.4%	75.0%	No Violations			
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations											
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations											
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	717.0	834.0	104.2%	69.5%	715.0	811.7	101.5%	67.6%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	AMPS (65025)	% Δ Volts			0.963	0.897		-6.85%	0.970	0.920		-5.15%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts			0.957	0.878		-8.25%	0.963	0.903		-6.23%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts			0.966	0.884		-8.49%	0.980	0.917		-6.43%
N-2: Bethel - Cedar Spring 500 kV / Bethel - Round Butte 230 kV	No Violations											
N-2: Bethel - Cedar Spring 500 kV / Bethel - Santiam 230 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	Contingency Unavailable				901.8	1032.7	102.3%	80.4%
N-2: Bethel - Cedar Spring 500 kV / Santiam - Mikkalo 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	Contingency Unavailable				901.8	1018.0	100.9%	79.2%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations											
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations											
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations											
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	BROONT12 (61981) -> ONTARIO (60265) CKT 1 at BROONT12	Branch Amp	1590.0	2147.0	949.3	1593.5	100.2%	74.2%	No Violations			
N-2: Bridger-Populus #1 & #2 345 kV	No Violations											
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	No Violations											
N-2: Broadview-Garrisont #1 & #2 500 kV + RAS	No Violations											
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations											
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	983.6	106.9%	94.0%	775.1	952.0	103.5%	90.9%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations											
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations											
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations											
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations											
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations											
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations											
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations											
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations											
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations											
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations											
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	2400.0	3200.0	1968.1	3178.6	132.4%	99.3%	1737.7	2814.2	117.3%	87.9%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1974.4	3193.5	133.1%	84.0%	1744.6	2829.2	117.9%	74.5%

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	2199.9	3280.5	1810.8	2442.7	111.0%	74.5%	1802.9	2424.6	110.2%	73.9%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	2199.9	3280.5	1795.5	2422.0	110.1%	73.8%	1787.6	2404.1	109.3%	73.3%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3280.0	1658.1	2343.8	106.5%	71.5%	1646.9	2320.3	105.5%	70.7%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	2134.0	3499.9	No Violations				1559.3	2266.1	106.2%	64.7%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2477.9	4000.0	2011.7	2635.6	106.4%	65.9%	1971.2	2589.0	104.5%	64.7%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	2134.0	3499.9	No Violations				1539.5	2234.0	104.7%	63.8%
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	2134.0	3499.9	No Violations				1517.5	2204.7	103.3%	63.0%
N-2: DC-BIPOLE	HESPERUS (79071) -> COYOTE G (79191) CKT 1 at HESPERUS	Branch Amp	431.8	441.8	391.4	459.3	106.4%	104.0%	No Violations			
N-2: DC-BIPOLE	TL TAP (66557) -> DIXCLTP (65467) CKT 1 at DIXCLTP	Branch Amp	234.3	234.3	230.1	235.6	100.6%	100.6%	No Violations			
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	2400.0	3200.0	1968.1	2957.8	123.2%	92.4%	1737.7	2603.9	108.5%	81.4%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1974.4	2977.1	124.0%	78.3%	1744.6	2623.4	109.3%	69.0%
N-2: Double Palo Verde	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	2199.9	3280.5	1810.8	2234.5	101.6%	68.1%	1802.9	2220.0	100.9%	67.7%
N-2: Double Palo Verde	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	2199.9	3280.5	1795.5	2215.6	100.7%	67.5%	1787.6	2201.2	100.1%	67.1%
N-2: Double Palo Verde	HESPERUS (79071) -> COYOTE G (79191) CKT 1 at HESPERUS	Branch Amp	431.8	441.8	391.4	477.5	110.6%	108.1%	No Violations			
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations											
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations											
N-2: Garrison-Taft #1 & #2 500 kV + RAS	No Violations											
N-2: Grassland - Cedar Spring 500 kV / Slatt - Buckley 500 kV	No Violations											
N-2: Grassland - Coyote 500 kV / Slatt - Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	Contingency Unavailable				1118.5	1239.0	100.2%	88.8%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1974.4	3774.1	157.3%	99.3%	1744.6	3351.4	139.6%	88.2%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	2700.0	4000.0	1349.3	3274.6	121.3%	81.9%	1414.8	3221.7	119.3%	80.5%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	GRIZZ R3 (40488) -> PONDROSA (40837) CKT 1 at GRIZZ R3	Branch Amp	3780.0	3780.0	2082.4	3971.7	105.1%	105.1%	No Violations			
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	GRIZZLY (40489) -> GRIZZ R3 (40488) CKT 1 at GRIZZ R3	Branch Amp	3780.0	3780.0	2087.3	3971.7	105.1%	105.1%	No Violations			
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONDROSA (40837) -> PONSUM11 (90099) CKT 1 at PONDROSA	Branch Amp	3780.0	3780.0	1992.5	3788.2	100.2%	100.2%	No Violations			
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1057.9	104.8%	82.3%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	3647.0	152.0%	96.0%	1632.9	3170.8	132.1%	83.4%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON12	Branch Amp	2400.0	3800.0	1709.0	3633.9	151.4%	95.6%	1618.4	3157.2	131.5%	83.1%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	GRIZZLY (40489) -> PONDROSB (40834) CKT 1 at PONDROSB	Branch Amp	3500.0	3500.0	1834.0	3836.5	109.6%	109.6%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	PONDROSB (40834) -> CAPPON16 (90142) CKT 1 at PONDROSB	Branch Amp	3500.0	3500.0	1740.0	3659.8	104.6%	104.6%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON15 (90141) -> CAPPON14 (90140) CKT 1 at CAPPON15	Branch Amp	3500.0	3500.0	1724.7	3647.0	104.2%	104.2%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON13 (90139) -> CAPPON12 (90138) CKT 1 at CAPPON13	Branch Amp	3500.0	3500.0	1718.1	3646.2	104.2%	104.2%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON11 (90137) -> CAPTJACK (45035) CKT 1 at CAPPON11	Branch Amp	3220.0	3220.0	1709.0	3633.9	112.9%	112.9%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1252.9	101.3%	89.8%	No Violations			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1057.1	104.8%	82.2%	No Violations			
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1724.7	3271.1	136.3%	86.1%	1632.9	3187.7	132.8%	83.9%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON12	Branch Amp	2400.0	3800.0	1709.0	3259.6	135.8%	85.8%	1618.4	3177.3	132.4%	83.6%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON11 (90137) -> CAPTJACK (45035) CKT 1 at CAPPON11	Branch Amp	3220.0	3220.0	1709.0	3259.6	101.2%	101.2%	No Violations			
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations											
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations											
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations											
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations											
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	2900.0	4350.0	2217.4	3850.3	132.8%	88.5%	1856.1	3167.7	109.2%	72.8%
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1395.9	1116.2	1257.0	101.6%	90.0%	No Violations			

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1086.5	107.7%	84.5%	No Violations			
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	JOHN DAY (40585) -> GRIJOH12 (90065) CKT 1 at JOHN DAY	Branch Amp	3500.0	3500.0	2040.9	4012.6	114.6%	114.6%	1891.3	3540.0	101.1%	101.1%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH11 (90064) -> GRIZZLY (40489) CKT 1 at GRIJOH11	Branch Amp	3500.0	3500.0	2035.4	4007.5	114.5%	114.5%	1882.9	3532.5	100.9%	100.9%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	3000.0	4050.0	2035.4	4007.5	133.6%	99.0%	1882.9	3532.5	117.7%	87.2%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1018.9	1049.6	104.0%	81.7%	No Violations			
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations											
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations											
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations											
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	275.2	359.7	112.4%	97.2%	270.1	348.3	108.8%	94.1%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	653.3	1240.9	130.6%	96.5%	650.5	1185.8	124.8%	92.2%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CLATSOP (40243) -> LWISCLARK (45314) CKT 1 at CLATSOP	Branch MVA	94.0	139.0	82.1	100.4	106.8%	72.2%	79.4	96.5	102.6%	69.4%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40597) -> FOR GROV (40427) CKT 2 at KEELER	Branch Amp	850.0	850.0	589.2	876.7	103.1%	103.1%	578.0	846.2	99.6%	99.6%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CARLTON (40181)	% Δ Volts			No Violations				1.026	0.971		-5.36%
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations											
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations											
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations											
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	DRYGULCH (48113) -> DRYGULCH (45097) CKT 1 at DRYGULCH	Branch MVA	20.0	20.0	14.5	20.9	104.7%	104.7%	No Violations			
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	795.4	1017.6	110.6%	97.2%	775.1	1016.3	110.5%	97.1%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	2667.4	4099.2	1814.9	3755.2	140.8%	91.6%	1814.6	3725.7	139.7%	90.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	2667.4	4099.2	1783.4	3647.4	136.7%	89.0%	1781.5	3618.1	135.6%	88.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPOLI11	Branch Amp	2667.4	4099.2	1783.4	3647.4	136.7%	89.0%	1781.5	3618.1	135.6%	88.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	2993.0	4514.9	1956.4	3206.7	107.1%	71.0%	1971.1	3202.0	107.0%	70.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	2993.0	4514.9	1956.4	3206.7	107.1%	71.0%	1971.1	3202.0	107.0%	70.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	2993.0	4514.9	1924.7	3172.8	106.0%	70.3%	1941.6	3169.7	105.9%	70.2%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	2993.0	4514.9	1924.7	3172.8	106.0%	70.3%	1941.6	3169.7	105.9%	70.2%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	2993.0	4514.9	1902.5	3135.0	104.7%	69.4%	1920.3	3132.7	104.7%	69.4%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations											
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	HORSE HV (40547)	% Δ Volts			1.031	0.979		-5.04%	1.032	0.980		-5.04%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations											
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations											
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	PTRSNFUR (62386)	% Δ Volts			No Violations				0.980	0.929		-5.20%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations											
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	No Violations											
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	No Violations											
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations											
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	275.2	340.8	106.5%	92.1%	270.1	329.3	102.9%	89.0%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	653.3	1099.6	115.8%	85.5%	650.5	1045.8	110.1%	81.3%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations											
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations											
N-2: Raver-Covington #1 & #2 500 kV	No Violations											
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations											
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations											
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations											
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations											

Appendix A - 16hs2a_2250idnw_N Base Case Post-Transient Contingency Results

					1200 HS Case				2250 HS Case			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: Raver-Schultz #1 & #2 500 kV	No Violations											
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations											
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations											
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	830.9	953.9	703.3	925.6	111.4%	97.0%	688.9	910.6	109.6%	95.5%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	BRDGVILLE (31110) -> FRUTLDJT (31120) CKT 1 at BRDGVILLE	Branch Amp	328.1	371.4	292.6	333.2	101.5%	89.7%	290.3	330.7	100.8%	89.0%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	2667.4	4099.2	1814.9	3468.3	130.0%	84.6%	1814.6	3448.3	129.3%	84.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	2667.4	4099.2	1783.4	3374.0	126.5%	82.3%	1781.5	3355.8	125.8%	81.9%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	2667.4	4099.2	1783.4	3362.9	126.1%	82.0%	1781.5	3342.8	125.3%	81.5%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	2993.0	4514.9	1956.4	3500.6	117.0%	77.5%	1971.1	3501.4	117.0%	77.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	2993.0	4514.9	1956.4	3500.6	117.0%	77.5%	1971.1	3501.4	117.0%	77.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	2993.0	4514.9	1924.7	3481.3	116.3%	77.1%	1941.6	3483.0	116.4%	77.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	2993.0	4514.9	1924.7	3481.3	116.3%	77.1%	1941.6	3483.0	116.4%	77.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	2993.0	4514.9	1902.5	3448.4	115.2%	76.4%	1920.3	3450.7	115.3%	76.4%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	FRUTLDJT (31120) -> FTSWRDJT (31122) CKT 1 at FRUTLDJT	Branch Amp	303.1	339.7	265.1	304.6	100.5%	89.7%	No Violations			
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations											
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations											
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	825.9	976.5	285.9	922.0	111.6%	94.4%	285.6	921.2	111.5%	94.3%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	825.1	975.0	232.8	863.4	104.6%	88.6%	232.5	862.6	104.5%	88.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	462.9	579.9	396.9	474.8	102.6%	81.9%	389.2	466.5	100.8%	80.4%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2477.9	4000.0	2011.7	2549.7	102.9%	63.7%	1971.2	2544.4	102.7%	63.6%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations											
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations											
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations											
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations											
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations											
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations											
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations											
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations											
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations											

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.82	-1153	0.89	-3838	0.74	-2642	0.70	-454	0.97	-2224	0.80	-3220	0.91	-1649	0.75	-588	0.75	-349
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.82	-1138	0.88	-3946	0.74	-2598	0.70	-450	0.97	-2992	0.76	-3254	0.89	-2079	0.76	-582	0.75	-344
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.81	-1170	0.88	-4071	0.73	-2682	0.70	-454	0.97	-3076	0.81	-3339	0.93	-1581	0.75	-600	0.75	-351
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.82	-1131	0.88	-4024	0.74	-2561	0.70	-444	0.97	-2252	0.87	-2498	0.85	-2319	0.76	-582	0.75	-338
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.81	-1162	0.84	-3641	0.73	-2686	0.70	-457	0.98	-2857	0.83	-3288	0.85	-2410	0.76	-578	0.75	-344
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.82	-1170	0.87	-4200	0.74	-2672	0.70	-420	0.97	-2516	0.82	-3334	0.85	-2509	0.75	-602	0.75	-353
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.81	-1212	0.87	-4023	0.74	-2746	0.70	-459	0.97	-2597	0.81	-3512	0.84	-2650	0.78	-531	0.76	-294
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.83	-1059	0.90	-3552	0.75	-2360	0.70	-432	0.98	-1698	0.84	-2509	0.87	-1941	0.77	-550	0.76	-316
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.82	-1151	0.87	-4089	0.74	-2590	0.70	-444	0.97	-3019	0.81	-2861	0.85	-2418	0.75	-591	0.75	-345
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.83	-1093	0.89	-3805	0.74	-2408	0.70	-428	0.98	-1941	0.82	-2393	0.87	-2119	0.76	-566	0.76	-326
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.81	-1177	0.85	-3910	0.73	-2714	0.70	-457	0.97	-2498	0.82	-3435	0.84	-2586	0.75	-600	0.75	-352
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.81	-1176	0.84	-3732	0.74	-2717	0.70	-458	0.97	-2469	0.82	-3409	0.85	-2542	0.75	-590	0.75	-347
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.81	-1212	0.88	-3966	0.74	-2745	0.70	-459	0.97	-2592	0.81	-3514	0.84	-2648	0.78	-524	0.76	-293
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.81	-1192	0.87	-4363	0.73	-2744	0.70	-458	0.97	-2634	0.81	-3521	0.84	-2683	0.75	-614	0.75	-352
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500 KV	0.81	-1190	0.87	-4102	0.73	-2737	0.70	-458	0.97	-2571	0.81	-3467	0.84	-2637	0.78	-540	0.75	-354
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.82	-1105	0.89	-3747	0.74	-2481	0.70	-444	0.97	-2463	0.84	-2849	0.86	-2163	0.76	-574	0.75	-333
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.82	-1100	0.90	-3550	0.74	-2487	0.70	-445	0.97	-1700	0.85	-2687	0.88	-2011	0.76	-567	0.76	-329
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.81	-1187	0.87	-4218	0.73	-2730	0.70	-458	0.97	-2602	0.81	-3494	0.84	-2665	0.77	-542	0.75	-335
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.82	-1159	0.89	-3799	0.73	-2641	0.70	-453	0.97	-2637	0.83	-3048	0.84	-2093	0.75	-596	0.75	-350
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.82	-1137	0.88	-4019	0.74	-2531	0.70	-404	0.97	-2266	0.83	-2697	0.86	-2279	0.76	-586	0.75	-342
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.82	-1145	0.88	-3666	0.74	-2653	0.70	-455	0.97	-2065	0.84	-3202	0.86	-2317	0.76	-570	0.76	-331
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.81	-1171	0.88	-3981	0.73	-2677	0.70	-456	0.96	-2243	0.83	-3216	0.86	-2411	0.75	-601	0.75	-353
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.81	-1185	0.87	-4155	0.73	-2716	0.70	-458	0.96	-3135	0.81	-3377	0.84	-2527	0.75	-607	0.75	-357
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.81	-1111	0.87	-4138	0.74	-2708	0.70	-459	0.97	-2533	0.81	-3455	0.84	-2596	0.75	-598	0.75	-348
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.81	-1175	0.88	-3873	0.73	-2794	0.70	-467	0.97	-2512	0.82	-3572	0.84	-2602	0.75	-594	0.75	-356
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.81	-1166	0.88	-3678	0.74	-2703	0.70	-458	0.97	-2354	0.82	-3357	0.85	-2467	0.76	-574	0.76	-330
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.81	-1178	0.85	-3975	0.73	-2719	0.70	-458	0.97	-3201	0.82	-3447	0.84	-2605	0.75	-599	0.75	-352
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.81	-1184	0.88	-4064	0.73	-2732	0.70	-458	0.97	-2582	0.81	-3488	0.84	-2643	0.75	-595	0.75	-352
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.81	-1184	0.87	-4210	0.73	-2731	0.70	-458	0.97	-3268	0.81	-3481	0.84	-2656	0.75	-602	0.75	-354
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV + RAS	0.81	-1192	0.88	-3787	0.73	-2794	0.70	-466	0.97	-3068	0.84	-3343	0.80	-1982	0.75	-602	0.75	-366
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV + RAS	0.81	-1194	0.88	-3824	0.73	-2811	0.70	-467	0.98	-3030	0.82	-3593	0.83	-2358	0.75	-602	0.75	-366
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.81	-1177	0.88	-4055	0.73	-2702	0.70	-457	0.98	-2243	0.83	-3294	0.84	-2401	0.75	-603	0.75	-354
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.81	-1184	0.87	-4106	0.73	-2729	0.70	-458	0.97	-2553	0.81	-3467	0.84	-2621	0.75	-605	0.75	-355
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.81	-1182	0.88	-3919	0.73	-2731	0.70	-458	0.97	-2562	0.81	-3481	0.84	-2621	0.75	-597	0.75	-352
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.81	-1182	0.88	-3916	0.73	-2730	0.70	-458	0.97	-2550	0.81	-3474	0.84	-2614	0.75	-597	0.75	-352
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV + RAS	0.81	-1159	0.88	-3872	0.73	-2717	0.70	-459	0.98	-2145	0.86	-2927	0.83	-2246	0.74	-610	0.75	-371
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.81	-1175	0.88	-4075	0.73	-2684	0.70	-456	0.97	-2365	0.82	-3300	0.81	-2231	0.75	-604	0.75	-355
BF 4432 OSTRANDER-TROUTDALE & SPLIT OSTRANDER 500 KV	0.81	-1186	0.87	-4239	0.73	-2731	0.70	-458	0.98	-2427	0.81	-3473	0.84	-2606	0.75	-607	0.75	-356
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.81	-1184	0.87	-4174	0.73	-2721	0.70	-458	0.98	-3035	0.82	-3404	0.84	-2518	0.75	-606	0.75	-356
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.81	-1183	0.87	-4194	0.73	-2719	0.70	-457	0.98	-2360	0.81	-3415	0.83	-2532	0.75	-606	0.75	-356
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.81	-1179	0.88	-4092	0.73	-2709	0.70	-457	0.98	-2297	0.82	-3353	0.84	-2458	0.75	-604	0.75	-354
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.81	-1178	0.88	-4111	0.73	-2706	0.70	-457	0.98	-2230	0.82	-3355	0.84	-2468	0.75	-603	0.75	-354
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV + RAS	0.81	-1219	0.91	-3482	0.73	-2973	0.70	-481	0.98	-2662	0.82	-4064	0.85	-2568	0.73	-622	0.74	-393

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.81	-1169	0.88	-3945	0.73	-2661	0.70	-456	0.97	-2205	0.85	-3006	0.81	-1825	0.75	-597	0.75	-350
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV + RAS	0.81	-1237	0.88	-4196	0.73	-2974	0.70	-480	0.97	-3539	0.80	-4145	0.82	-2989	0.72	-654	0.74	-407
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV	0.81	-1158	0.89	-3583	0.74	-2667	0.70	-455	0.98	-2129	0.83	-3278	0.86	-2402	0.76	-577	0.75	-339
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV + RAS	0.81	-1213	0.89	-3822	0.73	-2901	0.70	-473	0.97	-2805	0.80	-3963	0.83	-2868	0.74	-623	0.74	-383
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.81	-1178	0.88	-4099	0.73	-2716	0.70	-457	0.97	-2481	0.81	-3419	0.84	-2561	0.75	-599	0.75	-352
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.81	-1190	0.88	-3896	0.73	-2783	0.70	-463	0.97	-2511	0.82	-3564	0.84	-2553	0.75	-601	0.75	-361
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.81	-1194	0.89	-3996	0.73	-2795	0.70	-464	0.97	-2622	0.81	-3640	0.84	-2672	0.75	-605	0.75	-364
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.81	-1176	0.87	-4076	0.74	-2707	0.70	-457	0.97	-3090	0.82	-3377	0.85	-2486	0.75	-596	0.75	-350
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.81	-1188	0.87	-4316	0.73	-2738	0.70	-458	0.97	-3314	0.81	-3520	0.84	-2686	0.75	-608	0.75	-357
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.81	-1083	0.87	-3684	0.74	-2692	0.70	-458	0.98	-2335	0.82	-3414	0.85	-2477	0.76	-574	0.76	-329
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.81	-1180	0.87	-4204	0.73	-2725	0.70	-458	0.97	-2559	0.81	-3465	0.84	-2625	0.75	-601	0.75	-352
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.81	-1260	0.87	-4209	0.73	-2918	0.70	-473	0.97	-3651	0.80	-3965	0.82	-2935	0.77	-564	0.75	-354
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.81	-1179	0.89	-3664	0.73	-2714	0.70	-458	0.97	-3120	0.82	-3403	0.85	-2546	0.75	-595	0.75	-351
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.81	-1173	0.87	-4031	0.73	-2715	0.70	-457	0.97	-2509	0.82	-3444	0.84	-2585	0.75	-597	0.75	-349
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.81	-1174	0.88	-4032	0.73	-2703	0.70	-457	0.97	-2379	0.82	-3357	0.85	-2449	0.75	-595	0.75	-349
BF 4700 HATWAI 500KV & 230 KV + RAS	0.81	-1276	0.87	-4154	0.73	-2927	0.70	-475	0.97	-2936	0.80	-3918	0.82	-2906	0.77	-557	0.75	-348
BF 4708 HATWAI 500 KV BUS	0.82	-1202	0.88	-3723	0.74	-2727	0.70	-460	0.97	-2562	0.82	-3498	0.84	-2614	0.80	-454	0.77	-255
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.81	-1185	0.87	-4098	0.73	-2732	0.70	-458	0.97	-3265	0.81	-3481	0.84	-2647	0.75	-602	0.75	-354
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV + RAS	0.81	-1169	0.87	-4124	0.73	-2825	0.70	-466	0.97	-2854	0.80	-3832	0.83	-2842	0.75	-609	0.75	-353
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.81	-1121	0.87	-3987	0.74	-2698	0.70	-457	0.97	-2627	0.82	-3545	0.84	-2674	0.78	-520	0.76	-303
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.81	-1188	0.87	-4216	0.73	-2729	0.70	-458	0.95	-2638	0.82	-3446	0.84	-2611	0.75	-608	0.75	-357
BF 4888 ASHE-SLATT & CGS 500 KV	0.81	-1191	0.87	-3700	0.73	-2864	0.70	-472	0.97	-2692	0.81	-3805	0.83	-2737	0.75	-589	0.75	-358
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.81	-1146	0.86	-3378	0.74	-2682	0.70	-458	0.98	-2134	0.84	-3234	0.86	-2331	0.76	-564	0.76	-328
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.81	-1150	0.85	-3623	0.74	-2710	0.70	-458	0.98	-2331	0.82	-3387	0.86	-2441	0.76	-567	0.76	-329
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.82	-1134	0.88	-3472	0.74	-2607	0.70	-452	0.98	-1853	0.85	-2991	0.86	-2045	0.76	-576	0.75	-336
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.84	-1032	0.88	-3953	0.75	-1865	0.70	-448	0.97	-2835	0.81	-2638	0.86	-2259	0.77	-554	0.76	-320
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.83	-1056	0.89	-3811	0.76	-1916	0.70	-450	0.98	-2591	0.82	-2481	0.87	-2122	0.77	-553	0.76	-319
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.82	-1170	0.87	-4271	0.73	-2679	0.70	-454	0.97	-2572	0.71	-3330	0.84	-2634	0.75	-601	0.75	-352
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.82	-1129	0.89	-3781	0.74	-2552	0.70	-449	0.98	-1920	0.84	-3010	0.86	-2191	0.76	-582	0.75	-338
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.82	-1166	0.87	-4080	0.73	-2616	0.70	-453	0.97	-2359	0.82	-3384	0.85	-2543	0.75	-606	0.75	-356
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.82	-1107	0.88	-3337	0.74	-2554	0.70	-448	0.98	-1755	0.86	-2887	0.87	-2018	0.77	-554	0.76	-321
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.82	-1143	0.87	-3563	0.74	-2637	0.70	-455	0.97	-1991	0.84	-3216	0.86	-2313	0.76	-570	0.76	-330
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.82	-1163	0.88	-4003	0.74	-2642	0.70	-453	0.97	-2864	0.82	-3347	0.85	-2473	0.75	-602	0.75	-353
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.83	-1022	0.90	-3518	0.75	-2290	0.70	-444	0.98	-2309	0.83	-2539	0.88	-1951	0.77	-531	0.76	-305
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.82	-1114	0.89	-3845	0.74	-2523	0.70	-447	0.97	-2012	0.83	-2879	0.86	-2220	0.76	-573	0.75	-332
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.81	-1181	0.88	-3905	0.73	-2727	0.70	-458	0.97	-2531	0.82	-3467	0.84	-2608	0.75	-591	0.75	-350
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.81	-1181	0.88	-3910	0.73	-2723	0.70	-458	0.97	-2500	0.82	-3453	0.84	-2593	0.75	-597	0.75	-352
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.81	-1176	0.88	-3702	0.74	-2710	0.70	-457	0.97	-2445	0.82	-3407	0.85	-2550	0.76	-583	0.75	-345
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.81	-1172	0.86	-3725	0.74	-2708	0.70	-458	0.97	-2375	0.82	-3378	0.85	-2480	0.76	-576	0.75	-341
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.81	-1184	0.87	-3916	0.73	-2727	0.70	-458	0.97	-3199	0.82	-3454	0.84	-2595	0.75	-594	0.75	-350
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.81	-1153	0.87	-4072	0.74	-2691	0.70	-458	0.97	-2409	0.82	-3374	0.84	-2532	0.75	-595	0.75	-347
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.81	-1173	0.88	-3920	0.74	-2759	0.70	-467	0.97	-2436	0.82	-3477	0.85	-2536	0.75	-592	0.75	-352
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.81	-1083	0.87	-3684	0.74	-2692	0.70	-458	0.98	-2335	0.82	-3413	0.85	-2477	0.76	-574	0.76	-329
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.81	-1179	0.89	-3381	0.74	-2763	0.70	-466	0.98	-2206	0.83	-3429	0.85	-2430	0.76	-572	0.75	-337

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.82	-1142	0.87	-3594	0.74	-2640	0.70	-454	0.98	-1991	0.84	-3168	0.86	-2259	0.76	-571	0.75	-332
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.82	-1141	0.87	-3561	0.74	-2651	0.70	-455	0.98	-2048	0.84	-3225	0.86	-2306	0.76	-565	0.76	-329
BF 5266 SLATT-BUCKLY 500 KV	0.82	-1134	0.89	-3825	0.74	-2581	0.70	-447	0.98	-1986	0.84	-3071	0.86	-2222	0.76	-585	0.75	-342
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.81	-1184	0.86	-4033	0.73	-2731	0.70	-458	0.97	-2546	0.82	-3464	0.84	-2612	0.75	-596	0.75	-351
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.81	-1174	0.84	-3922	0.73	-2725	0.70	-458	0.97	-2480	0.81	-3439	0.84	-2564	0.75	-588	0.75	-348
BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.87	-709	0.91	-3444	0.73	-1977	0.70	-490	0.98	-2300	0.86	-2377	0.89	-1914	0.80	-440	0.77	-245
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.86	-905	0.87	-4234	0.71	-1910	0.70	-467	0.97	-3215	0.82	-3167	0.84	-2599	0.76	-580	0.75	-338
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.88	-652	0.87	-4205	0.70	-1824	0.70	-502	0.97	-3233	0.82	-3120	0.85	-2581	0.78	-492	0.76	-287
BF IPC POPULUS-CHILL-HEMINGWAY 500 KV & HEM 500/230 XFMR	0.86	-956	0.87	-4272	0.70	-2399	0.70	-457	0.97	-3258	0.82	-3398	0.84	-2640	0.75	-596	0.75	-346
BF LOLO 230KV	0.82	-1174	0.88	-4050	0.73	-2719	0.70	-463	0.97	-2396	0.82	-3304	0.85	-2515	0.76	-583	0.75	-335
BF MCNARY 230 KV SECT 1	0.81	-1212	0.87	-4098	0.73	-2815	0.70	-465	0.97	-2704	0.81	-3676	0.83	-2725	0.75	-603	0.75	-362
BF MCNARY 230 KV SECT 2	0.81	-1198	0.87	-4152	0.73	-2770	0.70	-462	0.97	-3301	0.80	-3606	0.96	-1952	0.75	-604	0.75	-359
BF MCNARY 230 KV SECT 3	0.81	-1184	0.88	-3994	0.73	-2746	0.70	-460	0.97	-3200	0.82	-3500	0.84	-2593	0.75	-604	0.75	-358
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.845	-844	0.93	-2916	0.79	-1877	0.70	-485	0.98	-1886	0.88	-2002	0.90	-1463	0.80	-422	0.78	-234
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV+PTSN	0.846	-850	0.93	-2938	0.78	-1892	0.70	-485	0.98	-1902	0.88	-2045	0.90	-1478	0.81	-437	0.78	-239
BF PGE GRASSLAND-COYOTE SP 500KV & CARTY GAS PLANT	0.813	-1160	0.88	-4088	0.74	-2690	0.70	-461	0.97	-3051	0.82	-3325	0.84	-2490	0.76	-593	0.76	-345
BF PGE GRASSLAND-SLATT 500KV & BOARDMAN PLANT	0.815	-1182	0.88	-3942	0.73	-2754	0.70	-467	0.97	-3126	0.81	-3553	0.84	-2605	0.75	-594	0.75	-357
BUS: ALVEY 500 KV + RAS	0.81	-1171	0.88	-4318	0.73	-2742	0.70	-458	0.97	-2619	0.88	-2704	0.82	-2621	0.74	-620	0.75	-377
BUS: BELL BPA 500 KV	0.81	-1184	0.87	-4090	0.73	-2731	0.70	-458	0.97	-2568	0.81	-3462	0.84	-2635	0.78	-537	0.75	-359
BUS: BUCKLEY 500 KV	0.82	-1109	0.90	-3554	0.74	-2504	0.70	-443	0.98	-2384	0.84	-2797	0.85	-1876	0.76	-578	0.75	-336
BUS: DIXONVILLE 500 KV	0.82	-1119	0.88	-4024	0.74	-2533	0.70	-441	0.97	-2917	0.86	-2498	0.85	-2346	0.76	-577	0.75	-334
BUS: HOT SPRINGS 500 KV	0.81	-1183	0.87	-4218	0.73	-2726	0.70	-458	0.97	-2584	0.81	-3477	0.84	-2655	0.76	-573	0.75	-350
BUS: KEELER 500 KV + RAS	0.81	-1220	0.92	-3336	0.73	-2965	0.70	-481	0.98	-2414	0.83	-3816	0.85	-2309	0.73	-625	0.74	-395
BUS: ROCK CREEK 500 KV	0.82	-1140	0.88	-3561	0.74	-2647	0.70	-455	0.98	-1987	0.84	-3198	0.86	-2284	0.76	-564	0.76	-329
BUS: SICKLER 500 KV	0.81	-1181	0.88	-3866	0.73	-2729	0.70	-458	0.97	-2542	0.82	-3471	0.84	-2609	0.75	-596	0.75	-352
BUS: SUMMER LAKE 500 KV	0.84	-1017	0.89	-3745	0.75	-1835	0.70	-444	0.98	-1887	0.82	-2439	0.87	-2096	0.77	-549	0.76	-316
N-1: ALLSTON-KEELER 500 KV + RAS	0.81	-1222	0.90	-3545	0.73	-2980	0.70	-481	0.97	-3463	0.82	-4100	0.84	-2610	0.73	-625	0.74	-395
N-1: ALLSTON-NAPAVINE 500 KV	0.81	-1175	0.88	-4034	0.73	-2703	0.70	-457	0.97	-2384	0.82	-3359	0.85	-2454	0.75	-595	0.75	-350
N-1: ALLSTON-PAUL #2 500 KV	0.81	-1174	0.88	-4039	0.73	-2703	0.70	-457	0.97	-3060	0.82	-3359	0.85	-2457	0.75	-595	0.75	-349
N-1: ALVERY-DIXONVILLE 500 KV	0.82	-1118	0.88	-3995	0.74	-2525	0.70	-441	0.97	-2868	0.87	-2363	0.85	-2373	0.76	-577	0.75	-334
N-1: ALVEY-MARION 500 KV	0.82	-1130	0.89	-3880	0.74	-2555	0.70	-445	0.97	-2774	0.86	-2586	0.85	-2253	0.76	-582	0.75	-339
N-1: ASHE-HANFORD 500 KV	0.81	-1182	0.84	-3881	0.73	-2729	0.70	-458	0.97	-2530	0.82	-3448	0.84	-2584	0.75	-595	0.75	-350
N-1: ASHE-LOW MON 500 KV	0.81	-1176	0.87	-4079	0.73	-2720	0.70	-457	0.97	-2532	0.82	-3454	0.84	-2602	0.75	-601	0.75	-351
N-1: ASHE-MARION 500 KV	0.82	-1141	0.88	-3664	0.74	-2617	0.70	-452	0.98	-1910	0.85	-3019	0.85	-2094	0.76	-580	0.75	-339
N-1: ASHE-SLATT 500 KV	0.81	-1149	0.87	-3628	0.74	-2688	0.70	-458	0.98	-2174	0.83	-3280	0.85	-2393	0.76	-568	0.76	-329
N-1: BELL-COULEE 500 KV	0.81	-1182	0.87	-4168	0.73	-2726	0.70	-458	0.97	-2577	0.81	-3470	0.84	-2643	0.77	-548	0.75	-348
N-1: BELL-TAFT 500 KV	0.81	-1186	0.87	-4182	0.73	-2733	0.70	-458	0.97	-3247	0.81	-3459	0.84	-2636	0.77	-548	0.75	-363
N-1: BIG EDDY-CELILO 500 KV	0.81	-1185	0.87	-4274	0.73	-2731	0.70	-458	0.97	-3265	0.81	-3478	0.84	-2658	0.75	-606	0.75	-355
N-1: BIG EDDY-JOHN DAY 500 KV	0.81	-1186	0.87	-4234	0.73	-2729	0.70	-458	0.96	-3273	0.82	-3458	0.84	-2624	0.75	-607	0.75	-356
N-1: BIG EDDY-KNIGHT 500 KV	0.81	-1171	0.88	-4043	0.73	-2700	0.70	-457	0.98	-2249	0.82	-3386	0.84	-2531	0.75	-594	0.75	-347
N-1: BIG EDDY-OSTRANDER 500 KV	0.81	-1183	0.87	-4208	0.73	-2720	0.70	-457	0.98	-2348	0.81	-3428	0.83	-2563	0.75	-606	0.75	-356
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.81	-1107	0.87	-4227	0.74	-2617	0.70	-458	0.97	-2552	0.81	-3440	0.84	-2620	0.75	-601	0.75	-352
N-1: BRADY-ANTELOPE 230 KV	0.81	-1182	0.87	-4257	0.74	-2716	0.70	-458	0.97	-3258	0.81	-3469	0.84	-2644	0.75	-565	0.75	-352
N-1: BROADVIEW-GARRISON #1 500 KV	0.81	-1189	0.87	-4239	0.74	-2731	0.70	-458	0.97	-2609	0.81	-3499	0.84	-2670	0.81	-470	0.78	-278

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: BROWNLEE-ONTARIO 230 KV	0.82	-1073	0.87	-4201	0.75	-2517	0.70	-457	0.97	-3204	0.82	-3422	0.84	-2604	0.75	-599	0.75	-350
N-1: BUCKLEY-GRIZZLY 500 KV	0.82	-1137	0.88	-3983	0.74	-2598	0.70	-449	0.97	-2196	0.82	-3129	0.85	-2351	0.76	-584	0.75	-340
N-1: BUCKLEY-MARION 500 KV	0.81	-1177	0.88	-4116	0.73	-2692	0.70	-456	0.97	-2401	0.82	-3333	0.81	-2260	0.75	-604	0.75	-355
N-1: BUCKLEY-SLATT 500 KV	0.82	-1134	0.89	-3825	0.74	-2581	0.70	-447	0.98	-1986	0.84	-3071	0.86	-2220	0.76	-585	0.75	-342
N-1: CAPTAIN JACK-OLINDA 500 KV	0.83	-1105	0.89	-3862	0.74	-2426	0.70	-429	0.97	-2100	0.82	-2324	0.87	-2198	0.76	-570	0.76	-329
N-1: CAPTJACK-KFALLS 500 KV	0.82	-1136	0.87	-4189	0.74	-2572	0.70	-447	0.97	-3071	0.74	-3267	0.88	-2441	0.76	-584	0.75	-340
N-1: CASCADE CROSSING 500 KV	0.82	-1165	0.89	-3892	0.73	-2640	0.70	-451	0.98	-2091	0.84	-3117	0.85	-2113	0.75	-603	0.75	-354
N-1: CHIEF JO-COULEE 500 KV	0.81	-1185	0.87	-4172	0.73	-2733	0.70	-458	0.97	-2591	0.81	-3479	0.84	-2656	0.75	-606	0.75	-356
N-1: CHIEF JO-MONROE 500 KV	0.81	-1182	0.87	-4028	0.73	-2726	0.70	-458	0.97	-3225	0.81	-3463	0.84	-2617	0.75	-601	0.75	-353
N-1: CHIEF JO-SICKLER 500 KV	0.81	-1183	0.87	-4052	0.73	-2728	0.70	-458	0.97	-2571	0.81	-3473	0.84	-2637	0.75	-597	0.75	-351
N-1: COULEE-HANFORD 500 KV	0.81	-1175	0.86	-3652	0.74	-2722	0.70	-458	0.97	-3134	0.83	-3435	0.85	-2541	0.76	-561	0.75	-334
N-1: COULEE-SCHULTZ 500 KV	0.81	-1178	0.88	-3874	0.73	-2718	0.70	-458	0.97	-3181	0.82	-3453	0.84	-2589	0.76	-585	0.75	-345
N-1: COVINGTON4-RAVER 500 KV	0.81	-1186	0.87	-4252	0.73	-2733	0.70	-458	0.97	-2598	0.81	-3483	0.84	-2658	0.75	-607	0.75	-356
N-1: COVINGTON5-RAVER 500 KV	0.81	-1186	0.87	-4250	0.73	-2733	0.70	-458	0.97	-3276	0.81	-3483	0.84	-2657	0.75	-607	0.75	-356
N-1: COYOTE-LONGHORN 500 KV	0.81	-1171	0.87	-4185	0.73	-2721	0.70	-460	0.97	-3185	0.82	-3431	0.84	-2596	0.75	-598	0.75	-349
N-1: CUSTERW-MONROE 500 KV	0.81	-1184	0.88	-4075	0.73	-2732	0.70	-458	0.97	-2587	0.81	-3487	0.84	-2643	0.75	-596	0.75	-353
N-1: DIXONVILLE-MERIDIAN 500 KV	0.82	-1130	0.88	-4043	0.74	-2564	0.70	-444	0.97	-2954	0.84	-2701	0.84	-2381	0.76	-582	0.75	-338
N-1: DRYCREEK-LOLO 230 KV	0.81	-1184	0.87	-4275	0.73	-2731	0.70	-458	0.97	-2592	0.81	-3479	0.84	-2659	0.75	-606	0.75	-355
N-1: DRYCREEK-N LEWISTON 230 KV	0.81	-1186	0.87	-4268	0.73	-2732	0.70	-458	0.97	-3266	0.81	-3476	0.84	-2657	0.75	-605	0.75	-355
N-1: DRYCREEK-WALA AVA 230 KV	0.81	-1186	0.87	-4263	0.73	-2731	0.70	-458	0.97	-3266	0.81	-3476	0.84	-2656	0.75	-604	0.75	-354
N-1: DWORSHAK-HATWAI 500 KV + RAS	0.81	-1219	0.89	-3748	0.74	-2740	0.70	-459	0.97	-3241	0.82	-3510	0.84	-2617	0.77	-549	0.77	-270
N-1: DWORSHAK-HATWAI 500 KV + RAS+PTSN	0.81	-1223	0.89	-3764	0.74	-2758	0.70	-459	0.97	-3253	0.81	-3519	0.84	-2625	0.77	-561	0.77	-274
N-1: DWORSHAK-TAFT 500 KV	0.81	-1211	0.87	-3945	0.74	-2739	0.70	-459	0.97	-2584	0.81	-3506	0.84	-2635	0.80	-464	0.77	-282
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.81	-1186	0.87	-4157	0.73	-2734	0.70	-458	0.97	-3251	0.81	-3477	0.84	-2638	0.75	-607	0.75	-356
N-1: ECHO LAKE-RAVER 500 KV	0.81	-1183	0.87	-4171	0.73	-2728	0.70	-458	0.97	-3252	0.81	-3475	0.84	-2633	0.75	-602	0.75	-354
N-1: ECHO LAKE-SCHULTZ 500 KV	0.81	-1183	0.87	-4082	0.73	-2726	0.70	-458	0.97	-3221	0.81	-3459	0.84	-2616	0.75	-604	0.75	-355
N-1: ECHO LAKE-SNOK TAP 500 KV	0.81	-1182	0.88	-3943	0.73	-2728	0.70	-458	0.97	-2544	0.82	-3470	0.84	-2614	0.75	-592	0.75	-351
N-1: GARRISON-TAFT #2 500 KV	0.81	-1188	0.87	-4281	0.73	-2736	0.70	-458	0.97	-2609	0.81	-3493	0.84	-2669	0.76	-576	0.75	-345
N-1: GOLDHILL-PLACER 115 KV	0.81	-1189	0.87	-4317	0.73	-2740	0.70	-459	0.97	-3308	0.82	-3528	0.84	-2682	0.75	-608	0.75	-356
N-1: GRASSLAND-COYOTE 500 KV	0.81	-1160	0.88	-4091	0.74	-2689	0.70	-461	0.97	-2376	0.82	-3324	0.85	-2486	0.75	-593	0.75	-346
N-1: GRASSLAND-SLATT 500 KV	0.81	-1183	0.87	-4230	0.73	-2696	0.70	-458	0.97	-3216	0.81	-3456	0.84	-2630	0.75	-604	0.75	-354
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.82	-1118	0.89	-3876	0.74	-2541	0.70	-447	0.97	-2732	0.83	-2908	0.86	-2252	0.76	-575	0.75	-333
N-1: GRIZZLY-MALIN 500 KV	0.83	-1107	0.89	-3828	0.74	-2483	0.70	-436	0.98	-2631	0.82	-2737	0.87	-2158	0.76	-575	0.75	-333
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.83	-1069	0.89	-3854	0.74	-2415	0.70	-453	0.97	-2065	0.83	-2840	0.86	-2200	0.77	-552	0.76	-318
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.83	-1104	0.89	-3807	0.74	-2472	0.70	-435	0.98	-2608	0.82	-2700	0.87	-2137	0.76	-574	0.75	-333
N-1: GRIZZLY-ROUND BU 500 KV	0.81	-1184	0.86	-4241	0.73	-2723	0.70	-458	0.97	-3226	0.81	-3462	0.84	-2637	0.75	-606	0.75	-355
N-1: HANFORD-LOW MON 500 KV	0.81	-1182	0.86	-4035	0.73	-2724	0.70	-458	0.97	-2546	0.81	-3456	0.84	-2619	0.75	-602	0.75	-354
N-1: HANFORD-VANTAGE 500 KV	0.81	-1174	0.84	-3920	0.73	-2725	0.70	-458	0.97	-3159	0.81	-3439	0.84	-2564	0.75	-588	0.75	-348
N-1: HANFORD-WAUTOMA 500 KV	0.81	-1181	0.86	-4162	0.73	-2723	0.70	-458	0.97	-3221	0.81	-3460	0.84	-2616	0.75	-603	0.75	-353
N-1: HATWAI 500/230 KV XFMR + RAS	0.82	-1202	0.87	-4204	0.73	-2746	0.70	-460	0.97	-2541	0.82	-3432	0.84	-2613	0.75	-607	0.75	-350
N-1: HATWAI-LOLO 230 KV	0.81	-1188	0.87	-4232	0.73	-2734	0.70	-459	0.97	-3246	0.81	-3460	0.84	-2638	0.75	-603	0.75	-353
N-1: HATWAI-LOW GRAN 500 KV	0.81	-1122	0.87	-4015	0.74	-2700	0.70	-457	0.97	-3326	0.81	-3569	0.84	-2685	0.78	-520	0.76	-303
N-1: HATWAI-N LEWISTON 230 KV	0.81	-1186	0.87	-4268	0.73	-2732	0.70	-458	0.97	-2589	0.81	-3477	0.84	-2657	0.75	-605	0.75	-355
N-1: HELLS CANYON-BROWNLEE 230 KV	0.81	-1057	0.88	-3979	0.74	-2608	0.70	-466	0.97	-3012	0.82	-3247	0.85	-2456	0.76	-575	0.75	-336

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.82	-1205	0.87	-4142	0.73	-2736	0.70	-460	0.97	-2481	0.82	-3379	0.84	-2567	0.75	-596	0.75	-349
N-1: HEMINGWAY-GRASSLAND 500 KV	0.84	-867	0.91	-3446	0.78	-1938	0.70	-488	0.98	-1639	0.85	-2387	0.89	-1913	0.80	-452	0.77	-247
N-1: HEMINGWAY-GRASSLAND 500 KV + FACRI	0.82	-1071	0.86	-4464	0.74	-2348	0.70	-504	0.97	-3720	0.84	-4124	0.82	-2973	0.76	-552	0.76	-318
N-1: HEMINGWAY-GRASSLAND 500 KV + PTSN SHUNT	0.83	-923	0.90	-3510	0.78	-2073	0.70	-496	0.98	-1703	0.85	-2470	0.88	-1972	0.80	-469	0.77	-254
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.83	-1079	0.87	-4226	0.74	-1970	0.70	-466	0.97	-2518	0.82	-3147	0.84	-2586	0.76	-578	0.75	-335
N-1: HILL TOP 345/230 XFMR	0.82	-1161	0.87	-4264	0.74	-2635	0.70	-375	0.97	-3269	0.82	-3400	0.84	-2660	0.75	-598	0.75	-350
N-1: HORSE HV-MCNARY 230 KV	0.81	-1177	0.87	-4211	0.73	-2719	0.70	-457	0.97	-3225	0.81	-3457	0.84	-2616	0.75	-605	0.75	-355
N-1: HOT SPRINGS-TAFT 500 KV	0.81	-1183	0.87	-4218	0.73	-2726	0.70	-458	0.97	-2584	0.81	-3477	0.84	-2655	0.76	-573	0.75	-350
N-1: HUMBOLDT-COYOTE CK 345 KV	0.81	-1240	0.87	-4175	0.74	-2755	0.70	-208	0.97	-3132	0.82	-3188	0.85	-2526	0.75	-616	0.75	-361
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.81	-1196	0.87	-4304	0.73	-2760	0.70	-456	0.97	-2603	0.81	-3467	0.84	-2664	0.75	-612	0.75	-360
N-1: ING500-CUSTERW 500 KV	0.81	-1185	0.87	-4216	0.73	-2732	0.70	-458	0.97	-3269	0.81	-3482	0.84	-2656	0.75	-602	0.75	-354
N-1: JOHN DAY-MARION 500 KV	0.81	-1174	0.87	-4084	0.73	-2690	0.70	-456	0.97	-3004	0.82	-3288	0.82	-2253	0.75	-602	0.75	-353
N-1: JOHN DAY-ROCK CK 500 KV	0.82	-1144	0.88	-3698	0.74	-2655	0.70	-455	0.98	-2050	0.84	-3232	0.86	-2331	0.76	-569	0.76	-330
N-1: JOHN DAY-SLATT 500 KV	0.82	-1170	0.87	-4079	0.73	-2663	0.70	-453	0.97	-2246	0.82	-3398	0.84	-2531	0.75	-604	0.75	-354
N-1: KFALLS-MERIDIAN 500 KV	0.81	-1174	0.88	-4134	0.73	-2695	0.70	-455	0.97	-2459	0.79	-3504	0.91	-1742	0.75	-602	0.75	-352
N-1: KNIGHT-WAUTOMA 500 KV	0.82	-1144	0.87	-3655	0.74	-2645	0.70	-454	0.98	-2015	0.84	-3182	0.86	-2278	0.76	-573	0.75	-333
N-1: LAGRANDE-NORTH POWDER 230 KV	0.82	-1129	0.87	-4227	0.73	-2713	0.70	-460	0.97	-2537	0.82	-3417	0.84	-2610	0.75	-600	0.75	-351
N-1: LANES-MARION 500 KV	0.81	-1175	0.88	-4122	0.73	-2694	0.70	-456	0.97	-2407	0.83	-3255	0.84	-2433	0.75	-602	0.75	-353
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.81	-1183	0.87	-4254	0.73	-2729	0.70	-458	0.97	-2582	0.81	-3475	0.84	-2646	0.75	-604	0.75	-354
N-1: LIT GOOSE-LOW MON 500 KV	0.81	-1182	0.87	-4223	0.73	-2727	0.70	-458	0.97	-3248	0.81	-3470	0.84	-2640	0.75	-603	0.75	-353
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.81	-1181	0.87	-4237	0.73	-2728	0.70	-458	0.97	-3257	0.81	-3476	0.84	-2644	0.75	-601	0.75	-352
N-1: LOW MON-SAC TAP 500 KV	0.81	-1172	0.87	-3800	0.74	-2718	0.70	-458	0.97	-3108	0.82	-3399	0.84	-2525	0.76	-579	0.75	-332
N-1: MALIN 500/230 XFMR	0.82	-1171	0.87	-4203	0.74	-2677	0.70	-420	0.97	-3200	0.83	-3343	0.84	-2516	0.75	-602	0.75	-353
N-1: MALIN-HILLTOP 230 KV	0.82	-1155	0.87	-4215	0.74	-2618	0.70	-373	0.97	-3225	0.82	-3375	0.84	-2614	0.75	-596	0.75	-349
N-1: MALIN-ROUND MTN #1 500 KV	0.82	-1152	0.87	-4095	0.74	-2594	0.70	-445	0.97	-3028	0.82	-2863	0.85	-2425	0.75	-591	0.75	-345
N-1: MALIN-ROUND MTN #2 500 KV	0.82	-1151	0.87	-4087	0.74	-2587	0.70	-444	0.97	-2339	0.82	-2835	0.86	-2413	0.75	-591	0.75	-344
N-1: MALIN-SUMMER LAKE 500 KV	0.82	-1181	0.88	-4046	0.74	-2548	0.70	-430	0.97	-2301	0.80	-2891	0.85	-2365	0.75	-606	0.75	-356
N-1: MAPLE VLY-ROCKY RH 345 KV	0.81	-1184	0.87	-4139	0.73	-2730	0.70	-458	0.97	-3251	0.81	-3474	0.84	-2639	0.75	-605	0.75	-355
N-1: MARION-PEARL 500 KV	0.81	-1174	0.87	-4125	0.74	-2680	0.70	-456	0.97	-3056	0.84	-3093	0.80	-1908	0.75	-600	0.75	-352
N-1: MARION-SANTIAM 500 KV	0.81	-1190	0.86	-4343	0.73	-2750	0.70	-459	0.97	-2694	0.81	-3566	0.83	-2746	0.75	-608	0.75	-356
N-1: MCLOUGLIN-OSTRANDER 230 KV	0.81	-1185	0.87	-4266	0.73	-2732	0.70	-458	0.97	-2578	0.81	-3466	0.84	-2629	0.75	-606	0.75	-356
N-1: MCNARY 500/230 KV XFMR	0.81	-1125	0.87	-4269	0.73	-2724	0.70	-458	0.97	-2621	0.81	-3525	0.83	-2674	0.75	-607	0.75	-356
N-1: MCNARY S2-MCNARY S3 230 KV	0.81	-1184	0.87	-4249	0.73	-2730	0.70	-458	0.97	-2592	0.81	-3480	0.84	-2658	0.75	-606	0.75	-356
N-1: MCNARY-BOARD T1 230 KV	0.81	-1179	0.87	-4276	0.73	-2712	0.70	-457	0.97	-3241	0.81	-3434	0.84	-2634	0.75	-605	0.75	-353
N-1: MCNARY-JOHN DAY 500 KV	0.82	-1152	0.88	-3995	0.73	-2657	0.70	-454	0.97	-2887	0.83	-3309	0.85	-2450	0.75	-598	0.75	-350
N-1: MCNARY-LONGHORN 500 KV	0.81	-1156	0.87	-4135	0.74	-2718	0.70	-460	0.97	-2491	0.81	-3427	0.84	-2580	0.75	-595	0.75	-346
N-1: MCNARY-ROSS 345 KV	0.81	-1174	0.87	-4177	0.73	-2713	0.70	-457	0.97	-2496	0.81	-3426	0.84	-2571	0.75	-606	0.75	-355
N-1: MCNARY-ROUNDUP 230 KV	0.85	-1020	0.87	-4176	0.74	-2656	0.70	-461	0.97	-2471	0.81	-3351	0.84	-2560	0.75	-592	0.75	-346
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.81	-1170	0.88	-3738	0.74	-2708	0.70	-458	0.97	-2380	0.82	-3369	0.85	-2481	0.76	-578	0.75	-332
N-1: MIDPOINT-HEMINGWAY 500 KV	0.84	-1046	0.87	-4211	0.70	-2143	0.70	-486	0.97	-3186	0.82	-3186	0.85	-2562	0.77	-527	0.76	-303
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN SHUNT	0.84	-1051	0.87	-4230	0.70	-2151	0.70	-486	0.97	-3199	0.82	-3197	0.84	-2571	0.77	-540	0.76	-306
N-1: MIDPOINT-HUMBOLDT 345 KV	0.81	-1242	0.87	-4143	0.73	-2779	0.70	-305	0.97	-3092	0.82	-3123	0.85	-2497	0.75	-616	0.75	-361
N-1: NAPAVINE-PAUL 500 KV	0.81	-1179	0.87	-4162	0.73	-2719	0.70	-457	0.97	-2504	0.82	-3440	0.84	-2589	0.75	-600	0.75	-352
N-1: OLYMPIA-PAUL 500 KV	0.81	-1187	0.87	-4315	0.73	-2736	0.70	-458	0.97	-2627	0.81	-3514	0.84	-2683	0.75	-607	0.75	-356

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: ONTARIO-CALDWELL 230 KV	0.82	-1143	0.86	-4230	0.74	-2619	0.70	-457	0.97	-2557	0.81	-3443	0.84	-2623	0.75	-602	0.75	-353
N-1: OSTRANDER-KNIGHT 500 KV	0.81	-1178	0.87	-4130	0.73	-2707	0.70	-457	0.98	-2989	0.82	-3367	0.84	-2488	0.75	-603	0.75	-354
N-1: OSTRANDER-PEARL 500 KV	0.81	-1184	0.87	-4256	0.73	-2726	0.70	-458	0.98	-2378	0.81	-3484	0.83	-2625	0.75	-606	0.75	-355
N-1: OSTRANDER-TROUTDALE 500 KV	0.81	-1187	0.87	-4232	0.73	-2734	0.70	-458	0.97	-2565	0.81	-3466	0.84	-2613	0.75	-607	0.75	-356
N-1: OXBOW-BROWNLEE #2 230 KV	0.81	-1171	0.87	-4270	0.73	-2722	0.70	-458	0.97	-2585	0.81	-3473	0.84	-2655	0.75	-605	0.75	-354
N-1: OXBOW-LOLO 230 KV	0.82	-1164	0.88	-4056	0.73	-2713	0.70	-463	0.97	-3078	0.82	-3303	0.85	-2515	0.76	-583	0.75	-335
N-1: PAUL-SATSOP 500 KV	0.81	-1184	0.87	-4207	0.73	-2729	0.70	-458	0.97	-2562	0.81	-3463	0.84	-2617	0.75	-605	0.75	-355
N-1: PEARL-KEELER 500 KV	0.81	-1171	0.88	-3964	0.73	-2689	0.70	-457	0.98	-2876	0.83	-3259	0.85	-2297	0.75	-591	0.75	-347
N-1: PEARL-KEELER 500 KV + RAS	0.81	-1196	0.88	-3843	0.73	-2818	0.70	-467	0.98	-2412	0.82	-3610	0.84	-2468	0.74	-603	0.75	-367
N-1: PINTO-FOUR CORNER 345 KV	0.81	-1188	0.87	-4272	0.73	-2736	0.70	-456	0.97	-2583	0.81	-3453	0.84	-2653	0.75	-607	0.75	-357
N-1: PONDEROSA A 500/230 KV XFMR	0.81	-1186	0.87	-4275	0.73	-2731	0.70	-458	0.97	-2590	0.81	-3473	0.84	-2658	0.75	-606	0.75	-356
N-1: PONDEROSA B 500/230 KV XFMR	0.81	-1184	0.87	-4277	0.73	-2730	0.70	-458	0.97	-3271	0.81	-3478	0.84	-2660	0.75	-606	0.75	-355
N-1: RAVER-PAUL 500 KV	0.81	-1160	0.89	-3622	0.74	-2672	0.70	-456	0.98	-2162	0.83	-3305	0.85	-2456	0.76	-579	0.75	-340
N-1: RAVER-TACOMA 500 KV	0.81	-1185	0.87	-4182	0.73	-2731	0.70	-458	0.97	-2575	0.81	-3475	0.84	-2639	0.75	-605	0.75	-355
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.81	-1194	0.86	-4232	0.73	-2759	0.70	-452	0.97	-3230	0.81	-3396	0.84	-2616	0.75	-611	0.75	-361
N-1: ROBINSON-HARRY ALLEN 500 KV	0.82	-1163	0.87	-4278	0.74	-2626	0.70	-368	0.97	-3279	0.81	-3498	0.84	-2665	0.75	-602	0.75	-353
N-1: ROCK CK-WAUTOMA 500 KV	0.82	-1144	0.88	-3622	0.74	-2656	0.70	-455	0.98	-2744	0.84	-3237	0.86	-2322	0.76	-566	0.76	-329
N-1: ROUND MTN-TABLE MTN 500 KV	0.82	-1163	0.87	-4160	0.74	-2647	0.70	-449	0.97	-2460	0.82	-3109	0.85	-2537	0.75	-595	0.75	-348
N-1: ROUNDUP-LAGRANDE 230 KV	0.82	-1110	0.87	-4196	0.73	-2703	0.70	-461	0.97	-3173	0.82	-3386	0.84	-2580	0.75	-596	0.75	-349
N-1: SCHULTZ-SICKLER 500 KV	0.81	-1182	0.88	-3975	0.73	-2729	0.70	-458	0.97	-2549	0.81	-3473	0.84	-2614	0.75	-596	0.75	-352
N-1: SCHULTZ-VANTAGE 500 KV	0.81	-1186	0.86	-4031	0.73	-2732	0.70	-458	0.97	-2556	0.81	-3466	0.84	-2618	0.75	-597	0.75	-351
N-1: SCHULTZ-WAUTOMA 500 KV	0.81	-1174	0.86	-3822	0.73	-2712	0.70	-458	0.97	-2402	0.82	-3390	0.85	-2507	0.76	-579	0.75	-342
N-1: SIGURD-GLEN CANYON 230 KV	0.81	-1184	0.87	-4277	0.73	-2726	0.70	-458	0.97	-3273	0.81	-3480	0.84	-2661	0.75	-606	0.75	-355
N-1: SLATT 500/230 KV XFMR	0.81	-1195	0.87	-3955	0.73	-2816	0.70	-467	0.97	-2598	0.81	-3659	0.84	-2660	0.75	-599	0.75	-362
N-1: SLATT-LONGHORN 500 KV	0.81	-1174	0.87	-4168	0.73	-2705	0.70	-457	0.97	-3149	0.81	-3415	0.84	-2576	0.75	-604	0.75	-354
N-1: SNOK TAP-SNOKING 500 KV	0.81	-1185	0.87	-4231	0.73	-2732	0.70	-458	0.97	-3271	0.81	-3482	0.84	-2656	0.75	-606	0.75	-355
N-1: TABLE MTN-TESLA 500 KV	0.82	-1163	0.87	-4178	0.74	-2655	0.70	-451	0.97	-2493	0.82	-3173	0.84	-2564	0.75	-595	0.75	-347
N-1: TABLE MTN-VACA DIXON 500 KV	0.82	-1152	0.88	-4125	0.74	-2610	0.70	-447	0.97	-2416	0.82	-2941	0.85	-2504	0.75	-589	0.75	-343
N-1: VANTAGE 500/230 KV XFMR #1	0.81	-1184	0.87	-4291	0.73	-2731	0.70	-458	0.97	-2586	0.81	-3478	0.84	-2657	0.75	-606	0.75	-355
N-1: VANTAGE 500/230 KV XFMR #2	0.81	-1184	0.87	-4291	0.73	-2731	0.70	-458	0.97	-3264	0.81	-3478	0.84	-2657	0.75	-606	0.75	-355
N-1: WALLA WALLA-TALBOT 230 KV	0.81	-1192	0.87	-4220	0.73	-2729	0.70	-458	0.97	-3250	0.81	-3469	0.84	-2640	0.75	-599	0.75	-351
N-1: WALLA WALLA-WALLULA 230 KV	0.82	-1165	0.87	-4262	0.73	-2730	0.70	-458	0.97	-3267	0.81	-3474	0.84	-2657	0.75	-605	0.75	-355
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.82	-1084	0.89	-2886	0.75	-2536	0.70	-452	0.98	-2125	0.88	-2664	0.89	-1733	0.78	-521	0.76	-301
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.82	-1128	0.90	-3433	0.74	-2567	0.70	-449	0.98	-1674	0.86	-2781	0.83	-1697	0.76	-578	0.75	-338
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.83	-1066	0.92	-2992	0.74	-2400	0.70	-439	0.98	-1276	0.89	-2416	0.89	-1575	0.77	-551	0.76	-320
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.82	-1127	0.89	-3539	0.74	-2583	0.70	-451	0.98	-1788	0.85	-2926	0.86	-2011	0.76	-578	0.75	-337
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.82	-1120	0.89	-3441	0.74	-2533	0.70	-447	0.98	-1612	0.86	-2900	0.86	-1958	0.76	-576	0.75	-337
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.82	-1113	0.88	-3388	0.74	-2613	0.70	-454	0.98	-1821	0.85	-3056	0.87	-2160	0.76	-557	0.76	-323
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.82	-1131	0.88	-3504	0.74	-2649	0.70	-456	0.98	-2012	0.84	-3168	0.86	-2270	0.76	-561	0.76	-325
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.81	-1237	0.88	-4109	0.74	-2797	0.70	-465	0.97	-2826	0.80	-3762	0.83	-2823	0.87	-274	0.78	-218
N-2: BETHEL-CEDAR SP 500KV & BETHEL-ROUND BUTTE 230 KV	0.814	-1175	0.88	-4053	0.73	-2674	0.70	-453	0.98	-2936	0.83	-3287	0.84	-2202	0.75	-607	0.75	-356
N-2: BETHEL-CEDAR SP 500KV & BETHEL-SANTIAM 230KV	0.814	-1174	0.88	-4061	0.73	-2672	0.70	-453	0.98	-2939	0.83	-3291	0.84	-2277	0.75	-606	0.75	-356
N-2: BETHEL-CEDAR SP 500KV & SANTIAM-MIKKALO 500KV	0.814	-1168	0.89	-3911	0.73	-2648	0.70	-451	0.98	-2814	0.83	-3143	0.85	-2122	0.75	-603	0.75	-354
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.81	-1182	0.87	-4178	0.73	-2714	0.70	-457	0.98	-2996	0.82	-3382	0.83	-2494	0.75	-605	0.75	-355

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.81	-1183	0.87	-4201	0.73	-2718	0.70	-457	0.98	-2352	0.81	-3419	0.83	-2539	0.75	-606	0.75	-356
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.79	-893	0.87	-4124	0.77	-2270	0.70	-459	0.97	-2412	0.82	-3289	0.85	-2523	0.75	-585	0.75	-339
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.79	-892	0.87	-4122	0.77	-2264	0.70	-459	0.97	-2409	0.82	-3285	0.85	-2521	0.75	-584	0.75	-339
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.82	-1147	0.87	-4195	0.75	-2413	0.70	-457	0.97	-2533	0.82	-3420	0.84	-2607	0.74	-608	0.74	-381
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.83	-1118	0.87	-4154	0.78	-2112	0.70	-451	0.97	-3171	0.82	-3380	0.84	-2577	0.74	-580	0.74	-385
N-2: BROADVIEW-GARRISON #1 & #2 500 KV + RAS	0.81	-1197	0.88	-4309	0.72	-2853	0.70	-483	0.97	-2974	0.80	-3967	0.82	-2941	0.70	-579	0.82	-413
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.81	-1073	0.89	-3612	0.74	-2502	0.70	-472	0.98	-1934	0.85	-2885	0.87	-2181	0.77	-538	0.76	-305
N-2: BROWNLEE-OSBOW & BROWNLEE-HELLS CANYON 230 KV	0.81	-1048	0.88	-3973	0.74	-2598	0.70	-466	0.97	-2329	0.82	-3239	0.85	-2450	0.76	-575	0.75	-336
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.82	-1165	0.89	-3868	0.73	-2648	0.70	-453	0.97	-2125	0.84	-3082	0.79	-1757	0.75	-601	0.75	-353
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.81	-1179	0.88	-3741	0.73	-2719	0.70	-458	0.97	-2504	0.82	-3450	0.84	-2589	0.76	-587	0.75	-347
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.81	-1181	0.88	-3905	0.73	-2722	0.70	-458	0.97	-3196	0.82	-3454	0.84	-2601	0.75	-598	0.75	-352
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.81	-1182	0.87	-3984	0.73	-2726	0.70	-458	0.97	-2538	0.82	-3461	0.84	-2611	0.75	-600	0.75	-353
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.81	-1182	0.88	-3944	0.73	-2725	0.70	-458	0.97	-2548	0.81	-3466	0.84	-2616	0.75	-594	0.75	-350
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.81	-1185	0.87	-4060	0.73	-2731	0.70	-458	0.97	-2578	0.81	-3476	0.84	-2640	0.75	-605	0.75	-356
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.81	-1151	0.85	-3142	0.74	-2709	0.70	-459	0.98	-2916	0.83	-3366	0.86	-2373	0.78	-507	0.76	-313
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.81	-1162	0.90	-3068	0.74	-2686	0.70	-457	0.97	-2311	0.83	-3349	0.85	-2459	0.77	-532	0.76	-320
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.81	-1183	0.88	-4006	0.73	-2732	0.70	-458	0.97	-3252	0.81	-3486	0.84	-2639	0.75	-591	0.75	-351
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.81	-1242	0.86	-4735	0.73	-2978	0.70	-479	0.97	-3876	0.78	-4254	0.80	-3164	0.73	-646	0.74	-400
N-2: DC-BIPOLE	0.84	-1016	0.89	-3938	0.76	-2267	0.70	-401	0.96	-2411	0.84	-2335	0.86	-2315	0.76	-575	0.75	-343
N-2: DOUBLE PALO VERDE	0.84	-613	0.96	-1699	0.78	-2156	0.70	-414	0.99	-1308	0.92	-2209	0.92	-1643	0.81	-424	0.77	-272
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.81	-1186	0.87	-4156	0.73	-2734	0.70	-458	0.97	-2572	0.81	-3476	0.84	-2638	0.75	-607	0.75	-356
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.81	-1184	0.88	-4004	0.73	-2730	0.70	-458	0.97	-2540	0.82	-3464	0.84	-2612	0.75	-605	0.75	-355
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.81	-1200	0.87	-4263	0.72	-2823	0.70	-468	0.97	-2773	0.81	-3705	0.83	-2790	0.83	-457	0.74	-456
N-2: GRASSLAND-CEDAR SP 500KV & SLATT-BUCKLEY 500KV	0.83	-1105	0.91	-3394	0.74	-2469	0.70	-438	0.98	-2293	0.87	-2704	0.88	-1747	0.75	-582	0.76	-340
N-2: GRASSLAND-COYOTE 500KV & SLATT-LONGHORN 500KV	0.82	-1079	0.89	-3448	0.75	-2596	0.70	-460	0.98	-2427	0.86	-2929	0.88	-2076	0.76	-565	0.75	-326
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV + RAS	0.82	-1100	0.89	-4157	0.74	-2547	0.70	-434	0.97	-2382	0.80	-2765	0.84	-2334	0.73	-625	0.74	-386
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV + RAS	0.82	-1060	0.89	-4218	0.74	-2498	0.70	-460	0.97	-2465	0.80	-3014	0.84	-2447	0.74	-606	0.75	-370
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV + RAS	0.82	-1202	0.86	-4824	0.74	-2671	0.70	-423	0.97	-3341	0.79	-2849	0.83	-2541	0.72	-656	0.74	-412
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.81	-1183	0.82	-3160	0.74	-2725	0.70	-459	0.97	-2483	0.82	-3413	0.84	-2552	0.76	-586	0.75	-349
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.82	-1153	0.84	-3620	0.74	-2670	0.70	-455	0.97	-2983	0.82	-3340	0.85	-2453	0.75	-588	0.75	-341
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.81	-1200	0.91	-3827	0.73	-2725	0.70	-459	0.90	-3140	0.82	-3294	0.89	-2305	0.74	-617	0.75	-365
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.81	-1175	0.88	-4050	0.73	-2685	0.70	-456	0.96	-3002	0.82	-3246	0.82	-2227	0.75	-603	0.75	-354
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV + RAS	0.82	-1050	0.91	-3836	0.75	-2483	0.70	-453	0.98	-2642	0.84	-2775	0.84	-2156	0.75	-590	0.75	-356
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV + RAS	0.82	-1095	0.90	-3973	0.74	-2562	0.70	-465	0.97	-2758	0.82	-3030	0.86	-2286	0.75	-591	0.75	-353
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.82	-1165	0.89	-3868	0.73	-2648	0.70	-453	0.97	-2125	0.84	-3082	0.79	-1757	0.75	-601	0.75	-353
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.82	-1155	0.89	-3849	0.74	-2604	0.70	-452	0.97	-2100	0.85	-2721	0.79	-1366	0.75	-591	0.75	-347
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.82	-1132	0.88	-3608	0.74	-2636	0.70	-454	0.98	-2631	0.84	-3152	0.86	-2254	0.76	-569	0.76	-330
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.81	-1171	0.88	-3959	0.73	-2687	0.70	-457	0.98	-2191	0.83	-3246	0.85	-2282	0.75	-592	0.75	-347
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.81	-1176	0.88	-4046	0.73	-2694	0.70	-456	0.98	-2165	0.83	-3270	0.84	-2295	0.75	-604	0.75	-355
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.81	-1166	0.88	-4031	0.73	-2687	0.70	-456	0.98	-2216	0.83	-3291	0.85	-2395	0.75	-603	0.75	-354
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.81	-1171	0.88	-4001	0.73	-2689	0.70	-456	0.98	-2908	0.83	-3297	0.85	-2431	0.75	-598	0.75	-351
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.81	-1107	0.87	-3824	0.74	-2683	0.70	-456	0.97	-2588	0.81	-3537	0.84	-2635	0.78	-520	0.76	-292
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.82	-1179	0.87	-4788	0.74	-2607	0.70	-427	0.97	-2961	0.79	-2344	0.85	-2768	0.73	-644	0.74	-388
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.82	-1093	0.89	-3343	0.74	-2550	0.70	-449	0.98	-1648	0.86	-2958	0.88	-2027	0.77	-553	0.76	-320

Appendix A - 16hs2a_2250idnw_N Base Case VQ Results

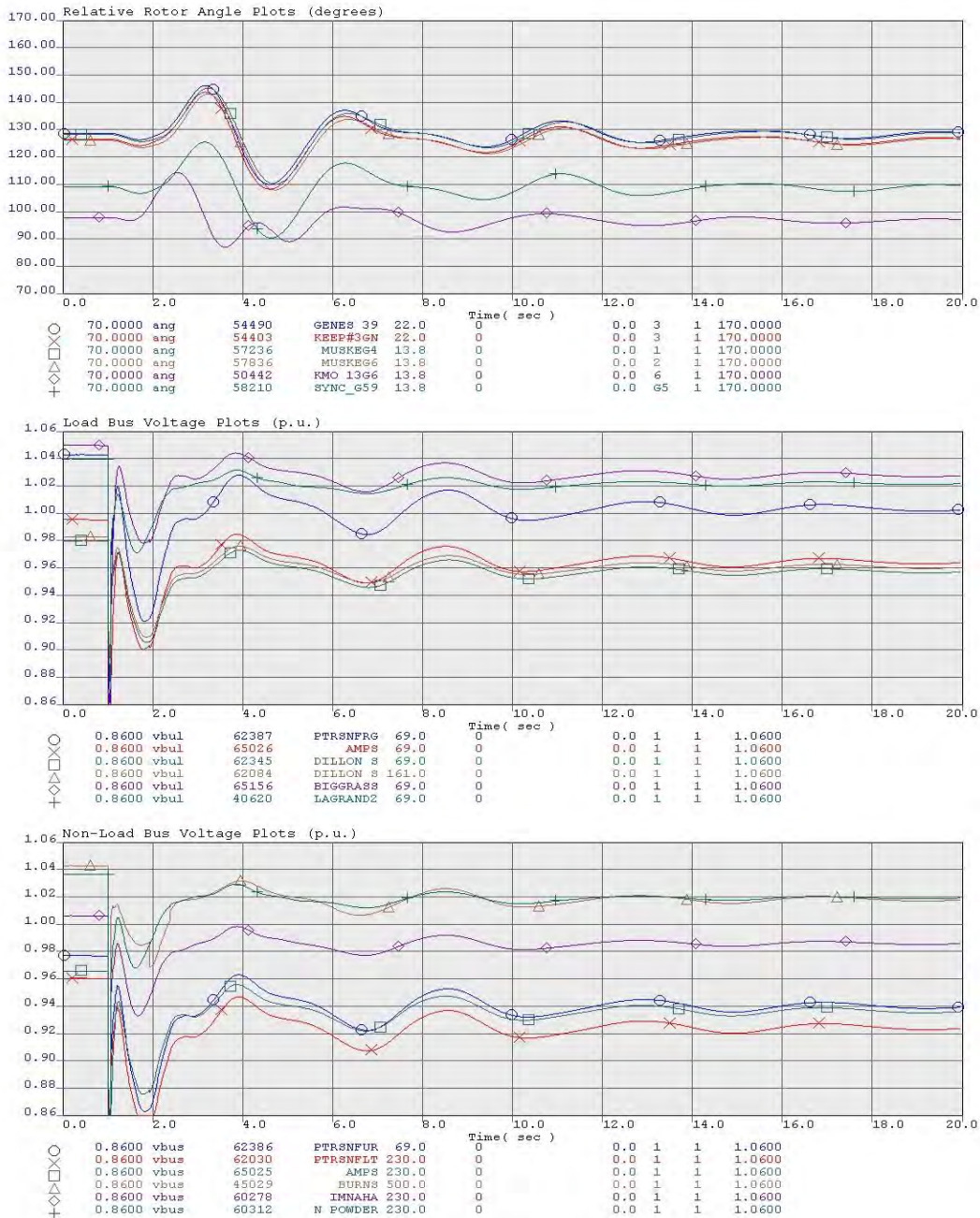
V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Brownlee		Hanford		Hemingway		Humbolt		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.82	-1139	0.88	-3900	0.74	-2635	0.70	-453	0.97	-2155	0.83	-3267	0.85	-2399	0.75	-596	0.75	-348
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.82	-1136	0.88	-3869	0.74	-2631	0.70	-452	0.98	-2017	0.84	-3220	0.86	-2340	0.75	-597	0.75	-349
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.81	-1164	0.88	-4112	0.73	-2697	0.70	-456	0.97	-2436	0.82	-3386	0.84	-2530	0.75	-605	0.75	-354
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.84	-1043	0.87	-4200	0.73	-2087	0.70	-486	0.97	-2501	0.82	-3175	0.85	-2557	0.77	-517	0.76	-299
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.81	-1181	0.89	-3803	0.73	-2725	0.70	-458	0.97	-3195	0.82	-3461	0.84	-2599	0.75	-590	0.75	-350
N-2: NAPA-VINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.81	-1131	0.94	-1990	0.75	-2728	0.70	-473	0.99	-1126	0.92	-2671	0.93	-1373	0.76	-545	0.75	-355
N-2: PAUL-NAPA-VINE & PAUL-ALLSTON #2 500 KV + RAS	0.81	-1131	0.94	-2003	0.75	-2734	0.70	-473	0.99	-1163	0.92	-2753	0.93	-1420	0.76	-545	0.75	-355
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.81	-1160	0.89	-3567	0.74	-2671	0.70	-456	0.98	-2151	0.83	-3302	0.86	-2428	0.76	-579	0.75	-340
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV + RAS	0.81	-1196	0.88	-3842	0.73	-2820	0.70	-467	0.98	-2413	0.82	-3608	0.84	-2462	0.74	-604	0.75	-367
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.81	-1183	0.87	-4240	0.73	-2723	0.70	-458	0.98	-2377	0.81	-3467	0.83	-2584	0.75	-606	0.75	-355
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.81	-1184	0.87	-4239	0.73	-2726	0.70	-458	0.98	-2395	0.81	-3453	0.83	-2547	0.75	-606	0.75	-355
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.81	-1187	0.87	-4212	0.73	-2735	0.70	-458	0.97	-3272	0.82	-3487	0.84	-2655	0.75	-608	0.75	-356
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.81	-1181	0.87	-4028	0.73	-2723	0.70	-458	0.97	-3202	0.82	-3456	0.84	-2608	0.75	-599	0.75	-352
N-2: RAVER-PAUL & NAPA-VINE-PAUL 500 KV	0.81	-1158	0.89	-3590	0.74	-2667	0.70	-455	0.98	-2129	0.83	-3282	0.86	-2407	0.76	-576	0.75	-339
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.81	-1209	0.89	-3589	0.73	-2892	0.70	-473	0.97	-2742	0.80	-3943	0.83	-2835	0.74	-616	0.75	-379
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.81	-1209	0.90	-3711	0.73	-2889	0.70	-473	0.97	-2738	0.80	-3935	0.83	-2843	0.74	-618	0.75	-380
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.81	-1177	0.88	-3761	0.73	-2707	0.70	-457	0.97	-2431	0.82	-3396	0.85	-2556	0.75	-599	0.75	-352
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.81	-1185	0.87	-4125	0.73	-2731	0.70	-458	0.97	-2563	0.81	-3470	0.84	-2624	0.75	-606	0.75	-355
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.81	-1184	0.87	-4163	0.73	-2730	0.70	-458	0.97	-2567	0.81	-3472	0.84	-2626	0.75	-605	0.75	-355
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV + RAS	0.81	-1225	0.85	-5189	0.74	-2732	0.70	-434	0.97	-3375	0.78	-2768	0.83	-3121	0.73	-659	0.74	-396
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV + RAS	0.81	-1239	0.83	-4100	0.73	-2987	0.70	-480	0.97	-3770	0.79	-4226	0.81	-3029	0.74	-619	0.74	-387
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV + RAS	0.81	-1212	0.86	-4055	0.73	-2853	0.70	-468	0.97	-2860	0.80	-3837	0.83	-2851	0.74	-614	0.75	-373
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.81	-1169	0.91	-3549	0.74	-2861	0.70	-465	0.97	-2808	0.80	-3393	0.83	-2780	0.73	-629	0.74	-404
N-2: TAFT-BELL 500 KV & BELL-LANCASTER 230 KV	0.81	-1182	0.87	-4188	0.73	-2728	0.70	-458	0.97	-2581	0.81	-3476	0.84	-2646	0.79	-495	0.75	-346
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.81	-1188	0.87	-4128	0.73	-2737	0.70	-459	0.97	-3252	0.81	-3468	0.84	-2636	0.77	-549	0.75	-364
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV	0.81	-1182	0.87	-4188	0.73	-2728	0.70	-458	0.97	-3260	0.81	-3476	0.84	-2646	0.79	-495	0.75	-346
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.81	-1187	0.87	-4181	0.73	-2733	0.70	-458	0.97	-3247	0.81	-3460	0.84	-2636	0.77	-548	0.75	-363
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV	0.81	-1186	0.87	-4184	0.73	-2732	0.70	-458	0.97	-3248	0.81	-3461	0.84	-2637	0.78	-538	0.75	-360
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.81	-1213	0.88	-3962	0.74	-2741	0.70	-459	0.97	-3275	0.81	-3516	0.84	-2651	0.81	-457	0.77	-275
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.82	-1133	0.88	-3502	0.74	-2638	0.70	-454	0.97	-2081	0.84	-3192	0.85	-2269	0.77	-557	0.76	-325
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.82	-1133	0.88	-3502	0.74	-2638	0.70	-454	0.97	-2081	0.84	-3192	0.85	-2269	0.77	-557	0.76	-325
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.81	-1174	0.88	-3624	0.73	-2700	0.70	-457	0.97	-3048	0.82	-3370	0.85	-2513	0.75	-595	0.75	-351

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Hemingway-Boardman 500 kV Line



Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None

Page 1



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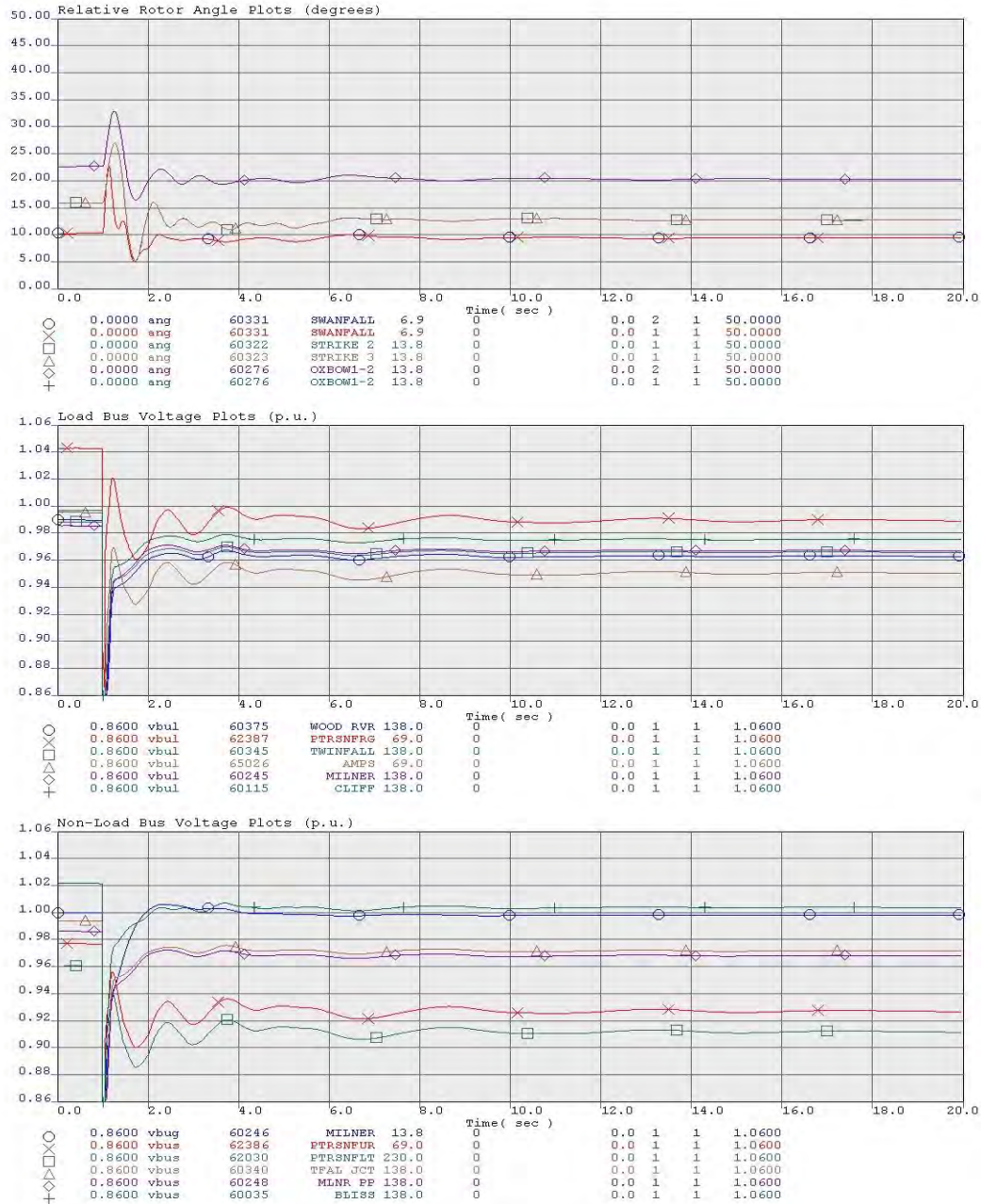
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Sat Jul 21 12:39:55 2012

Figure A8: N-1 Loss of Hemingway-Boardman 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Hemingway-Midpoint 500 kV Line



Loss of Hemingway-Midpoint 500 kV line
3ph fault @ MPSN 500 kV clear in 3 Cycles
RAS: None

Page 1



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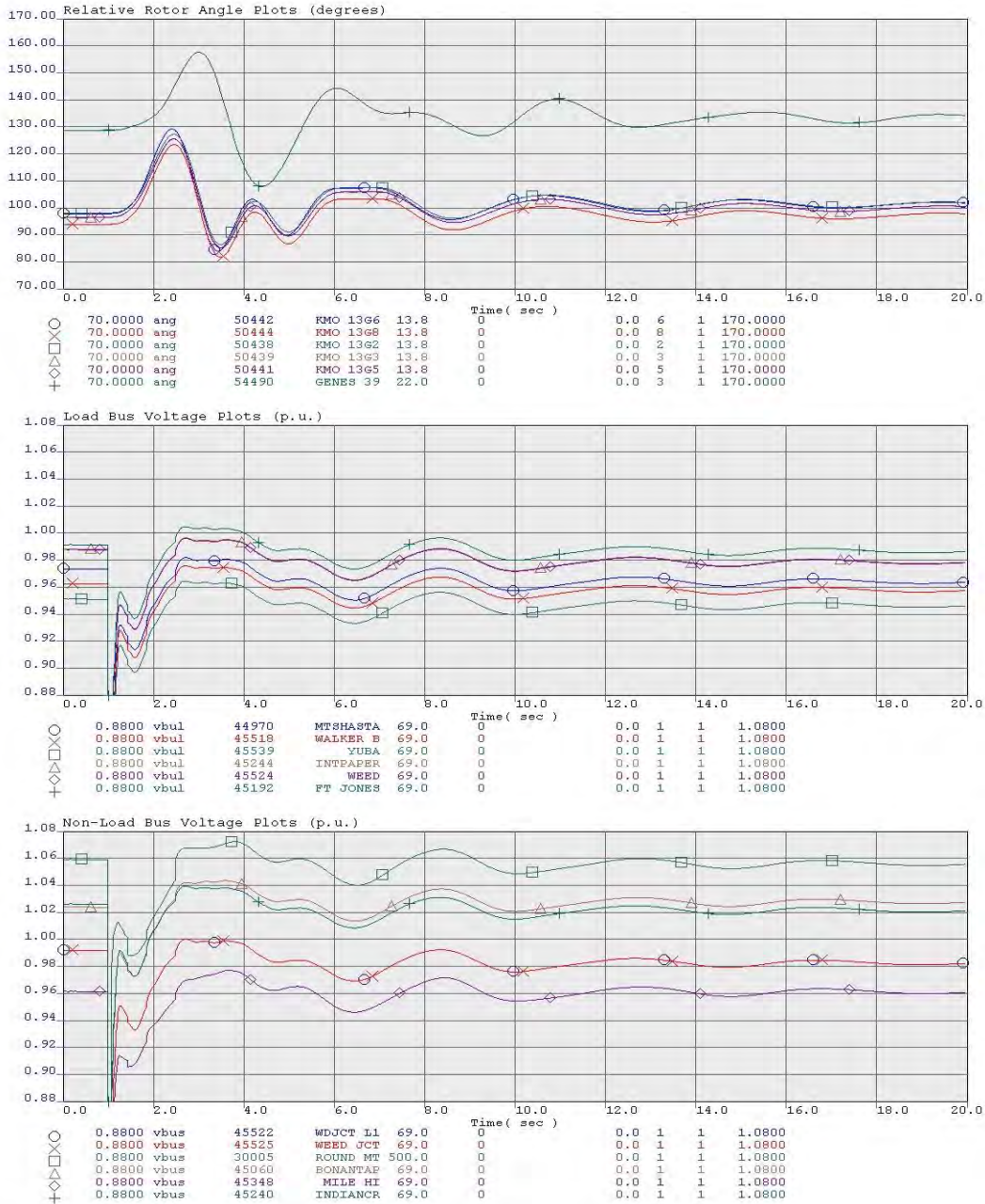
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Figure A9: N-1 Loss of Hemingway-Midpoint 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Captain Jack-Olinda 500 kV Line



Loss of Captain Jack-Olinda 500 kV line
3-Phase Fault @ Captain Jack 500 kV with 4 Cycle Clearing
RAS: Insert Table Mtn 500 kV shunt Capacitors

Page 1



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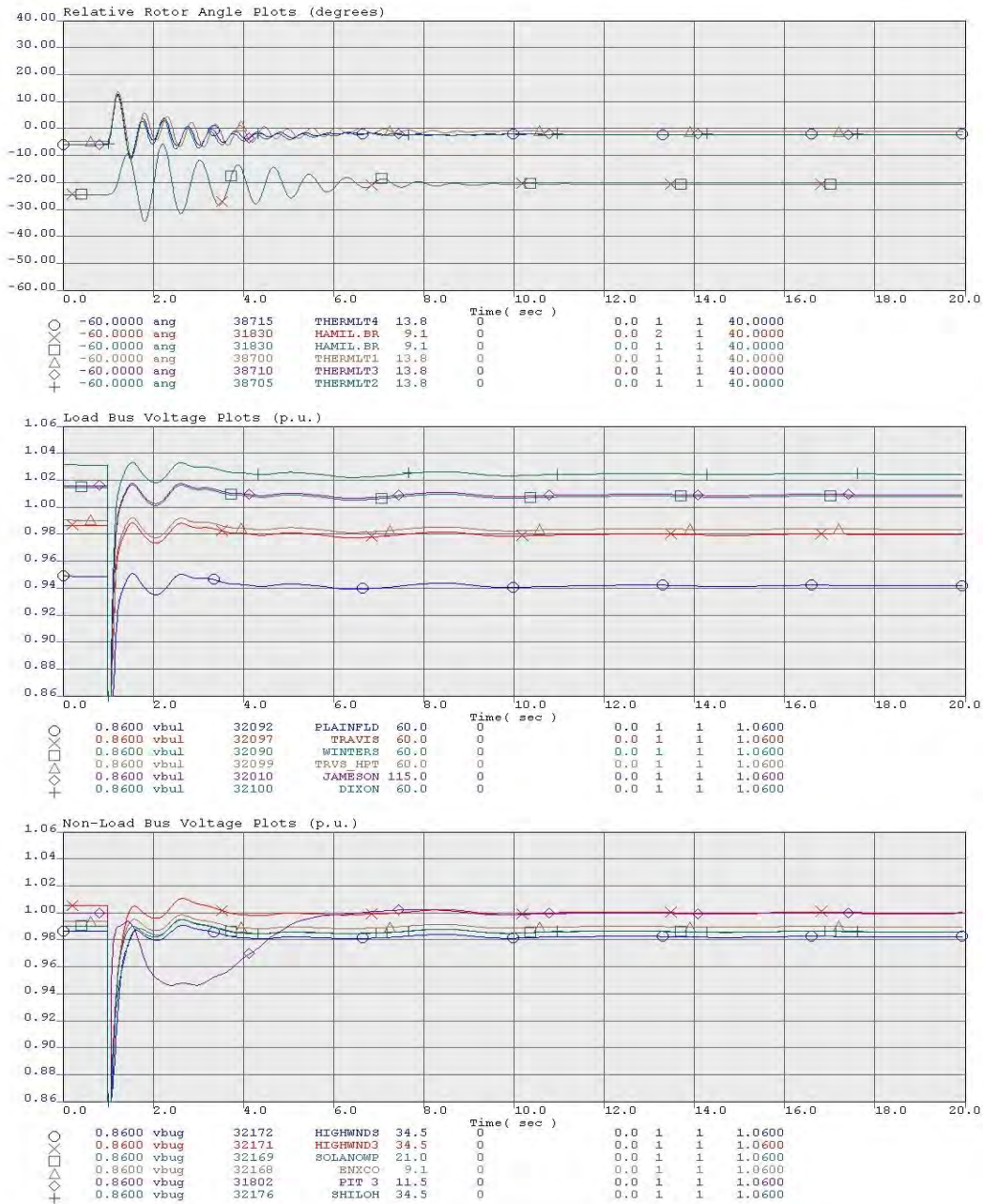
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Figure A10: N-1 Loss of Captain Jack-Olinda 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Table Mtn-Tesla 500 kV Line



Outage of Table Mtn-Tesla 500 kV Line
RAS: None

Page 1



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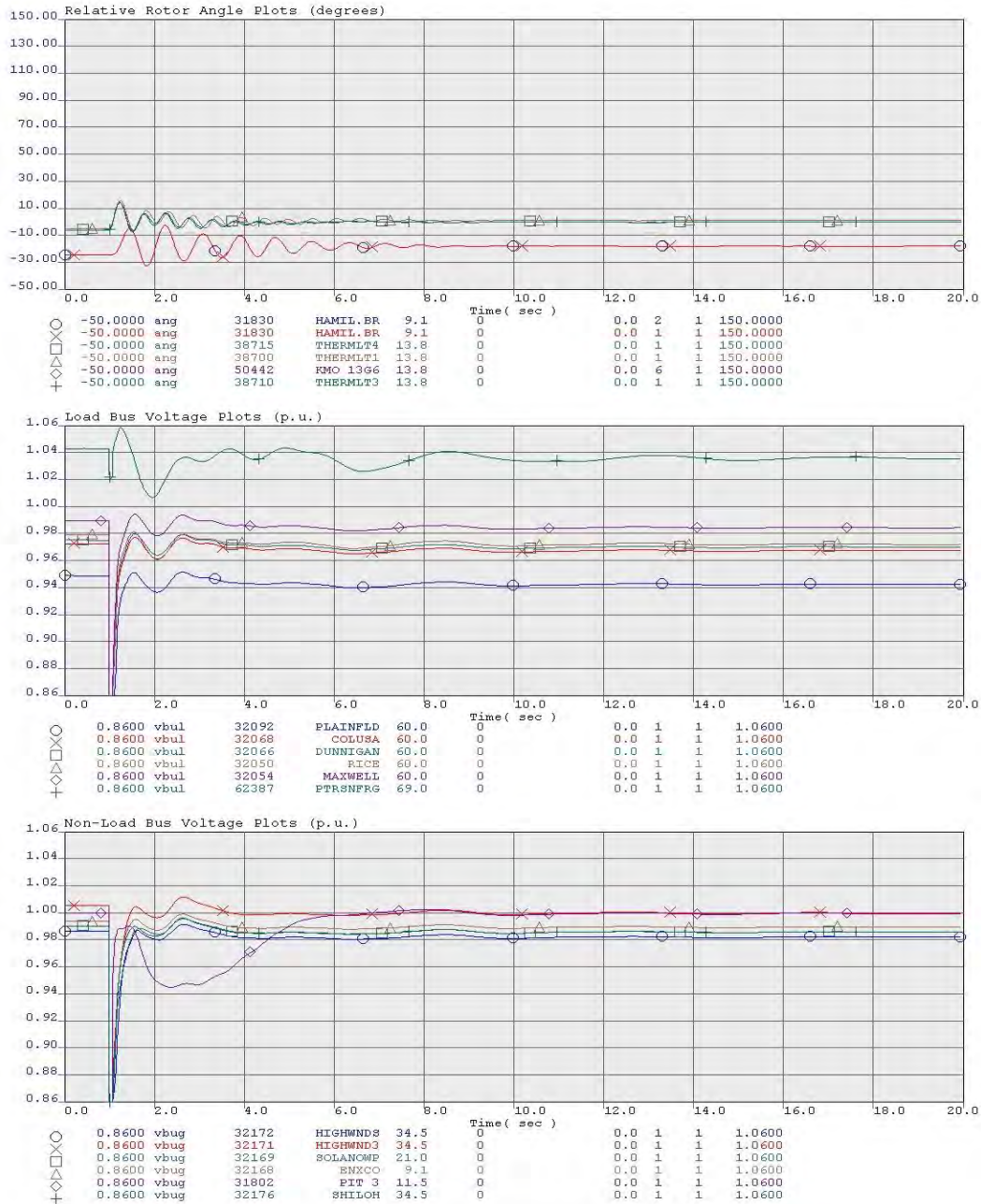
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Figure A11: N-1 Loss of Table Mtn-Tesla 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Table Mtn-Vaca Dixon 500 kV Line



Outage of Table Mtn-Vaca Dixon 500 kV Line
RAS: None

Page 1



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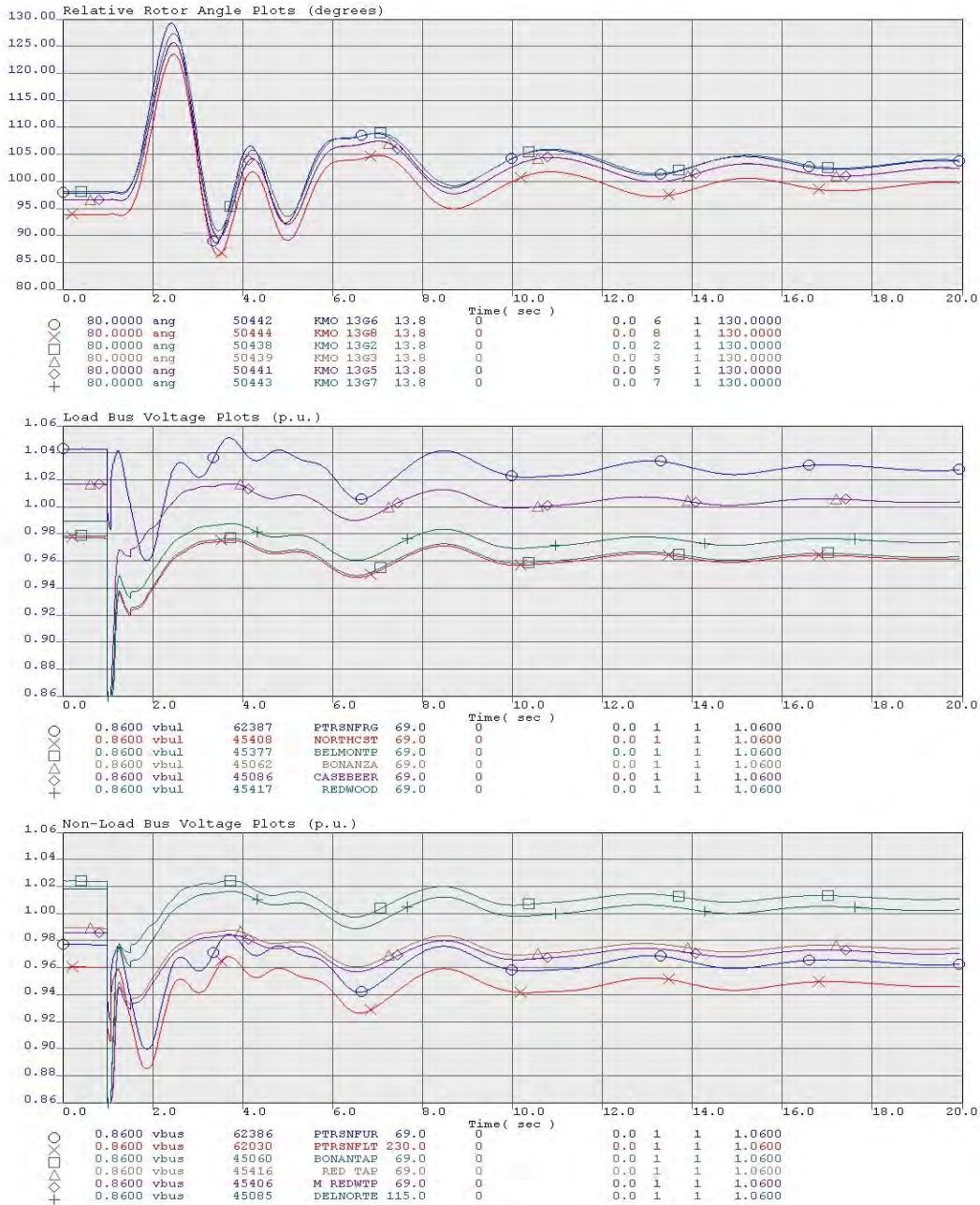
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Figure A12: N-1 Loss of Table Mtn-Vaca Dixon 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Grizzly-Captain Jack 500 kV Line



Loss of Captain Jack-Grizzly 500 kV line
3-Phase Fault @ Captain Jack 500 kV with 4 Cycle Clearing
RAS: None

Page 1



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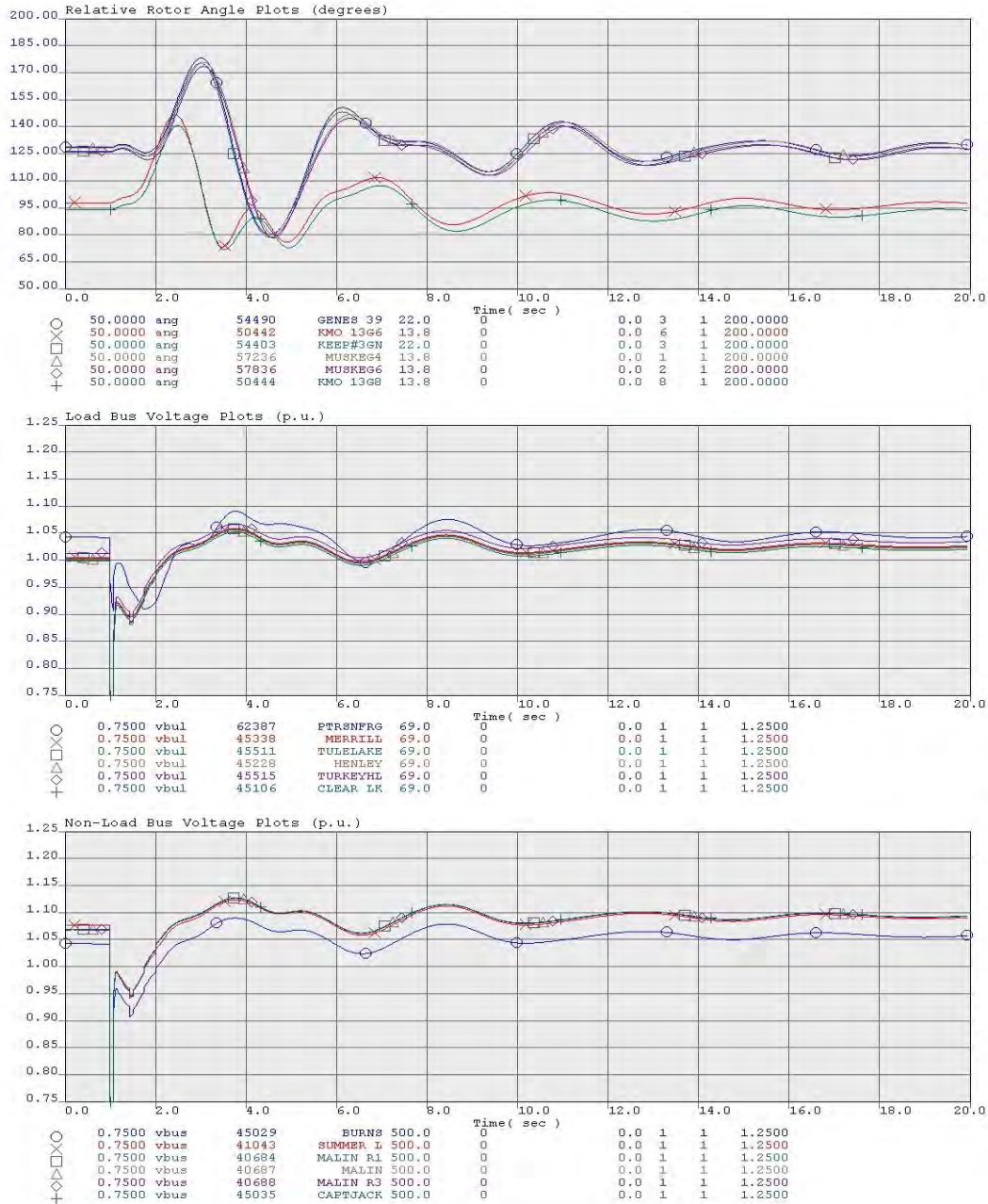
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Sat Jul 21 13:09:25 2012

Figure A13: N-1 Loss of Grizzly-Captain Jack 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of John Day-Grizzly #1 500 kV Line



Loss of John Day-Grizzly #1 500 kV line
3-Phase Fault @ John Day 500 kV with 4 Cycle Clearing
RAS: None

Page 1



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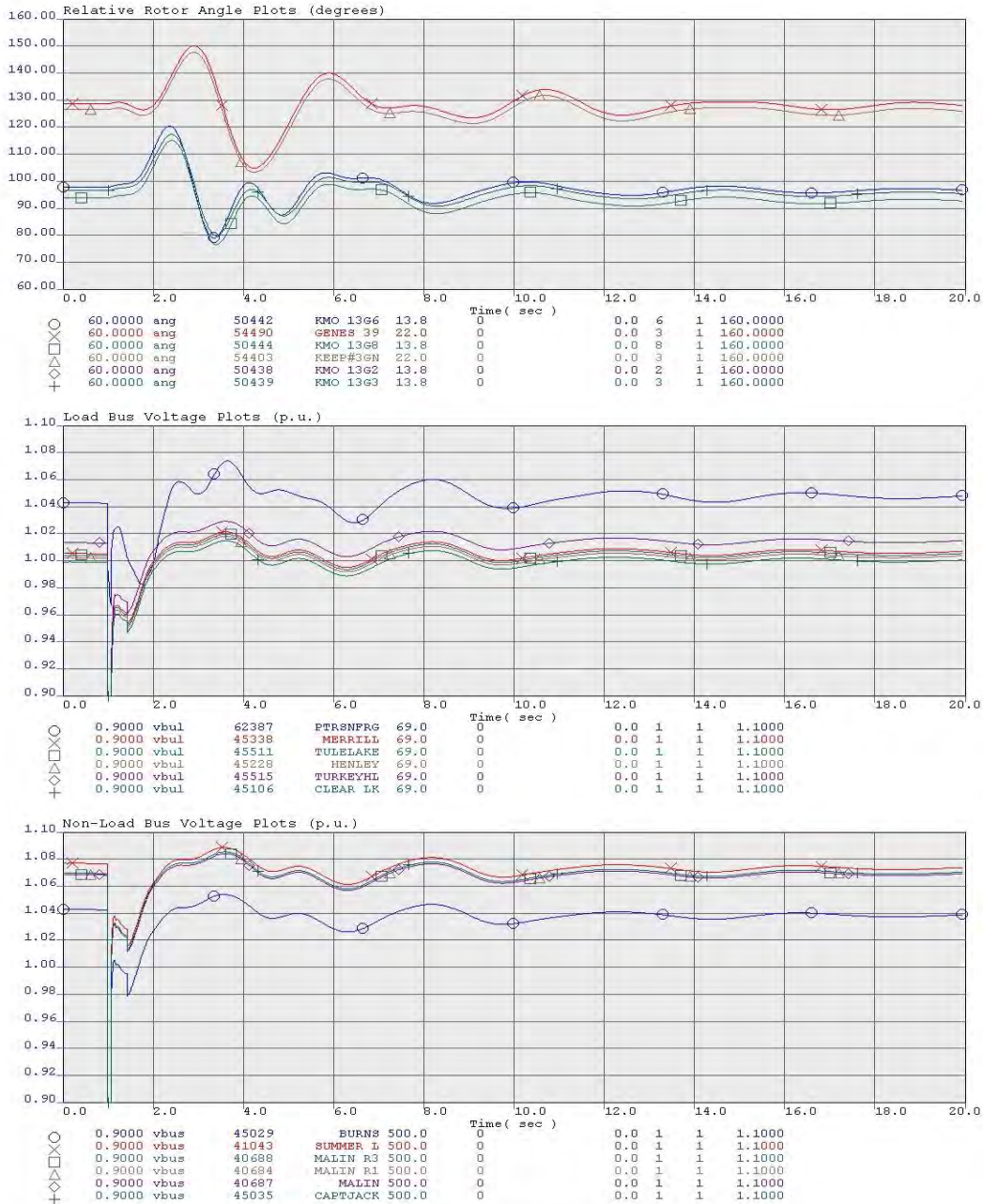
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Sat Jul 21 13:11:45 2012

Figure A14: N-1 Loss of John Day-Grizzly #1 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Buckley-Grizzly 500 kV Line



Loss of Buckley-Grizzly 500 kV line
3-Phase Fault @ Buckley 500 kV with 4 Cycle Clearing
RAS: None

Page 1



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Sat Jul 21 13:13:43 2012

Figure A15: N-1 Loss of Buckley-Grizzly 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

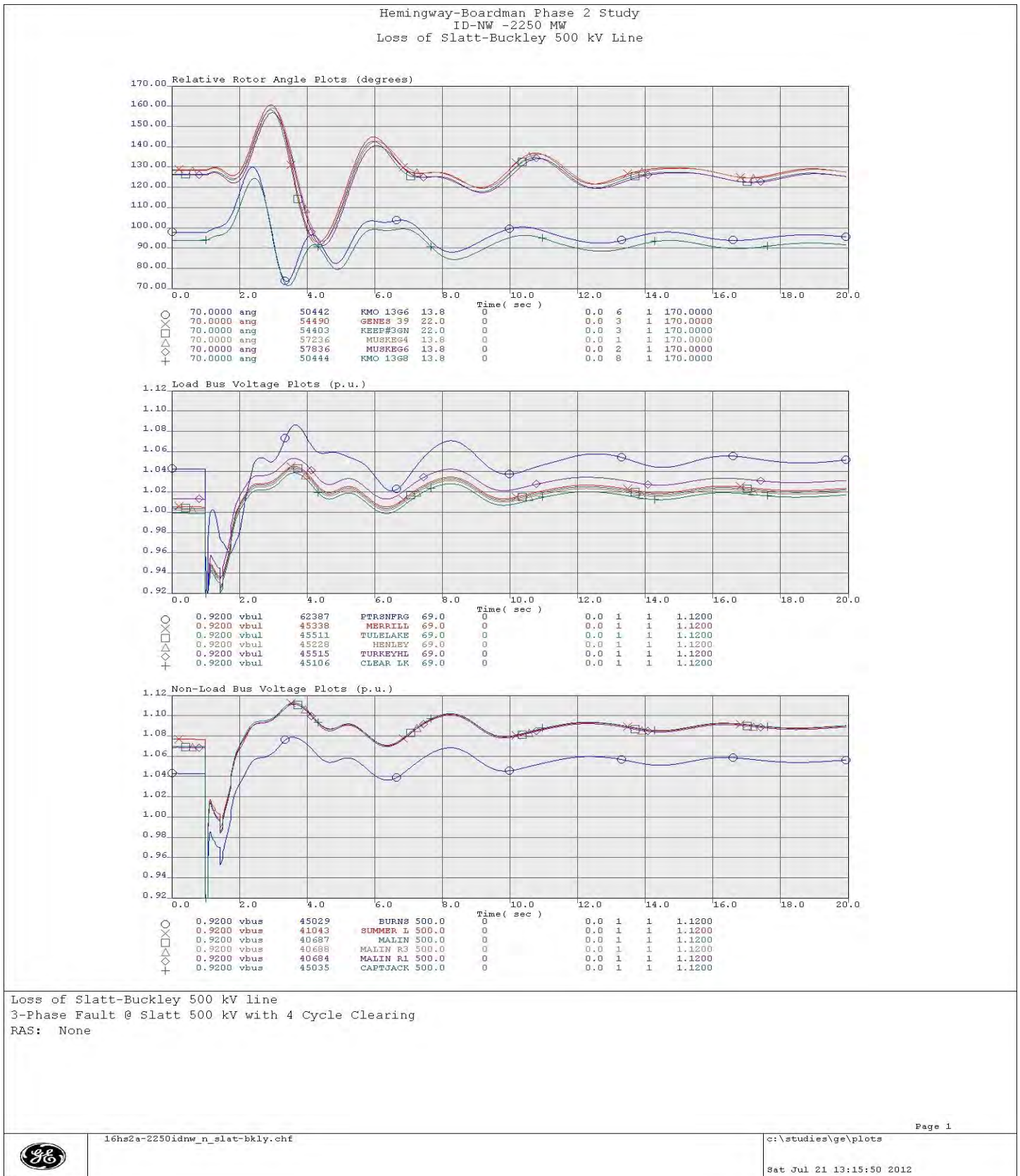
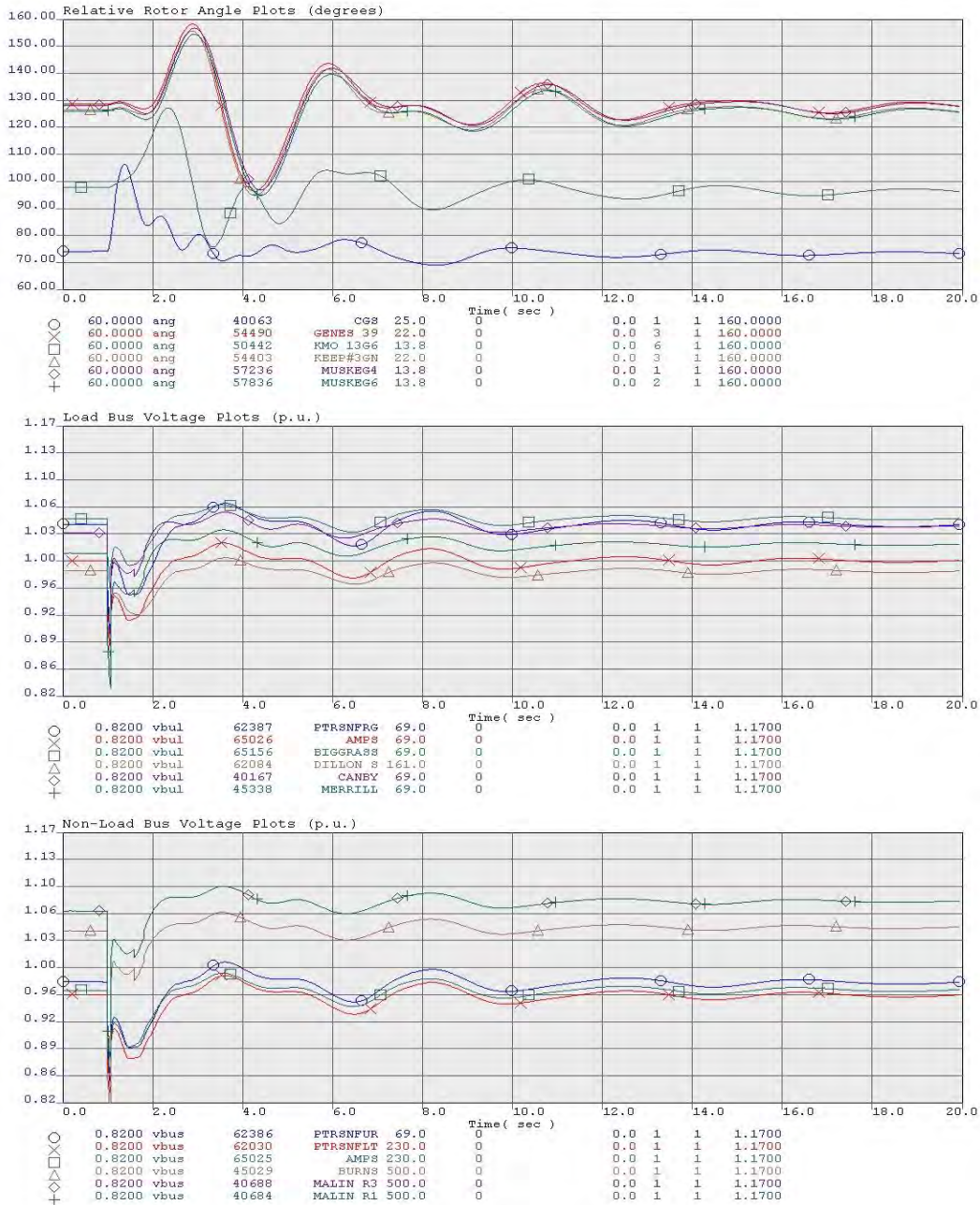


Figure A16: N-1 Loss of Slatt-Buckley 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Ashe-Slatt 500 kV Line



Loss of Ashe-Slatt 500 kV line
3-Phase Fault @ Ashe 500 kV with 4 Cycle Clearing
RAS: None

Page 1



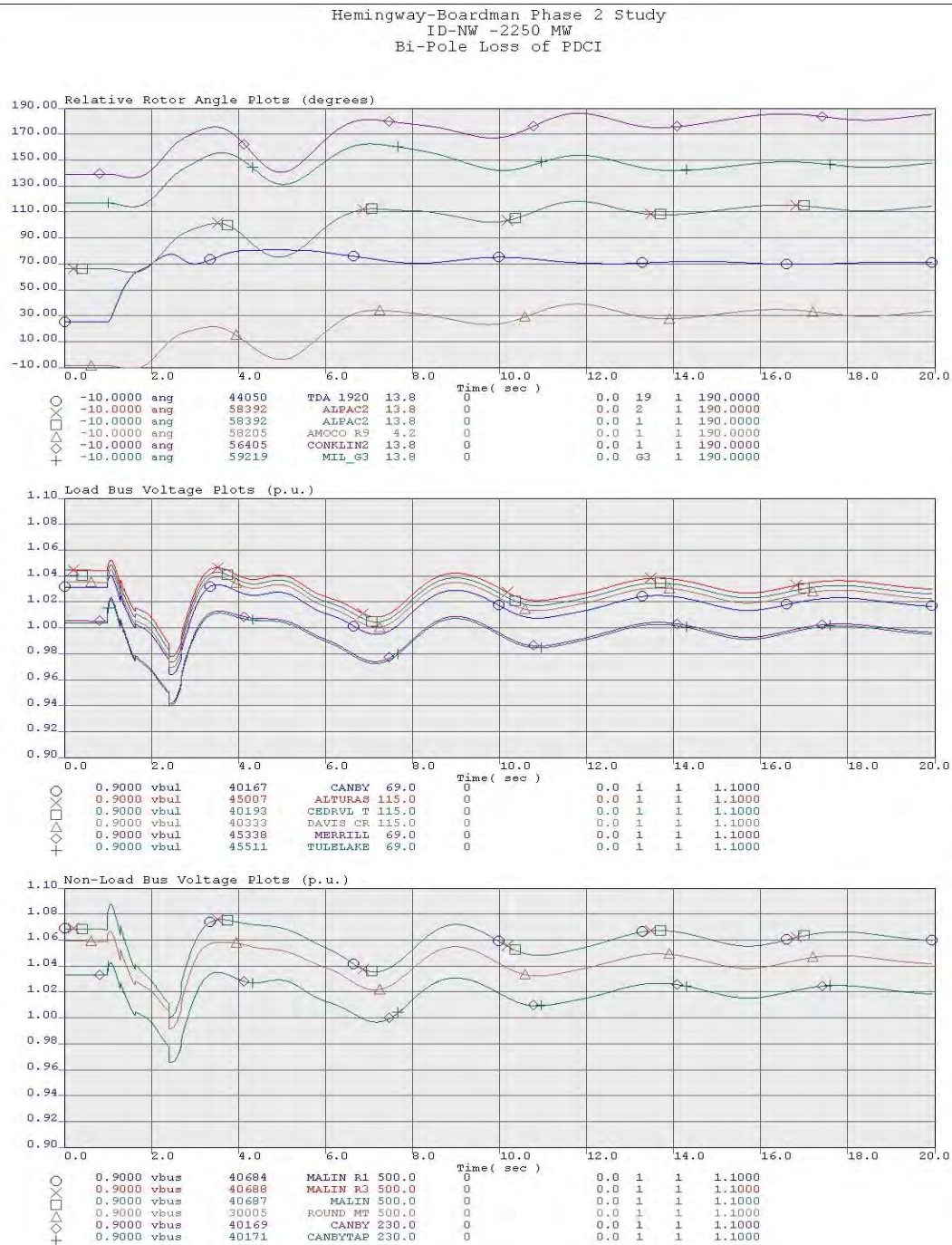
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Sat Jul 21 13:18:41 2012

Figure A17: N-1 Loss of Ashe-Slatt 500 kV Line (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



Bipole loss of Pacific DC Intertie
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
Northwest Generation Drop (2550 MW)

Page 1



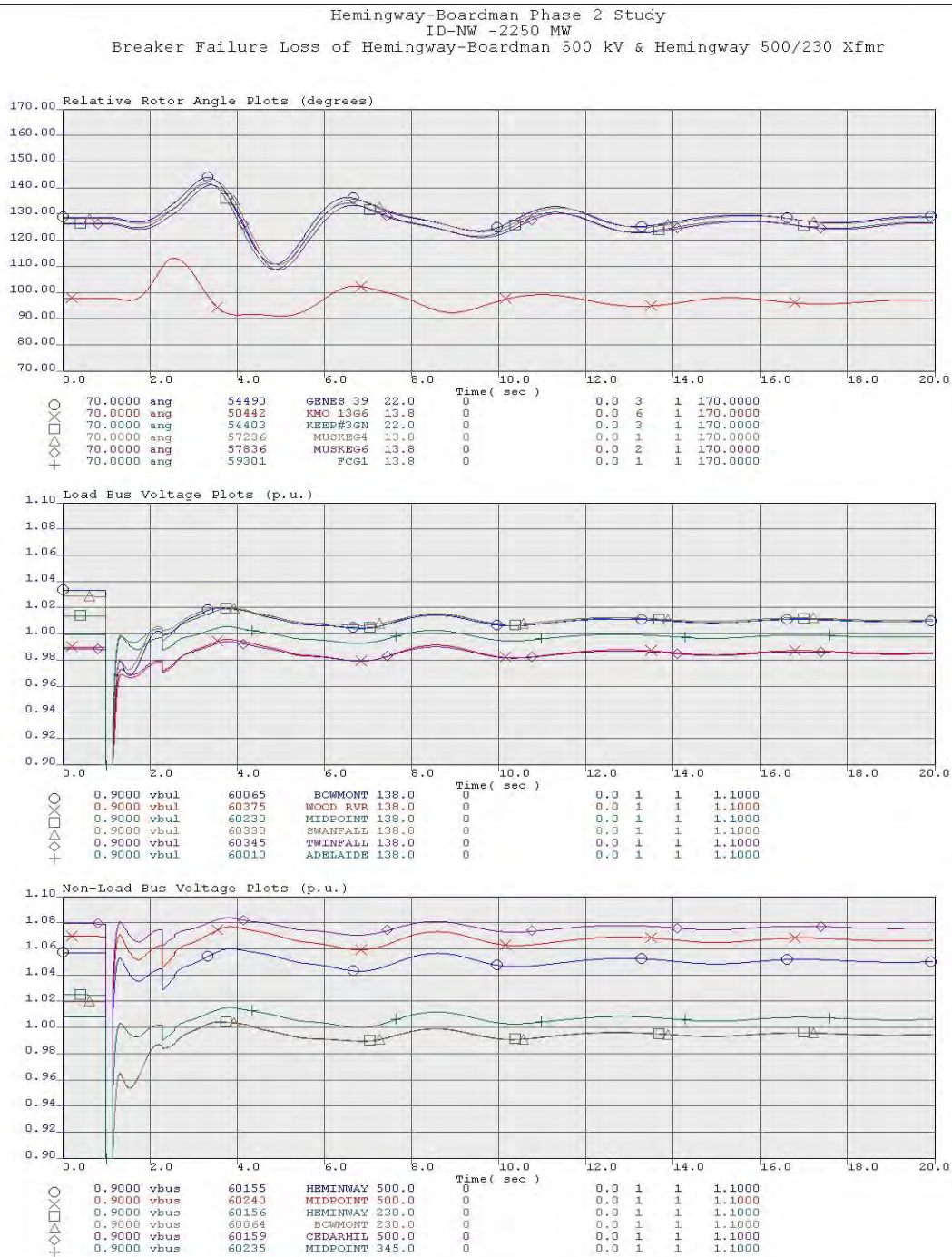
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Figure A18: Bi-Pole Loss – Pacific DC Intertie (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



Loss of Hemingway-Boardman 500 kV Line and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: None

Page 1



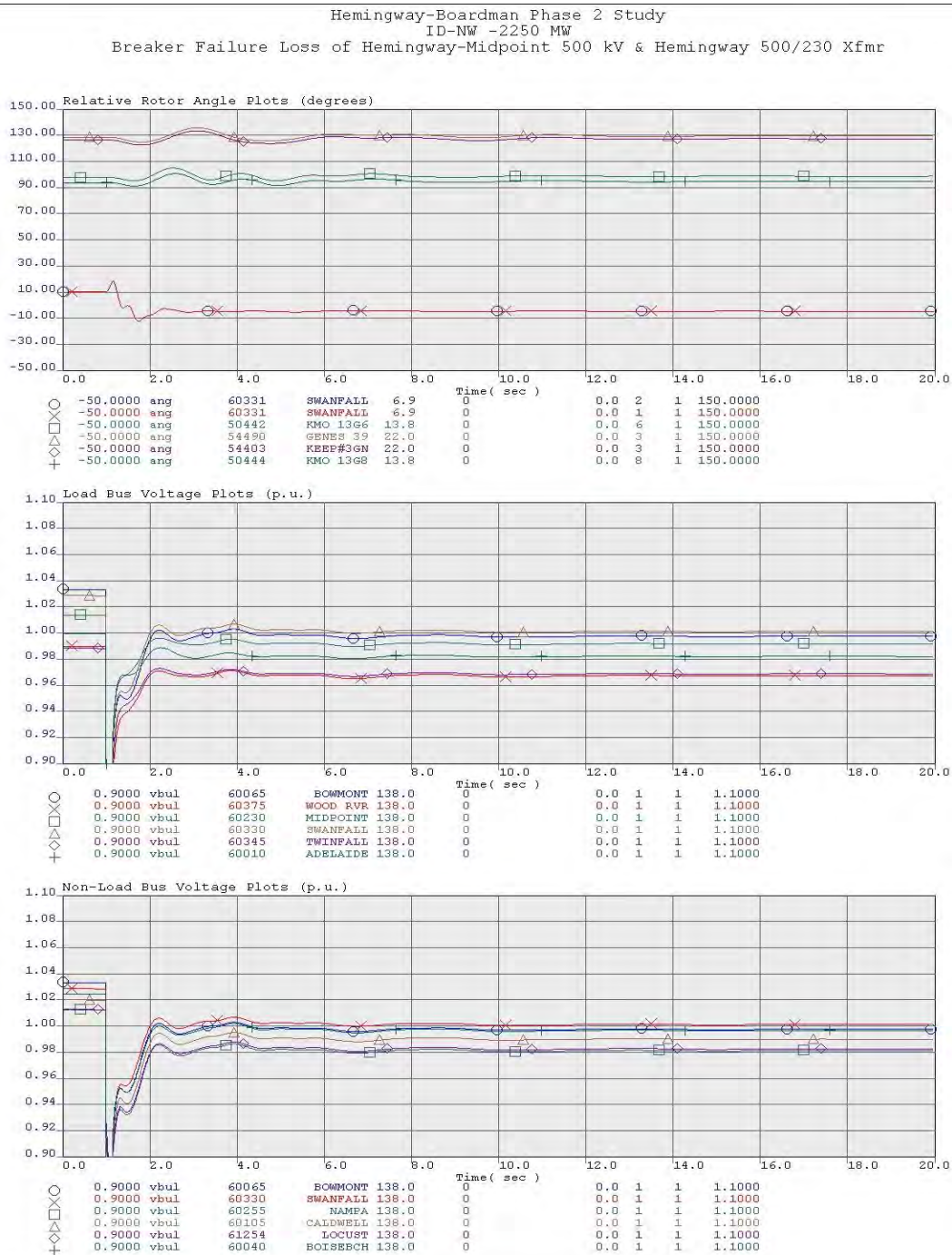
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Sat Jul 21 14:01:08 2012

Figure A19: Breaker Failure Loss of Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



Loss of Hemingway-Midpoint 500 kV Line and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: None

Page 1



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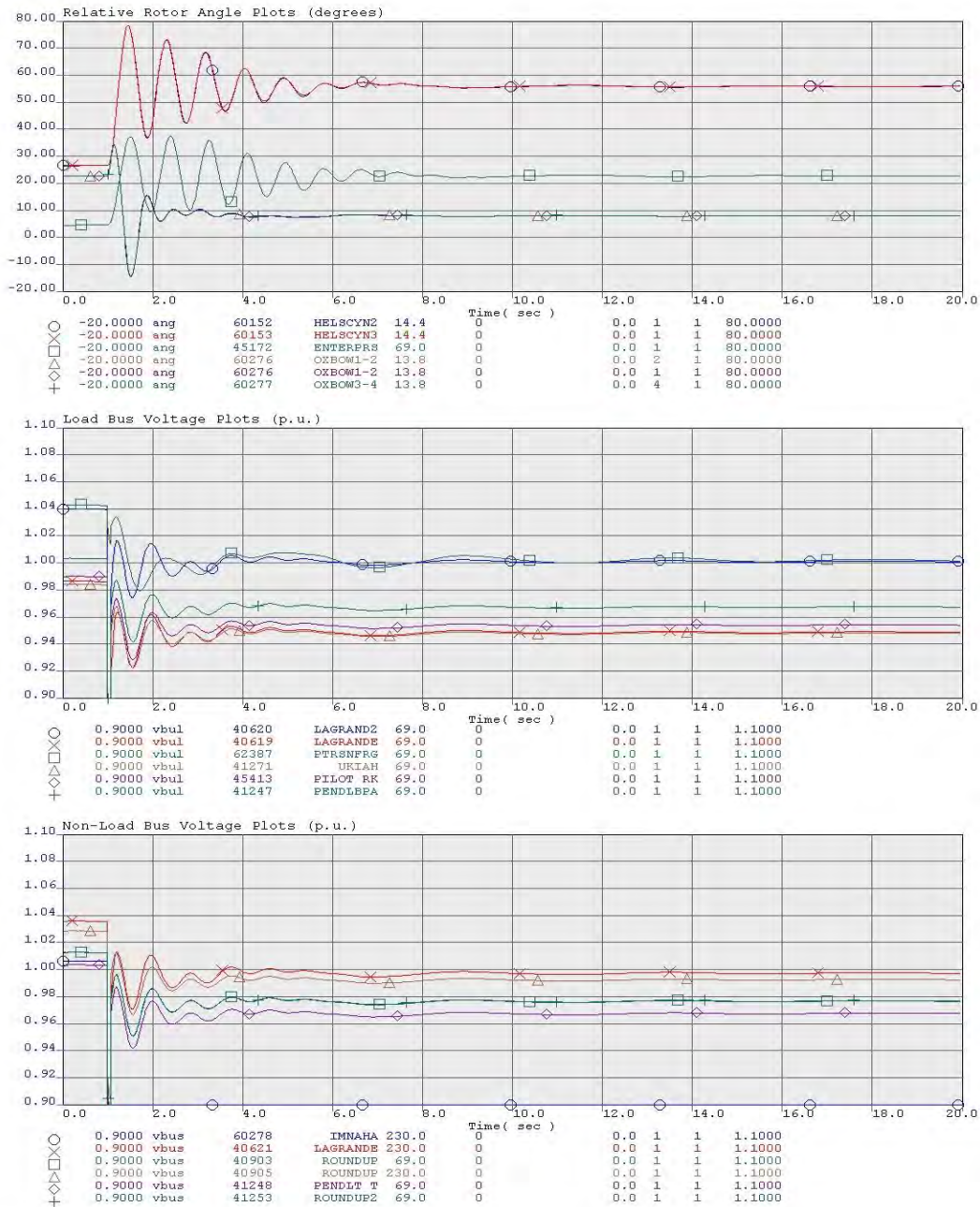
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Sat Jul 21 14:03:31 2012

Figure A20: Breaker Failure Loss of Hemingway-Midpoint 500 kV & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Brownlee-Hells Canyon & Oxbow-Lolo 230 kV



Outage of Brownlee-Hells Canyon 230 and Oxbow-Lolo 230 Lines
LLG fault @ OBPR 230 kV clear in 4 cycles
RAS: Trip 1 HellsCyn Unit @ 5 cyc (110 MW)

Page 1



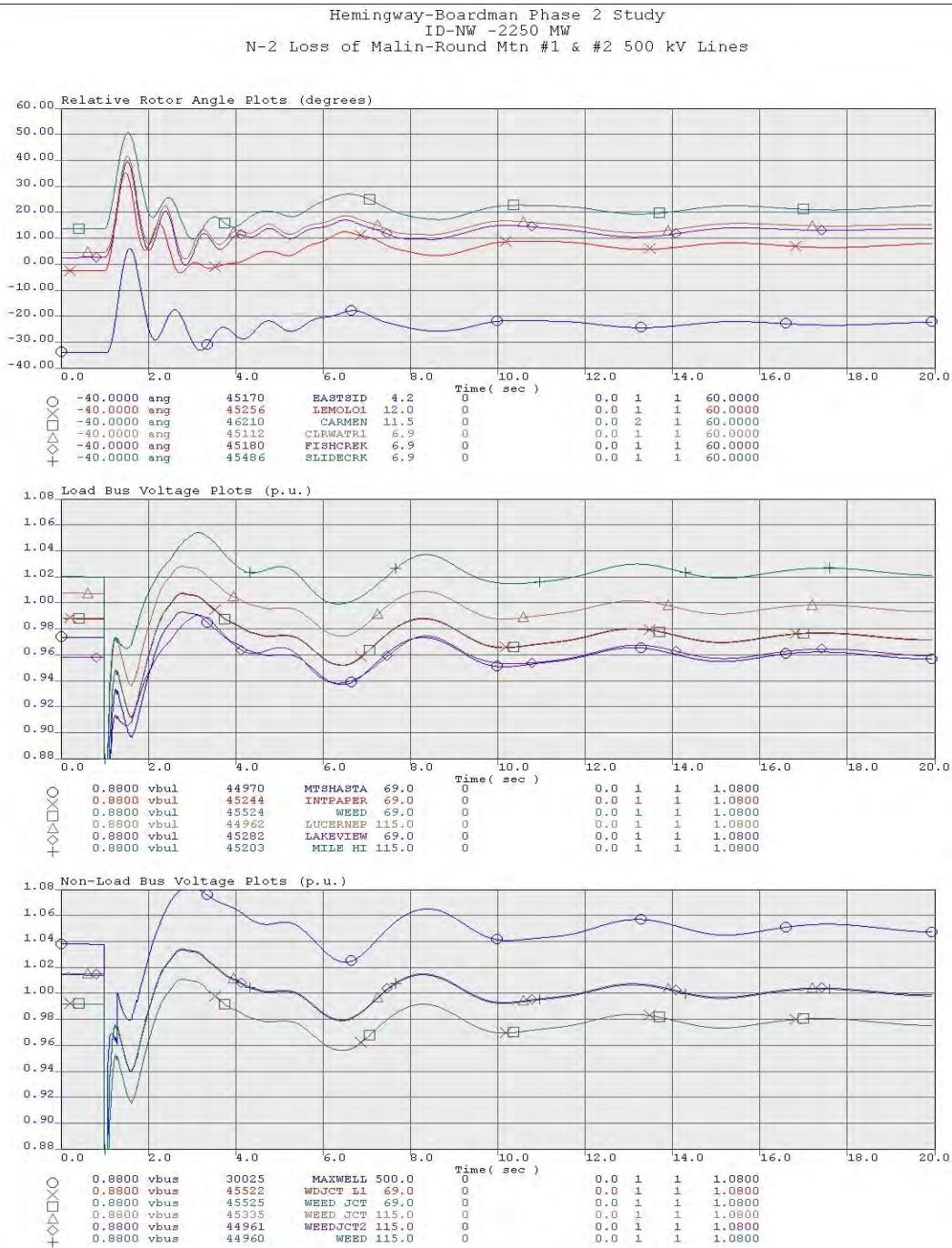
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Figure A21: N-2 Loss of Brownlee-Hells Canyon 230 kV & Oxbow-Lolo 230 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



3-Phase Fault @ Malin 500 kV with 4 Cycle Clearing
Loss of Malin-Round Mtn #1 & #2 500 kV Lines
Opens Round Mtn-Table Mtn #2 500 kV Line
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
NW Gen Drop 2400 MW

Page 1



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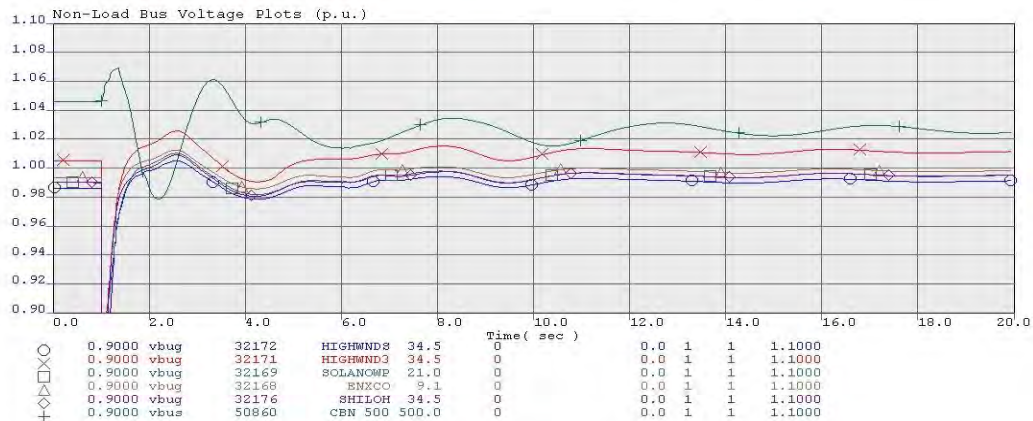
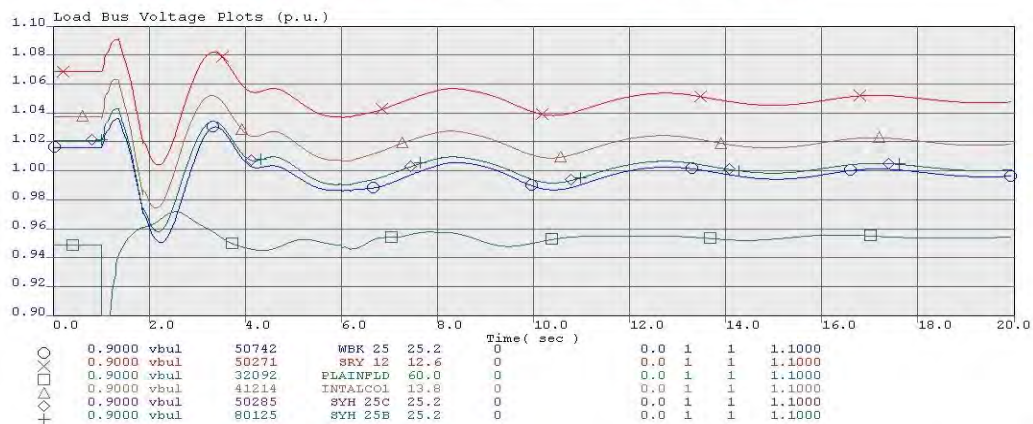
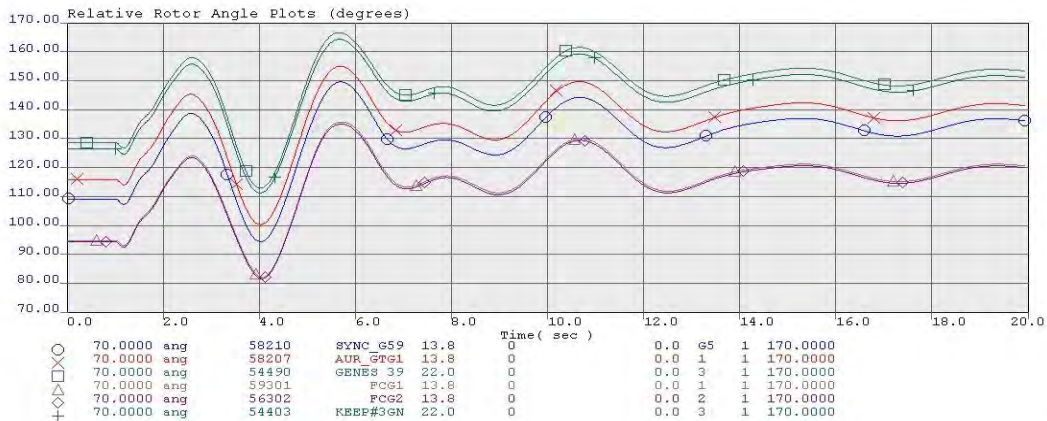
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Sat Jul 21 14:08:36 2012

Figure A22: N-2 Loss of Malin-Round Mtn #1 & 2 500 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV Lines



3-Phase Fault @ Table Mt 500 kV with 4 Cycle Clearing
Loss of Table Mtn-Tesla and Table Mtn-Vaca Dixon 500 kV Lines
RAS: NW Gen Drop 2400 MW

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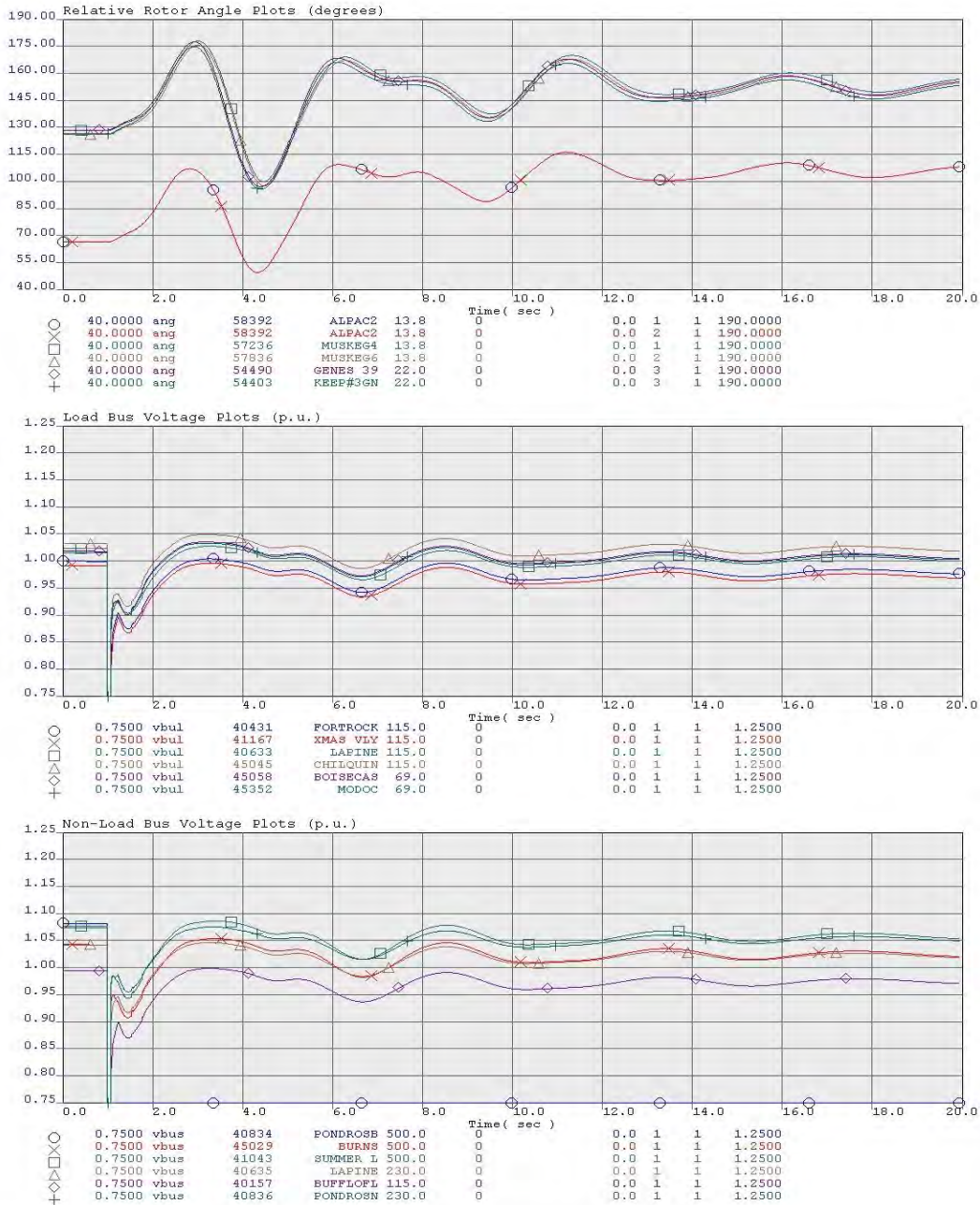
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Sat Jul 21 14:13:27 2012

Figure A23: N-2 Loss of Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Grizzly-Captain Jack & Grizzly-Malin 500 kV Lines



3-Phase Fault @ Grizzly 500 kV with 4 Cycle Clearing
Loss of Grizzly-Captain Jack and
Grizzly-Malin 500 kV Lines
RAS: NW Gen Drop 2400 MW

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Sat Jul 21 14:15:34 2012

Figure A24: N-2 Loss of Grizzly-Captain Jack & Grizzly-Malin 500 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

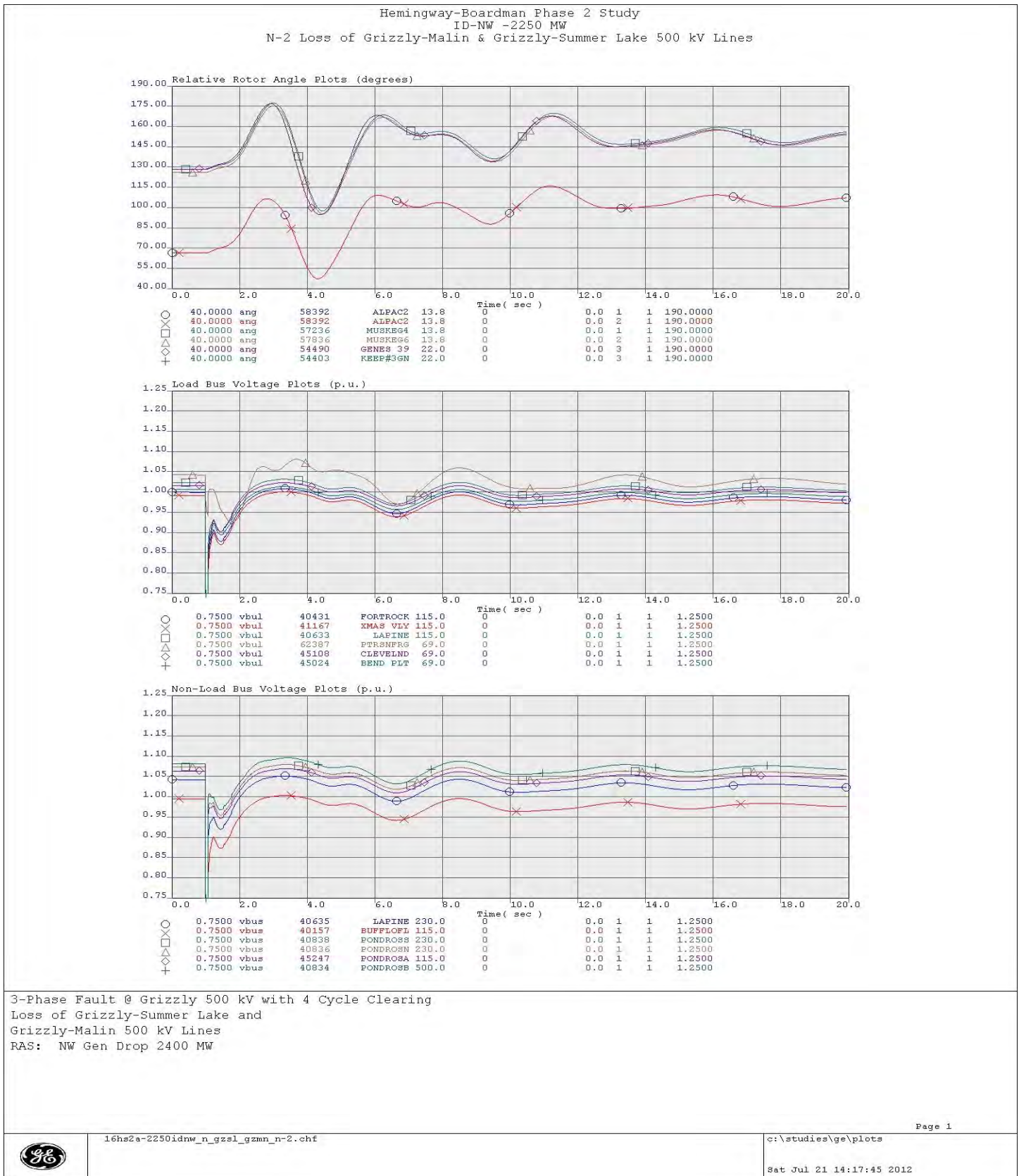
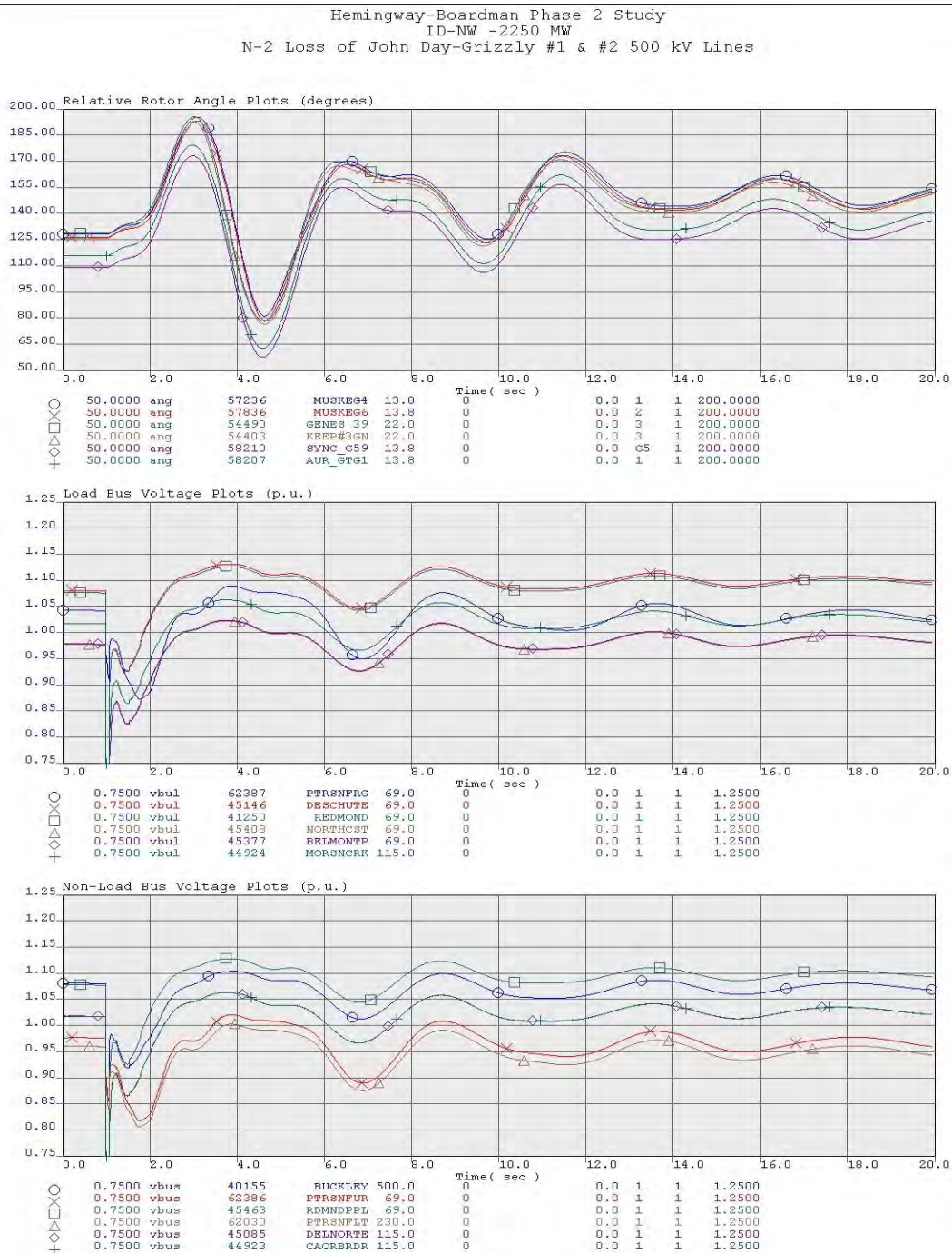


Figure A25: N-2 Loss of Grizzly-Malin Jack & Grizzly-Summer Lake 500 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



3-Phase Fault @ John Day 500 kV with 4 Cycle Clearing
Loss of John Day-Grizzly #1 and
John Day-Grizzly #2 500 kV Lines
RAS: NW Gen Drop 2400 MW

Page 1



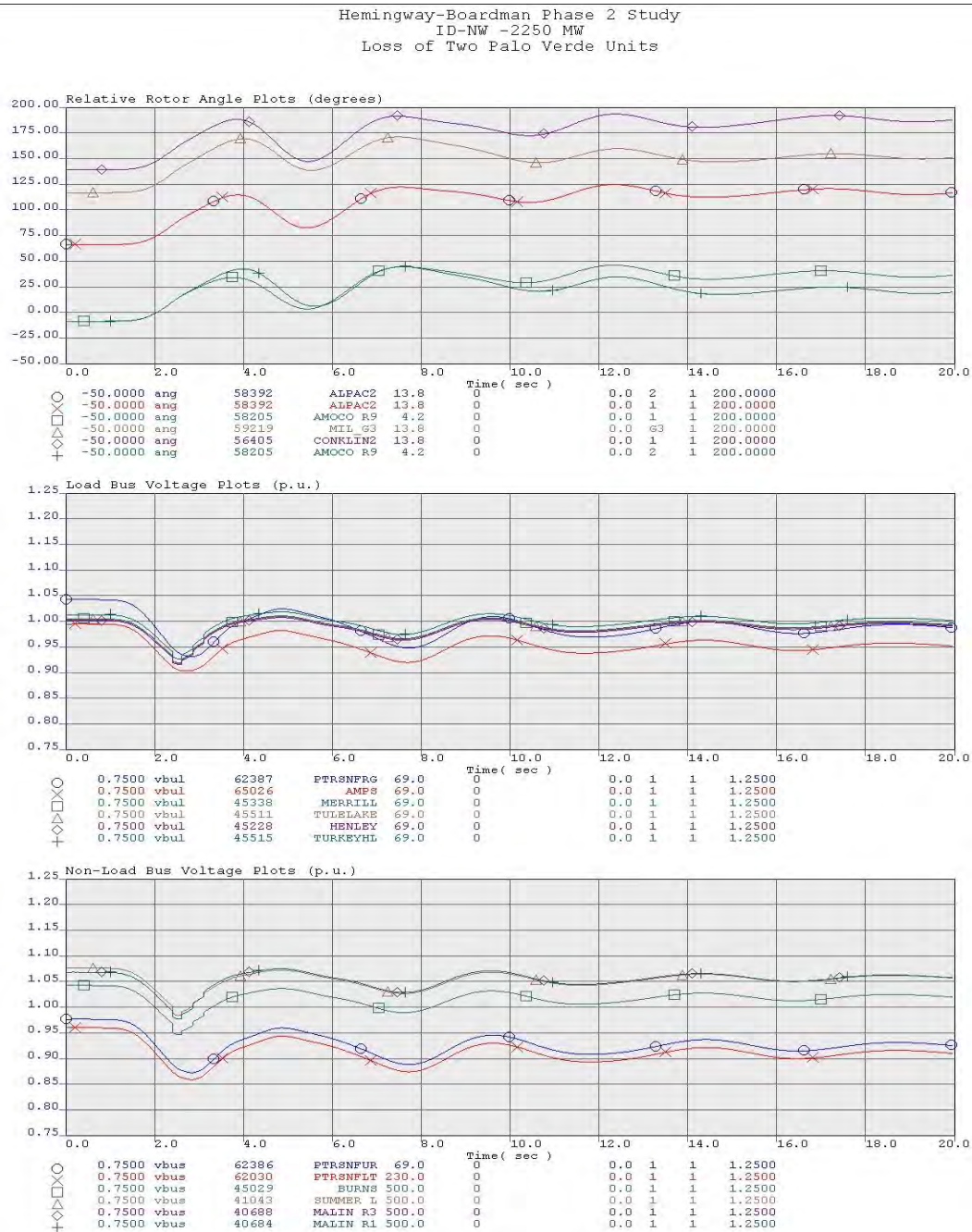
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Figure A26: N-2 Loss of John Day-Grizzly #1 & #2 500 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



Loss of 2 Palo Verde Units
RAS: With Phoenix Area Load Tripping RAS
FACRI Reactive Switching

Page 1



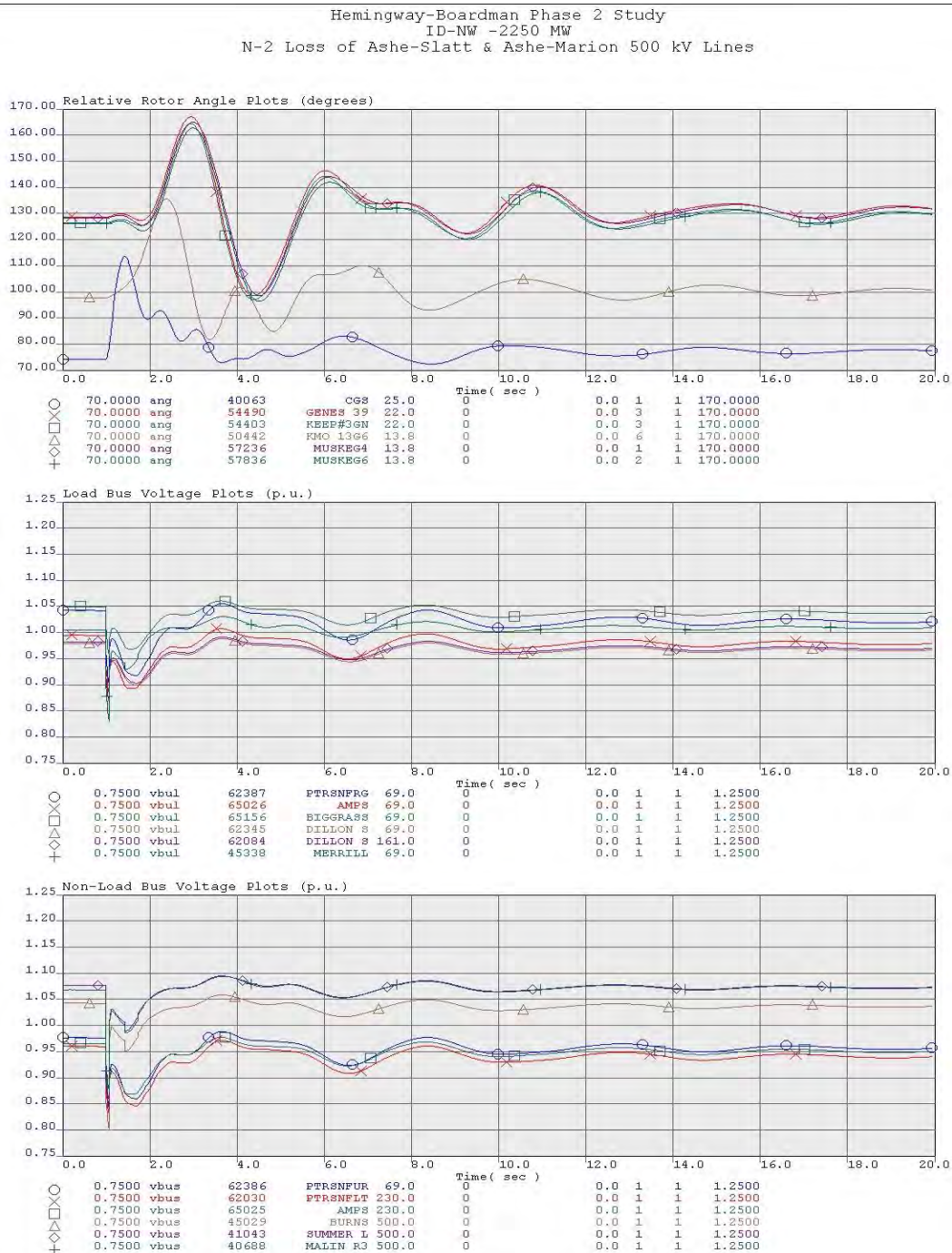
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Sat Jul 21 14:22:07 2012

Figure A27: N-2 Loss of Two Palo Verde Units (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots



Loss of Ashe-Slatt and
Slatt-Longhorn 500 kV Lines
3-Phase Fault @ Ashe 500 kV with 4 Cycle Clearing
RAS: None

Page 1



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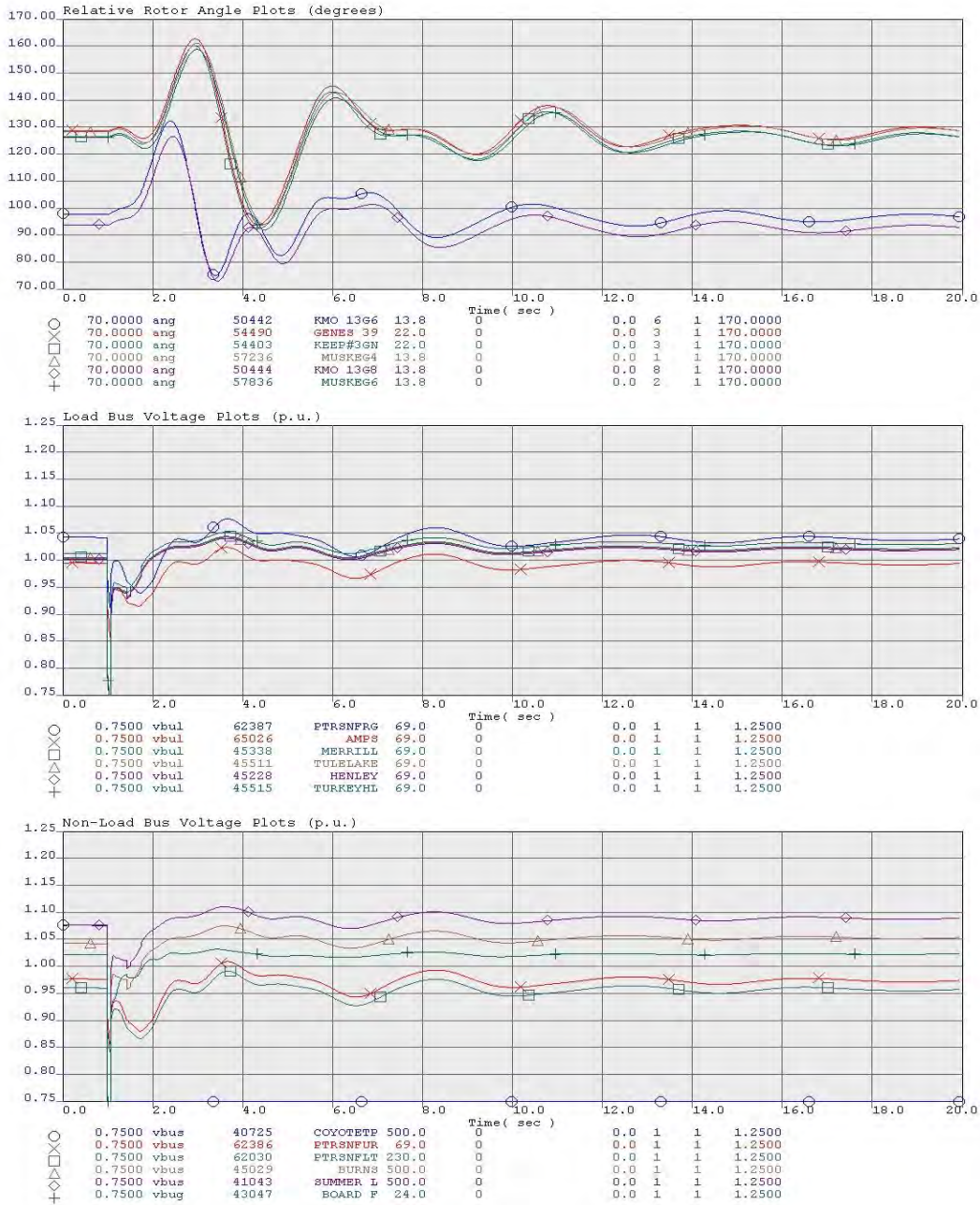
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Figure A28: N-2 Loss of Ashe-Slatt & Ashe-Marion 500 kV Lines (Angle & Voltage Plots)

Appendix A – 16la1sa_2250idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Slatt-Ashe & Slatt-Longhorn 500 kV Lines



Loss of Ashe-Slatt and
Slatt-Longhorn 500 kV Lines
3-Phase Fault @ Slatt 500 kV with 4 Cycle Clearing
RAS: None

Page 1



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Figure A29: N-2 Loss of Slatt-Ashe & Slatt-Longhorn 500 kV Lines (Angle & Voltage Plots)

Appendix A - 16hs2a_2250idnw_N Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Lowest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Lowest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1	Hemingway-Grassland 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap	Ptrsnfilt 230	Ptrsnfilt 230	Ptrsnftrg 69	Muskeg5 & 7 25	Stable & Damped
3 Cy 3PH Hemingway 500 kV				-11.6%	0.850	-11.7%	59.907	
N-1	Hemingway-Midpoint 500 kV		None	Ptrsnfilt 230	Ptrsnfilt 230	Ptrsnftrg 69	Bridger 34.5	Stable & Damped
3 Cy 3PH Hemingway 500 kV				-7.8%	0.886	-7.9%	59.929	
N-1	Captain Jack-Olinda 500 kV	Var	FACRI insertion of Ft Rock Series Caps	Round Mt 500	KI2 12T3	Clear Lk 69	Kit13b20 13.2	Stable & Damped
4 Cy 3PH Capt Jack 500 kV				-6.7%	0.889	-6.3%	59.863	
N-1	Table Mt-Tesla 500 kV		None	Ptrsnfilt 230	Ritzvill 115	Ptrsnftrg 69	Jeld-Wen 60	Stable & Damped
4 Cy 3PH Table Mt 500 kV				-3.1%	0.913	-3.2%	59.838	
N-1	Table Mt-Vaca Dixon 500 kV		None	Maxwell 500	Ritzvill 115	Ptrsnftrg 69	Millwood 60	Stable & Damped
4 Cy 3PH Table Mt 500 kV				-3.5%	0.913	-3.5%	59.830	
N-1	Grizzly-Captain Jack 500 kV	Var Note	FACRI insertion of Malin Shunt Cap, Blocked Series Caps	Ptrsnfilt 230	Ptrsnfilt 230	Ptrsnftrg 69	Kit13b20 13.2	Stable & Damped
4 Cy 3PH Capt Jack 500 kV				-7.8%	0.886	-7.9%	59.884	
N-1	John Day-Grizzly #1 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin/Captn Jack Shunt Caps	Ptrsnfilt 230	Ptrsnfilt 230	Ptrsnftrg 69	Longlk13 25	Stable & Damped
4 Cy 3PH John Day 500 kV				-12.6%	0.840	-12.8%	59.753	
N-1	Buckley-Grizzly 500 kV	Var	FACRI insertion of Ft Rock Series Caps	Burns 500	Gardnvlly 69	Ptrsnftrg 69	Kit13b20 13.2	Stable & Damped
4 Cy 3PH Buckley 500 kV				-6.1%	0.903	-5.8%	59.871	

Appendix A - 16hs2a_2250idnw_N Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Lowest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Lowest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1	Slatt-Buckley 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap	Burns 500 -8.6%	Sprague 69 0.881	Ptrsnftrg 69 -8.1%	Kit13b20 13.2 59.824	Stable & Damped
4 Cy 3PH Slatt 500 kV								
N-1	Ashe-Slatt 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap	Ptrsnflt 230 -8.6%	Ptrsnflt 230 0.878	Ptrsnftrg 69 -8.7%	Kit13b20 13.2 59.840	Stable & Damped
4 Cy 3PH Ashe 500 kV								
Bi-pole Block	PDCI Bipole	Var	FACRI Ft Rock Series Caps and Malin/Captn Jack Shunt Caps Tracy&Olinda React Switching NW 2550 MW Gen Drop	Canby 230 -6.5%	Sprague 69 0.894	Canby 69 -6.5%	Longlk13 25 59.767	Stable & Damped
Breaker Failure	Hemingway-Grassland 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap	Ptrsnflt 230 -10.3%	Ptrsnflt 230 0.862	Ptrsnftrg 69 -10.5%	Bridger 34.5 59.912	Stable & Damped
3/10 Cy SLG Hemingway 500 kV	Hemingway 500/230 kV Transformer							
Breaker Failure	Hemingway-Midpoint 500 kV		None	Ptrsnflt 230 -9.1%	Ptrsnflt 230 0.873	Ptrsnftrg 69 -9.2%	Strike 138 59.903	Stable & Damped
3/10 Cy SLG Hemingway 500 kV	Hemingway 500/230 kV Transformer							
N-2	Brownlee-Hells Canyon 230 kV	5	Tripped 1 Hells Cyn Unit (110 MW)	La Grande 230 -6.3%	Ptrsnflt 230 0.903	La Grande 69 -6.5%	Oxbow 138 59.846	Stable & Damped
4 Cy LLG Oxbow 230 kV	Oxbow-Lolo 230 kV							
N-2	Malin-Round Mt #1 500 kV	Var	Chief Jo Braking Resistor Tracy&Olinda Reactive Switching NW 2400 MW Gen Drop Flash Malin-Round Mt S-Caps	Maxwell 500 -7.4%	Mt Shasta 69 0.897	Mt Shasta 69 -7.9%	Muskeg5 & 7 25 59.798	Stable & Damped
4 Cy 3PH Malin 500 kV	Malin-Round Mt #2 500 kV Round Mt-Table Mt #2 500 kV							
N-2	Table Mt-Tesla 500 kV	Var	Chief Jo Braking Resistor Tracy & Olinda Reactive Switching NW 2400 MW Gen Drop	Custer W 500 -6.4%	SKA 138 138 0.886	WBK 25 25 -6.5%	Millwood 60 59.702	Stable & Damped
4 Cy 3PH Table Mt 500 kV	Table Mt-Vaca Dixon 500 kV							

Appendix A - 16hs2a_2250idnw_N Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Lowest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Lowest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-2 4 Cy 3PH Grizzly 500 kV	Grizzly-CaptJack 500 kV Grizzly-Malin 500 kV	Var	FACRI insertion of Malin C1 and CaptJack C1 Shunt Capacitors NW 2400 MW Gen Drop	Summer L 500 -12.4%	Goldhill 69 0.839	Fortrock 115 -12.5%	Longlk13 25 59.697	Stable & Damped
N-2 4 Cy 3PH Grizzly 500 kV	Grizzly-Malin 500 kV Grizzly-Summer Lake 500 kV	Var	FACRI insertion of Malin C1 and CaptJack C1 Shunt Capacitors NW 2400 MW Gen Drop	Bufflofl 115 -12.3%	Sprague 69 0.845	Xmas Vly 115 -12.3%	Longlk13 25 59.691	Stable & Damped
N-2 4 Cy 3PH John Day 500 kV	John Day-Grizzly #1 & #2 500 kV	Var	FACRI insert Ft Rock Series Caps, Malin C1&C2, CaptJack C1 NW 2400 MW Gen Drop	Ptrsfnlt 230 -16.2%	Goldhill 69 0.798	Ptrsfntrg 69 -16.5%	Longlk13 25 59.604	Stable & Damped
N-2 4 Cy 3PH Grizzly 500 kV	John Day-Grizzly #2 500 kV Buckley-Grizzly 500 kV	Var	FACRI insert Ft Rock Series Caps, Malin C1, CaptJack C1 NW 2400 MW Gen Drop	CBN 500 500 -10.0%	SKA 138 138 0.853	WBK 25 25 -10.1%	Longlk13 25 59.692	Stable & Damped
N-2	Loss of 2 Palo Verde units	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1&C2 & CaptJack Sh Cap C1	Ptrsfnlt 230 -10.5%	Ptrsfnlt 230 0.859	Ptrsfntrg 69 -10.7%	Muskeg5 & 7 25 59.753	Stable & Damped
N-2 4 Cy 3PH Ashe 500 kV	Ashe-Slatt 500 kV Ashe-Marion 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 & CaptJack Sh Cap C1	Ptrsfnlt 230 -11.9%	Ptrsfnlt 230 0.847	Ptrsfntrg 69 -12.0%	Muskeg5 & 7 25 59.835	Stable & Damped
N-2 4 Cy 3PH Slatt 500 kV	Slatt-Ashe 500 kV Slatt-Longhorn 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 & CaptJack Sh Cap C1	Ptrsfnlt 230 -9.8%	Ptrsfnlt 230 0.867	Ptrsfntrg 69 -9.9%	Kit13B20 13.2 59.824	Stable & Damped

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_ 18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_ 18.0 (45447)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_ 18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_ 18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_ 18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_ 18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_ 18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_ 18.0 (45452)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_ 18.0 (47639)

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Contingency Studied	Actions Taken in the Contingency
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_ 18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_ 500.0 (40724) TO MCNARY_ 500.0 (40723) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_ 18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_ 500.0 (47638)
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACIWA T_ 500.0 (40917)
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 2
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_ 500.0 (40683) #s
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO LOW MON_ 500.0 (40683) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_ 500.0 (40957) TO SICKLER_ 500.0 (40973) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_ 500.0 (40062)
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_ 500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_ 500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	CLOSE MultiSectionLine PEARL_ 500.0 (40827) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_ 230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_ 500.0 (40749) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_ 500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONAZ_ 13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_ 500.0 (41001)

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Contingency Studied	Actions Taken in the Contingency
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_ 13.8 (42043) #3
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_ 500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_ 13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_ 13.8 (42111) #1
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_ 500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_ 20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_ 13.8 (47747)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_ 4.2 (47746)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_ 13.8 (47743)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_ 4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_ 20.0 (47740)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_ 115.0 (42806) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_ 500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_ 500.0 (40917)
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO CEN FERY_ 500.0 (40666) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_ 500.0 (40749) #s
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_ 500.0 (40683) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_ 500.0 (40045) TO ALLSTN E_ 230.0 (40043) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_ 230.0 (40519)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_ 500.0 (40521)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_ 115.0 (48245) TO SPULLMAN_ 115.0 (48413) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_ 115.0 (48243) TO MOSCITYT_ 115.0 (48245) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS N LEWIST_ 115.0 (48253) TO 44.4 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line NPULLMAN_ 115.0 (48291) TO SHAWNEE_ 115.0 (48383) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS HOT SPR_ 500.0 (40553) TO -148.3 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_ 230.0 (48512) TO 134.2 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	CLOSE Line LEON_ 115.0 (48183) TO MOSCITYT_ 115.0 (48243) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_ 500.0 (40521)
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_ 230.0 (48512) TO 134.2 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_ 500.0 (40233) TO CHIEF J2_ 230.0 (40232) CKT 3
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_ 500.0 (40666) TO LOW GRAN_ 500.0 (40679) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRSSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRSSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus IONE_69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_100.0 (44116)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_100.0 (44115)
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_13.8 (44108)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_100.0 (44118)
BF McNary 230 kV SECT 2	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 52.2 MVR
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_13.8 (44107)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_230.0 (44125)
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_345.0 (40721)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_100.0 (44119)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_230.0 (44127)

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Contingency Studied	Actions Taken in the Contingency
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_ 13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_ 13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_ 13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_ 100.0 (44120)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_ 13.8 (44112)
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN MultiSectionLine HEMINWAY_ 500.0 (60155) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN Line CDR SPRG_ 500.0 (43950) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	CLOSE Shunt QUARTZ_ 138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN MultiSectionLine HEMINWAY_ 500.0 (60155) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN Line CDR SPRG_ 500.0 (43950) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	CLOSE Shunt QUARTZ_ 138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 63.4 MVR
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD CT_ 18.5 (43044) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD CT_ 18.5 (43044) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Line GRASSLND_ 500.0 (43049) TO COYOTE_ 500.0 (43123) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD ST_ 16.0 (43045) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD ST_ 16.0 (43045) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Line GRASSLND_ 500.0 (43049) TO SLATT_ 500.0 (40989) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Transformer BOARD F_ 24.0 (43047) TO GRASSLND_ 500.0 (43049) CKT 1
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_ 500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_ 500.0 (40091)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_ 500.0 (40155)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_ 230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_ 500.0 (45095)
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #3
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #2
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_ 500.0 (40553)
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_ 500.0 (40601)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_ 0.7 (47981)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_ 0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_ 0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_ 34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_ 34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_ 230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_ 34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_ 0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_ 0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_ 34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_ 230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_ 34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_ 34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_ 34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_ 230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_ 230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_ 34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_ 34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_ 230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_ 500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_ 0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_ 0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_ 230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_ 0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_ 0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_ 0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_ 34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_ 34.5 (47979)

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_ 34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_ 34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_ 34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_ 34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_ 230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_ 34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_ 34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_ 34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_ 34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_ 0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_ 34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_ 230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_ 230.0 (47386)
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_ 500.0 (43041)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_ 500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_ 500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_ 500.0 (43950)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_ 500.0 (40302) TO RAVER_ 500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_ 500.0 (43123) TO LONGHORN_ 500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_ 500.0 (45095) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO LOLO_ 230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO N LEWIST_ 230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO WALA AVA_ 230.0 (48451) CKT 1

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCASTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCASTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCASTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32229)
N-1: Grassland-Coyote 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELSCYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_ 500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_ 500.0 (60155) TO GRASSLND_ 500.0 (43049) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_ 500.0 (45029) TO SUMMER L_ 500.0 (41043) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_ 500.0 (60155) TO BURNS_ 500.0 (45029) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_ 230.0 (40537) TO HIL TOP_ 345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_ 500.0 (40553) TO TAFT_ 500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	CLOSE Shunt HUMBOLT1_ 24.9 (64216) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_ 69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_ 120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_ 120.0 (64070) TO CARLIN_ 120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_ 345.0 (64032) TO HUMBOLDT_ 345.0 (64059) CKT 1
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_ 99.0 (65017)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_ 99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_ 345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_ 345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_ 345.0 (67582)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO SLATT_ 500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_ 500.0 (45262) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_ 500.0 (41450) TO WAUTOMA_ 500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_ 230.0 (40621) TO N POWDER_ 230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_ 500.0 (40629) TO MARION_ 500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO CEN FERY_ 500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_ 500.0 (40666) TO LOW GRAN_ 500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_ 500.0 (40683) TO SACJWA T_ 500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_ 230.0 (45189) TO MALIN_ 500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_ 230.0 (40171) TO HIL TOP_ 230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO SUMMER L_ 500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_ 345.0 (40691) TO ROCKY RH_ 345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_ 230.0 (40939) #s
N-1: Marion-Santiam 500 kV	OPEN Line MARION_ 500.0 (40699) TO SANTIAM_ 500.0 (40941) CKT 1
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDR_ 230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_ 230.0 (41352) TO MCNRY S3_ 230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_ 230.0 (40121) TO MCNRY S1_ 230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_ 500.0 (40724) TO MCNARY_ 500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_ 345.0 (40901)
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_ 345.0 (40721)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_ 230.0 (41351) TO ROUNDUP_ 230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_ 13.8 (40559) #1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_ 500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_ 500.0 (40917)
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_ 69.0 (45005) TO 10.8 MVR
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_ 230.0 (40537) TO 52.2 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_ 345.0 (64061)
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_ 230.0 (40794) #s

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUNDB N_230.0 (43483) CKT 1

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap SANTIAM_500.0 (40941) TO SANTMKO2_500.0 (43492) CKT 2
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap MIKKALO_500.0 (43970) TO MKLOSNT2_500.0 (43971) CKT 2
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Shunt GARLAND1_34.5 (67147) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Shunt FRANNIE2_34.5 (67145) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Shunt OREBASIN_230.0 (66145) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Shunt PTRSNFLT_230.0 (62030) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELSCYN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER_L_500.0 (41043) CKT 1
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW_MON_500.0 (40683) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG_EDDY_500.0 (40111) TO JOHN_DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG_EDDY_500.0 (40111) TO JOHN_DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN_DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG_EDDY_500.0 (40111) TO JOHN_DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN_DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN_DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN_DAY_500.0 (40585) CKT 2
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN_DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN_DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN_DAY_500.0 (40585) TO ROCK_CK_500.0 (41401) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG_EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN_FERY_500.0 (40666) TO LOW_GRAN_500.0 (40679) CKT 2
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN_FERY_500.0 (40666) TO LOW_GRAN_500.0 (40679) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND_MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND_MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA_E_13.2 (38760) #11
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA_E_13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD2_13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD2_13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD2_13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD2_13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD1_13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD1_13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD1_13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR_RD1_13.2 (38785) #2

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_ 13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_ 13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_ 13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_ 13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_ 13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_ 13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_ 13.2 (38775) #4
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_ 345.0 (40721) TO ROSS_ 345.0 (40901) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_ 345.0 (40901)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_ 345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_ 230.0 (60177) TO MIDPOINT_ 230.0 (60232) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_ 115.0 (40539) TO VALLEY T_ 115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_ 115.0 (40539) TO VALLEY T_ 115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_ 500.0 (40302)
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL #_ 230.0 (43773) TO SHERWOOD_ 230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	OPEN MultiSectionLine BIGEDDY3_ 230.0 (41343) TO MCLOUGLN_ 230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	OPEN Bus OSTRNDER_ 230.0 (40810)
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_ 500.0 (40306)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_ 500.0 (40302)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 3
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_ 500.0 (40381) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_ 300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_ 300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_ 230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covington 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma & Raver-Covington 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVR_500.0 (40869) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_500.0 (30005) TO RD MT 1M_500.0 (30065) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_18.0 (34604)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA C_13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA E_13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA D_13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA B_13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA A_13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_13.8 (38715)

Appendix A - 16hs2a_2250idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_ 13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_ 13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_ 13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 5_ 12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 4_ 12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 3_ 12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 2_ 12.5 (38830)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 1_ 12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1

Appendix B

16la1sa_3400idnw_N Base Case (Idaho-Northwest, East-to-West)

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

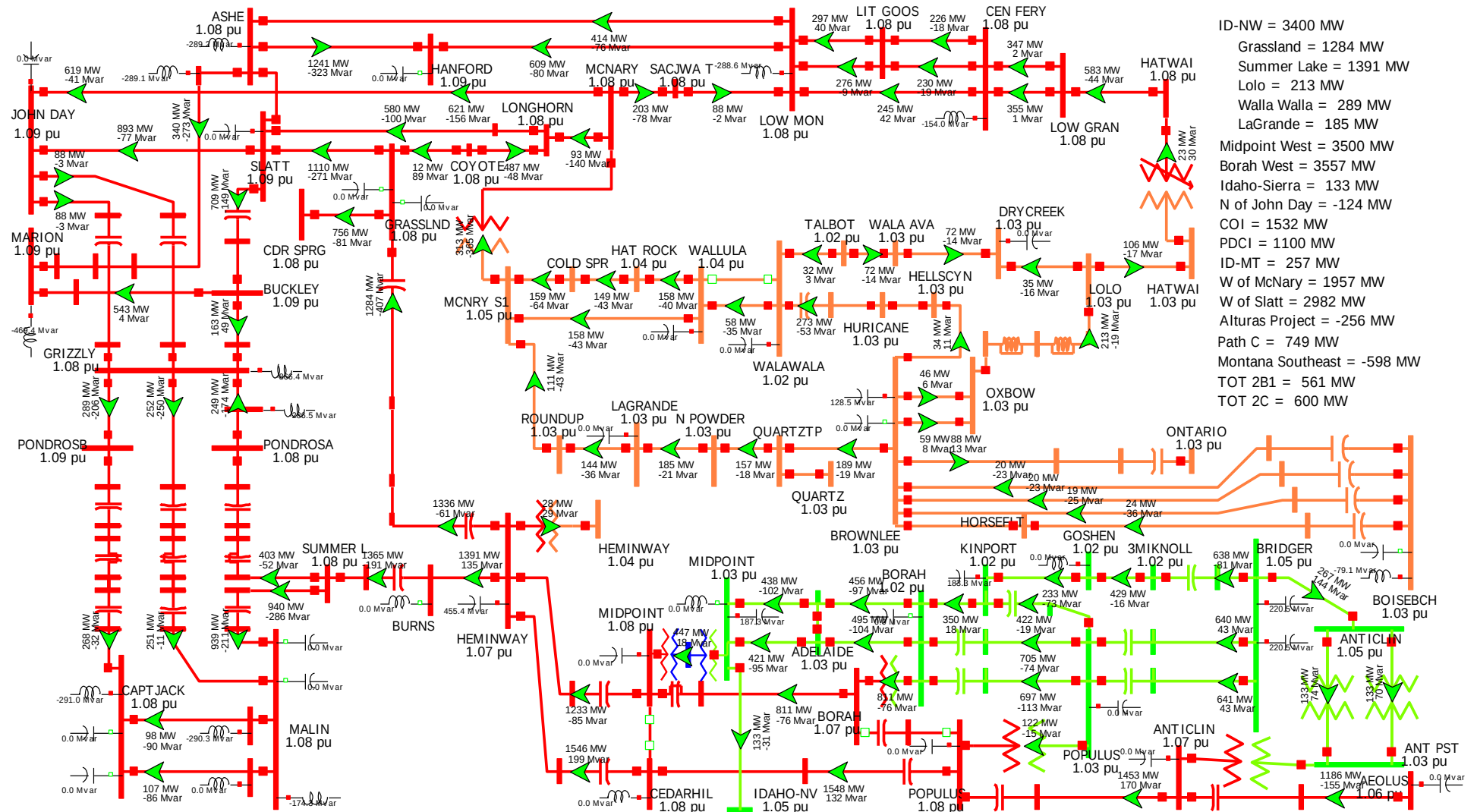


Figure B1: 16la1sa_3400idnw_N Base Case **Pre-Contingency**

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

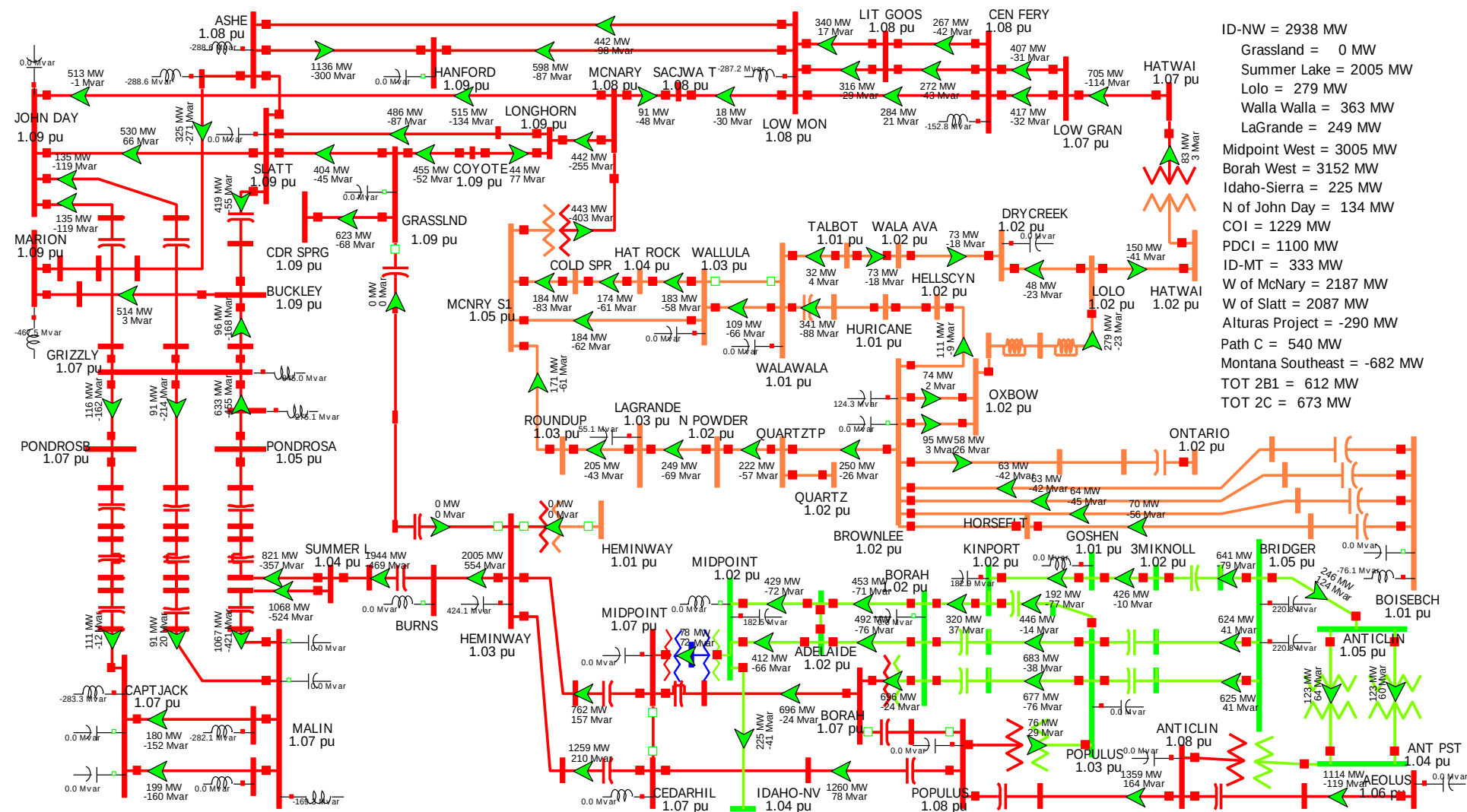


Figure B2: 16la1sa 3400idnw N Base Case after the contingency **BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr**

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

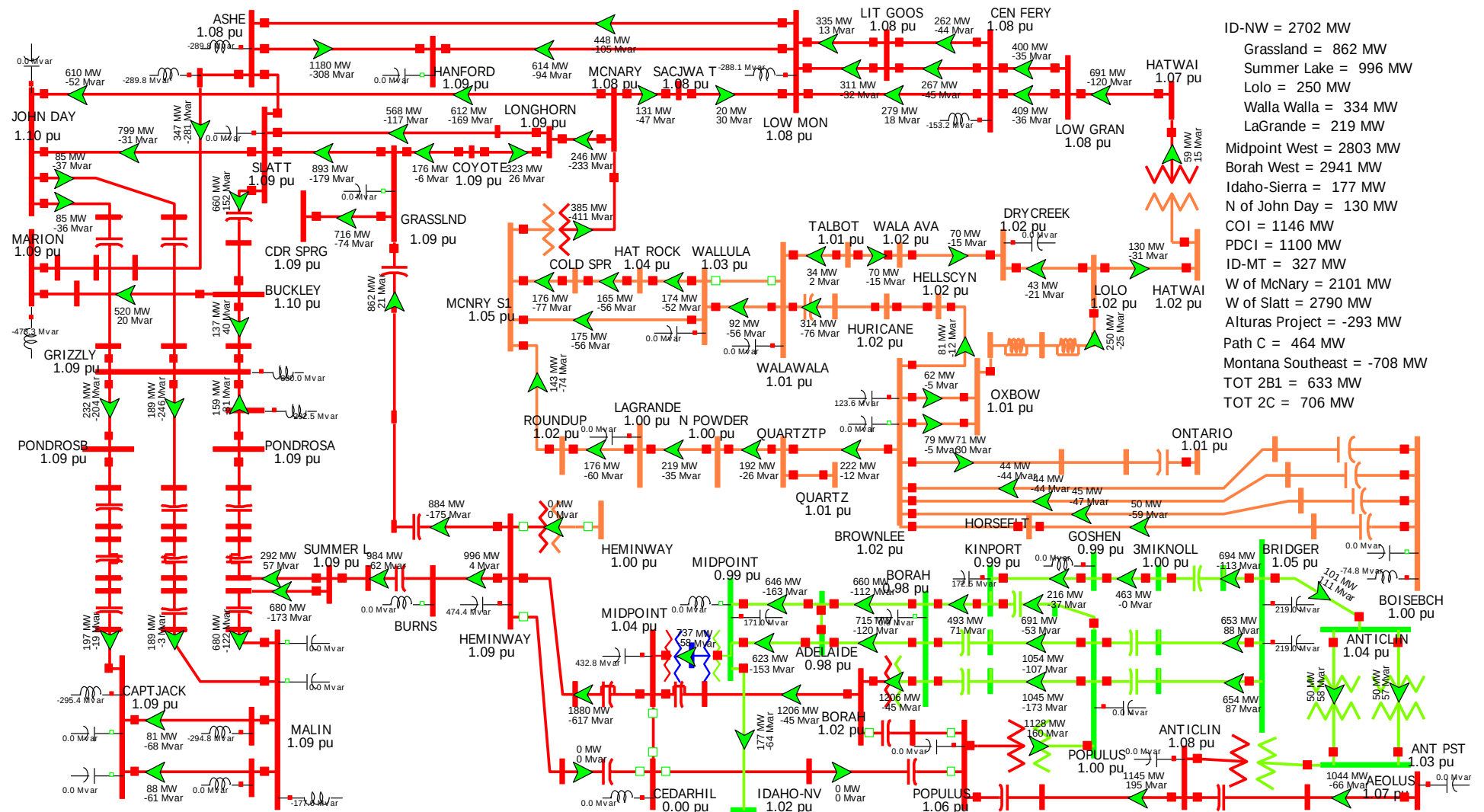


Figure B3: 16la1sa_3400idnw_N Base Case after the contingency BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

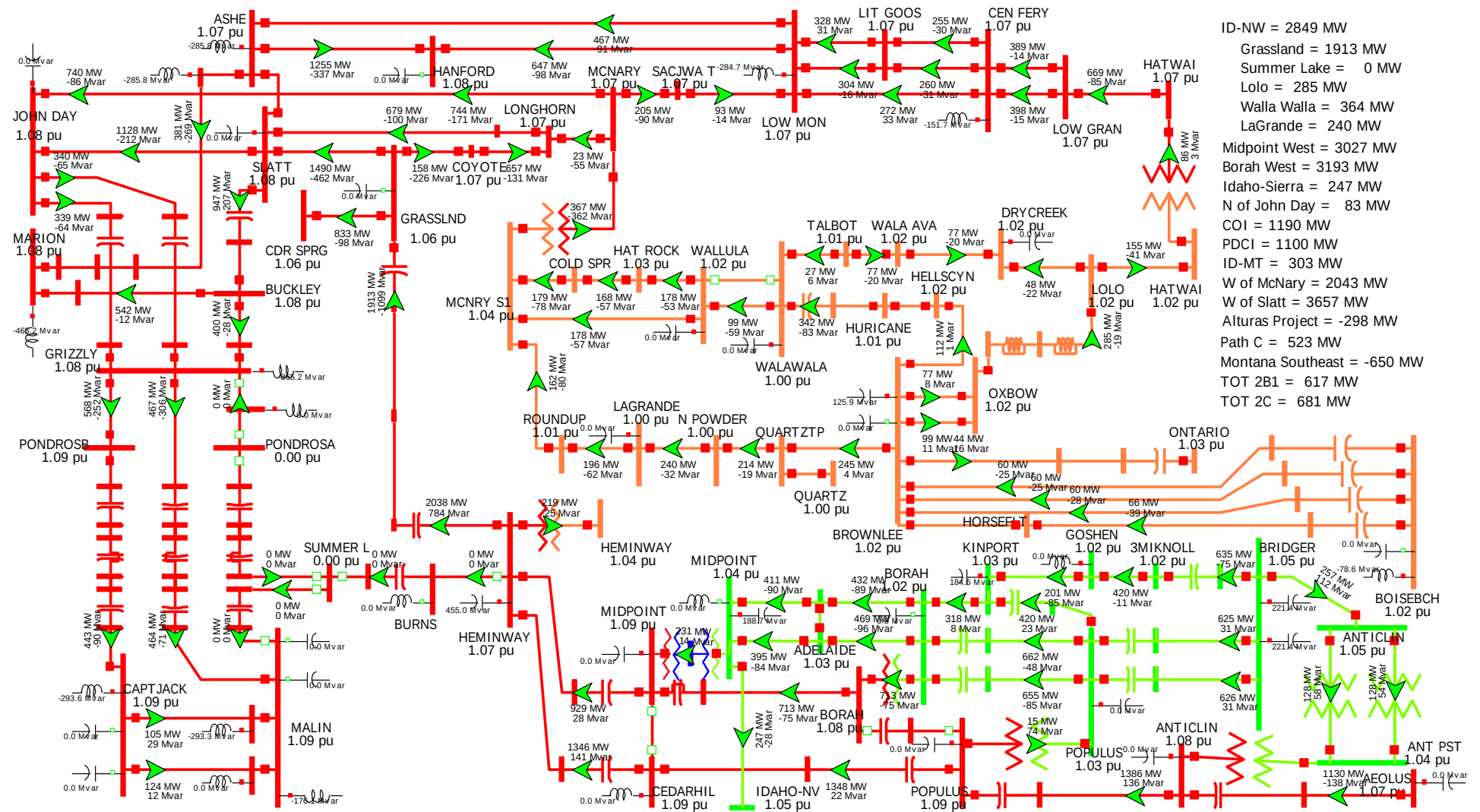


Figure B4: 16la1sa_3400idnw_N Base Case after the contingency **Bus: Summer Lake 500 kV**

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

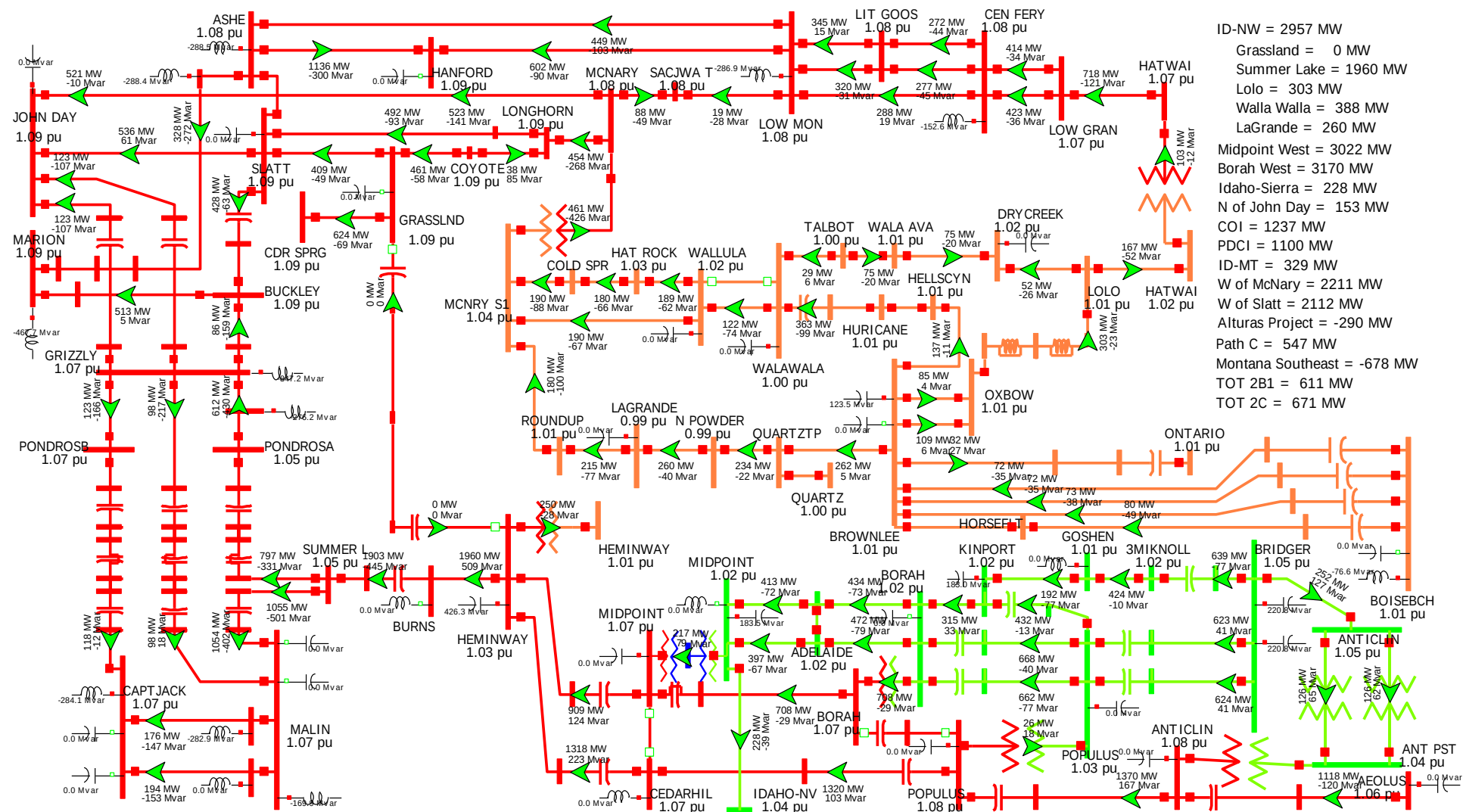


Figure B5: 16la1sa_3400idnw_N Base Case after the contingency **N-1: Hemingway-Grassland 500 kV**

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

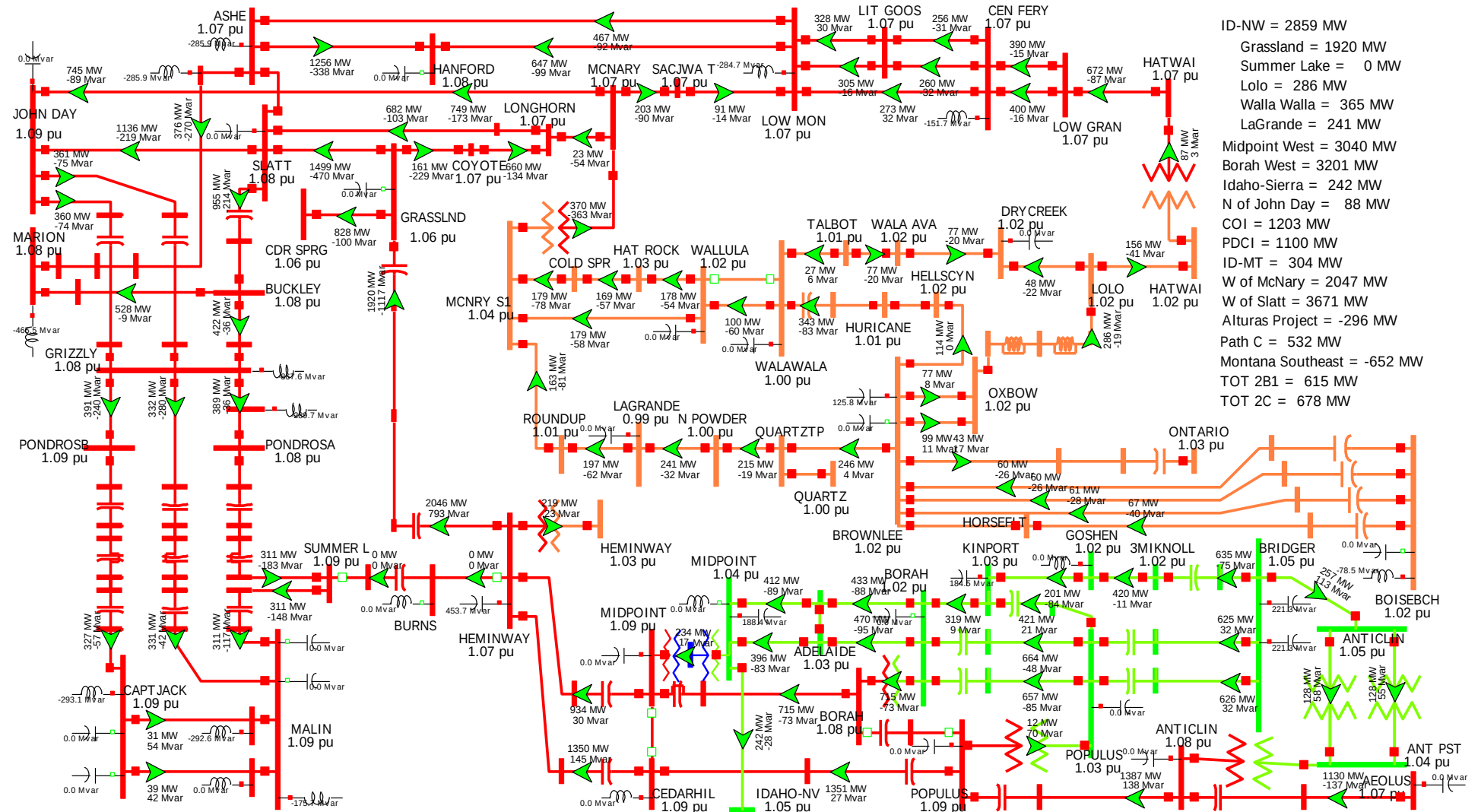


Figure B6: 16la1sa_3400idnw_N Base Case after the contingency N-1: Hemingway-Summer Lake 500 kV

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

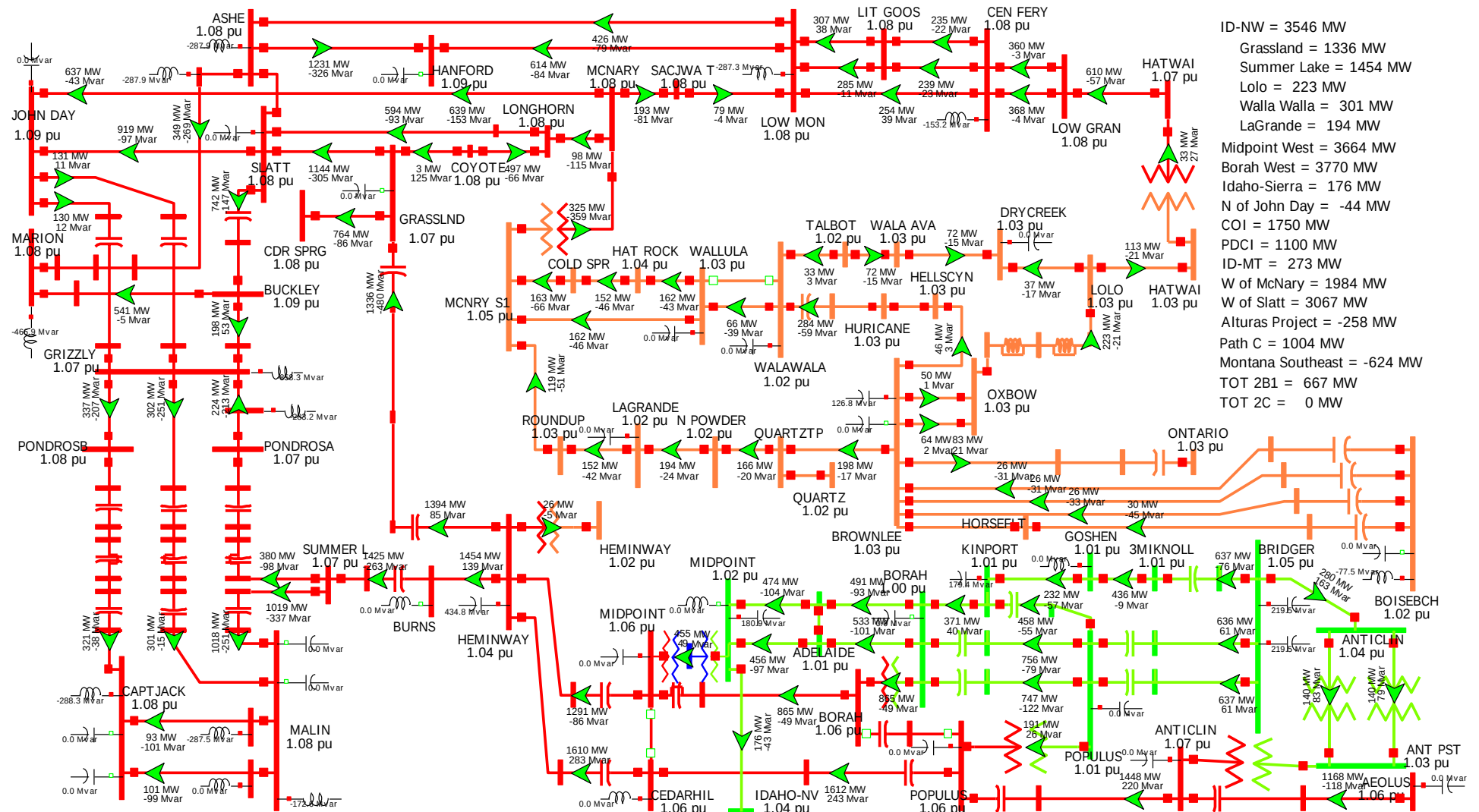


Figure B7: 16la1sa_3400idnw_N Base Case after the contingency N-1: Red Butte-Harry Allen 345 kV

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

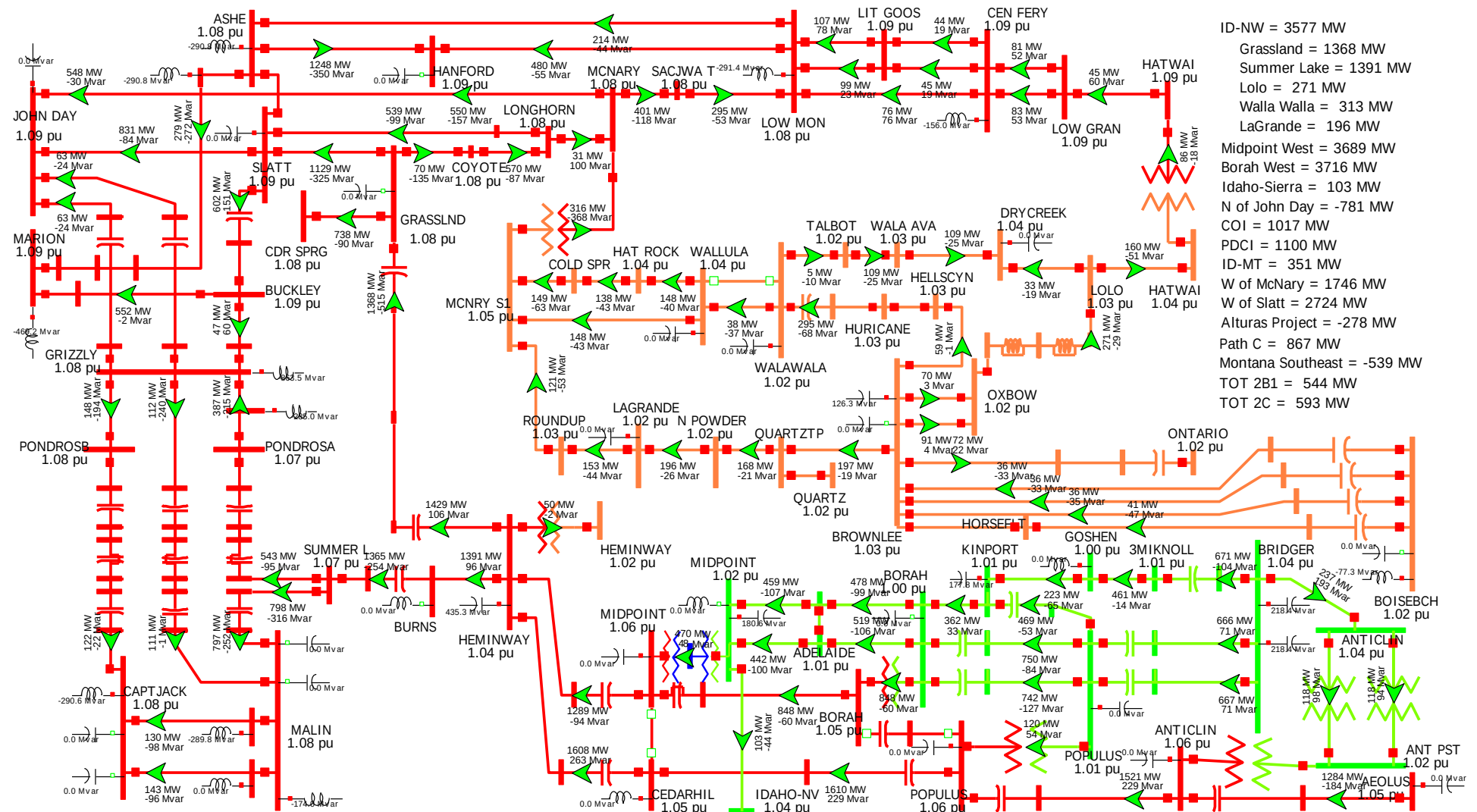


Figure B8: 16la1sa_3400idnw_N Base Case after the contingency N-2: Broadview-Garrison #1 & #2 500 kV + RAS

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

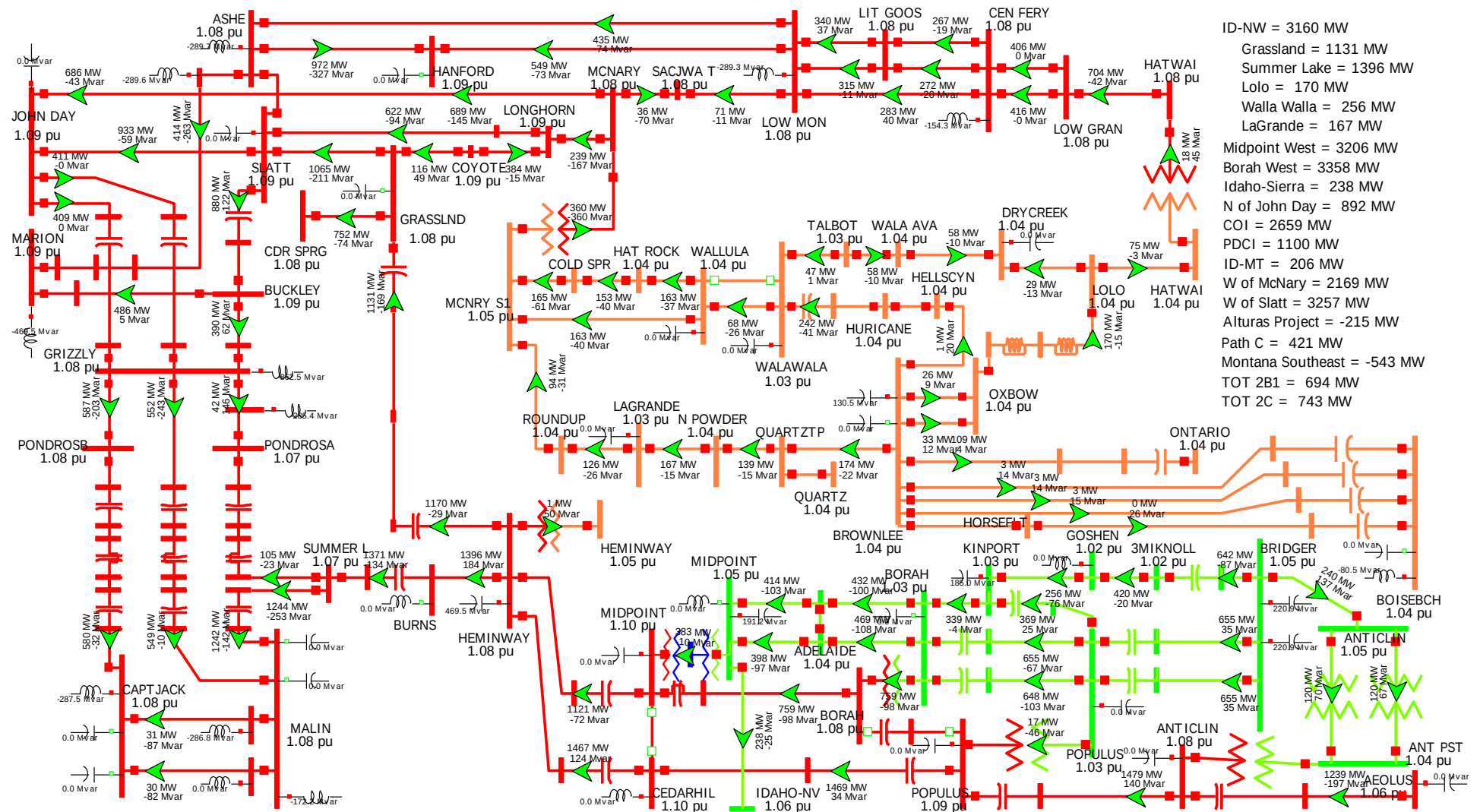


Figure B9: 16la1sa_3400idnw_N Base Case after the contingency N-2: Double Palo Verde

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

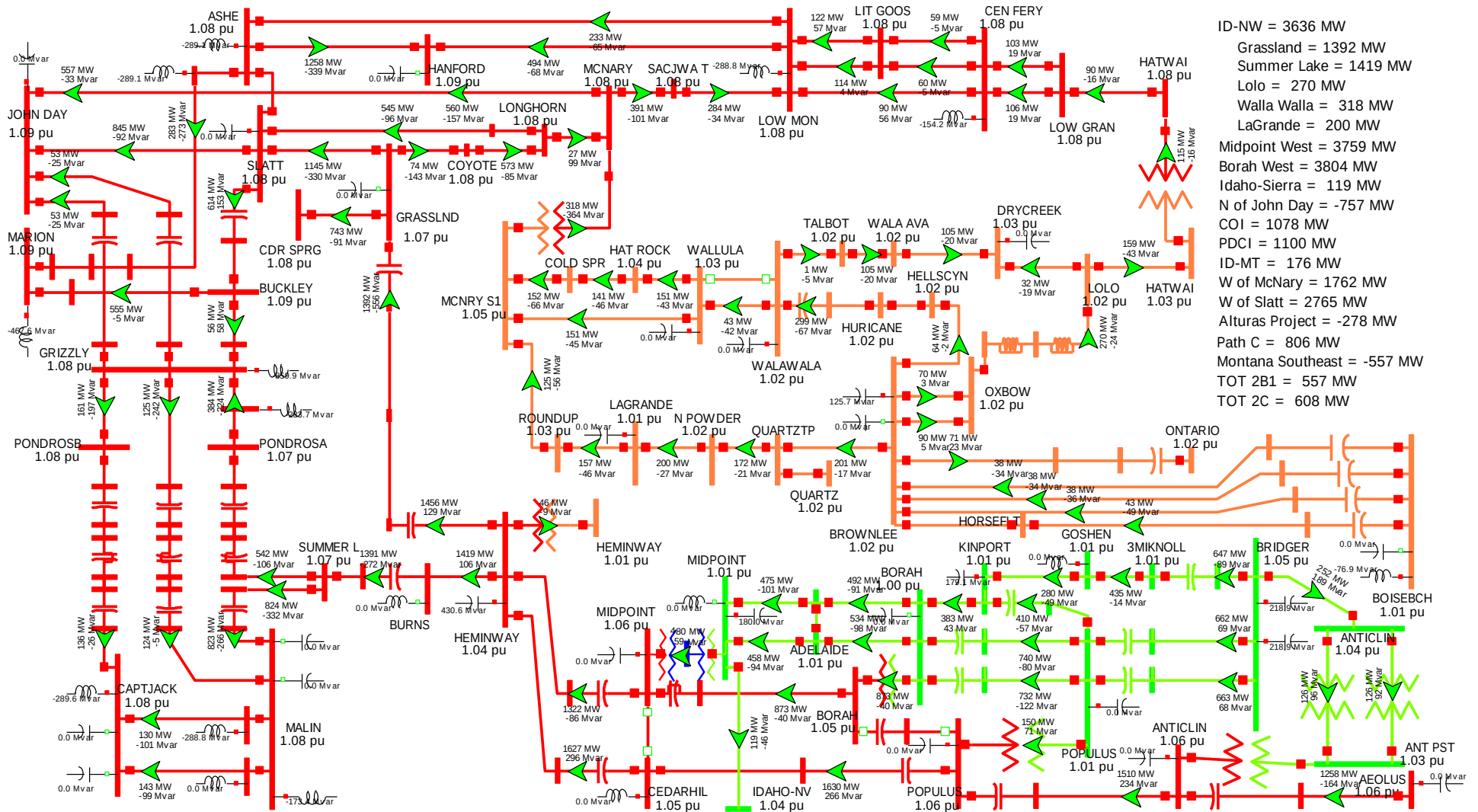


Figure B10: 16la1sa_3400idnw_N Base Case after the contingency N-2: Garrison-Taft #1 & #2

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	No Violations							
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.7	300.0	100.2%	370.0	81.3%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.7	300.0	100.2%	370.0	81.3%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	304.3	300.0	101.4%	370.0	82.2%
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	304.3	300.0	101.4%	370.0	82.2%
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	No Violations							
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	No Violations							
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	193.1	264.8	254.0	104.2%	307.0	86.2%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	No Violations							
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.4	51.0	50.0	101.9%	55.0	92.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	336.2	300.0	112.1%	370.0	90.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	336.2	300.0	112.1%	370.0	90.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	305.1	300.0	101.7%	370.0	82.5%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	322.3	315.0	102.3%	394.0	81.8%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	321.7	315.0	102.1%	394.0	81.6%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1440.6	2258.5	2000.1	112.9%	3000.0	75.3%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1462.1	2234.5	2000.1	111.7%	3000.0	74.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.4	51.5	50.0	103.0%	55.0	93.7%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	334.4	300.0	111.5%	370.0	90.4%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	334.4	300.0	111.5%	370.0	90.4%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	304.5	300.0	101.5%	370.0	82.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	320.9	315.0	101.9%	394.0	81.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	320.4	315.0	101.7%	394.0	81.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1440.6	2253.8	2000.1	112.7%	3000.0	75.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1462.1	2224.8	2000.1	111.2%	3000.0	74.2%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	303.1	300.0	101.0%	370.0	81.9%
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	303.1	300.0	101.0%	370.0	81.9%
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	193.1	262.2	254.0	103.2%	307.0	85.4%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	STATL C2 (47959)	% Δ Volts	1.016	0.962				5.31%

Appendix B - 161a1sa_340idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	STATL W2 (47571)	% Δ Volts	1.002	0.949				5.29%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	332.2	300.0	110.7%	370.0	89.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	332.2	300.0	110.7%	370.0	89.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.5	121.5	112.0	108.5%	146.7	82.9%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	319.4	315.0	101.4%	394.0	81.1%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	318.8	315.0	101.2%	394.0	80.9%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1532.2	2372.7	1732.1	137.0%	2338.3	101.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	333.9	300.0	111.3%	370.0	90.2%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	333.9	300.0	111.3%	370.0	90.2%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	90.5	122.7	112.0	109.6%	146.7	83.6%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	320.7	315.0	101.8%	394.0	81.4%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	263.7	300.7	300.0	100.2%	370.0	81.3%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	320.1	315.0	101.6%	394.0	81.2%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1532.2	2309.6	1732.1	133.3%	2338.3	98.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	334.9	300.0	111.6%	370.0	90.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	334.9	300.0	111.6%	370.0	90.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	303.7	300.0	101.2%	370.0	82.1%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	321.3	315.0	102.0%	394.0	81.6%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	320.7	315.0	101.8%	394.0	81.4%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1440.6	2335.2	2000.1	116.8%	3000.0	77.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1462.1	2308.3	2000.1	115.4%	3000.0	76.9%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	324.3	300.0	108.1%	370.0	87.7%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	324.3	300.0	108.1%	370.0	87.7%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	301.4	300.0	100.5%	370.0	81.5%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	CEDARHIL (60159) -> CEDHEM21 (61992) CKT 2 at CEDARHIL	Branch Amp	1661.2	2454.0	2309.4	106.3%	3464.1	70.8%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	POPULUS (67794) -> POPCED21 (61963) CKT 2 at POPULUS	Branch Amp	1663.5	2426.2	2309.4	105.1%	3464.1	70.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	331.4	300.0	110.5%	370.0	89.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	331.4	300.0	110.5%	370.0	89.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	317.7	315.0	100.9%	394.0	80.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	317.2	315.0	100.7%	394.0	80.5%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1346.9	2434.9	1732.1	140.6%	2338.3	104.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1172.4	1891.4	1701.6	111.2%	2108.6	89.7%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1156.6	1873.6	1650.1	113.5%	2227.4	84.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1162.5	1886.4	1492.7	126.4%	2264.2	83.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.993	0.937				5.64%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.991	0.938				5.35%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.991	0.939				5.25%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	348.8	300.0	116.3%	370.0	94.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	348.8	300.0	116.3%	370.0	94.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	331.2	315.0	105.2%	394.0	84.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	330.4	315.0	104.9%	394.0	83.9%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	90.5	122.0	112.0	109.0%	146.7	83.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	301.1	300.0	100.4%	370.0	81.4%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1172.4	1806.0	1701.6	106.1%	2108.6	85.7%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1156.6	1791.3	1650.1	108.6%	2227.4	80.4%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at BORPOP11	Branch Amp	1162.5	1804.1	1492.7	120.9%	2264.2	79.7%

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF IPC Populus-CHill-Hem 500 kV & Hem 500/230 Xfmr + RAS	AMPS (65025)	% Δ Volts	0.991	0.939				5.25%
BF Lolo 230kV	No Violations							
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	332.6	300.0	110.9%	370.0	89.9%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	332.6	300.0	110.9%	370.0	89.9%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	90.5	119.3	112.0	106.5%	146.7	81.3%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	319.6	315.0	101.5%	394.0	81.1%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	319.0	315.0	101.3%	394.0	81.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUN11 (90132) CKT 1 at BURNS	Branch Amp	1532.2	2314.7	1732.1	133.6%	2338.3	99.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFUR (62386)	% Δ Volts	0.993	0.927				6.65%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.991	0.930				6.16%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	KINGSR 5 (47177)	% Δ Volts	1.024	0.966				5.66%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	MCDERMIT (47189)	% Δ Volts	1.026	0.968				5.65%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	FIELDS T (47160)	% Δ Volts	1.034	0.977				5.51%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HINES (61825)	% Δ Volts	1.038	0.981				5.49%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	CATLOW (47134)	% Δ Volts	1.035	0.979				5.41%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	WJOHN DY (61835)	% Δ Volts	1.038	0.983				5.30%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HINES (61826)	% Δ Volts	1.042	0.988				5.18%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HARNEY (40507)	% Δ Volts	1.043	0.989				5.18%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts	0.991	0.940				5.15%
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	No Violations							
Bus: Alvey 500 kV	No Violations							
Bus: Bell BPA 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	303.1	300.0	101.0%	370.0	81.9%
Bus: Bell BPA 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	303.1	300.0	101.0%	370.0	81.9%
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.4	51.5	50.0	102.9%	55.0	93.6%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	336.2	300.0	112.1%	370.0	90.9%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	336.2	300.0	112.1%	370.0	90.9%
Bus: Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	305.6	300.0	101.9%	370.0	82.6%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	322.3	315.0	102.3%	394.0	81.8%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	321.7	315.0	102.1%	394.0	81.6%
Bus: Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1440.6	2257.4	2000.1	112.9%	3000.0	75.2%
Bus: Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1462.1	2233.6	2000.1	111.7%	3000.0	74.5%
N-1: Allston-Keeler 500 kV	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	302.9	300.0	101.0%	370.0	81.9%
N-1: Bell-Taft 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	302.9	300.0	101.0%	370.0	81.9%
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.3	300.0	100.1%	370.0	81.2%
N-1: Brady-Antelope 230 kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.3	300.0	100.1%	370.0	81.2%
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Cal Sub 120 kV Phase Shifter	No Violations							
N-1: Captain Jack-Olinda 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	301.3	300.0	100.4%	370.0	81.4%
N-1: Captain Jack-Olinda 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	301.3	300.0	100.4%	370.0	81.4%
N-1: Captjack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	No Violations							
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	No Violations							
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	350.7	315.0	111.3%	394.0	89.0%
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	349.5	315.0	111.0%	394.0	88.7%
N-1: Hatwai 500/230 kV Xfmr	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	No Violations							
N-1: Hatwai-N Lewiston 230 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Hells Canyon-Brownlee 230 kV	No Violations							
N-1: Hells Canyon-Walla Walla 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
N-1: Hells Canyon-Walla Walla 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
N-1: Hemingway-Grassland 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.4	54.4	50.0	108.9%	55.0	99.0%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	331.1	300.0	110.4%	370.0	89.5%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	331.1	300.0	110.4%	370.0	89.5%
N-1: Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.5	121.5	112.0	108.5%	146.7	82.8%
N-1: Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	318.5	315.0	101.1%	394.0	80.8%
N-1: Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	318.0	315.0	100.9%	394.0	80.7%
N-1: Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUMP11 (90132) CKT 1 at BURNS	Branch Amp	1532.2	2303.2	1732.1	133.0%	2338.3	98.5%
N-1: Hemingway-Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.4	51.3	50.0	102.6%	55.0	93.3%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	334.5	300.0	111.5%	370.0	90.4%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	334.5	300.0	111.5%	370.0	90.4%
N-1: Hemingway-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	263.7	304.0	300.0	101.3%	370.0	82.2%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	321.0	315.0	101.9%	394.0	81.5%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	320.4	315.0	101.7%	394.0	81.3%
N-1: Hemingway-Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1440.6	2269.6	2000.1	113.5%	3000.0	75.7%
N-1: Hemingway-Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1462.1	2245.9	2000.1	112.3%	3000.0	74.9%
N-1: Hill Top 345/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	109.1	169.8	150.0	113.2%	180.0	94.3%
N-1: Hill Top 345/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	316.0	421.8	415.7	101.5%	483.5	87.2%
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	360.0	300.0	120.0%	370.0	97.3%
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	360.0	300.0	120.0%	370.0	97.3%
N-1: Huntington-Pinto-Four Corners 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	298.4	367.4	357.0	102.9%	415.9	88.3%
N-1: Huntington-Pinto-Four Corners 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	298.4	367.4	357.0	102.9%	415.9	88.3%
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.4	50.4	50.0	100.8%	55.0	91.7%
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	No Violations							
N-1: Malin-Round Mtn #2 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	303.9	300.0	101.3%	370.0	82.1%
N-1: Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	303.9	300.0	101.3%	370.0	82.1%
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	319.3	300.0	106.4%	370.0	86.3%
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	319.3	300.0	106.4%	370.0	86.3%
N-1: Midpoint-Humboldt 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.9	300.0	100.3%	370.0	81.3%
N-1: Midpoint-Humboldt 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.9	300.0	100.3%	370.0	81.3%
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	No Violations							
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	No Violations							
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	357.2	300.0	119.1%	370.0	96.6%
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	357.2	300.0	119.1%	370.0	96.6%
N-1: Pinto-Four Corner 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	298.4	364.4	357.0	102.1%	415.9	87.6%
N-1: Pinto-Four Corner 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	298.4	364.4	357.0	102.1%	415.9	87.6%
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	330.3	300.0	110.1%	370.0	89.3%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	330.3	300.0	110.1%	370.0	89.3%
N-1: Populus-Cedar Hill-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	316.9	315.0	100.6%	394.0	80.4%
N-1: Populus-Cedar Hill-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	316.3	315.0	100.4%	394.0	80.3%
N-1: Populus-Cedar Hill-Hemingway 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1346.9	2296.5	1732.1	132.6%	2338.3	98.2%
N-1: Populus-Cedar Hill-Hemingway 500 kV	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1172.4	1893.1	1701.6	111.3%	2108.6	89.8%
N-1: Populus-Cedar Hill-Hemingway 500 kV	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1156.6	1875.2	1650.1	113.6%	2227.4	84.2%
N-1: Populus-Cedar Hill-Hemingway 500 kV	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1162.5	1888.0	1492.7	126.5%	2264.2	83.4%
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	350.6	315.0	111.3%	394.0	89.0%
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	349.3	315.0	110.9%	394.0	88.7%
N-1: Robinson-Harry Allen 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	109.1	165.9	150.0	110.6%	180.0	92.2%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	334.3	300.0	111.4%	370.0	90.4%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	334.3	300.0	111.4%	370.0	90.4%
N-1: Robinson-Harry Allen 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	263.7	328.4	300.0	109.5%	370.0	88.8%
N-1: Robinson-Harry Allen 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	257.6	320.5	300.0	106.8%	370.0	86.6%
N-1: Robinson-Harry Allen 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	315.1	315.0	100.0%	394.0	80.0%
N-1: Robinson-Harry Allen 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	316.0	419.0	415.7	100.8%	483.5	86.7%
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	318.9	300.0	106.3%	370.0	86.2%
N-1: Sigurd-Glen Canyon 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	318.9	300.0	106.3%	370.0	86.2%
N-1: Slatt 500/230 kV Xfmr	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	No Violations							
N-1: Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
N-1: Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	No Violations							
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	BRIDGER (60085) -> BRI3MI11 (61999) CKT 1 at BRIDGER	Branch Amp	1065.7	1764.7	1600.0	110.3%	1840.0	95.9%
N-2: Bridger-Populus #1 & #2 345 kV	BRI3MI11 (61999) -> 3MIKNOLL (60084) CKT 1 at 3MIKNOLL	Branch Amp	1065.7	1738.8	1650.1	105.4%	2227.4	78.1%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> POPBRI11 (61968) CKT 1 at BRIDGER	Branch Amp	1022.3	1815.8	1492.7	121.6%	1849.2	98.2%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	POPBRI11 (61968) -> POPULUS (67790) CKT 1 at POPULUS	Branch Amp	1011.6	1800.1	1650.1	109.1%	2227.6	80.8%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.5	126.1	112.0	112.6%	146.7	86.0%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	ABSAROKA (62201)	% Δ Volts	0.956	0.878				8.16%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLBUSAT (62224)	% Δ Volts	0.976	0.901				7.68%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLUMBUS (62015)	% Δ Volts	0.979	0.904				7.66%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	BGTMBERA (62250)	% Δ Volts	1.010	0.936				7.33%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLRPLJE (62220)	% Δ Volts	1.001	0.930				7.09%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	DUCKCR-R (62325)	% Δ Volts	1.016	0.945				6.99%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	WILLSALL (62019)	% Δ Volts	1.037	0.966				6.85%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLRPLJE (62205)	% Δ Volts	1.001	0.937				6.39%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	WILLSALL (62016)	% Δ Volts	1.034	0.968				6.38%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	CLYDE P (62108)	% Δ Volts	1.027	0.966				5.94%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	AMPS (65025)	% Δ Volts	0.991	0.939				5.25%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	THRRIVER (62331)	% Δ Volts	1.033	0.979				5.23%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	BENCHLND (62230)	% Δ Volts	1.030	0.978				5.05%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	STANFRDM (62231)	% Δ Volts	1.033	0.981				5.03%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	326.8	300.0	108.9%	370.0	88.3%
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	326.8	300.0	108.9%	370.0	88.3%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	368.9	300.0	123.0%	370.0	99.7%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	368.9	300.0	123.0%	370.0	99.7%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO	Branch MVA	290.6	366.3	315.0	116.3%	394.0	93.0%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO	Branch MVA	290.6	364.8	315.0	115.8%	394.0	92.6%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	298.4	377.4	357.0	105.7%	415.9	90.7%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	298.4	377.4	357.0	105.7%	415.9	90.7%
N-2: Double Palo Verde	CHOLLA (14000) -> CHOSAG11 (14014) CKT 1 at CHOSAG11	Branch Amp	965.8	1059.9	1026.0	103.3%	1538.1	68.9%
N-2: Double Palo Verde	MONTROSE (79049)	% Δ Volts	1.020	0.968				5.10%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	PLACIDLK (62344)	% Δ Volts	1.026	0.962				6.24%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	DIXON MV (40348)	% Δ Volts	1.026	0.969				5.56%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	SUPERRMT (62296)	% Δ Volts	1.022	0.967				5.38%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	RATTLE S (40867)	% Δ Volts	1.025	0.970				5.37%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	DIAMNDMT (62295)	% Δ Volts	1.022	0.968				5.28%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	TARKIO-R (62294)	% Δ Volts	1.025	0.971				5.27%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HAMLTNMT (62074)	% Δ Volts	1.015	0.962				5.22%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	ST REGIS (62297)	% Δ Volts	1.020	0.967				5.20%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	ALBERTON (62293)	% Δ Volts	1.029	0.976				5.15%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HUSON-R (62300)	% Δ Volts	1.032	0.979				5.14%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HAUGEN (62298)	% Δ Volts	1.018	0.966				5.11%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	SALTESE (62299)	% Δ Volts	1.017	0.966				5.01%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	WALDORF (62091)	% Δ Volts	1.038	0.986				5.01%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	FRENCH-R (62292)	% Δ Volts	1.038	0.986				5.01%
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	301.2	300.0	100.4%	370.0	81.4%
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	301.2	300.0	100.4%	370.0	81.4%
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	301.6	300.0	100.5%	370.0	81.5%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	301.6	300.0	100.5%	370.0	81.5%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	No Violations							
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	310.8	300.0	103.6%	370.0	84.0%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	310.8	300.0	103.6%	370.0	84.0%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	225.8	266.7	252.0	105.8%	271.1	98.4%
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	300.2	300.0	100.1%	370.0	81.1%
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV	No Violations							
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	No Violations							
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	No Violations							
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Malin-Round Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	316.2	300.0	105.4%	370.0	85.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	316.2	300.0	105.4%	370.0	85.5%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	320.0	300.0	106.7%	370.0	86.5%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	320.0	300.0	106.7%	370.0	86.5%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Raver & Raver-Covington4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covington4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	315.5	300.0	105.2%	370.0	85.3%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	315.5	300.0	105.2%	370.0	85.3%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	225.8	254.9	252.0	101.1%	271.1	94.0%
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	314.8	300.0	104.9%	370.0	85.1%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	314.8	300.0	104.9%	370.0	85.1%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	303.0	300.0	101.0%	370.0	81.9%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	303.0	300.0	101.0%	370.0	81.9%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	302.9	300.0	101.0%	370.0	81.9%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	302.9	300.0	101.0%	370.0	81.9%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	225.8	254.1	252.0	100.8%	271.1	93.7%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	DWOR (41201)	% Δ Volts	1.0	1.0				5.09%
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	302.9	300.0	101.0%	370.0	81.9%
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	302.9	300.0	101.0%	370.0	81.9%
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	302.8	300.0	100.9%	370.0	81.8%
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	302.8	300.0	100.9%	370.0	81.8%
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	295.5	301.2	300.0	100.4%	370.0	81.4%
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	295.5	301.2	300.0	100.4%	370.0	81.4%
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.70	-1142	0.71	-1821	0.75	-1628	0.73	-621	0.70	-719	0.80	-1445	0.90	-1250	0.70	-484
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.70	-1141	0.71	-1833	0.75	-1636	0.73	-627	0.70	-717	0.80	-1452	0.90	-1265	0.70	-486
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.70	-1146	0.70	-1882	0.74	-1681	0.72	-630	0.70	-719	0.80	-1499	0.89	-1276	0.70	-488
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.70	-1143	0.70	-1901	0.74	-1696	0.72	-640	0.70	-717	0.80	-1511	0.89	-1305	0.70	-492
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.70	-1142	0.70	-1912	0.74	-1705	0.72	-632	0.70	-716	0.80	-1519	0.89	-1280	0.70	-490
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.70	-1141	0.70	-1913	0.74	-1704	0.72	-645	0.70	-716	0.80	-1518	0.89	-1319	0.70	-493
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.70	-1139	0.70	-1861	0.74	-1658	0.76	-570	0.70	-714	0.80	-1478	0.89	-857	0.70	-511
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.70	-1137	0.70	-1878	0.74	-1704	0.72	-646	0.70	-712	0.80	-1520	0.89	-1318	0.70	-493
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.70	-1138	0.70	-1933	0.73	-1724	0.72	-651	0.70	-713	0.80	-1537	0.89	-1333	0.70	-495
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.70	-1132	0.70	-1891	0.73	-1719	0.72	-651	0.70	-709	0.80	-1536	0.89	-1329	0.70	-495
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.70	-1141	0.70	-1904	0.74	-1699	0.72	-637	0.70	-715	0.80	-1514	0.89	-1284	0.70	-494
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.70	-1141	0.70	-1901	0.74	-1700	0.73	-623	0.70	-716	0.80	-1517	0.89	-1252	0.70	-489
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.70	-1139	0.70	-1865	0.74	-1661	0.75	-586	0.70	-714	0.80	-1481	0.88	-843	0.70	-512
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.70	-1135	0.71	-1812	0.75	-1617	0.78	-428	0.70	-712	0.80	-1438	0.90	-990	0.75	-455
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500KV + RAS	0.70	-1125	0.72	-1647	0.76	-1487	0.83	-385	0.70	-706	0.81	-1321	0.90	-555	0.74	-500
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.70	-1138	0.70	-1895	0.74	-1700	0.72	-637	0.70	-713	0.80	-1520	0.89	-1295	0.70	-492
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.70	-1141	0.70	-1902	0.74	-1698	0.72	-643	0.70	-715	0.80	-1514	0.89	-1314	0.70	-493
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.70	-1136	0.71	-1838	0.75	-1637	0.77	-507	0.70	-712	0.80	-1454	0.88	-1216	0.73	-492
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.70	-1141	0.70	-1903	0.74	-1699	0.72	-641	0.70	-715	0.80	-1515	0.89	-1305	0.70	-493
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.70	-1136	0.70	-1911	0.74	-1709	0.72	-647	0.70	-712	0.80	-1527	0.89	-1323	0.70	-495
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.70	-1142	0.70	-1910	0.74	-1704	0.72	-642	0.70	-716	0.80	-1518	0.89	-1311	0.70	-492
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.70	-1142	0.70	-1916	0.74	-1707	0.72	-642	0.70	-716	0.80	-1520	0.89	-1312	0.70	-492
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.70	-1142	0.70	-1906	0.74	-1701	0.72	-637	0.70	-716	0.80	-1516	0.89	-1295	0.70	-491
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.70	-1141	0.70	-1884	0.74	-1699	0.72	-644	0.70	-715	0.80	-1517	0.89	-1317	0.70	-492
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.70	-1143	0.72	-1773	0.75	-1591	0.74	-610	0.70	-721	0.81	-1409	0.90	-1225	0.70	-479
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.70	-1142	0.70	-1907	0.74	-1702	0.72	-632	0.70	-716	0.80	-1517	0.89	-1259	0.70	-492
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.70	-1141	0.70	-1903	0.74	-1707	0.72	-650	0.70	-715	0.80	-1519	0.89	-1324	0.70	-494
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.70	-1142	0.70	-1915	0.74	-1706	0.72	-644	0.70	-716	0.80	-1519	0.89	-1312	0.70	-494
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.70	-1142	0.70	-1917	0.74	-1707	0.72	-645	0.70	-716	0.80	-1520	0.89	-1319	0.70	-494
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV	0.70	-1144	0.70	-1911	0.74	-1704	0.72	-635	0.70	-717	0.80	-1517	0.89	-1292	0.70	-490
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-645	0.70	-716	0.80	-1521	0.89	-1318	0.70	-493
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-645	0.70	-716	0.80	-1520	0.89	-1320	0.70	-493
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.70	-1142	0.70	-1913	0.74	-1705	0.72	-642	0.70	-716	0.80	-1518	0.89	-1307	0.70	-493
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-645	0.70	-716	0.80	-1519	0.89	-1315	0.70	-494
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-646	0.70	-716	0.80	-1519	0.89	-1319	0.70	-494
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV	0.70	-1139	0.70	-1897	0.74	-1696	0.72	-646	0.70	-714	0.80	-1513	0.89	-1316	0.70	-495
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.70	-1141	0.70	-1900	0.74	-1699	0.72	-637	0.70	-715	0.80	-1515	0.89	-1296	0.70	-491
BF 4432 OSTRANDER-TROUTDALE & SPLIT OSTRANDER 500 KV	0.70	-1141	0.70	-1886	0.74	-1689	0.72	-634	0.70	-715	0.80	-1508	0.89	-1284	0.70	-492
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.70	-1142	0.70	-1906	0.74	-1701	0.72	-640	0.70	-716	0.80	-1516	0.89	-1303	0.70	-492
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.70	-1142	0.70	-1908	0.74	-1702	0.72	-641	0.70	-716	0.80	-1516	0.89	-1307	0.70	-492
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.70	-1141	0.70	-1903	0.74	-1699	0.72	-641	0.70	-716	0.80	-1514	0.89	-1305	0.70	-493
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.70	-1141	0.70	-1907	0.74	-1701	0.72	-642	0.70	-716	0.80	-1516	0.89	-1308	0.70	-493
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV	0.70	-1141	0.70	-1913	0.74	-1705	0.72	-648	0.70	-716	0.80	-1518	0.89	-1325	0.70	-495
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.70	-1144	0.70	-1911	0.74	-1703	0.72	-635	0.70	-717	0.80	-1517	0.89	-1291	0.70	-490
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV	0.70	-1142	0.70	-1913	0.74	-1704	0.72	-641	0.70	-716	0.80	-1518	0.89	-1304	0.70	-493
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV	0.70	-1143	0.70	-1916	0.74	-1706	0.72	-634	0.70	-716	0.80	-1519	0.89	-1287	0.70	-491

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-643	0.70	-716	0.80	-1519	0.89	-1312	0.70	-493
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.70	-1142	0.72	-1754	0.76	-1565	0.74	-593	0.70	-720	0.81	-1383	0.90	-1182	0.71	-469
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.70	-1142	0.72	-1767	0.75	-1575	0.74	-594	0.70	-720	0.81	-1392	0.90	-1186	0.71	-469
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.70	-1142	0.70	-1914	0.74	-1704	0.72	-645	0.70	-716	0.80	-1517	0.89	-1319	0.70	-493
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-641	0.70	-716	0.80	-1519	0.89	-1310	0.70	-492
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.70	-1141	0.70	-1904	0.74	-1701	0.72	-634	0.70	-715	0.80	-1517	0.89	-1267	0.70	-492
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.70	-1142	0.70	-1913	0.74	-1704	0.72	-641	0.70	-716	0.80	-1518	0.89	-1299	0.70	-494
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.70	-1141	0.71	-1824	0.75	-1620	0.78	-526	0.70	-718	0.80	-1436	0.91	-744	0.70	-496
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.70	-1142	0.70	-1911	0.74	-1703	0.72	-640	0.70	-716	0.80	-1517	0.89	-1298	0.70	-493
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.70	-1141	0.70	-1920	0.74	-1708	0.72	-654	0.70	-716	0.80	-1520	0.89	-1335	0.70	-496
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.70	-1142	0.70	-1914	0.74	-1705	0.72	-647	0.70	-716	0.80	-1519	0.89	-1323	0.70	-494
BF 4708 HATWAI 500 KV BUS	0.70	-1136	0.70	-1844	0.74	-1646	0.77	-509	0.70	-712	0.80	-1463	0.88	-750	0.71	-501
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.70	-1141	0.70	-1911	0.74	-1703	0.72	-642	0.70	-716	0.80	-1516	0.89	-1301	0.70	-494
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV	0.70	-1135	0.70	-1850	0.74	-1656	0.73	-621	0.70	-711	0.80	-1474	0.89	-1023	0.70	-511
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.70	-1136	0.70	-1858	0.74	-1662	0.75	-586	0.70	-712	0.80	-1480	0.89	-946	0.70	-507
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.70	-1142	0.70	-1915	0.74	-1707	0.72	-642	0.70	-716	0.80	-1520	0.89	-1311	0.70	-492
BF 4888 ASHE-SLATT & CGS 500 KV	0.70	-1143	0.73	-1678	0.76	-1499	0.76	-560	0.70	-724	0.81	-1320	0.91	-1110	0.72	-450
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.70	-1141	0.70	-1896	0.74	-1697	0.72	-633	0.70	-715	0.80	-1514	0.89	-1269	0.70	-493
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.70	-1142	0.70	-1890	0.74	-1696	0.73	-617	0.70	-716	0.80	-1516	0.90	-1226	0.70	-485
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.70	-1139	0.70	-1893	0.74	-1693	0.72	-642	0.70	-714	0.80	-1510	0.89	-1294	0.70	-496
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.70	-1066	0.70	-1476	0.73	-1562	0.77	-506	0.70	-658	0.81	-1571	0.92	-987	0.73	-423
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.70	-1070	0.71	-1549	0.72	-1635	0.77	-518	0.70	-661	0.81	-1642	0.92	-1012	0.73	-432
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.70	-1143	0.70	-1928	0.74	-1715	0.72	-647	0.70	-717	0.80	-1527	0.89	-1326	0.70	-493
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.70	-1134	0.70	-1886	0.73	-1706	0.72	-636	0.70	-710	0.80	-1533	0.89	-1292	0.70	-491
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.70	-1129	0.70	-1882	0.73	-1716	0.73	-618	0.70	-706	0.80	-1550	0.90	-1239	0.70	-485
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.70	-1137	0.70	-1900	0.74	-1705	0.72	-636	0.70	-712	0.80	-1524	0.89	-1283	0.70	-493
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.70	-1138	0.70	-1897	0.73	-1708	0.73	-627	0.70	-713	0.80	-1528	0.89	-1263	0.70	-489
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.70	-1138	0.70	-1906	0.74	-1708	0.72	-640	0.70	-713	0.80	-1525	0.89	-1301	0.70	-493
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.70	-1141	0.70	-1882	0.74	-1694	0.72	-637	0.70	-715	0.80	-1518	0.89	-1300	0.70	-490
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.70	-1141	0.70	-1898	0.74	-1696	0.72	-643	0.70	-715	0.80	-1513	0.89	-1312	0.70	-493
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-642	0.70	-716	0.80	-1520	0.89	-1311	0.70	-493
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.70	-1142	0.70	-1912	0.74	-1704	0.72	-641	0.70	-716	0.80	-1517	0.89	-1304	0.70	-493
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.70	-1141	0.70	-1901	0.74	-1696	0.72	-632	0.70	-715	0.80	-1512	0.89	-1268	0.70	-494
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.70	-1142	0.70	-1910	0.74	-1704	0.73	-625	0.70	-716	0.80	-1518	0.89	-1262	0.70	-489
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.70	-1142	0.70	-1912	0.74	-1705	0.72	-634	0.70	-716	0.80	-1518	0.89	-1285	0.70	-491
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.70	-1141	0.70	-1896	0.74	-1705	0.72	-641	0.70	-715	0.80	-1522	0.89	-1307	0.70	-493
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.70	-1142	0.71	-1760	0.75	-1592	0.73	-618	0.70	-719	0.81	-1415	0.90	-1246	0.70	-482
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.70	-1141	0.70	-1895	0.74	-1700	0.72	-634	0.70	-715	0.80	-1517	0.89	-1266	0.70	-491
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.70	-1143	0.72	-1762	0.76	-1581	0.74	-606	0.70	-720	0.81	-1401	0.90	-1202	0.70	-479
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.70	-1141	0.70	-1906	0.74	-1701	0.72	-644	0.70	-715	0.80	-1516	0.89	-1308	0.70	-495
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.70	-1142	0.70	-1908	0.74	-1702	0.72	-638	0.70	-716	0.80	-1517	0.89	-1294	0.70	-492
BF 5266 SLATT-BUCKLY 500 KV	0.70	-1138	0.70	-1914	0.73	-1710	0.72	-646	0.70	-713	0.80	-1525	0.89	-1317	0.70	-495
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.70	-1142	0.70	-1915	0.74	-1706	0.72	-636	0.70	-716	0.80	-1519	0.89	-1294	0.70	-491
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.70	-1142	0.70	-1912	0.74	-1705	0.72	-632	0.70	-716	0.80	-1519	0.89	-1280	0.70	-490
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.70	-1073	0.70	-1074	0.74	-1286	0.80	-450	0.70	-664	0.83	-1343	0.94	-870	0.75	-381
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR + RAS	0.70	-1069	0.70	-964	0.73	-1269	0.80	-443	0.70	-661	0.83	-1321	0.94	-856	0.75	-378

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.70	-1069	0.70	-1296	0.73	-1490	0.77	-501	0.70	-660	0.82	-1511	0.92	-979	0.74	-419
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.70	-1088	0.70	-1148	0.73	-1294	0.77	-510	0.70	-675	0.78	-1220	0.92	-1008	0.73	-427
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR	0.70	-1076	0.70	-1423	0.74	-1224	0.79	-466	0.70	-665	0.82	-1133	0.94	-914	0.75	-386
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.70	-1039	0.70	-1335	0.73	-992	0.82	-380	0.70	-635	0.83	-1082	0.95	-736	0.77	-330
BF LOLO 230KV	0.70	-1136	0.70	-1873	0.74	-1691	0.73	-623	0.70	-712	0.80	-1514	0.90	-1258	0.70	-484
BF PGE GRASSLAND-CEDAR SPRING & HEMINGWAY-GRASSLAND 500 KV	0.70	-1072	0.70	-1213	0.74	-1334	0.80	-428	0.70	-663	0.82	-1388	0.94	-827	0.76	-373
BF PGE GRASSLAND-COYOTE 500 KV & CARTY GAS PROJECT	0.70	-1142	0.70	-1876	0.74	-1692	0.72	-644	0.70	-716	0.80	-1511	0.89	-1318	0.70	-493
BF PGE SLATT-GRASSLAND 500 KV & BOARDMAN COAL GEN	0.70	-1139	0.71	-1734	0.75	-1570	0.74	-609	0.70	-717	0.81	-1403	0.90	-1230	0.70	-479
BUS: ALVEY 500 KV	0.70	-1141	0.70	-1902	0.74	-1699	0.72	-643	0.70	-715	0.80	-1514	0.89	-1311	0.70	-493
BUS: BELL BPA 500 KV	0.70	-1128	0.71	-1720	0.75	-1552	0.80	-448	0.70	-707	0.80	-1384	0.88	-595	0.73	-498
BUS: BUCKLEY 500 KV	0.70	-1137	0.70	-1887	0.74	-1693	0.72	-636	0.70	-713	0.80	-1513	0.89	-1288	0.70	-492
BUS: DIXONVILLE 500 KV	0.70	-1142	0.70	-1906	0.74	-1700	0.72	-642	0.70	-716	0.80	-1514	0.89	-1312	0.70	-492
BUS: HOT SPRINGS 500 KV	0.70	-1142	0.70	-1921	0.74	-1710	0.71	-661	0.70	-716	0.80	-1523	0.88	-1335	0.70	-495
BUS: KEELER 500 KV	0.70	-1142	0.70	-1913	0.74	-1705	0.72	-648	0.70	-716	0.80	-1518	0.89	-1325	0.70	-494
BUS: ROCK CREEK 500 KV	0.70	-1141	0.70	-1889	0.74	-1686	0.72	-635	0.70	-716	0.80	-1501	0.89	-1288	0.70	-491
BUS: SICKLER 500 KV	0.70	-1142	0.70	-1913	0.74	-1705	0.72	-642	0.70	-716	0.80	-1518	0.89	-1307	0.70	-494
BUS: SUMMER LAKE 500 KV	0.70	-1066	0.70	-1478	0.73	-1564	0.77	-507	0.70	-658	0.81	-1573	0.92	-990	0.73	-425
N-1: ALLSTON-KEELER 500 KV	0.70	-1141	0.70	-1913	0.74	-1705	0.72	-649	0.70	-716	0.80	-1518	0.89	-1328	0.70	-495
N-1: ALLSTON-NAPAVINE 500 KV	0.70	-1142	0.70	-1914	0.74	-1705	0.72	-647	0.70	-716	0.80	-1518	0.89	-1324	0.70	-494
N-1: ALLSTON-PAUL #2 500 KV	0.70	-1142	0.70	-1914	0.74	-1705	0.72	-647	0.70	-716	0.80	-1519	0.89	-1323	0.70	-494
N-1: ALVERY-DIXONVILLE 500 KV	0.70	-1142	0.70	-1910	0.74	-1702	0.72	-644	0.70	-716	0.80	-1517	0.89	-1316	0.70	-493
N-1: ALVEY-MARION 500 KV	0.70	-1140	0.70	-1914	0.74	-1706	0.72	-646	0.70	-715	0.80	-1520	0.89	-1321	0.70	-494
N-1: ASHE-HANFORD 500 KV	0.70	-1141	0.70	-1903	0.74	-1701	0.73	-624	0.70	-716	0.80	-1518	0.89	-1256	0.70	-489
N-1: ASHE-LOW MON 500 KV	0.70	-1141	0.70	-1909	0.74	-1702	0.72	-641	0.70	-715	0.80	-1516	0.89	-1297	0.70	-495
N-1: ASHE-MARION 500 KV	0.70	-1140	0.70	-1901	0.74	-1698	0.72	-646	0.70	-715	0.80	-1513	0.89	-1317	0.70	-495
N-1: ASHE-SLATT 500 KV	0.70	-1142	0.70	-1904	0.74	-1702	0.72	-637	0.70	-716	0.80	-1518	0.89	-1291	0.70	-492
N-1: BELL-COULEE 500 KV	0.70	-1137	0.70	-1858	0.74	-1660	0.73	-611	0.70	-712	0.80	-1478	0.88	-1038	0.70	-511
N-1: BELL-TAFT 500 KV	0.70	-1129	0.71	-1721	0.75	-1553	0.80	-442	0.70	-707	0.80	-1386	0.88	-587	0.74	-494
N-1: BIG EDDY-CELILO 500 KV	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-646	0.70	-716	0.80	-1520	0.89	-1321	0.70	-493
N-1: BIG EDDY-JOHN DAY 500 KV	0.70	-1142	0.70	-1916	0.74	-1707	0.72	-642	0.70	-716	0.80	-1520	0.89	-1312	0.70	-492
N-1: BIG EDDY-KNIGHT 500 KV	0.70	-1142	0.70	-1914	0.74	-1705	0.72	-643	0.70	-716	0.80	-1519	0.89	-1315	0.70	-492
N-1: BIG EDDY-OSTRANDER 500 KV	0.70	-1142	0.70	-1909	0.74	-1703	0.72	-641	0.70	-716	0.80	-1517	0.89	-1306	0.70	-492
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.70	-1141	0.70	-1886	0.74	-1678	0.72	-644	0.70	-716	0.80	-1506	0.89	-1318	0.70	-493
N-1: BRADY-ANTELOPE 230 KV + RAS	0.70	-1134	0.70	-1835	0.73	-1647	0.72	-617	0.70	-709	0.80	-1487	0.90	-1324	0.70	-479
N-1: BROADVIEW-GARRISON #1 500 KV	0.70	-1137	0.73	-1773	0.76	-1597	0.81	-383	0.70	-713	0.81	-1408	0.95	-764	0.81	-380
N-1: BROWNLEE-ONTARIO 230 KV	0.70	-1142	0.70	-1873	0.74	-1673	0.72	-644	0.70	-716	0.80	-1501	0.89	-1318	0.70	-493
N-1: BUCKLEY-GRIZZLY 500 KV	0.70	-1140	0.70	-1911	0.74	-1703	0.72	-646	0.70	-715	0.80	-1518	0.89	-1319	0.70	-494
N-1: BUCKLEY-MARION 500 KV	0.70	-1141	0.70	-1902	0.74	-1700	0.72	-637	0.70	-715	0.80	-1516	0.89	-1296	0.70	-491
N-1: BUCKLEY-SLATT 500 KV	0.70	-1138	0.70	-1914	0.73	-1710	0.72	-646	0.70	-713	0.80	-1525	0.89	-1317	0.70	-495
N-1: CAL SUB 120 KV PHASE SHIFTER	0.70	-1138	0.70	-1889	0.74	-1688	0.72	-640	0.70	-714	0.80	-1507	0.89	-1308	0.70	-491
N-1: CAPTAIN JACK-OLINDA 500 KV	0.70	-1132	0.70	-1923	0.73	-1724	0.72	-652	0.70	-708	0.80	-1542	0.89	-1332	0.70	-497
N-1: CAPTJACK-KFALLS 500 KV	0.70	-1141	0.70	-1908	0.74	-1702	0.72	-645	0.70	-715	0.80	-1517	0.89	-1319	0.70	-493
N-1: CASCADE CROSSING 500 KV	0.70	-1138	0.70	-1904	0.74	-1706	0.72	-634	0.70	-713	0.80	-1525	0.89	-1286	0.70	-491
N-1: CHIEF JO-COULEE 500 KV	0.70	-1142	0.70	-1911	0.74	-1702	0.72	-641	0.70	-716	0.80	-1516	0.89	-1298	0.70	-494
N-1: CHIEF JO-MONROE 500 KV	0.70	-1142	0.70	-1911	0.74	-1703	0.72	-640	0.70	-716	0.80	-1517	0.89	-1298	0.70	-493
N-1: CHIEF JO-SICKLER 500 KV	0.70	-1142	0.70	-1915	0.74	-1705	0.72	-644	0.70	-716	0.80	-1519	0.89	-1313	0.70	-494

Appendix B - 161a1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: COULEE-HANFORD 500 KV	0.70	-1142	0.70	-1912	0.74	-1704	0.72	-631	0.70	-716	0.80	-1518	0.89	-1276	0.70	-491
N-1: COULEE-SCHULTZ 500 KV	0.70	-1141	0.70	-1908	0.74	-1701	0.72	-639	0.70	-716	0.80	-1515	0.89	-1292	0.70	-494
N-1: COVINGTON4-RAVER 500 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-645	0.70	-716	0.80	-1520	0.89	-1320	0.70	-493
N-1: COVINGTON5-RAVER 500 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-645	0.70	-716	0.80	-1520	0.89	-1319	0.70	-493
N-1: COYOTE-LONGHORN 500 KV	0.70	-1141	0.70	-1910	0.74	-1710	0.72	-642	0.70	-715	0.80	-1525	0.89	-1312	0.70	-492
N-1: CUSTERW-MONROE 500 KV	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-644	0.70	-716	0.80	-1519	0.89	-1312	0.70	-493
N-1: DIXONVILLE-MERIDIAN 500 KV	0.70	-1142	0.70	-1902	0.74	-1697	0.72	-640	0.70	-716	0.80	-1512	0.89	-1307	0.70	-492
N-1: DRYCREEK-LOLO 230 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-645	0.70	-716	0.80	-1520	0.89	-1319	0.70	-493
N-1: DRYCREEK-N LEWISTON 230 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-645	0.70	-716	0.80	-1520	0.89	-1319	0.70	-493
N-1: DRYCREEK-WALA AVA 230 KV	0.70	-1142	0.70	-1916	0.74	-1707	0.72	-642	0.70	-716	0.80	-1521	0.89	-1310	0.70	-492
N-1: DWORSHAK-HATWAI 500 KV	0.70	-1138	0.70	-1861	0.74	-1653	0.77	-512	0.70	-714	0.80	-1470	0.88	-761	0.71	-500
N-1: DWORSHAK-TAFT 500 KV	0.70	-1139	0.70	-1861	0.74	-1658	0.76	-570	0.70	-714	0.80	-1478	0.89	-857	0.70	-511
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.70	-1142	0.70	-1913	0.74	-1704	0.72	-641	0.70	-716	0.80	-1518	0.89	-1304	0.70	-493
N-1: ECHO LAKE-RAVER 500 KV	0.70	-1142	0.70	-1917	0.74	-1707	0.72	-644	0.70	-716	0.80	-1520	0.89	-1315	0.70	-493
N-1: ECHO LAKE-SCHULTZ 500 KV	0.70	-1142	0.70	-1911	0.74	-1703	0.72	-639	0.70	-716	0.80	-1517	0.89	-1298	0.70	-493
N-1: ECHO LAKE-SNOK TAP 500 KV	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-643	0.70	-716	0.80	-1521	0.89	-1315	0.70	-493
N-1: GARRISON-TAFT #2 500 KV	0.70	-1135	0.71	-1812	0.75	-1617	0.78	-428	0.70	-712	0.80	-1438	0.90	-990	0.75	-455
N-1: GOLDHILL-PLACER 115 KV	0.70	-1142	0.70	-1919	0.74	-1709	0.72	-646	0.70	-716	0.80	-1522	0.89	-1321	0.70	-493
N-1: GRASSLAND-COYOTE 500 KV	0.70	-1142	0.70	-1876	0.74	-1692	0.72	-644	0.70	-716	0.80	-1511	0.89	-1318	0.70	-493
N-1: GRASSLAND-SLATT 500 KV	0.70	-1137	0.70	-1891	0.73	-1706	0.72	-634	0.70	-712	0.80	-1531	0.89	-1290	0.70	-489
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.70	-1141	0.70	-1902	0.74	-1698	0.72	-643	0.70	-715	0.80	-1514	0.89	-1314	0.70	-493
N-1: GRIZZLY-MALIN 500 KV	0.70	-1138	0.70	-1897	0.74	-1697	0.72	-643	0.70	-713	0.80	-1515	0.89	-1311	0.70	-494
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.70	-1142	0.70	-1887	0.74	-1696	0.72	-637	0.70	-716	0.80	-1519	0.89	-1300	0.70	-490
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.70	-1138	0.70	-1896	0.74	-1696	0.72	-644	0.70	-713	0.80	-1515	0.89	-1312	0.70	-494
N-1: GRIZZLY-ROUND BU 500 KV	0.70	-1142	0.70	-1915	0.74	-1706	0.72	-645	0.70	-716	0.80	-1519	0.89	-1319	0.70	-493
N-1: HANFORD-LOW MON 500 KV	0.70	-1141	0.70	-1907	0.74	-1701	0.72	-638	0.70	-715	0.80	-1515	0.89	-1289	0.70	-494
N-1: HANFORD-VANTAGE 500 KV	0.70	-1142	0.70	-1912	0.74	-1705	0.72	-632	0.70	-716	0.80	-1519	0.89	-1280	0.70	-490
N-1: HANFORD-WAUTOMA 500 KV	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-645	0.70	-716	0.80	-1519	0.89	-1315	0.70	-494
N-1: HARRY ALLEN 345 KV PHASE SHIFTER	0.70	-982	0.74	-1517	0.77	-1362	0.74	-584	0.70	-596	0.82	-1232	0.91	-1163	0.71	-467
N-1: HATWAI 500/230 KV XFMR	0.70	-805	0.70	-1892	0.74	-1713	0.72	-641	0.70	-708	0.80	-1523	0.89	-1300	0.70	-492
N-1: HATWAI-LOLO 230 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-644	0.70	-716	0.80	-1520	0.89	-1315	0.70	-493
N-1: HATWAI-LOW GRAN 500 KV	0.70	-1142	0.70	-1916	0.74	-1663	0.74	-586	0.70	-716	0.80	-1481	0.89	-947	0.70	-493
N-1: HATWAI-N LEWISTON 230 KV	0.70	-1136	0.70	-1860	0.74	-1708	0.72	-645	0.70	-712	0.80	-1520	0.89	-1318	0.70	-508
N-1: HELLS CANYON-BROWNEE 230 KV	0.70	-1142	0.70	-1918	0.74	-1661	0.72	-639	0.70	-716	0.80	-1494	0.89	-1304	0.70	-493
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.70	-1141	0.71	-1839	0.74	-1667	0.73	-619	0.70	-716	0.80	-1500	0.90	-1251	0.70	-490
N-1: HEMINGWAY-GRASSLAND 500 KV	0.70	-1134	0.70	-1831	0.74	-1356	0.80	-458	0.70	-710	0.82	-1410	0.93	-894	0.70	-484
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.70	-1075	0.70	-1235	0.73	-1555	0.77	-503	0.70	-666	0.81	-1563	0.92	-981	0.75	-388
N-1: HILL TOP 345/230 XFMR	0.70	-1070	0.70	-1470	0.74	-1639	0.73	-626	0.70	-660	0.80	-1467	0.90	-1265	0.74	-420
N-1: HORSE HV-MCNARY 230 KV	0.70	-1136	0.70	-1826	0.74	-1707	0.72	-645	0.70	-713	0.80	-1520	0.89	-1319	0.70	-486
N-1: HOT SPRINGS-TAFT 500 KV	0.70	-1141	0.70	-1917	0.74	-1703	0.73	-610	0.70	-716	0.80	-1516	0.89	-1228	0.70	-493
N-1: HUMBOLDT-COYOTE CK 345 KV	0.70	-1142	0.70	-1912	0.75	-1493	0.72	-635	0.70	-716	0.81	-1413	0.89	-1292	0.70	-491
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.70	-1139	0.70	-1849	0.77	-1404	0.74	-596	0.70	-714	0.82	-1277	0.90	-1205	0.70	-493
N-1: ING500-CUSTERW 500 KV	0.70	-1025	0.73	-1560	0.74	-1707	0.72	-645	0.70	-716	0.80	-1520	0.89	-1319	0.70	-476
N-1: JOHN DAY-MARION 500 KV	0.70	-1142	0.70	-1917	0.74	-1699	0.72	-641	0.70	-716	0.80	-1515	0.89	-1305	0.70	-493
N-1: JOHN DAY-ROCK CK 500 KV	0.70	-1141	0.70	-1903	0.74	-1705	0.72	-647	0.70	-715	0.80	-1519	0.89	-1323	0.70	-493
N-1: JOHN DAY-SLATT 500 KV	0.70	-1142	0.70	-1913	0.74	-1712	0.72	-641	0.70	-716	0.80	-1528	0.89	-1306	0.70	-493

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: KFALLS-MERIDIAN 500 KV	0.70	-1139	0.70	-1914	0.74	-1680	0.72	-630	0.70	-714	0.80	-1498	0.89	-1275	0.70	-493
N-1: KNIGHT-WAUTOMA 500 KV	0.70	-1146	0.70	-1881	0.74	-1702	0.72	-645	0.70	-719	0.80	-1516	0.89	-1314	0.70	-488
N-1: LAGRANDE-NORTH POWDER 230 KV	0.70	-1141	0.70	-1908	0.74	-1692	0.72	-630	0.70	-715	0.80	-1513	0.89	-1277	0.70	-495
N-1: LANES-MARION 500 KV	0.70	-1137	0.70	-1879	0.74	-1703	0.72	-644	0.70	-712	0.80	-1518	0.89	-1315	0.70	-489
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.70	-1141	0.70	-1910	0.74	-1706	0.72	-643	0.70	-716	0.80	-1519	0.89	-1311	0.70	-493
N-1: LIT GOOSE-LOW MON 500 KV	0.70	-1142	0.70	-1916	0.74	-1705	0.72	-643	0.70	-716	0.80	-1519	0.89	-1308	0.70	-493
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.70	-1142	0.70	-1915	0.74	-1704	0.72	-641	0.70	-716	0.80	-1518	0.89	-1296	0.70	-494
N-1: LOW MON-SAC TAP 500 KV	0.70	-1142	0.70	-1914	0.74	-1707	0.72	-638	0.70	-716	0.80	-1520	0.89	-1282	0.70	-494
N-1: MALIN 500/230 XFMR	0.70	-1142	0.70	-1916	0.74	-1705	0.72	-645	0.70	-716	0.80	-1519	0.89	-1320	0.70	-492
N-1: MALIN-HILLTOP 230 KV	0.70	-1141	0.70	-1915	0.74	-1665	0.72	-634	0.70	-716	0.80	-1487	0.89	-1287	0.70	-493
N-1: MALIN-ROUND MTN #1 500 KV	0.70	-1138	0.70	-1861	0.74	-1711	0.72	-648	0.70	-714	0.80	-1528	0.89	-1324	0.70	-489
N-1: MALIN-ROUND MTN #2 500 KV	0.70	-1137	0.70	-1914	0.74	-1711	0.72	-648	0.70	-712	0.80	-1529	0.89	-1324	0.70	-495
N-1: MALIN-SUMMER LAKE 500 KV	0.70	-1136	0.70	-1914	0.73	-1721	0.72	-643	0.70	-712	0.80	-1554	0.89	-1311	0.70	-495
N-1: MAPLE VLY-ROCKY RH 345 KV	0.70	-1127	0.70	-1885	0.74	-1707	0.72	-644	0.70	-705	0.80	-1520	0.89	-1315	0.70	-494
N-1: MARION-PEARL 500 KV	0.70	-1142	0.70	-1917	0.74	-1704	0.72	-635	0.70	-716	0.80	-1517	0.89	-1291	0.70	-493
N-1: MARION-SANTIAM 500 KV	0.70	-1144	0.70	-1912	0.74	-1706	0.72	-646	0.70	-717	0.80	-1519	0.89	-1321	0.70	-490
N-1: MCLOUGLIN-OSTRANDER 230 KV	0.70	-1142	0.70	-1916	0.74	-1707	0.72	-646	0.70	-716	0.80	-1520	0.89	-1322	0.70	-493
N-1: MCNARY 500/230 KV XFMR	0.70	-1142	0.70	-1918	0.74	-1701	0.72	-644	0.70	-716	0.80	-1518	0.89	-1314	0.70	-493
N-1: MCNARY-BOARD T1 230 KV	0.70	-1141	0.70	-1906	0.73	-1718	0.72	-648	0.70	-715	0.80	-1532	0.89	-1328	0.70	-493
N-1: MCNARY-JOHN DAY 500 KV	0.70	-1142	0.70	-1930	0.74	-1703	0.72	-642	0.70	-715	0.80	-1518	0.89	-1306	0.70	-495
N-1: MCNARY-LONGHORN 500 KV	0.70	-1139	0.70	-1906	0.74	-1704	0.72	-645	0.70	-714	0.80	-1519	0.89	-1318	0.70	-494
N-1: MCNARY-ROSS 345 KV	0.70	-1142	0.70	-1901	0.74	-1704	0.72	-641	0.70	-716	0.80	-1518	0.89	-1306	0.70	-494
N-1: MCNARY-ROUNDUP 230 KV	0.70	-1141	0.70	-1909	0.74	-1693	0.72	-637	0.70	-715	0.80	-1515	0.89	-1298	0.70	-493
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.70	-1139	0.70	-1887	0.74	-1705	0.72	-635	0.70	-714	0.80	-1519	0.89	-1275	0.70	-490
N-1: MIDPOINT-HEMINGWAY 500 KV	0.70	-1142	0.70	-1911	0.72	-1277	0.76	-550	0.70	-716	0.79	-1290	0.91	-1095	0.70	-491
N-1: MIDPOINT-HUMBOLDT 345 KV	0.70	-1098	0.70	-1449	0.74	-1557	0.72	-637	0.70	-683	0.81	-1467	0.89	-1301	0.72	-447
N-1: NAPA-VINE-PAUL 500 KV	0.70	-1134	0.71	-1772	0.74	-1708	0.72	-645	0.70	-709	0.80	-1520	0.89	-1319	0.70	-491
N-1: OLYMPIA-PAUL 500 KV	0.70	-1142	0.70	-1918	0.74	-1707	0.72	-643	0.70	-716	0.80	-1519	0.89	-1316	0.70	-493
N-1: ONTARIO-CALDWELL 230 KV	0.70	-1142	0.70	-1919	0.74	-1697	0.72	-645	0.70	-716	0.80	-1515	0.89	-1320	0.70	-493
N-1: OSTRANDER-KNIGHT 500 KV	0.70	-1142	0.70	-1904	0.74	-1701	0.72	-642	0.70	-716	0.80	-1516	0.89	-1309	0.70	-493
N-1: OSTRANDER-PEARL 500 KV	0.70	-1141	0.70	-1906	0.74	-1708	0.72	-646	0.70	-716	0.80	-1521	0.89	-1321	0.70	-493
N-1: OSTRANDER-TROUTDALE 500 KV	0.70	-1142	0.70	-1920	0.74	-1706	0.72	-644	0.70	-716	0.80	-1519	0.89	-1317	0.70	-493
N-1: OXBOW-BROWNLEE #2 230 KV	0.70	-1142	0.70	-1915	0.74	-1705	0.72	-645	0.70	-716	0.80	-1519	0.89	-1320	0.70	-493
N-1: OXBOW-LOLO 230 KV	0.70	-1142	0.70	-1915	0.74	-1688	0.73	-624	0.70	-716	0.80	-1513	0.90	-1261	0.70	-493
N-1: PAUL-SATSOP 500 KV	0.70	-1136	0.70	-1870	0.74	-1706	0.72	-644	0.70	-712	0.80	-1519	0.89	-1316	0.70	-484
N-1: PEARL-KEELER 500 KV	0.70	-1142	0.70	-1916	0.74	-1709	0.72	-644	0.70	-716	0.80	-1522	0.89	-1318	0.70	-493
N-1: PEARL-KEELER 500 KV + RAS	0.70	-1142	0.70	-1920	0.74	-1709	0.72	-644	0.70	-716	0.80	-1522	0.89	-1318	0.70	-493
N-1: PINTO-FOUR CORNER 345 KV	0.70	-1032	0.73	-1588	0.76	-1426	0.73	-601	0.70	-580	0.82	-1297	0.90	-1214	0.70	-480
N-1: PONDEROSA A 500/230 KV XFMR	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-645	0.70	-716	0.80	-1521	0.89	-1320	0.70	-493
N-1: PONDEROSA B 500/230 KV XFMR	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-645	0.70	-716	0.80	-1519	0.89	-1321	0.70	-493
N-1: POPULUS-CEDAR HILL-HEMINGWAY 500 KV	0.70	-1078	0.70	-1564	0.74	-1236	0.79	-483	0.70	-667	0.81	-1139	0.93	-956	0.74	-396
N-1: RAVER-PAUL 500 KV	0.70	-1143	0.70	-1918	0.74	-1707	0.72	-635	0.70	-717	0.80	-1520	0.89	-1291	0.70	-491
N-1: RAVER-TACOMA 500 KV	0.70	-1142	0.70	-1917	0.74	-1707	0.72	-644	0.70	-716	0.80	-1520	0.89	-1317	0.70	-493
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.00	0	0.74	-1519	0.77	-1363	0.74	-584	0.70	-596	0.82	-1233	0.91	-1164	0.71	-467
N-1: ROBINSON-HARRY ALLEN 500 KV	0.70	-1091	0.70	-1824	0.74	-1651	0.72	-628	0.70	-674	0.80	-1494	0.89	-1272	0.70	-489
N-1: ROCK CK-WAUTOMA 500 KV	0.70	-1142	0.70	-1911	0.74	-1704	0.72	-640	0.70	-716	0.80	-1518	0.89	-1301	0.70	-492

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: ROUND MTN-TABLE MTN 500 KV	0.70	-1138	0.70	-1922	0.74	-1714	0.72	-648	0.70	-713	0.80	-1529	0.89	-1325	0.70	-495
N-1: ROUNDUP-LAGRANDE 230 KV	0.70	-1138	0.70	-1884	0.74	-1693	0.72	-634	0.70	-713	0.80	-1514	0.89	-1289	0.70	-490
N-1: SCHULTZ-SICKLER 500 KV	0.70	-1142	0.70	-1917	0.74	-1707	0.72	-643	0.70	-716	0.80	-1520	0.89	-1313	0.70	-493
N-1: SCHULTZ-VANTAGE 500 KV	0.70	-1142	0.70	-1915	0.74	-1706	0.72	-637	0.70	-716	0.80	-1519	0.89	-1296	0.70	-491
N-1: SCHULTZ-WAUTOMA 500 KV	0.70	-1142	0.70	-1913	0.74	-1706	0.72	-628	0.70	-716	0.80	-1520	0.89	-1272	0.70	-490
N-1: SIGURD-GLEN CANYON 230 KV	0.70	-1111	0.70	-1844	0.74	-1646	0.72	-635	0.70	-687	0.80	-1472	0.89	-1293	0.70	-490
N-1: SLATT 500/230 KV XFMR	0.70	-1142	0.70	-1914	0.74	-1705	0.72	-645	0.70	-716	0.80	-1519	0.89	-1318	0.70	-493
N-1: SLATT-LONGHORN 500 KV	0.70	-1141	0.70	-1913	0.74	-1706	0.72	-644	0.70	-715	0.80	-1520	0.89	-1315	0.70	-493
N-1: SNOK TAP-SNOKING 500 KV	0.70	-1142	0.70	-1915	0.74	-1705	0.72	-644	0.70	-716	0.80	-1518	0.89	-1315	0.70	-493
N-1: TABLE MTN-TESLA 500 KV	0.70	-1137	0.70	-1931	0.73	-1721	0.72	-650	0.70	-712	0.80	-1534	0.89	-1330	0.70	-495
N-1: TABLE MTN-VACA DIXON 500 KV	0.70	-1133	0.70	-1940	0.73	-1731	0.72	-652	0.70	-710	0.80	-1544	0.89	-1335	0.70	-496
N-1: VANTAGE 500/230 KV XFMR #1	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-645	0.70	-716	0.80	-1520	0.89	-1320	0.70	-493
N-1: VANTAGE 500/230 KV XFMR #2	0.70	-1142	0.70	-1918	0.74	-1708	0.72	-645	0.70	-716	0.80	-1520	0.89	-1320	0.70	-493
N-1: WALLA WALLA-TALBOT 230 KV	0.70	-1142	0.70	-1917	0.74	-1706	0.72	-643	0.70	-716	0.80	-1519	0.89	-1302	0.70	-494
N-1: WALLA WALLA-WALLULA 230 KV	0.70	-1141	0.70	-1910	0.74	-1703	0.72	-642	0.70	-715	0.80	-1518	0.89	-1308	0.70	-493
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.70	-1140	0.70	-1884	0.74	-1690	0.72	-640	0.70	-714	0.80	-1509	0.89	-1289	0.70	-494
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.70	-1139	0.70	-1886	0.74	-1691	0.72	-639	0.70	-714	0.80	-1510	0.89	-1293	0.70	-493
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.70	-1135	0.70	-1898	0.73	-1701	0.72	-647	0.70	-711	0.80	-1520	0.89	-1314	0.70	-497
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.70	-1139	0.70	-1896	0.74	-1696	0.72	-645	0.70	-714	0.80	-1513	0.89	-1311	0.70	-495
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.70	-1137	0.70	-1897	0.74	-1703	0.72	-642	0.70	-712	0.80	-1522	0.89	-1302	0.70	-494
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.70	-1139	0.70	-1891	0.74	-1697	0.72	-633	0.70	-714	0.80	-1515	0.89	-1276	0.70	-492
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.70	-1141	0.70	-1897	0.74	-1699	0.72	-637	0.70	-715	0.80	-1516	0.89	-1287	0.70	-493
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.70	-1132	0.74	-1468	0.77	-1324	0.85	-357	0.70	-717	0.82	-1177	0.91	-368	0.79	-388
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-ROUND BUTTE 230 KV	0.70	-1138	0.70	-1905	0.74	-1707	0.72	-632	0.70	-713	0.80	-1525	0.89	-1282	0.70	-491
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-SANTIAM 230 KV	0.70	-1138	0.70	-1907	0.74	-1707	0.72	-635	0.70	-713	0.80	-1526	0.89	-1287	0.70	-491
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.70	-1142	0.70	-1906	0.74	-1701	0.72	-640	0.70	-716	0.80	-1516	0.89	-1304	0.70	-492
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.70	-1142	0.70	-1907	0.74	-1702	0.72	-639	0.70	-716	0.80	-1516	0.89	-1303	0.70	-492
N-2: BOISE BENCH-BROWNEE #1 & #2 230 KV	0.70	-1140	0.71	-1796	0.74	-1600	0.72	-641	0.70	-715	0.81	-1467	0.89	-1312	0.70	-492
N-2: BOISE BENCH-BROWNEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.70	-1140	0.71	-1793	0.74	-1598	0.72	-641	0.70	-715	0.81	-1466	0.89	-1312	0.70	-492
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.70	-1142	0.79	-1509	0.81	-1283	0.77	-552	0.70	-720	0.84	-906	0.92	-1099	0.72	-435
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.70	-1141	0.79	-1452	0.81	-1236	0.76	-583	0.70	-719	0.84	-861	0.91	-1154	0.71	-440
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.70	-1142	0.85	-1198	0.83	-1205	0.83	-378	0.70	-727	0.86	-1030	0.91	-1394	0.92	-140
N-2: BROWNEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.70	-1134	0.71	-1765	0.74	-1632	0.73	-612	0.70	-711	0.80	-1483	0.90	-1242	0.70	-478
N-2: BROWNEE-OSBOW & BROWNEE-HELLS CANYON 230 KV	0.70	-1141	0.71	-1835	0.74	-1658	0.72	-639	0.70	-716	0.80	-1493	0.89	-1303	0.70	-489
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.70	-1140	0.70	-1886	0.74	-1691	0.72	-629	0.70	-715	0.80	-1510	0.89	-1273	0.70	-490
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.70	-1141	0.70	-1905	0.74	-1699	0.72	-638	0.70	-716	0.80	-1514	0.89	-1288	0.70	-494
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.70	-1141	0.70	-1907	0.74	-1700	0.72	-638	0.70	-716	0.80	-1515	0.89	-1289	0.70	-493
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.70	-1142	0.70	-1910	0.74	-1702	0.72	-640	0.70	-716	0.80	-1516	0.89	-1297	0.70	-493
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.70	-1142	0.70	-1912	0.74	-1704	0.72	-642	0.70	-716	0.80	-1517	0.89	-1304	0.70	-494
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.70	-1141	0.70	-1909	0.74	-1701	0.72	-639	0.70	-716	0.80	-1515	0.89	-1291	0.70	-494
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.70	-1143	0.70	-1905	0.74	-1701	0.73	-607	0.70	-717	0.80	-1517	0.90	-1202	0.70	-485
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.70	-1140	0.70	-1891	0.74	-1688	0.72	-634	0.70	-715	0.80	-1505	0.89	-1259	0.70	-497
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.70	-1142	0.70	-1915	0.74	-1705	0.72	-643	0.70	-716	0.80	-1519	0.89	-1310	0.70	-494
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.70	-1142	0.70	-1911	0.73	-1764	0.71	-669	0.70	-716	0.79	-1577	0.88	-1375	0.70	-494
N-2: DC-BIPOLE	0.70	-1090	0.70	-2163	0.71	-1924	0.70	-722	0.70	-674	0.78	-1722	0.87	-1498	0.70	-521
N-2: DOUBLE PALO VERDE	0.70	-1007	0.70	-2134	0.72	-1901	0.70	-715	0.70	-575	0.79	-1665	0.87	-1473	0.70	-524

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.70	-1142	0.70	-1913	0.74	-1704	0.72	-641	0.70	-716	0.80	-1518	0.89	-1303	0.70	-493
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.70	-1142	0.70	-1911	0.74	-1703	0.72	-640	0.70	-716	0.80	-1517	0.89	-1297	0.70	-493
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.70	-1131	0.75	-1458	0.79	-1311	0.83	-296	0.70	-716	0.82	-1160	0.85	-1475	0.81	-354
N-2: GRASSLAND-CEDAR SPRING & SLATT - BUCKLEY 500 KV	0.70	-1132	0.70	-1910	0.73	-1717	0.72	-637	0.70	-709	0.80	-1536	0.89	-1287	0.70	-493
N-2: GRASSLAND-COYOTE & SLATT - LONGHORN 500 KV	0.70	-1141	0.70	-1833	0.74	-1669	0.72	-646	0.70	-715	0.80	-1496	0.89	-1317	0.70	-495
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV	0.70	-1131	0.70	-1879	0.74	-1635	0.73	-621	0.70	-708	0.80	-1460	0.90	-1240	0.70	-496
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV	0.70	-1139	0.70	-1863	0.75	-1627	0.73	-609	0.70	-714	0.81	-1455	0.90	-1222	0.70	-490
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV	0.70	-1115	0.70	-1877	0.74	-1677	0.73	-622	0.70	-695	0.80	-1516	0.89	-1245	0.70	-497
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.70	-1138	0.70	-1865	0.74	-1680	0.74	-589	0.70	-713	0.80	-1503	0.90	-1143	0.71	-481
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.70	-1140	0.70	-1907	0.74	-1701	0.72	-643	0.70	-715	0.80	-1516	0.89	-1301	0.70	-496
N-2: HELLS CANYON-BROWNLEE & OXBOW-LOLO 230 KV	0.70	-1134	0.70	-1785	0.74	-1652	0.73	-617	0.70	-710	0.80	-1503	0.90	-1249	0.70	-481
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.70	-1144	0.70	-1902	0.74	-1699	0.73	-615	0.70	-718	0.80	-1515	0.90	-1228	0.70	-485
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.70	-1141	0.70	-1899	0.74	-1697	0.72	-637	0.70	-715	0.80	-1514	0.89	-1294	0.70	-492
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV	0.70	-1138	0.70	-1877	0.74	-1683	0.72	-643	0.70	-713	0.80	-1505	0.89	-1311	0.70	-494
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV	0.70	-1138	0.70	-1893	0.74	-1693	0.72	-645	0.70	-713	0.80	-1511	0.89	-1316	0.70	-494
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.70	-1140	0.70	-1886	0.74	-1691	0.72	-629	0.70	-715	0.80	-1510	0.89	-1273	0.70	-490
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.70	-1143	0.70	-1895	0.74	-1694	0.72	-630	0.70	-717	0.80	-1511	0.89	-1275	0.70	-490
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.70	-1141	0.70	-1904	0.74	-1701	0.72	-642	0.70	-715	0.80	-1516	0.89	-1309	0.70	-492
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.70	-1142	0.70	-1921	0.74	-1711	0.72	-645	0.70	-716	0.80	-1524	0.89	-1318	0.70	-493
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.70	-1141	0.70	-1893	0.74	-1693	0.72	-635	0.70	-715	0.80	-1510	0.89	-1287	0.70	-491
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.70	-1140	0.70	-1897	0.74	-1697	0.72	-637	0.70	-715	0.80	-1513	0.89	-1293	0.70	-492
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.70	-1141	0.70	-1907	0.74	-1702	0.72	-643	0.70	-715	0.80	-1517	0.89	-1310	0.70	-494
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.70	-1135	0.70	-1850	0.74	-1656	0.73	-621	0.70	-711	0.80	-1474	0.89	-1023	0.70	-511
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.70	-1104	0.70	-1960	0.72	-1786	0.71	-669	0.70	-688	0.79	-1617	0.88	-1370	0.70	-506
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.70	-1139	0.70	-1899	0.74	-1700	0.72	-645	0.70	-714	0.80	-1516	0.89	-1312	0.70	-494
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.70	-1139	0.70	-1903	0.74	-1702	0.72	-641	0.70	-713	0.80	-1518	0.89	-1302	0.70	-494
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.70	-1138	0.70	-1896	0.74	-1699	0.72	-636	0.70	-713	0.80	-1515	0.89	-1289	0.70	-493
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.70	-1140	0.70	-1907	0.74	-1703	0.72	-640	0.70	-715	0.80	-1517	0.89	-1303	0.70	-492
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.70	-1097	0.70	-1441	0.72	-1261	0.76	-534	0.70	-682	0.79	-1272	0.92	-1057	0.73	-438
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.70	-1141	0.70	-1908	0.74	-1701	0.72	-638	0.70	-716	0.80	-1515	0.89	-1290	0.70	-493
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV	0.70	-1139	0.70	-1892	0.74	-1685	0.71	-665	0.70	-714	0.80	-1503	0.89	-1362	0.70	-499
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV	0.70	-1141	0.70	-1909	0.74	-1701	0.72	-652	0.70	-715	0.80	-1515	0.89	-1335	0.70	-496
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.70	-1143	0.70	-1917	0.74	-1707	0.72	-636	0.70	-716	0.80	-1520	0.89	-1291	0.70	-491
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV	0.70	-1142	0.70	-1920	0.74	-1710	0.72	-644	0.70	-716	0.80	-1522	0.89	-1317	0.70	-493
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.70	-1142	0.70	-1917	0.74	-1707	0.72	-644	0.70	-716	0.80	-1520	0.89	-1317	0.70	-493
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.70	-1142	0.70	-1920	0.74	-1708	0.72	-646	0.70	-716	0.80	-1520	0.89	-1323	0.70	-493
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.70	-1142	0.70	-1917	0.74	-1706	0.72	-645	0.70	-716	0.80	-1519	0.89	-1318	0.70	-493
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.70	-1142	0.70	-1914	0.74	-1705	0.72	-641	0.70	-716	0.80	-1519	0.89	-1306	0.70	-493
N-2: RAVER-PAUL & NAPAVINE-PAUL 500 KV	0.70	-1143	0.70	-1917	0.74	-1707	0.72	-635	0.70	-716	0.80	-1520	0.89	-1290	0.70	-491
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.70	-1142	0.70	-1915	0.74	-1705	0.72	-633	0.70	-716	0.80	-1519	0.89	-1281	0.70	-491
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.70	-1143	0.70	-1922	0.74	-1710	0.72	-634	0.70	-716	0.80	-1523	0.89	-1287	0.70	-491
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.70	-1141	0.70	-1900	0.74	-1696	0.72	-633	0.70	-715	0.80	-1512	0.89	-1272	0.70	-493
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.70	-1142	0.70	-1915	0.74	-1705	0.72	-644	0.70	-716	0.80	-1518	0.89	-1315	0.70	-493
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.70	-1142	0.70	-1916	0.74	-1706	0.72	-644	0.70	-716	0.80	-1518	0.89	-1316	0.70	-493
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV	0.70	-1105	0.70	-2006	0.72	-1807	0.71	-675	0.70	-689	0.79	-1623	0.88	-1393	0.70	-507
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV	0.70	-1143	0.70	-1911	0.74	-1705	0.73	-605	0.70	-717	0.80	-1519	0.90	-1203	0.70	-483

Appendix B - 16la1sa_3400idnw_N Base Case VQ Results

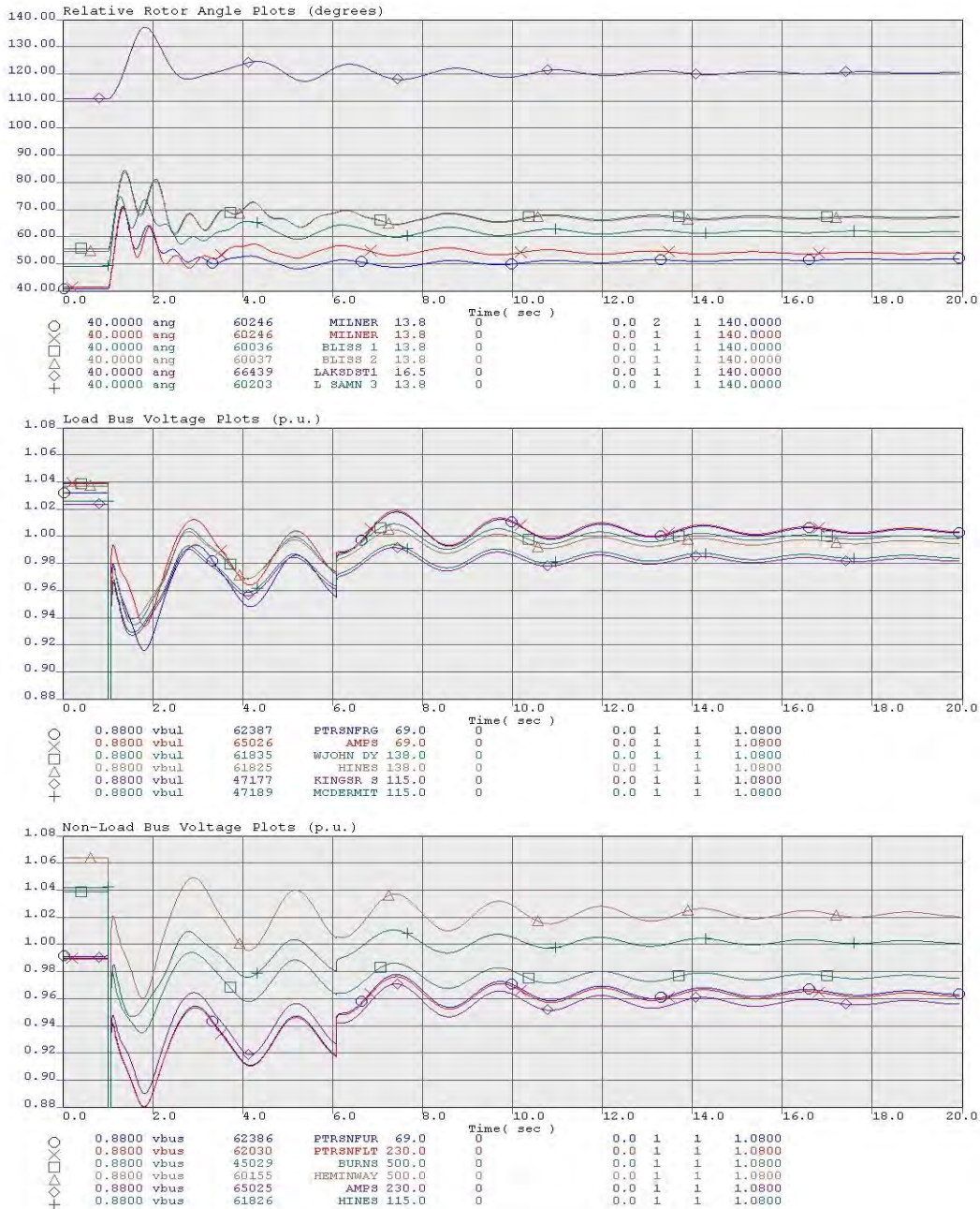
V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Harry Allen		Hemingway		Midpoint		Mill Creek		Pinto		Populus		Taft		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV	0.70	-1142	0.70	-1914	0.74	-1706	0.72	-635	0.70	-716	0.80	-1519	0.89	-1289	0.70	-491
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.70	-1106	0.70	-2018	0.74	-1694	0.72	-642	0.70	-690	0.80	-1511	0.89	-1312	0.70	-506
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.70	-1128	0.71	-1720	0.75	-1553	0.80	-440	0.70	-707	0.80	-1385	0.89	-584	0.74	-493
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV + RAS	0.70	-1127	0.72	-1646	0.75	-1526	0.77	-539	0.70	-708	0.80	-1361	0.87	-718	0.75	-475
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.70	-1129	0.71	-1721	0.75	-1553	0.80	-442	0.70	-707	0.80	-1386	0.88	-587	0.74	-494
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV + RAS	0.70	-1128	0.72	-1686	0.75	-1572	0.76	-556	0.70	-707	0.80	-1405	0.87	-749	0.75	-481
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.70	-1132	0.72	-1743	0.75	-1552	0.79	-468	0.70	-709	0.81	-1380	0.88	-711	0.77	-449
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.70	-1142	0.70	-1911	0.74	-1704	0.72	-639	0.70	-716	0.80	-1519	0.89	-1297	0.70	-492
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.70	-1142	0.70	-1911	0.74	-1704	0.72	-639	0.70	-716	0.80	-1519	0.89	-1297	0.70	-492
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.70	-1141	0.70	-1899	0.74	-1696	0.72	-636	0.70	-715	0.80	-1511	0.89	-1279	0.70	-493

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW
Loss of Hemingway-Boardman 500 kV Line



Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: Inserted LGBP 230 kV 52.2 Mvar MSC @ 5 Seconds
Inserted PTSN 230 kV 31.7 Mvar MSC @ 5 Seconds
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



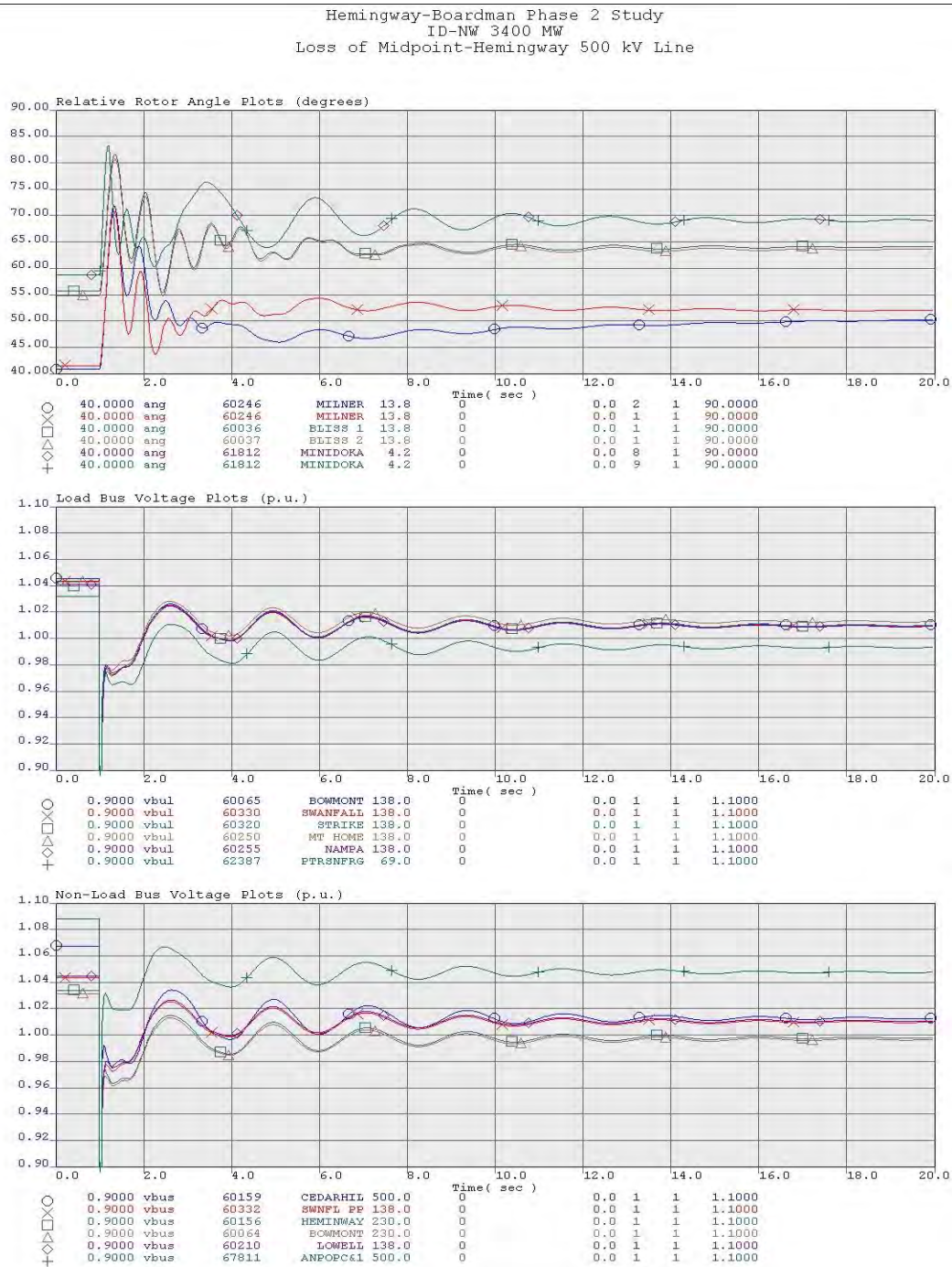
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Figure B11: N-1 loss of Hemingway-Boardman 500 kV

Appendix B - 161a1sa_3400idnw_N Base Case Transient Stability Plots



Loss of Hemingway-Midpoint 500 kV line
3ph fault @ MPSN 500 kV clear in 3 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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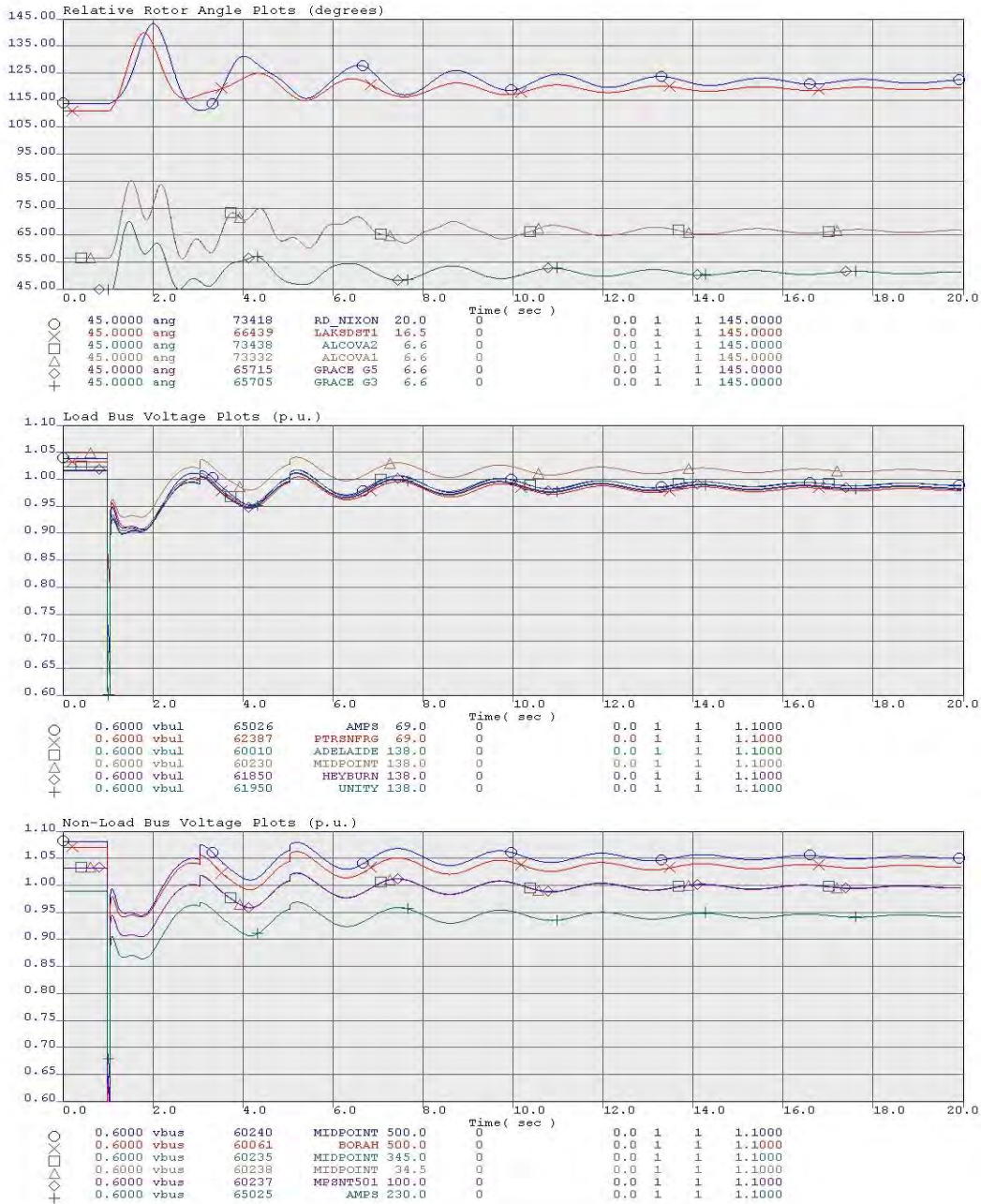
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Figure B12: N-1 loss of Hemingway-Midpoint 500 kV

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW
Loss of Populus-Hemingway 500 kV Line



Loss of Hemingway-Populus 500 kV line
3ph fault @ PPLS 500 kV clear in 3 Cycles
RAS: Insert Midpoint 500 kV 200 Mvar MSC @ 2 Seconds
Insert Borah 345 kV 175 Mvar MSC @ 4 Seconds
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

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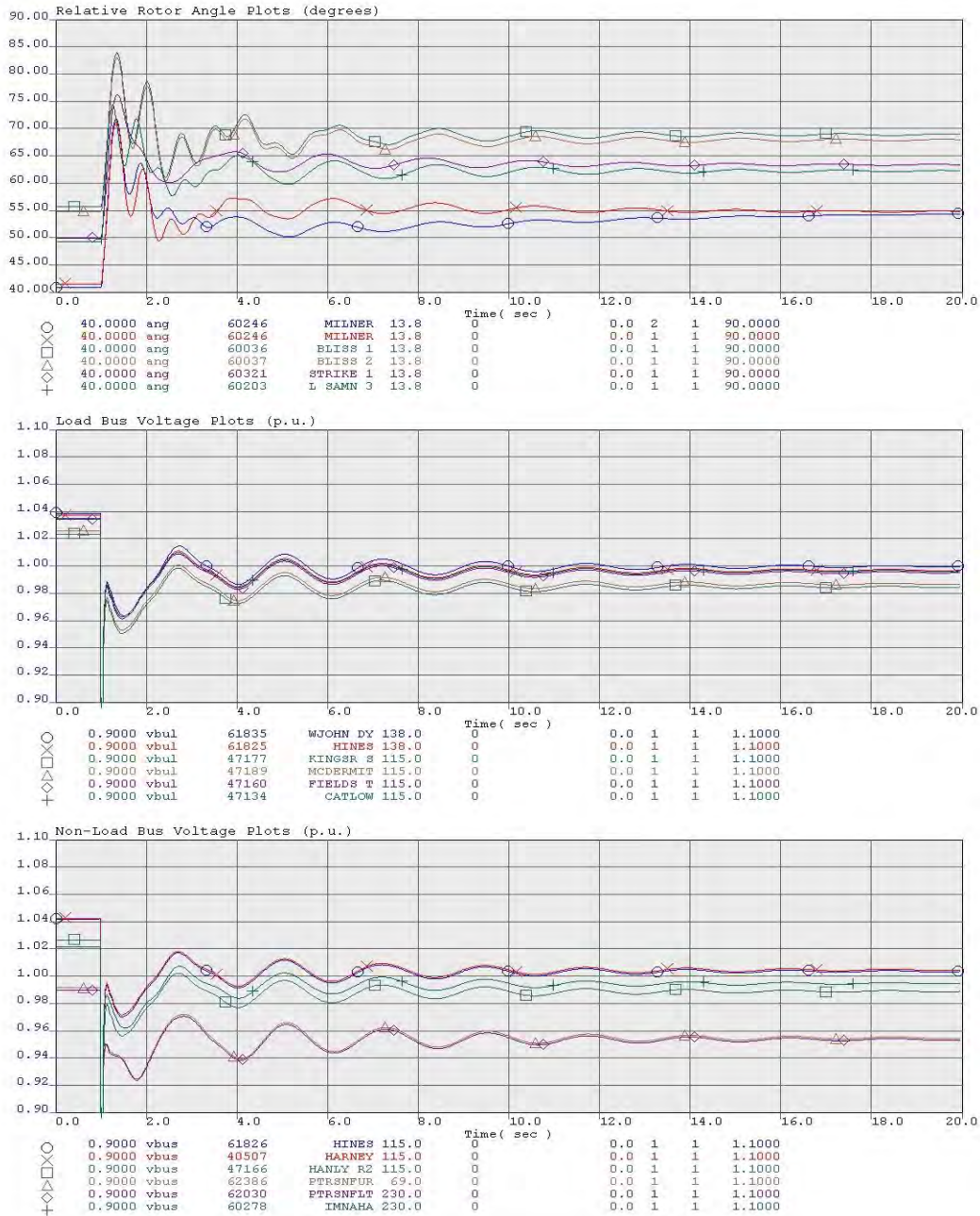
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Figure B13: N-1 loss of Hemingway-Populus 500 kV

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW
Loss of Hemingway-Summer Lake 500 kV Line



Loss of Hemingway-Summer Lake 500 kV Line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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Figure B14: N-1 loss of Hemingway-Summer Lake 500 kV

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

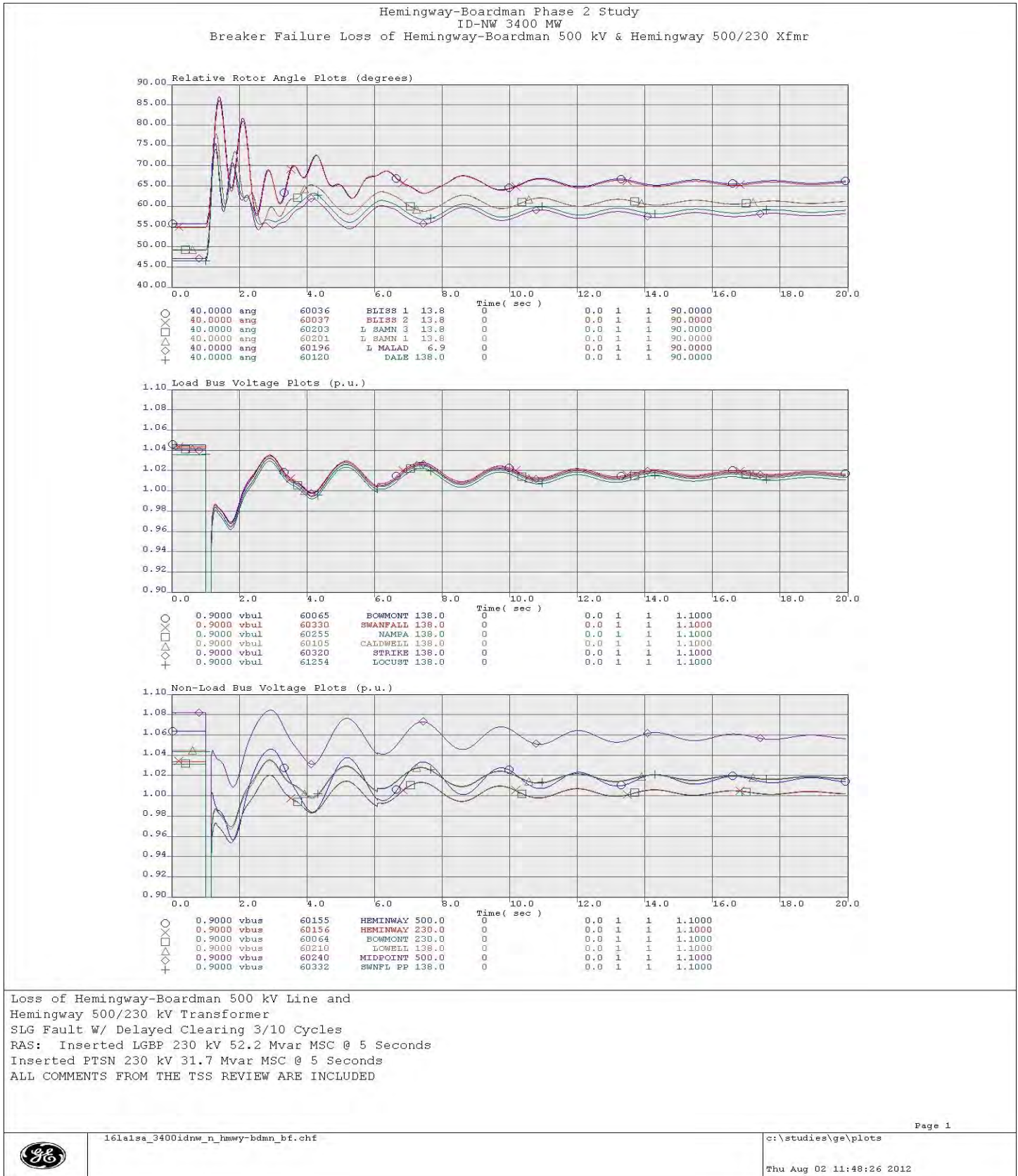
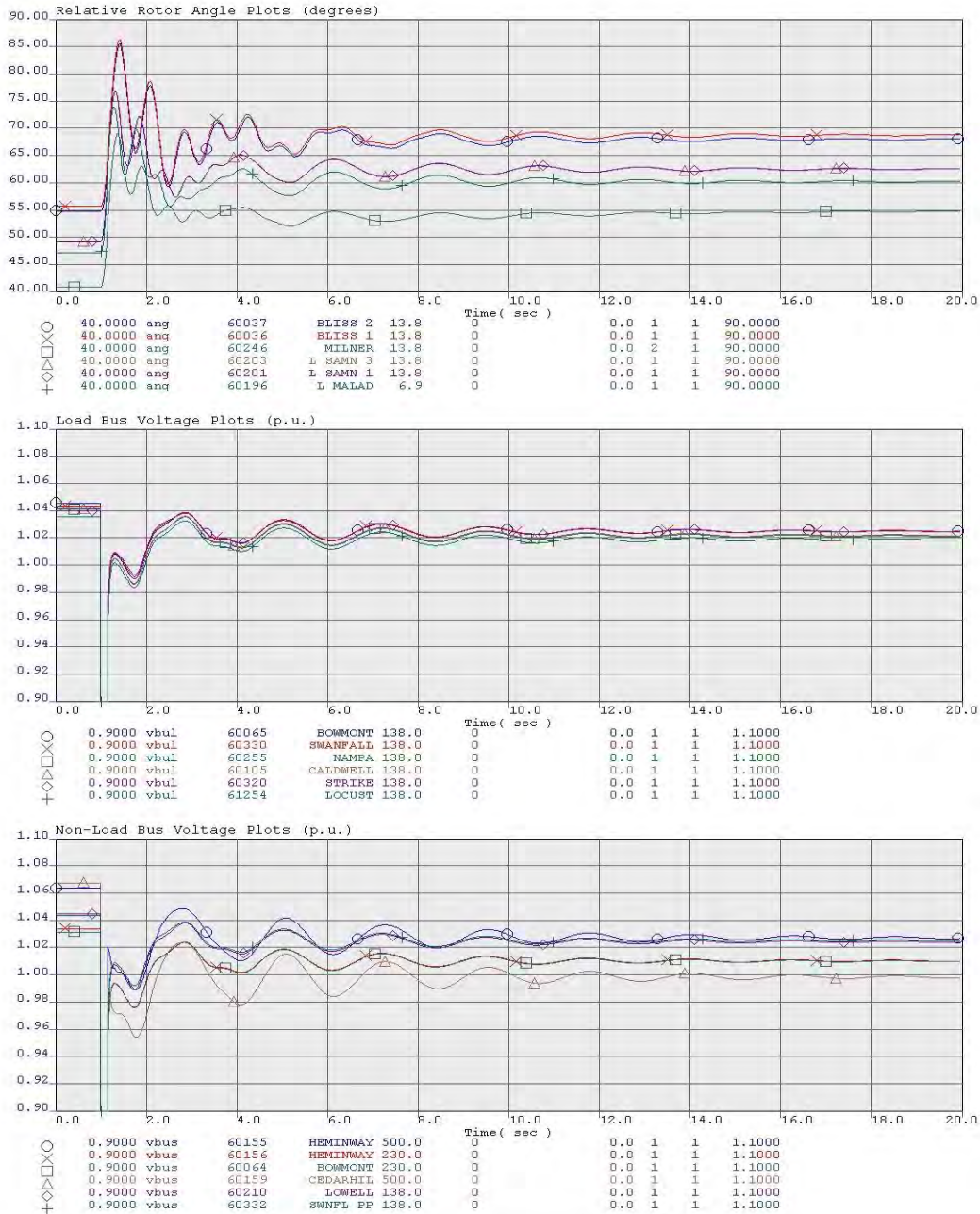


Figure B15: Breaker Failure loss of Hemingway-Boardman 500 kV and Hemingway 500/230 kV Transformer

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW
Breaker Failure Loss of Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr



Loss of Hemingway-Midpoint 500 kV Line and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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Figure B16: Breaker Failure loss of Hemingway-Midpoint 500 kV and Hemingway 500/230 kV Transformer

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

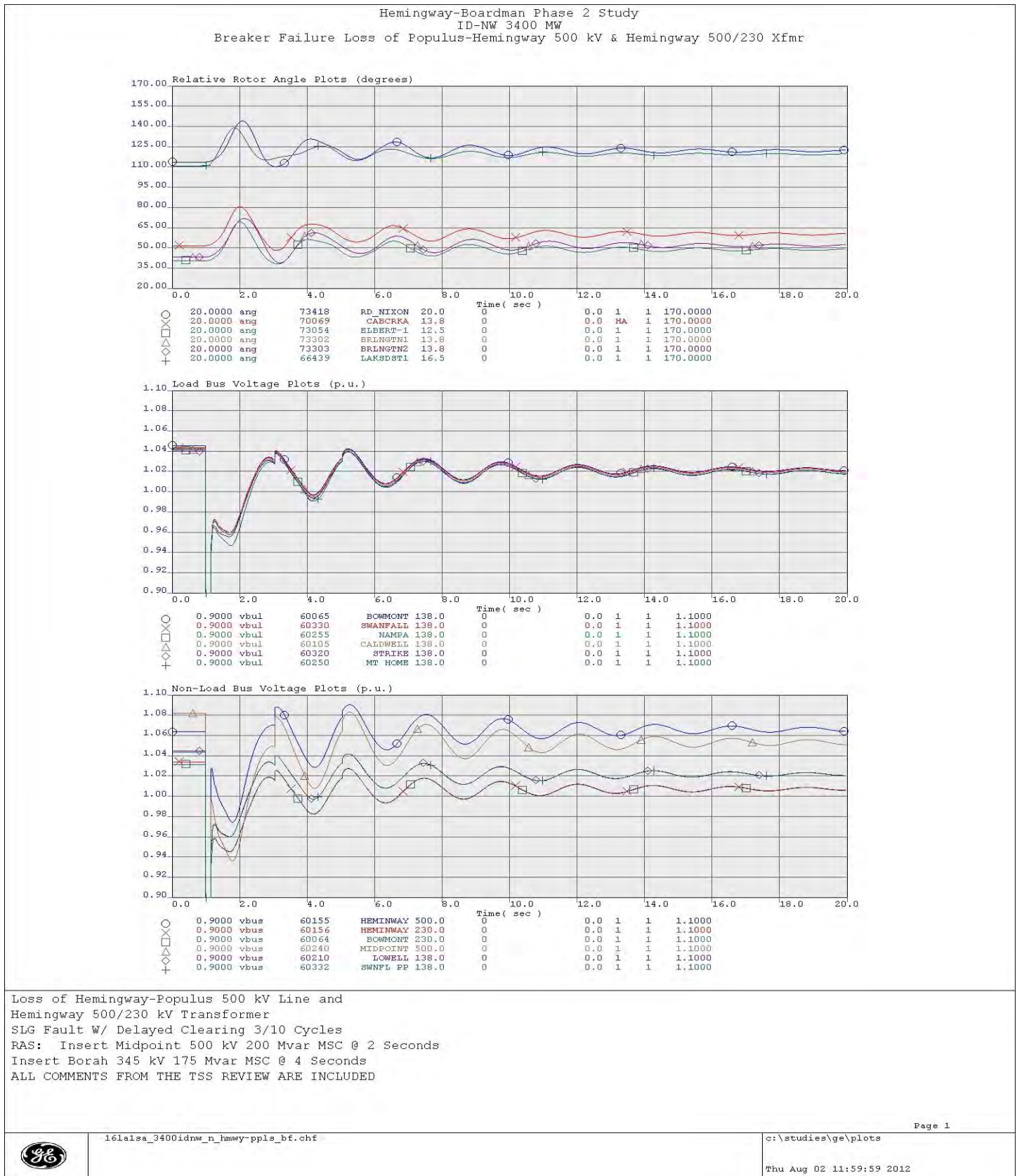
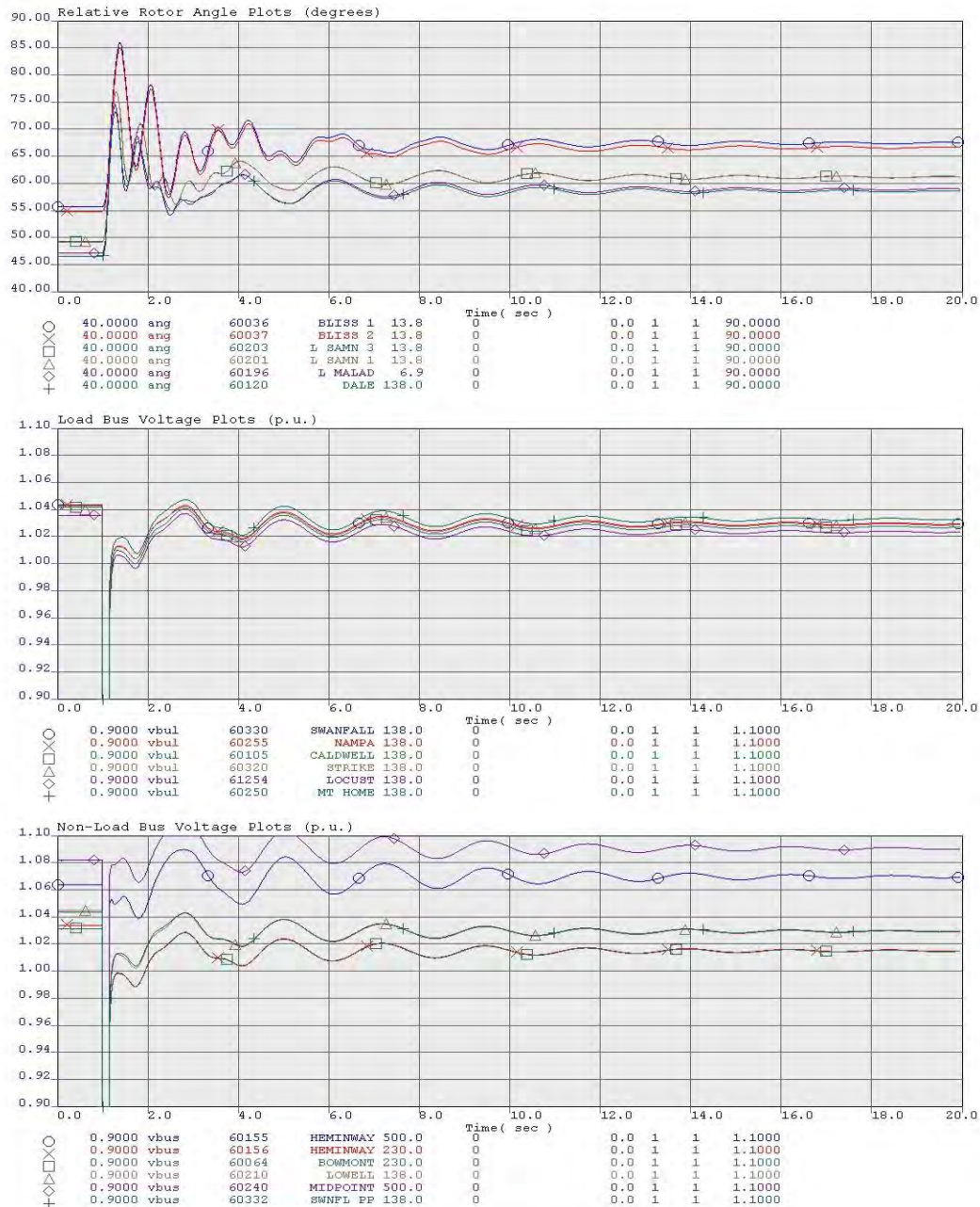


Figure B17: Breaker Failure loss of Hemingway-Populus 500 kV and Hemingway 500/230 kV Transformer

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW
Breaker Failure Loss of Hemingway-Summer Lake 500 kV & Hemingway 500/230 Xfmr



Loss of Hemingway-Summer Lake 500 kV and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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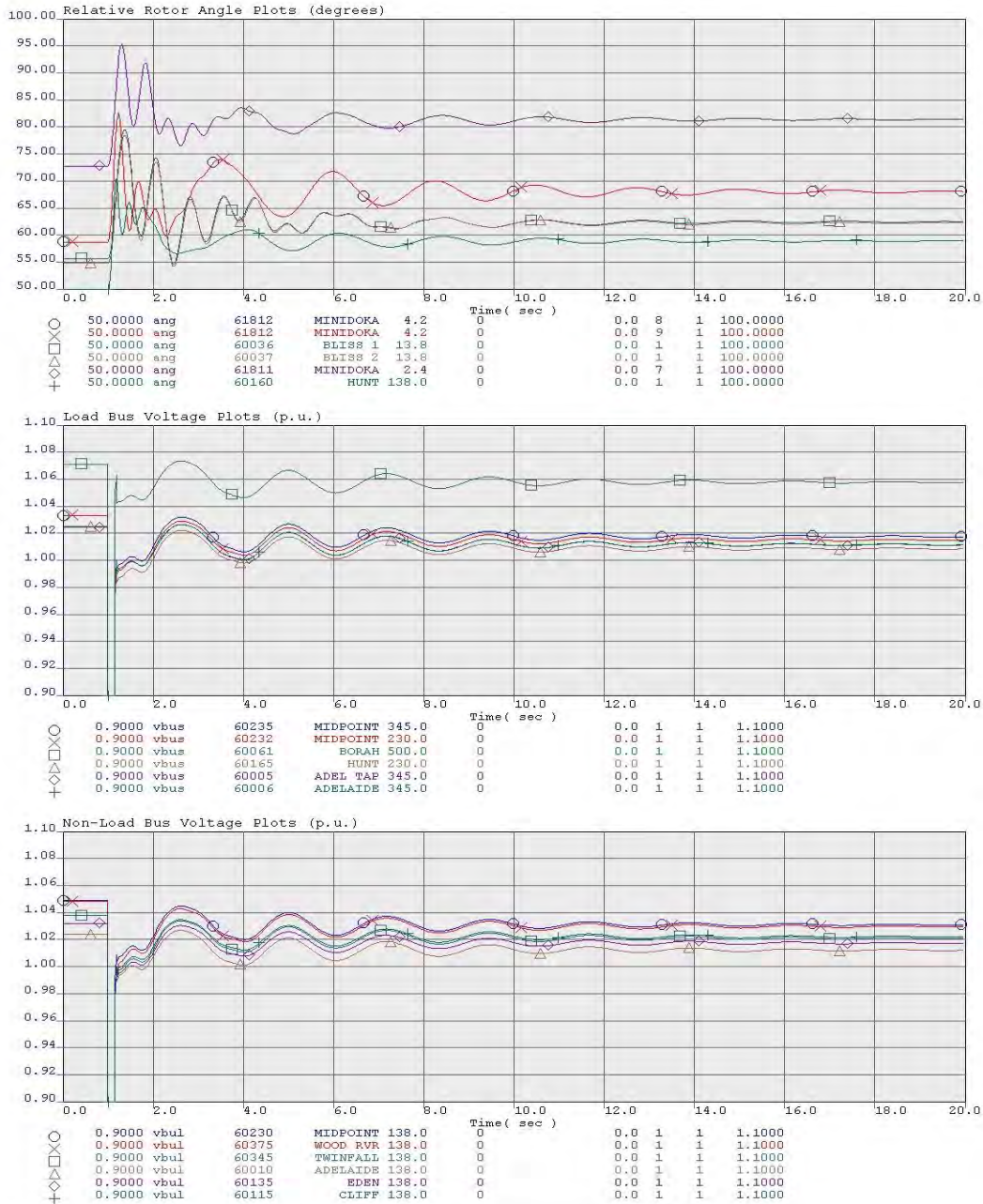
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Thu Aug 02 12:02:34 2012

Figure B18: Breaker Failure loss of Hemingway-Summer Lake 500 kV and Hemingway 500/230 kV Transformer

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW
Breaker Failure Loss of Midpoint 500 kV Bus



Loss of Midpoint-Hemingway 500 kV Line and
Midpoint 500/345 kV Transformer
Open-ends Midpoint-Borah 500 kV Line (Tripped @ 12 Cycles)
SLG fault @ MPSN 500 kV w/ Delayed Clearing in 3/10 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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Thu Aug 02 12:04:58 2012

Figure B19: Breaker Failure loss of Midpoint-500 kV Bus

Appendix B - 16la1sa_3400idnw_N Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Lowest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Lowest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	305 305	LaGrande 52 Mvar 230 kV MSC Peterson 31.7 Mvar 230 kV MSC	Ptrsnfilt 230 -11.0%	Ptrsnfilt 230 0.880	Ptrsnftrg 69 -11.2%	Arapasub 115 59.928	Stable & Damped
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Summer Lake 500 kV		None	Ptrsnfilt 230 -7.8%	Chromeat 100 0.909	W John Dy 138 -7.2%	Arapasub 115 59.932	Stable & Damped
N-1 3 Cy 3PH Midpoint 500 kV	Hemingway-Midpoint 500 kV		None	Cedarhil 500 -8.6%	Chromeat 100 0.910	Bowmont 138 -6.9%	Waanibe 115 59.940	Stable & Damped
N-1 3 Cy 3PH Populus 500 kV	Hemingway-Populus 500 kV	123 243	Midpoint 500 kV 200 Mvar MSC Borah 345 kV 175 Mvar MSC	Midpoint 500 -12.8%	Scoville 138 0.855	Amps 69 -12.8%	NSS2 69 59.892	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Grassland 500 kV Hemingway 500/230 kV Xfmr	305 305	LaGrande 52 Mvar 230 kV MSC Peterson 31.7 Mvar 230 kV MSC	Ptrsnfilt 230 -11.3%	Ptrsnfilt 230 0.878	Ptrsnftrg 69 -11.4%	Smokyhlw 115 59.922	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Summer Lake 500 kV Hemingway 500/230 kV Xfmr		None	Ptrsnfilt 230 -6.3%	Chromeat 100 0.909	W John Dy 138 -6.4%	Arapasub 115 59.928	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Midpoint 500 kV Hemingway 500/230 kV Xfmr		None	Ptrsnfilt 230 -7.8%	Chromeat 100 0.906	Ptrsnftrg 69 -7.9%	Arapasub 115 59.935	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Populus 500 kV Hemingway 500/230 kV Xfmr	123 243	Midpoint 500 kV 200 Mvar MSC Borah 345 kV 175 Mvar MSC	Midpoint 500 -13.5%	Scoville 138 0.853	Amps 69 -13.7%	Arapasub 115 59.893	Stable & Damped
Breaker Failure 3/10 Cy SLG Midpoint 500 kV	Midpoint-Hemingway 500 kV Midpoint 500/345 kV Xfmr Open Midpoint-Borah 500kV		None	Cedarhil 500 -8.8%	Chromeat 100 0.910	Ptrsnftrg 69 -7.0%	Arapasub 115 59.944	Stable & Damped

Appendix B - 161a1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_ 18.0 (45447)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_ 18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_ 18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_ 18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_ 500.0 (45262) TO MERIDINP_ 500.0 (45197) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_ 18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_ 18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_ 18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_ 18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_ 500.0 (45262) TO MERIDINP_ 500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_ 230.0 (45195) TO MERIDINP_ 500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_ 500.0 (45095) TO MERIDINP_ 500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_ 230.0 (45195) TO MERIDINP_ 500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_ 500.0 (40499) TO VANTAGE_ 500.0 (41113) CKT 1
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_ 500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_ 230.0 (45189) TO MALIN_ 500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_ 500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO JOHN DAY_ 500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO MALIN_ 500.0 (40687) CKT 2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_ 500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO MALIN_ 500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 2
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO LOW MON_ 500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO WAUTOMA_ 500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO WAUTOMA_ 500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_ 500.0 (40553) TO TAFT_ 500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt HOT SPR_ 500.0 (40553) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_ 500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_ 500.0 (41057) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt DWORSHAK_ 500.0 (40369) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt GARRISON_ 500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt HOT SPR_ 500.0 (40553) #s
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO SLATT_ 500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO JOHN DAY_ 500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO JOHN DAY_ 500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_ 500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_ 500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt DWORSHAK_ 500.0 (40369) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_ 500.0 (40459) #s
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_ 500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_ 230.0 (45189) TO MALIN_ 500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_ 500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 2
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_ 500.0 (40724) TO MCNARY_ 500.0 (40723) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_ 500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_ 18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_ 18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_ 18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_ 500.0 (40724) TO MCNARY_ 500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACIWA T_ 500.0 (40917)
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 2
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO LOW MON_ 500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1

Appendix B - 16la1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_500.0 (40809) #s
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Bus OSTRNDER_230.0 (40810)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 109.8 MVR
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2

Appendix B - 161a1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4728 Coulee-Chief Jo 500 kV & Chief Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Chief Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1

Appendix B - 16la1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 15.9 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	BYPASS SeriesCap MIDPOINT_500.0 (60240) TO MIDHEM11_500.0 (61988) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 15.9 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BYPASS SeriesCap MIDPOINT_500.0 (60240) TO MIDHEM11_500.0 (61988) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_24.0 (43047) #1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
Bus: Alvey 500 kV	OPEN Bus ALVEY_500.0 (40051)
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV	OPEN Bus KEELER_500.0 (40601)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus GDN0E 1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus GDN0E C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus GDN0E W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_0.7 (47981)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_34.5 (47825)

Appendix B - 16la1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_ 34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_ 34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_ 34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_ 34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_ 34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_ 0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_ 0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_ 0.7 (47498)
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
N-1: Allston-Keeler 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV + RAS	OPEN Bus MLCK PHA_ 230.0 (62355)
N-1: Brady-Antelope 230 kV + RAS	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Brady-Antelope 230 kV + RAS	OPEN Shunt AMPS_ 69.0 (65026) #1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Broadview-Garrison #1 500 kV	OPEN Shunt GARRISON_ 500.0 (40459) #s
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Cal Sub 120 kV Phase Shifter	OPEN Transformer CAL SUB_ 120.0 (64025) TO CAL S PS_ 120.0 (64023) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_ 500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_ 500.0 (43041)
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_ 500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_ 500.0 (43951)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_ 500.0 (40302) TO RAVER_ 500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_ 500.0 (43123) TO LONGHORN_ 500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_ 500.0 (45095) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO LOLO_ 230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO N LEWIST_ 230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO WALA AVA_ 230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_ 500.0 (40381) TO MAPLE VL_ 500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_ 500.0 (40381) TO RAVER_ 500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_ 500.0 (40381) TO SCHULTZ_ 500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_ 500.0 (40381) TO SNOK TAP_ 500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_ 500.0 (40459) #s
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_ 115.0 (32236)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_ 115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_ 115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_ 115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_ 13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_ 115.0 (32234)
N-1: Grassland-Coyote 500 kV	OPEN Line COYOTE_ 500.0 (43123) TO GRASSLND_ 500.0 (43049) CKT 1

Appendix B - 161a1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 2
N-1: Hatwai 500/230 kV Xfmr	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELSCYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 13 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACJWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1

Appendix B - 16la1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO 2_13.8 (66228) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO 3_13.8 (66229) #1
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Pinto-Four Corner 345 kV	OPEN Shunt PINTO_138.0 (66230) #1
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine CEDARHIL_500.0 (60159) TO HEMINWAY_500.0 (60155) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine POPULUS_500.0 (67794) TO CEDARHIL_500.0 (60159) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	CLOSE Shunt GARRISON_500.0 (40459) #r
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40496) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1

Appendix B - 161a1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR1EAST_500.0 (40451)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR2EAST_500.0 (40453)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN1_500.0 (62013)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN2_500.0 (62012)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP_2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP_3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP_4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT1_13.8 (62332) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT2_13.8 (62333) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS BZ EGALL_50.0 (62348) TO 20.4 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS JACKRABB_50.0 (62349) TO 19.7 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS TAFT_500.0 (41057) TO -186 MVR
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELSCYN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAFS_69.0 (14400) BY -120 MW (cnst pf)

Appendix B - 161a1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Double Palo Verde	CLOSE Shunt ROBINSON_345.0 (64885) #b1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS DURANGO_115.0 (79023) TO 40 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PINTO_138.0 (66230) TO 64 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS YORKCANY_115.0 (12091) TO 15 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP_3_26.0 (62048) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP_4_26.0 (62047) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Bus IMNAHA_230.0 (60278)
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1

Appendix B - 161a1sa_3400idnw_N Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPAVINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougln 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougln 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougln 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougln 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1

Appendix C

16hs2a_3400WoH_2250idnw_N Base Case (West of Hatwai, Path 8)

Appendix C– 16hs2sa_3400WoH_2250idnw_N Case Post-Transient Contingency Results

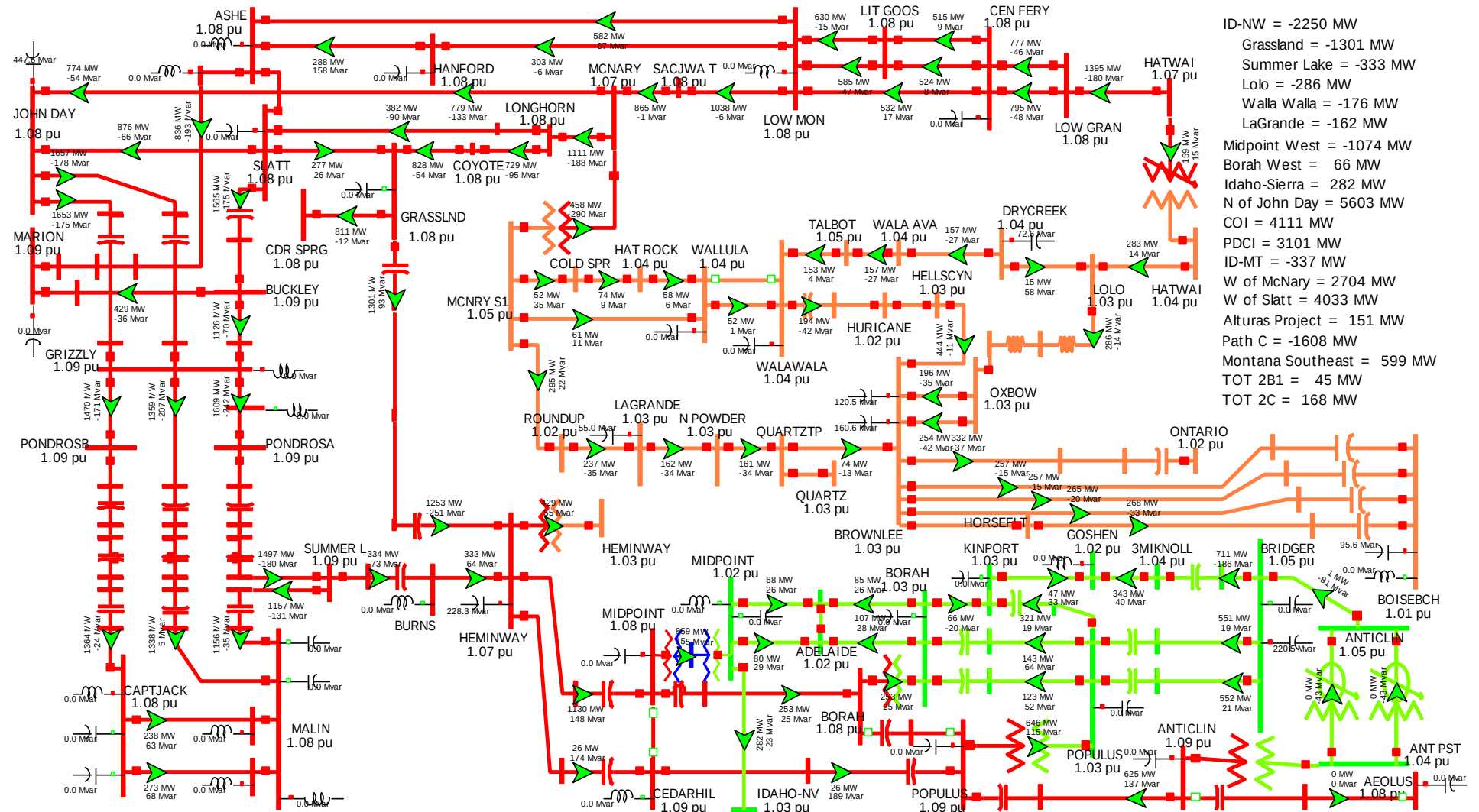


Figure C1: 16hs2sa_3400WoH_2250idnw_N Case Pre-Contingency

Appendix C– 16hs2sa_3400WoH_2250idnw_N Case Post-Transient Contingency Results

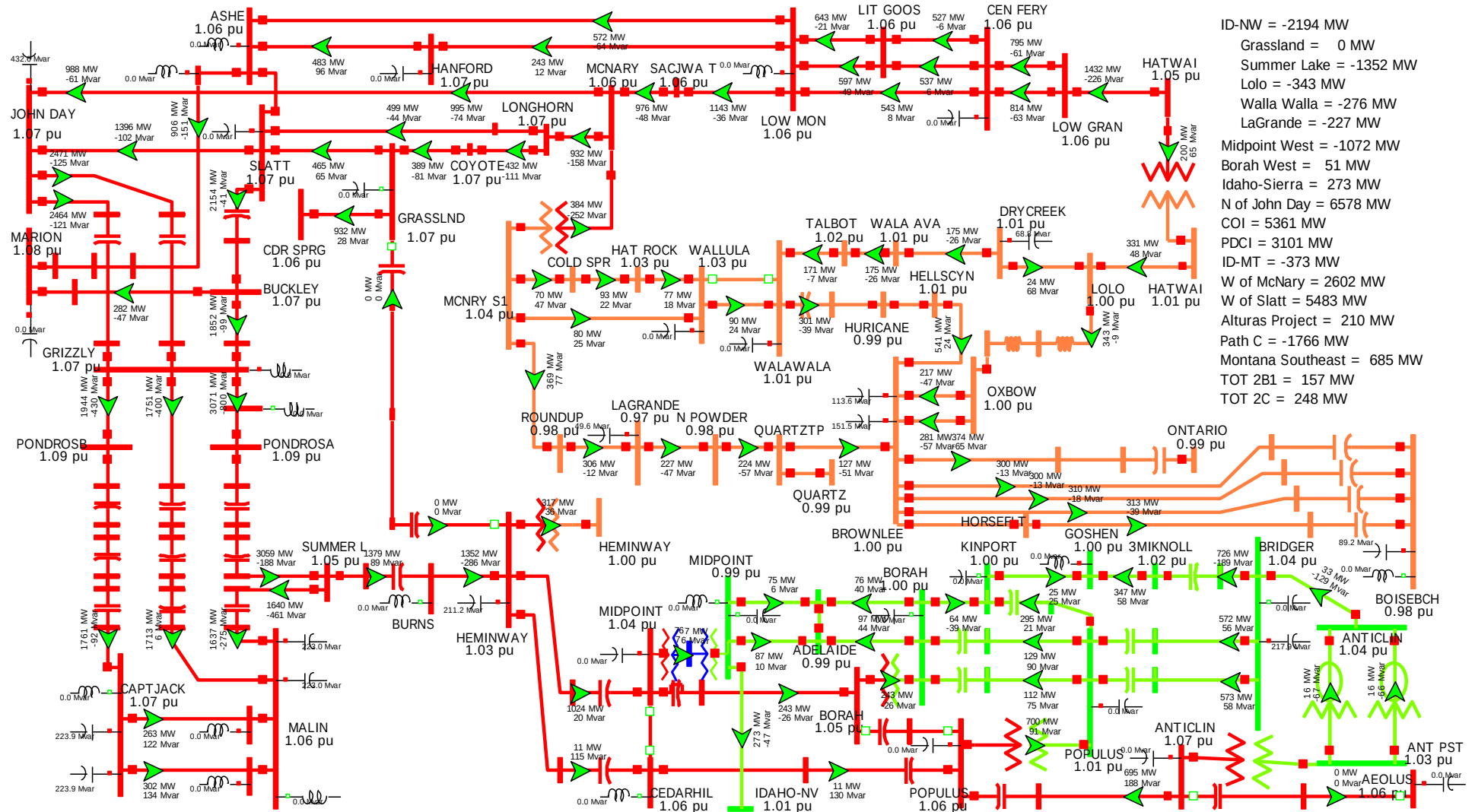


Figure C2: 16hs2sa_3400WoH_2250idnw_N Case N-1: Hemingway-Grassland 500 kV

Appendix C– 16hs2sa_3400WoH_2250idnw_N Case Post-Transient Contingency Results

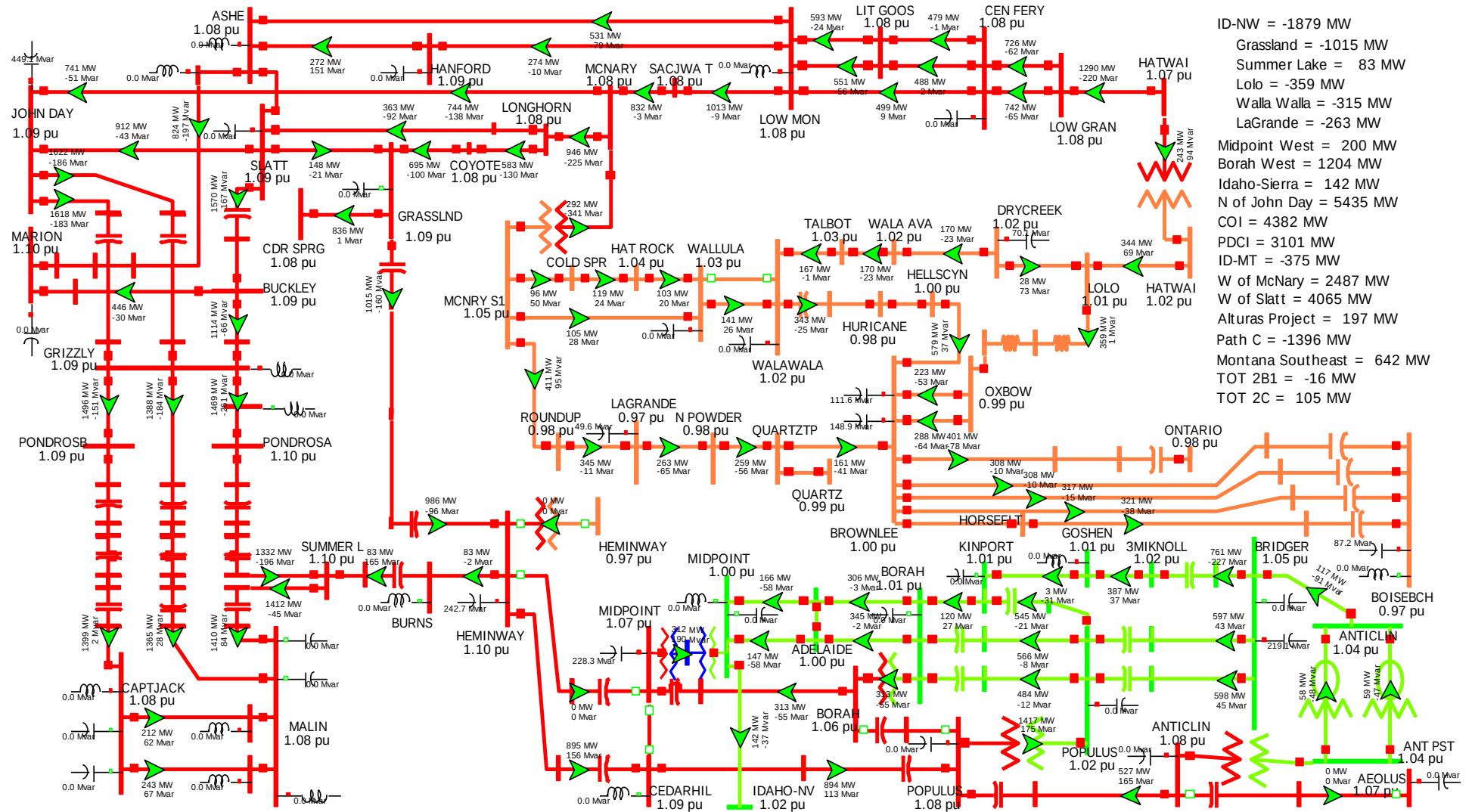


Figure C3: 16hs2sa_3400WoH_2250idnw_N Case **BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr**

Appendix C— 16hs2sa_3400WoH_2250idnw_N Case Post-Transient Contingency Results

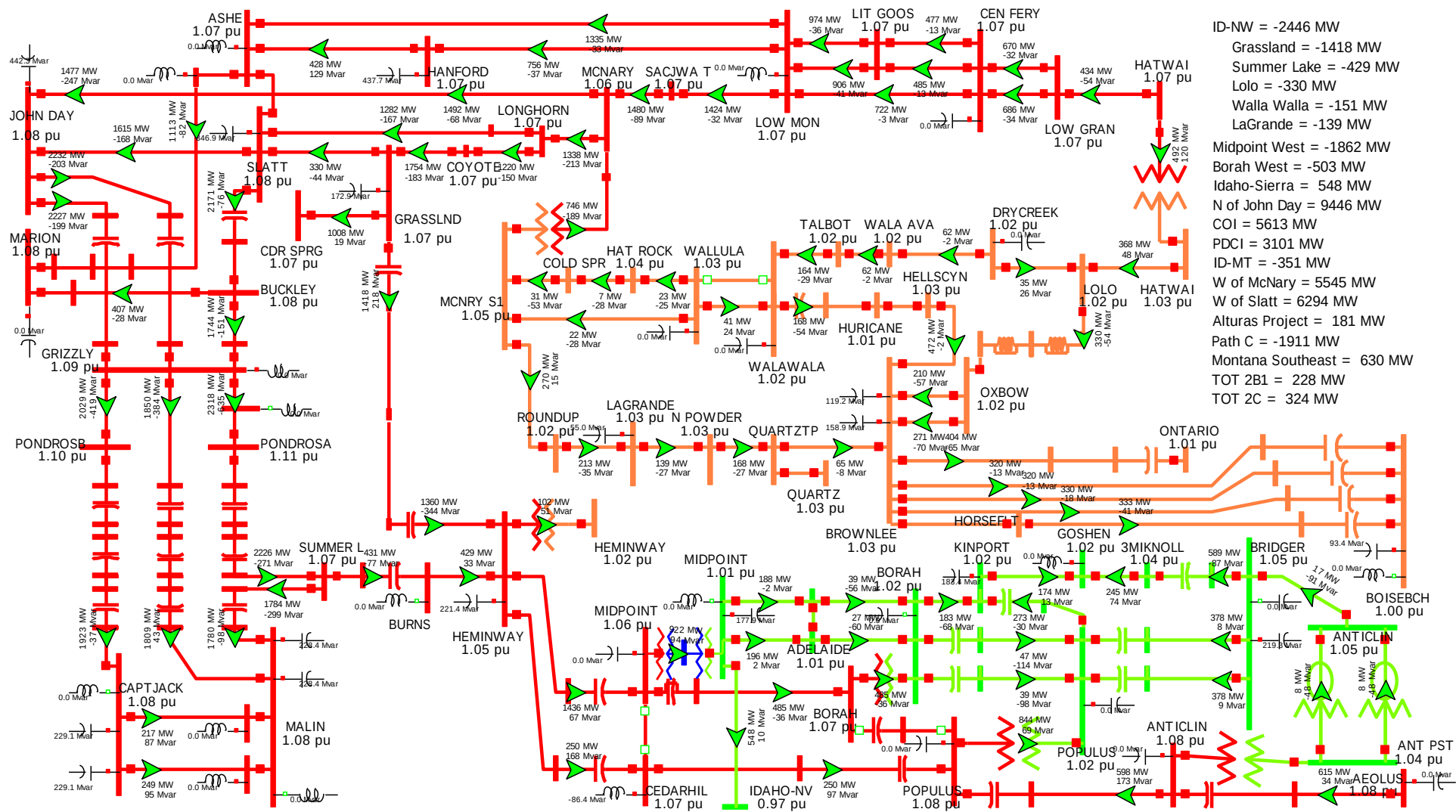


Figure C4: 16hs2sa 3400WoH 2250idnw N Case **N-2: Double Palo Verde**

Appendix C– 16hs2sa_3400WoH_2250idnw_N Case Post-Transient Contingency Results

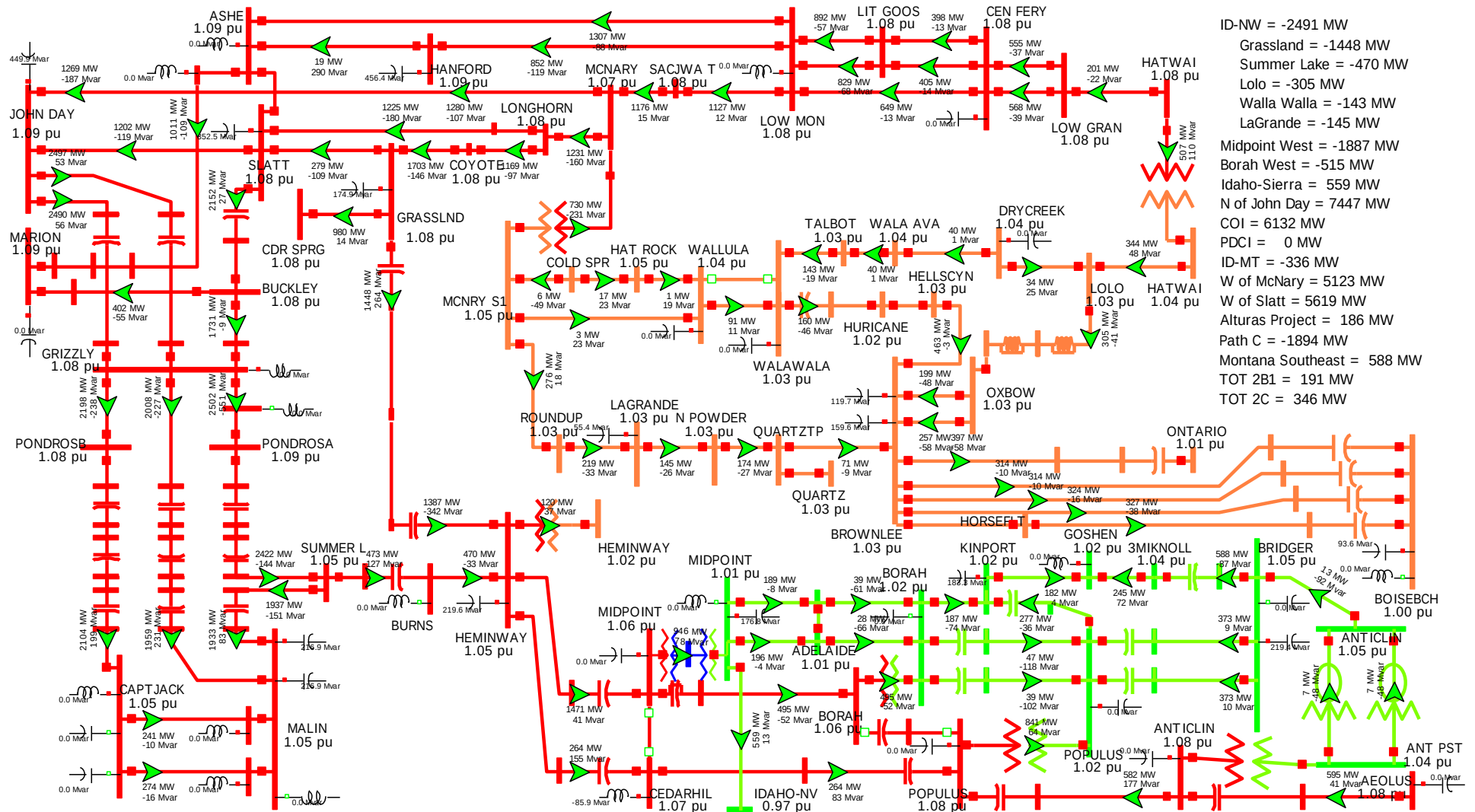


Figure C5: 16hs2sa_3400WoH_2250idnw_N Case N-2: DC Bipole

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations											
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations											
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	MERIDINP (45197) -> MERIDINP (45195) CKT 2 at MERIDINP	Branch MVA	650.0	780.0	369.8	651.8	100.3%	83.6%	369.8	665.3	102.3%	85.3%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	979.0	1287.7	667.7	1141.7	116.6%	88.7%	641.6	1143.4	116.8%	88.8%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations											
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations											
BF 4028 Taft-Dworshak & Taft Reactor 500kV + RAS	No Violations											
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1054.1	104.5%	82.0%	No Violation			
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	2442.0	3235.5	1462.5	2528.2	103.5%	78.1%	1444.9	2490.2	102.0%	77.0%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3235.5	1460.9	2528.2	114.9%	78.1%	1444.9	2490.2	113.2%	77.0%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	1807.2	2468.3	102.8%	65.0%	No Violation			
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations											
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations											
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations											
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations											
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.904		6.03%	No Violation			
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	PTRSNFLT (62030)	% Δ Volts			0.946	0.890		5.92%	No Violation			
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations											
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	GRIJOH22 (90067) -> GRIJOH21 (90066) CKT 2 at GRIJOH21	Branch Amp	3000.0	4050.0	1917.9	3002.4	100.1%	74.1%	No Violation			
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	No Violations											
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations											
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	2442.0	3235.5	1462.5	2582.1	105.7%	79.8%	1444.9	2537.0	103.9%	78.4%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3235.5	1460.9	2582.1	117.4%	79.8%	1444.9	2537.0	115.3%	78.4%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations											
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations											
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations											
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations											
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations											
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations											
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations											
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations											
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations											
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	270.5	328.8	102.7%	88.9%	271.8	342.1	106.9%	92.4%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	758.3	1051.0	110.6%	81.7%	674.9	1078.6	113.5%	83.9%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	270.5	340.0	106.2%	91.9%	271.8	352.2	110.1%	95.2%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	758.3	1074.3	113.1%	83.5%	674.9	1101.6	116.0%	85.7%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations											
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations											
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations											
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations											
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1153.3	114.3%	89.7%	923.8	1041.2	103.2%	81.0%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations											
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations											
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations											

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations											
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations											
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations											
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations											
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations											
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations											
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations											
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations											
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations											
BF 4542 Paul-Allston 500 kV & Center G2	No Violations											
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations											
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations											
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations											
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations											
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations											
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations											
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations											
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations											
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations											
BF 4708 Hatwai 500 kV Bus + RAS	No Violations											
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations											
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV + RAS	DRYGULCH (48113) -> DRYGULCH (45097) CKT 1 at DRYGULCH	Branch MVA	20.0	24.0	14.9	21.9	109.5%	91.3%	15.0	22.4	111.9%	93.3%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	921.7	100.2%	88.0%	729.2	922.0	100.2%	88.1%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations											
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations											
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations											
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations											
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations											
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1386.0	112.0%	99.3%	No Violation			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	944.5	102.7%	90.2%	No Violation			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	827.4	103.4%	69.0%	No Violation			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.878		8.73%	No Violation			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PTRSNFLT (62030)	% Δ Volts			0.946	0.866		8.46%	No Violation			
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	AMPS (65025)	% Δ Volts			0.955	0.886		7.23%	No Violation			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1393.3	112.6%	99.8%	No Violation			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	951.5	103.4%	90.9%	No Violation			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	832.0	104.0%	69.3%	No Violation			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.878		8.73%	No Violation			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PTRSNFLT (62030)	% Δ Volts			0.946	0.866		8.46%	No Violation			
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	AMPS (65025)	% Δ Volts			0.955	0.888		7.02%	No Violation			
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations											
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations											
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations											
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations											

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations											
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations											
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1275.5	103.1%	91.4%	No Violation			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1051.4	104.2%	81.8%	No Violation			
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.911		5.30%	No Violation			
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	GRIJOH22 (90067) -> GRIJOH21 (90066) CKT 2 at GRIJOH22	Branch Amp	3000.0	4050.0	1917.9	3003.3	100.1%	74.2%	No Violation			
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations											
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations											
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations											
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations											
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations											
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations											
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations											
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations											
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations											
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations											
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations											
BF 5266 Slatt-Buckly 500 kV	No Violations											
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations											
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations											
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	Contingency Unavailable				1081.6	1386.1	112.0%	99.3%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	Contingency Unavailable				729.2	947.2	103.0%	90.5%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				711.1	811.8	101.5%	67.7%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1344.6	108.7%	96.3%	1081.6	1244.8	100.6%	89.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	809.2	101.1%	67.4%	No Violation			
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts			0.962	0.894		7.07%	No Violation			
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts			0.946	0.882		6.77%	No Violation			
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts			0.955	0.900		5.76%	No Violation			
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1343.7	108.6%	96.3%	1081.6	1451.6	117.3%	104.0%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	No Violation				729.2	993.2	108.0%	94.9%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	804.1	100.5%	67.0%	711.1	807.7	101.0%	67.3%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HEMINWAY (60156)	% Δ Volts			No Violation				1.034	0.968		6.38%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LAGRANDE (40619)	% Δ Volts			No Violation				0.977	0.921		5.73%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	BOWMONT (60064)	% Δ Volts			No Violation				1.026	0.968		5.65%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	BOWMONT (60065)	% Δ Volts			No Violation				1.040	0.983		5.48%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	CHESTNUT (60211)	% Δ Volts			No Violation				1.025	0.973		5.07%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HAPPYVLY (60257)	% Δ Volts			No Violation				1.027	0.975		5.06%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LAGRANDE (40621)	% Δ Volts			No Violation				1.027	0.975		5.06%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts			0.962	0.891		7.38%	No Violation			
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts			0.946	0.878		7.19%	No Violation			
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts			0.955	0.891		6.70%	No Violation			
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	MIDPOINT (60240)	% Δ Volts			1.092	1.033		5.40%	No Violation			
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations											
BF Lolo 230kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1282.2	103.7%	91.9%	No Violation			

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
BF McNary 230 kV SECT 1	No Violations											
BF McNary 230 kV SECT 2	No Violations											
BF McNary 230 kV SECT 3	FRANKLIN (40443)	% Δ Volts			1.005	0.947		5.77%	1.005	0.946		5.87%
Bus: Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1140.8	113.1%	88.8%	923.8	1030.2	102.1%	80.2%
Bus: Bell BPA 500 kV	No Violations											
Bus: Buckley 500 kV	No Violations											
Bus: Dixonville 500 kV	No Violations											
Bus: Hot Springs 500 kV	DIXON MV (40348)	% Δ Volts			1.024	0.969		5.37%	No Violation			
Bus: Hot Springs 500 kV	HOT SPR (40551)	% Δ Volts			1.034	0.981		5.13%	No Violation			
Bus: Keeler 500 kV + RAS	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	94.0	139.0	74.7	95.1	101.1%	68.4%	No Violation			
Bus: Rock Creek 500 kV	No Violations											
Bus: Sickler 500 kV	No Violations											
Bus: Summer Lake 500 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1393.7	112.7%	99.8%	No Violation			
Bus: Summer Lake 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	950.5	103.3%	90.8%	No Violation			
Bus: Summer Lake 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	831.0	103.9%	69.3%	No Violation			
Bus: Summer Lake 500 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.874		9.15%	No Violation			
Bus: Summer Lake 500 kV	PTRSNFLT (62030)	% Δ Volts			0.946	0.863		8.77%	No Violation			
Bus: Summer Lake 500 kV	AMPS (65025)	% Δ Volts			0.955	0.883		7.54%	No Violation			
N-1: Allston-Keeler 500 kV + RAS	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	94.0	139.0	74.7	95.1	101.2%	68.4%	No Violation			
N-1: Allston-Napavine 500 kV	No Violations											
N-1: Allston-Paul #2 500 kV	No Violations											
N-1: Alvery-Dixonville 500 kV	No Violations											
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1196.0	118.5%	93.1%	923.8	1083.3	107.4%	84.3%
N-1: Ashe-Hanford 500 kV	No Violations											
N-1: Ashe-Low Mon 500 kV	No Violations											
N-1: Ashe-Marion 500 kV	No Violations											
N-1: Ashe-Slatt 500 kV	No Violations											
N-1: Bell-Coulee 500 kV	No Violations											
N-1: Bell-Taft 500 kV	No Violations											
N-1: Big Eddy-Celilo 500 kV	No Violations											
N-1: Big Eddy-John Day 500 kV	No Violations											
N-1: Big Eddy-Knight 500 kV	No Violations											
N-1: Big Eddy-Ostrander 500 kV	No Violations											
N-1: Boise Bench-Brownlee #3 230 kV	No Violations											
N-1: Brady-Antelope 230 kV	No Violations											
N-1: Broadview-Garrison #1 500 kV	No Violations											
N-1: Brownlee-Ontario 230 kV	No Violations											
N-1: Buckley-Grizzly 500 kV	No Violations											
N-1: Buckley-Marion 500 kV	No Violations											
N-1: Buckley-Slatt 500 kV	No Violations											
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	785.7	926.3	275.5	786.3	100.1%	84.9%	326.0	821.7	104.6%	88.7%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	785.7	926.3	275.5	786.3	100.1%	84.9%	326.0	821.7	104.6%	88.7%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3235.5	1460.9	2243.4	102.0%	69.3%	No Violation			
N-1: CaptJack-Kfalls 500 kV	No Violations											

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	No Violation				923.8	1029.7	102.0%	80.1%
N-1: Chief Jo-Coulee 500 kV	No Violations											
N-1: Chief Jo-Monroe 500 kV	No Violations											
N-1: Chief Jo-Sickler 500 kV	No Violations											
N-1: Coulee-Hanford 500 kV	No Violations											
N-1: Coulee-Schultz 500 kV	No Violations											
N-1: Covington4-Raver 500 kV	No Violations											
N-1: Covington5-Raver 500 kV	No Violations											
N-1: Coyote-Longhorn 500 kV	No Violations											
N-1: CusterW-Monroe 500 kV	No Violations											
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	979.0	1287.7	667.7	1096.1	112.0%	85.1%	641.6	1098.2	112.2%	85.3%
N-1: Drycreek-Lolo 230 kV	No Violations											
N-1: Drycreek-N Lewiston 230 kV	No Violations											
N-1: Drycreek-Wala Ava 230 kV	No Violations											
N-1: Dworshak-Hatwai 500 kV + RAS	No Violations											
N-1: Dworshak-Taft 500 kV + RAS	No Violations											
N-1: Echo Lake-Maple Valley 500 kV	No Violations											
N-1: Echo Lake-Raver 500 kV	No Violations											
N-1: Echo Lake-Schultz 500 kV	No Violations											
N-1: Echo Lake-Snok Tap 500 kV	No Violations											
N-1: Garrison-Taft #2 500 kV	No Violations											
N-1: Goldhill-Placer 115 kV	No Violations											
N-1: Grassland-Coyote 500 kV	No Violations											
N-1: Grassland-Slatt 500 kV	No Violations											
N-1: Grizzly-John Day #2 500 kV	No Violations											
N-1: Grizzly-Malin 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	1807.2	2475.4	103.1%	65.1%	No Violation			
N-1: Grizzly-Ponderosa A-Summer L 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1247.6	100.9%	89.4%	No Violation			
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	1807.2	2469.1	102.9%	65.0%	No Violation			
N-1: Grizzly-Round Bu 500 kV	No Violations											
N-1: Hanford-Low Mon 500 kV	No Violations											
N-1: Hanford-Vantage 500 kV	No Violations											
N-1: Hanford-Wautoma 500 kV	No Violations											
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations											
N-1: Hatwai-Lolo 230 kV	No Violations											
N-1: Hatwai-Low Gran 500 kV + RAS	DRYGULCH (48113) -> DRYGULCH (45097) CKT 1 at DRYGULCH	Branch MVA	20.0	24.0	14.9	20.2	101.1%	84.2%	15.0	22.4	111.9%	93.2%
N-1: Hatwai-Low Gran 500 kV + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	No Violation				729.2	921.8	100.2%	88.1%
N-1: Hatwai-N Lewiston 230 kV	No Violations											
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	951.4	103.4%	90.9%	No Violation			
N-1: Hells Canyon-Walla Walla 230 kV	No Violations											
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	Contingency Unavailable				1081.6	1312.2	106.1%	94.0%
N-1: Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				711.1	812.5	101.6%	67.7%
N-1: Hemingway-Grassland 500 kV	PTRS NFUR (62386)	% Δ Volts			Contingency Unavailable				0.982	0.913		7.03%
N-1: Hemingway-Grassland 500 kV	PTRS NF LT (62030)	% Δ Volts			Contingency Unavailable				0.965	0.900		6.74%
N-1: Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts			Contingency Unavailable				0.969	0.912		5.88%

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	Contingency Unavailable				1081.6	1305.0	105.5%	93.5%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	Contingency Unavailable				711.1	814.1	101.8%	67.8%
N-1: Hemingway-Summer Lake 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1345.2	108.7%	96.4%	No Violation			
N-1: Hemingway-Summer Lake 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	807.3	100.9%	67.3%	No Violation			
N-1: Hemingway-Summer Lake 500 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.897		6.76%	No Violation			
N-1: Hemingway-Summer Lake 500 kV	PTRSNFLT (62030)	% Δ Volts			0.946	0.884		6.55%	No Violation			
N-1: Hemingway-Summer Lake 500 kV	AMPS (65025)	% Δ Volts			0.955	0.901		5.65%	No Violation			
N-1: Hill Top 345/230 Xfmr	No Violations											
N-1: Horse Hv-McNary 230 kV	No Violations											
N-1: Hot Springs-Taft 500 kV	HOT SPR (40553)	% Δ Volts			1.054	0.980		7.02%	1.064	0.989		7.05%
N-1: Hot Springs-Taft 500 kV	DIXON MV (40348)	% Δ Volts			1.024	0.968		5.47%	No Violation			
N-1: Hot Springs-Taft 500 kV	HOT SPR (40551)	% Δ Volts			1.034	0.980		5.22%	No Violation			
N-1: Humboldt-Coyote Ck 345 kV	No Violations											
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations											
N-1: Ing500-CusterW 500 kV	No Violations											
N-1: John Day-Marion 500 kV	No Violations											
N-1: John Day-Rock Ck 500 kV	No Violations											
N-1: John Day-Slatt 500 kV	No Violations											
N-1: Kfalls-Meridian 500 kV	No Violations											
N-1: Knight-Wautoma 500 kV	No Violations											
N-1: LaGrande-North Powder 230 kV	No Violations											
N-1: Lanes-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1088.8	107.9%	84.7%	No Violation			
N-1: Lit Goose-Central Ferry 500 kV	No Violations											
N-1: Lit Goose-Low Mon 500 kV	No Violations											
N-1: Low Gran-Central Ferry 500 kV	No Violations											
N-1: Low Mon-Sac Tap 500 kV	No Violations											
N-1: Malin 500/230 Xfmr	No Violations											
N-1: Malin-Hilltop 230 kV	No Violations											
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	2442.0	3235.5	1462.5	2530.2	103.6%	78.2%	1444.9	2492.9	102.1%	77.0%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	2199.9	3235.5	1460.9	2530.2	115.0%	78.2%	1444.9	2492.9	113.3%	77.0%
N-1: Malin-Round Mtn #2 500 kV	No Violations											
N-1: Malin-Summer Lake 500 kV	No Violations											
N-1: Maple Vly-Rocky RH 345 kV	No Violations											
N-1: Marion-Pearl 500 kV	No Violations											
N-1: Marion-Santiam 500 kV	No Violations											
N-1: McLouglin-Ostrander 230 kV	No Violations											
N-1: McNary 500/230 kV Xfmr	No Violations											
N-1: McNary S2-McNary S3 230 kV	No Violations											
N-1: McNary-Board T1 230 kV	No Violations											
N-1: McNary-John Day 500 kV	No Violations											
N-1: McNary-Longhorn 500 kV	No Violations											
N-1: McNary-Ross 345 kV	No Violations											
N-1: McNary-Roundup 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1284.1	103.8%	92.0%	No Violation			
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations											

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-1: Midpoint-Hemingway 500 kV	No Violations											
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	No Violations											
N-1: Midpoint-Humboldt 345 kV	No Violations											
N-1: Napavine-Paul 500 kV	No Violations											
N-1: Olympia-Paul 500 kV	No Violations											
N-1: Ontario-Caldwell 230 kV	No Violations											
N-1: Ostrander-Knight 500 kV	No Violations											
N-1: Ostrander-Pearl 500 kV	No Violations											
N-1: Ostrander-Troutdale 500 kV	No Violations											
N-1: Oxbow-Brownlee #2 230 kV	No Violations											
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1284.6	103.8%	92.0%	No Violation			
N-1: Paul-Satsop 500 kV	No Violations											
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	320.0	370.0	270.5	329.8	103.1%	89.1%	271.8	344.1	107.5%	93.0%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	758.3	1054.0	110.9%	82.0%	674.9	1084.8	114.2%	84.4%
N-1: Pinto-Four Corner 345 kV	No Violations											
N-1: Ponderosa A 500/230 kV Xfmr	No Violations											
N-1: Ponderosa B 500/230 kV Xfmr	No Violations											
N-1: Raver-Paul 500 kV	No Violations											
N-1: Raver-Tacoma 500 kV	No Violations											
N-1: Red Butte-Harry Allen 345 kV	No Violations											
N-1: Robinson-Harry Allen 500 kV	No Violations											
N-1: Rock Ck-Wautoma 500 kV	No Violations											
N-1: Roundup-Lagrande 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1256.9	101.6%	90.0%	No Violation			
N-1: Schultz-Sickler 500 kV	No Violations											
N-1: Schultz-Vantage 500 kV	No Violations											
N-1: Schultz-Wautoma 500 kV	No Violations											
N-1: Sigurd-Glen Canyon 230 kV	No Violations											
N-1: Slatt 500/230 kV Xfmr	No Violations											
N-1: Slatt-Longhorn 500 kV	No Violations											
N-1: Snok Tap-Snoking 500 kV	No Violations											
N-1: Vantage 500/230 kV Xfmr #1	No Violations											
N-1: Vantage 500/230 kV Xfmr #2	No Violations											
N-1: Walla Walla-Talbot 230 kV	No Violations											
N-1: Walla Walla-Wallula 230 kV	No Violations											
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations											
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations											
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations											
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations											
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations											
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations											
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations											
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations											
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations											
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations											

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations											
N-2: Bridger-Populus #1 & #2 345 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	859.7	107.5%	71.6%	711.1	815.4	101.9%	68.0%
N-2: Bridger-Populus #1 & #2 345 kV + RAS	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1355.8	109.6%	97.1%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	931.0	101.2%	88.9%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	PTRSNFLT (62030)	% Δ Volts			0.946	0.839		11.31%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	AMPS (65025)	% Δ Volts			0.955	0.857		10.26%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	BIGGRASS (65155)	% Δ Volts			0.982	0.909		7.43%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	DILLON S (62084)	% Δ Volts			0.965	0.906		6.11%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SPAR CYN (66765)	% Δ Volts			0.983	0.924		6.00%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	LOST RIV (65910)	% Δ Volts			0.988	0.931		5.77%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	ANTLOPE (65075)	% Δ Volts			0.991	0.935		5.65%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SHERDNMT (62158)	% Δ Volts			0.964	0.913		5.29%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SCOV IPC (65015)	% Δ Volts			0.969	0.919		5.16%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SCOVILLE (65010)	% Δ Volts			0.969	0.919		5.16%	No Violation			
N-2: Bridger-Populus #1 & #2 345 kV + RAS	ANTLOPE (65080)	% Δ Volts			0.973	0.923		5.14%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	876.2	109.5%	73.0%	711.1	830.8	103.8%	69.2%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1362.4	110.1%	97.6%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	934.5	101.6%	89.3%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BIGGRASS (65155)	% Δ Volts			0.982	0.866		11.81%	0.983	0.920		6.41%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	AMPS (65025)	% Δ Volts			0.955	0.821		14.03%	0.969	0.913		5.78%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	PTRSNFUR (62386)	% Δ Volts			0.962	0.826		14.14%	0.982	0.928		5.50%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	PTRSNFLT (62030)	% Δ Volts			0.946	0.805		14.90%	0.965	0.914		5.28%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SPAR CYN (66765)	% Δ Volts			0.983	0.894		9.05%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	DILLON S (62084)	% Δ Volts			0.965	0.880		8.81%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	LOST RIV (65910)	% Δ Volts			0.988	0.902		8.70%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	ANTLOPE (65075)	% Δ Volts			0.991	0.907		8.48%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SCOV IPC (65015)	% Δ Volts			0.969	0.894		7.74%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SCOVILLE (65010)	% Δ Volts			0.969	0.894		7.74%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	ANTLOPE (65080)	% Δ Volts			0.973	0.898		7.71%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SHERDNMT (62158)	% Δ Volts			0.964	0.890		7.68%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	ENNIS MT (62065)	% Δ Volts			0.963	0.896		6.96%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	JEFERSON (65851)	% Δ Volts			1.011	0.946		6.43%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BRADLEYC (62064)	% Δ Volts			0.963	0.902		6.33%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	JEFFERSN (65850)	% Δ Volts			1.007	0.944		6.26%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BRADLEYC (62105)	% Δ Volts			0.940	0.883		6.06%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MADISON (62022)	% Δ Volts			0.940	0.883		6.06%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	HAR-PONY (62251)	% Δ Volts			0.935	0.881		5.78%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	THREFORK (62248)	% Δ Volts			0.932	0.881		5.47%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MAYFLWRT (62155)	% Δ Volts			0.934	0.883		5.46%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	JACKRABB (62349)	% Δ Volts			0.994	0.940		5.43%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MONTTALC (62253)	% Δ Volts			0.931	0.881		5.37%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	WILLWCKM (62252)	% Δ Volts			0.931	0.881		5.37%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	TRIDENT (62020)	% Δ Volts			0.951	0.900		5.36%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	RIGBY (66295)	% Δ Volts			0.999	0.946		5.31%	No Violation			

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BZ EGALL (62348)	% Δ Volts			0.981	0.929		5.30%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	RENOVA (62145)	% Δ Volts			0.933	0.884		5.25%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	TRIDENT (62073)	% Δ Volts			0.933	0.884		5.25%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	EUSTIS (62244)	% Δ Volts			0.929	0.881		5.17%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	JACKRABT (62256)	% Δ Volts			0.969	0.919		5.16%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	THREERIV (62021)	% Δ Volts			0.936	0.888		5.13%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BOULEVRD (65200)	% Δ Volts			0.970	0.921		5.05%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BOZMN WS (62324)	% Δ Volts			0.970	0.921		5.05%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	IDFLS UP (65835)	% Δ Volts			0.970	0.921		5.05%	No Violation			
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	ANDERSON (65035)	% Δ Volts			0.975	0.926		5.03%	No Violation			
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	No Violations											
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	MCNRY S1 (41351) -> ROUNDUP (40905) CKT 1 at ROUNDUP	Branch Amp	1070.1	1329.9	750.8	1143.6	106.9%	86.0%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	807.9	101.0%	67.3%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	PTRSNFUR (62386)	% Δ Volts			0.962	0.897		6.76%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	PTRSNFLT (62030)	% Δ Volts			0.946	0.884		6.55%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	AMPS (65025)	% Δ Volts			0.955	0.903		5.45%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	ATHENA (45015)	% Δ Volts			0.977	0.926		5.22%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	PILOT RK (45413)	% Δ Volts			0.977	0.926		5.22%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	MISSIONT (47191)	% Δ Volts			0.986	0.936		5.07%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	PENDLTON (45235)	% Δ Volts			0.987	0.937		5.07%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	BUCKAROO (45027)	% Δ Volts			0.988	0.938		5.06%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	LAGRANDE (40619)	% Δ Volts			0.971	0.922		5.05%	No Violation			
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	PENDLT T (41248)	% Δ Volts			0.991	0.941		5.05%	No Violation			
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	930.1	101.1%	88.9%	No Violation			
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations											
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations											
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations											
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations											
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations											
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations											
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations											
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations											
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations											
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations											
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at VINCENT	Branch Amp	2134.0	3499.9	1465.0	2166.1	101.5%	61.9%	1531.1	2220.4	104.0%	63.4%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	2134.0	3499.9	1445.2	2134.9	100.0%	61.0%	1509.8	2187.8	102.5%	62.5%
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	2134.0	3499.9	No Violation				1490.1	2160.3	101.2%	61.7%
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	2400.0	3200.0	1800.6	2873.7	119.7%	89.8%	1601.7	2613.5	108.9%	81.7%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	2400.0	3800.0	1807.2	2887.7	120.3%	76.0%	1610.2	2630.2	109.6%	69.2%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	2199.9	3280.5	1633.4	2207.5	100.3%	67.3%	1658.0	2213.4	100.6%	67.5%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	2400.0	3200.0	1800.6	2676.6	111.5%	83.6%	1601.7	2405.9	100.2%	75.2%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1807.2	2694.3	112.3%	70.9%	1610.2	2426.1	101.1%	63.8%
N-2: Double Palo Verde	PTRSNFUR (62386)	% Δ Volts			0.962	0.898		6.65%	No Violation			
N-2: Double Palo Verde	PTRSNFLT (62030)	% Δ Volts			0.946	0.885		6.45%	No Violation			

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: Double Palo Verde	AMPS (65025)	% Δ Volts			0.955	0.904		5.34%	No Violation			
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations											
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations											
N-2: Garrison-Taft #1 & #2 500 kV + RAS	No Violations											
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	2400.0	3800.0	1807.2	3703.4	154.3%	97.5%	1610.2	3319.7	138.3%	87.4%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	2700.0	4000.0	1206.1	3146.6	116.5%	78.7%	1231.0	3077.8	114.0%	76.9%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	GRIZZ R3 (40488) -> PONDROSA (40837) CKT 1 at GRIZZ R3	Branch Amp	3780.0	3780.0	1917.1	3900.4	103.2%	103.2%	No Violation			
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	GRIZZLY (40489) -> GRIZZ R3 (40488) CKT 1 at GRIZZ R3	Branch Amp	3780.0	3780.0	1922.4	3900.4	103.2%	103.2%	No Violation			
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1062.5	105.3%	82.7%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1567.0	3584.9	149.4%	94.3%	1471.2	3127.4	130.3%	82.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1549.3	3566.1	148.6%	93.8%	1454.0	3110.0	129.6%	81.8%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON11 (90137) -> CAPTJACK (45035) CKT 1 at CAPPON11	Branch Amp	3220.0	3220.0	1549.3	3566.1	110.7%	110.7%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	GRIZZLY (40489) -> PONDROSB (40834) CKT 1 at GRIZZLY	Branch Amp	3500.0	3500.0	1681.4	3773.4	107.8%	107.8%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	PONDROSB (40834) -> CAPPON16 (90142) CKT 1 at PONDROSB	Branch Amp	3500.0	3500.0	1584.0	3601.0	102.9%	102.9%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON15 (90141) -> CAPPON14 (90140) CKT 1 at CAPPON15	Branch Amp	3500.0	3500.0	1567.0	3584.9	102.4%	102.4%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON13 (90139) -> CAPPON12 (90138) CKT 1 at CAPPON13	Branch Amp	3500.0	3800.0	1558.8	3580.8	102.3%	94.2%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1237.0	1396.0	1124.9	1300.1	105.1%	93.1%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1062.8	105.3%	82.7%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts			0.962	0.906		5.82%	No Violation			
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts			0.946	0.893		5.60%	No Violation			
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	2400.0	3800.0	1567.0	3186.4	132.8%	83.9%	1471.2	3067.2	127.8%	80.7%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	2400.0	3800.0	1549.3	3172.6	132.2%	83.5%	1454.0	3054.6	127.3%	80.4%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1053.2	104.4%	81.9%	No Violation			
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations											
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations											
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations											
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations											
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1068.7	105.9%	83.2%	No Violation			
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	2900.0	4350.0	2034.9	3483.3	120.1%	80.1%	No Violation			
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	3000.0	4050.0	1922.9	3886.3	129.5%	96.0%	1762.2	3379.6	112.7%	83.4%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	JOHN DAY (40585) -> GRIJOH12 (90065) CKT 1 at JOHN DAY	Branch Amp	3500.0	3500.0	1931.9	3892.8	111.2%	111.2%	No Violation			
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH11 (90064) -> GRIZZLY (40489) CKT 1 at GRIJOH11	Branch Amp	3500.0	3500.0	1922.9	3886.3	111.0%	111.0%	No Violation			
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	1009.1	1285.2	1019.6	1055.7	104.6%	82.1%	No Violation			
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations											
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations											
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations											
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations											
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations											
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations											
N-2: Lower Granite-Central Ferry #1 & #2 500 kV + RAS Open 69 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	920.0	1046.8	754.8	953.7	103.7%	91.1%	729.2	954.4	103.7%	91.2%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	2667.4	4099.2	1619.4	3112.8	116.7%	75.9%	1576.0	3033.1	113.7%	74.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	2667.4	4099.2	1595.8	3027.9	113.5%	73.9%	1551.0	2948.6	110.5%	71.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	2667.4	4099.2	1595.8	3027.9	113.5%	73.9%	1551.0	2948.6	110.5%	71.9%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations											

Appendix C- 16hs2a_3400WoH_2250idnw_N Base Case Post-Transient Contingency Results

					ID-NW 1200 Case Results (WoH 3400)				ID-NW 2250 Case Results (WoH 3400)			
Contingency Studied	Element Overloaded	Violation Type	Limit A	Limit B	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts	Pre Cont. Value	Post Cont. Value	% Limit A	% Limit B or % Δ Volts
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations											
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations											
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations											
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	No Violations											
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations											
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations											
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at HORIZN	Branch MVA	320.0	370.0	270.5	331.9	103.7%	89.7%	271.8	345.7	108.0%	93.4%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	950.0	1286.0	758.3	1059.4	111.5%	82.4%	674.9	1089.0	114.6%	84.7%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughIn 230 kV	No Violations											
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughIn 230 kV	TROUTPP2 (45303) -> GRESHAM (43215) CKT 1 at GRESHAM	Branch Amp	948.9	1164.7	700.5	1036.5	109.2%	89.0%	No Violation			
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughIn 230 kV	TROUTPP1 (45301) -> LINNEMAN (43291) CKT 1 at LINNEMAN	Branch Amp	1009.1	1199.9	736.4	1064.6	105.5%	88.7%	No Violation			
N-2: Raver-Covington #1 & #2 500 kV	No Violations											
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations											
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations											
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations											
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations											
N-2: Raver-Schultz #1 & #2 500 kV	No Violations											
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations											
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations											
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations											
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations											
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	800.0	1199.9	725.8	813.4	101.7%	67.8%	711.1	822.1	102.8%	68.5%
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts			No Violation				0.982	0.920		6.31%
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts			No Violation				0.965	0.906		6.11%
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	AMPS (65025)	% Δ Volts			No Violation				0.969	0.917		5.37%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV + RAS	No Violations											
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV + RAS	No Violations											
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations											
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations											
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	No Violations											
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations											
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations											
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations											

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.85	-1891	0.82	-1001	0.79	-2116	0.81	-2255	0.92	-1401
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.85	-1889	0.82	-989	0.79	-2106	0.81	-2221	0.92	-1389
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.84	-1954	0.82	-1008	0.79	-2152	0.80	-2272	0.92	-1438
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.85	-1918	0.83	-976	0.79	-2117	0.81	-2187	0.93	-1402
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.85	-1917	0.82	-1011	0.79	-2097	0.80	-2292	0.92	-1405
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.84	-1954	0.82	-1006	0.79	-2154	0.81	-2261	0.92	-1438
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV + RAS	0.87	-1501	0.82	-1089	0.70	-2007	0.80	-2399	0.93	-1082
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.86	-1854	0.83	-926	0.81	-2033	0.81	-2055	0.93	-1331
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.85	-1927	0.83	-991	0.79	-2144	0.81	-2207	0.93	-1414
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.85	-1884	0.83	-951	0.80	-2089	0.81	-2093	0.93	-1374
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.84	-1925	0.82	-1009	0.78	-2068	0.80	-2287	0.92	-1420
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.85	-1929	0.82	-1011	0.79	-2115	0.80	-2290	0.92	-1422
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.86	-1668	0.82	-1079	0.70	-2002	0.80	-2365	0.92	-1148
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.9	-1416	0.82	-1012	0.88	-1568	0.81	-2256	0.94	-943
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500 KV	0.8	-1350	0.82	-1006	0.88	-1235	0.81	-2240	0.92	-667
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.85	-1900	0.83	-960	0.80	-2088	0.81	-2139	0.93	-1384
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.85	-1870	0.83	-956	0.80	-2069	0.81	-2140	0.93	-1367
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500KV + RAS	0.89	-1628	0.82	-1046	0.85	-1890	0.80	-2337	0.93	-1146
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.84	-1927	0.82	-998	0.79	-2129	0.80	-2242	0.92	-1422
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.85	-1923	0.83	-983	0.79	-2140	0.81	-2180	0.93	-1411
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.85	-1916	0.82	-995	0.80	-2084	0.81	-2258	0.93	-1395
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.84	-1946	0.82	-1006	0.79	-2142	0.80	-2266	0.92	-1434
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.84	-1968	0.82	-1016	0.78	-2180	0.80	-2292	0.92	-1451
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.85	-1932	0.82	-952	0.79	-2148	0.81	-2287	0.93	-1424
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.85	-1863	0.82	-1014	0.79	-2072	0.80	-2359	0.92	-1389
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.85	-1841	0.82	-1002	0.80	-1924	0.81	-2275	0.93	-1358
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.85	-1908	0.82	-1009	0.78	-2019	0.80	-2287	0.92	-1408
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.85	-1788	0.82	-1015	0.80	-2047	0.80	-2295	0.93	-1336
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.84	-1883	0.82	-1016	0.79	-2127	0.80	-2299	0.92	-1403
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV + RAS	0.85	-1916	0.82	-1005	0.79	-2116	0.81	-2267	0.92	-1400
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV + RAS	0.85	-1918	0.82	-1007	0.79	-2122	0.80	-2278	0.92	-1404
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.84	-1954	0.82	-1011	0.79	-2149	0.80	-2282	0.92	-1438
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.84	-1961	0.82	-1016	0.78	-2162	0.80	-2299	0.92	-1445
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.84	-1932	0.82	-1016	0.79	-2138	0.80	-2301	0.92	-1430
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.84	-1937	0.82	-1016	0.79	-2140	0.80	-2301	0.92	-1433
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV + RAS	0.84	-1806	0.82	-1020	0.79	-2101	0.80	-2322	0.92	-1406
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.84	-1960	0.82	-1010	0.78	-2162	0.80	-2270	0.92	-1443
BF 4432 OSTRANDER-TROUTDALE & SPLIT OSTRANDER 500 KV	0.84	-1961	0.82	-1012	0.78	-2162	0.80	-2286	0.92	-1444
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.84	-1967	0.82	-1016	0.78	-2177	0.80	-2296	0.92	-1449
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.84	-1966	0.82	-1015	0.78	-2174	0.80	-2293	0.92	-1448
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.84	-1961	0.82	-1013	0.78	-2161	0.80	-2288	0.92	-1443
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.84	-1959	0.82	-1012	0.78	-2158	0.80	-2286	0.92	-1442
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV + RAS	0.84	-1694	0.81	-1071	0.79	-2015	0.80	-2483	0.91	-1351
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.84	-1929	0.82	-1007	0.79	-2135	0.80	-2268	0.92	-1423

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV + RAS	0.81	-2229	0.81	-1082	0.73	-2436	0.79	-2487	0.9	-1688
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV	0.85	-1915	0.82	-1009	0.79	-2122	0.80	-2283	0.92	-1409
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV + RAS	0.85	-1915	0.82	-1009	0.79	-2122	0.80	-2283	0.92	-1409
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.84	-1947	0.82	-1014	0.79	-2147	0.80	-2294	0.92	-1434
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.84	-1914	0.82	-1032	0.78	-2133	0.80	-2351	0.92	-1428
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.84	-1922	0.82	-1035	0.78	-2159	0.80	-2358	0.92	-1438
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.84	-1934	0.82	-1013	0.79	-2140	0.80	-2290	0.92	-1427
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.84	-1975	0.82	-1020	0.78	-2192	0.80	-2307	0.92	-1457
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.85	-1861	0.82	-938	0.80	-1976	0.81	-2271	0.93	-1368
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.84	-1920	0.82	-1013	0.79	-2058	0.80	-2294	0.92	-1419
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.87	-1480	0.82	-1108	0.70	-2000	0.80	-2440	0.93	-1070
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.84	-1917	0.82	-1014	0.79	-2129	0.80	-2295	0.92	-1425
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.85	-1898	0.82	-1005	0.79	-1972	0.80	-2283	0.92	-1397
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.84	-1928	0.82	-1011	0.79	-2137	0.80	-2288	0.92	-1423
BF 4708 HATWAI 500 KV BUS + RAS	0.85	-1675	0.82	-1074	0.00	0	0.80	-2397	0.93	-1300
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.85	-1871	0.82	-1014	0.79	-2110	0.80	-2294	0.92	-1396
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV + RAS	0.86	-1676	0.82	-982	0.77	-1073	0.81	-2344	0.93	-1289
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.84	-1972	0.82	-1019	0.78	-2185	0.80	-2301	0.92	-1453
BF 4888 ASHE-SLATT & CGS 500 KV	0.84	-1853	0.82	-1049	0.79	-2048	0.80	-2422	0.92	-1398
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.86	-1845	0.82	-992	0.80	-1938	0.81	-2269	0.93	-1353
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.85	-1882	0.82	-997	0.80	-1949	0.81	-2280	0.93	-1380
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.85	-1868	0.82	-980	0.80	-1948	0.81	-2219	0.93	-1367
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.86	-1859	0.84	-843	0.81	-2040	0.82	-1461	0.94	-1325
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.86	-1856	0.84	-880	0.81	-2036	0.82	-1537	0.94	-1323
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.84	-1953	0.82	-1003	0.79	-2156	0.80	-2252	0.92	-1437
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.85	-1914	0.83	-976	0.79	-2112	0.81	-2183	0.93	-1402
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.84	-1959	0.82	-1011	0.78	-2157	0.80	-2270	0.92	-1442
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.86	-1848	0.83	-964	0.80	-2014	0.81	-2185	0.93	-1350
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.85	-1891	0.82	-992	0.80	-2051	0.81	-2247	0.93	-1381
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.84	-1958	0.82	-1004	0.78	-2157	0.80	-2253	0.92	-1442
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.87	-1807	0.83	-891	0.82	-1989	0.82	-1962	0.94	-1306
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.85	-1895	0.83	-963	0.80	-2087	0.81	-2160	0.93	-1380
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.85	-1857	0.82	-1015	0.79	-2078	0.80	-2296	0.92	-1379
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.85	-1898	0.82	-1016	0.79	-2129	0.80	-2298	0.92	-1418
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.85	-1882	0.82	-1010	0.79	-2089	0.80	-2285	0.92	-1386
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.85	-1898	0.82	-1009	0.79	-2079	0.80	-2285	0.93	-1383
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.84	-1927	0.82	-1015	0.79	-2128	0.80	-2295	0.92	-1423
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.85	-1923	0.82	-985	0.79	-2138	0.81	-2287	0.93	-1414
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.84	-1888	0.82	-1020	0.79	-2111	0.80	-2335	0.92	-1405
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.85	-1861	0.82	-938	0.80	-1976	0.81	-2271	0.93	-1368
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.85	-1813	0.82	-1024	0.80	-1929	0.81	-2333	0.93	-1345
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.85	-1896	0.82	-992	0.80	-2060	0.81	-2252	0.93	-1383
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.85	-1884	0.82	-992	0.80	-2054	0.81	-2257	0.93	-1376
BF 5266 SLATT-BUCKLY 500 KV	0.85	-1918	0.83	-979	0.79	-2135	0.81	-2199	0.93	-1409

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.84	-1939	0.82	-1016	0.79	-2135	0.80	-2298	0.92	-1429
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.85	-1916	0.82	-1010	0.79	-2097	0.80	-2292	0.92	-1406
BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.89	-1671	0.89	-491	0.85	-1796	0.85	-1544	0.95	-1152
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.85	-1883	0.88	-552	0.80	-2068	0.82	-1394	0.93	-1376
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.88	-1732	0.89	-350	0.84	-1847	0.71	-1928	0.95	-1212
BF IPC POPULUS-CHILL-HEMINGWAY 500 KV & HEM 500/230 XFMR	0.84	-1924	0.88	-605	0.79	-2123	0.79	-1956	0.92	-1422
BF LOLO 230KV	0.85	-1919	0.82	-1013	0.80	-2079	0.80	-2255	0.93	-1402
BF MCNARY 230 KV SECT 1	0.84	-1897	0.82	-1057	0.79	-2111	0.80	-2386	0.92	-1417
BF MCNARY 230 KV SECT 2	0.84	-1934	0.82	-1034	0.78	-2136	0.80	-2335	0.92	-1433
BF MCNARY 230 KV SECT 3	0.84	-1927	0.82	-1024	0.78	-2125	0.80	-2327	0.92	-1431
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.8973	-1554	0.846	-717	0.87	-1694	0.84	-1483	0.9656	-1067
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV+PTSN	0.898	-1612	0.846	-724	0.86	-1751	0.83	-1502	0.9567	-1108
BF PGE GRASSLAND-COYOTE SP 500KV & CARTY GAS PLANT	0.8483	-1892	0.815	-1017	0.79	-2108	0.80	-2306	0.9183	-1402
BF PGE GRASSLAND-SLATT 500KV & BOARDMAN PLANT	0.8475	-1881	0.816	-1027	0.79	-2100	0.80	-2329	0.9175	-1399
BUS: ALVEY 500 KV + RAS	0.83	-1846	0.82	-1028	0.78	-2178	0.80	-2334	0.91	-1443
BUS: BELL BPA 500 KV	0	0	0.82	-1006	0.84	-1678	0.81	-2283	0.94	-702
BUS: BUCKLEY 500 KV	0.85	-1905	0.83	-962	0.80	-2089	0.81	-2147	0.93	-1394
BUS: DIXONVILLE 500 KV	0.85	-1915	0.83	-968	0.80	-2099	0.81	-2167	0.93	-1394
BUS: HOT SPRINGS 500 KV	0.88	-1569	0.82	-1015	0.84	-1864	0.81	-2283	0.94	-1196
BUS: KEELER 500 KV + RAS	0.84	-1697	0.81	-1072	0.79	-2022	0.80	-2484	0.91	-1357
BUS: ROCK CREEK 500 KV	0.85	-1880	0.82	-991	0.80	-2054	0.81	-2254	0.93	-1374
BUS: SICKLER 500 KV	0.84	-1922	0.82	-1015	0.79	-2132	0.80	-2300	0.92	-1424
BUS: SUMMER LAKE 500 KV	0.86	-1834	0.85	-833	0.81	-2016	0.82	-1441	0.94	-1316
N-1: ALLSTON-KEELER 500 KV + RAS	0.84	-1698	0.81	-1072	0.79	-2024	0.80	-2486	0.91	-1357
N-1: ALLSTON-NAPAVINE 500 KV	0.84	-1926	0.82	-1011	0.79	-2136	0.80	-2287	0.92	-1422
N-1: ALLSTON-PAUL #2 500 KV	0.84	-1926	0.82	-1011	0.79	-2137	0.80	-2287	0.92	-1422
N-1: ALVERY-DIXONVILLE 500 KV	0.85	-1913	0.83	-967	0.80	-2097	0.81	-2160	0.93	-1393
N-1: ALVEY-MARION 500 KV	0.85	-1914	0.83	-975	0.79	-2103	0.81	-2182	0.93	-1398
N-1: ASHE-HANFORD 500 KV	0.84	-1949	0.82	-1015	0.78	-2131	0.80	-2297	0.92	-1434
N-1: ASHE-LOW MON 500 KV	0.84	-1917	0.82	-1008	0.79	-2025	0.80	-2289	0.92	-1417
N-1: ASHE-MARION 500 KV	0.85	-1896	0.82	-986	0.79	-2065	0.81	-2227	0.93	-1387
N-1: ASHE-SLATT 500 KV	0.85	-1884	0.82	-996	0.80	-2050	0.81	-2276	0.93	-1376
N-1: BELL-COULEE 500 KV	0.88	-918	0.82	-1006	0.87	-1339	0.81	-2277	0.94	-866
N-1: BELL-TAFT 500 KV	0.8	-1392	0.82	-1009	0.87	-1461	0.81	-2276	0.94	-855
N-1: BIG EDDY-CELILO 500 KV	0.84	-1967	0.82	-1017	0.78	-2174	0.80	-2301	0.92	-1447
N-1: BIG EDDY-JOHN DAY 500 KV	0.84	-1969	0.82	-1018	0.78	-2181	0.80	-2299	0.92	-1451
N-1: BIG EDDY-KNIGHT 500 KV	0.85	-1932	0.82	-1009	0.79	-2142	0.80	-2285	0.92	-1425
N-1: BIG EDDY-OSTRANDER 500 KV	0.84	-1967	0.82	-1016	0.78	-2177	0.80	-2295	0.92	-1449
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.84	-1956	0.82	-955	0.79	-2160	0.81	-2189	0.92	-1439
N-1: BRADY-ANTELOPE 230 KV	0.85	-1925	0.82	-1014	0.79	-2142	0.81	-2290	0.92	-1417
N-1: BROADVIEW-GARRISON #1 500 KV	0.93	-1329	0.82	-1018	0.90	-1528	0.81	-2281	0.97	-881
N-1: BROWNLEE-ONTARIO 230 KV	0.84	-1950	0.83	-922	0.79	-2159	0.82	-2103	0.92	-1435
N-1: BUCKLEY-GRIZZLY 500 KV	0.85	-1920	0.83	-980	0.79	-2131	0.81	-2208	0.93	-1408
N-1: BUCKLEY-MARION 500 KV	0.84	-1959	0.82	-1010	0.78	-2162	0.80	-2273	0.92	-1443

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: BUCKLEY-SLATT 500 KV	0.85	-1918	0.83	-979	0.79	-2135	0.81	-2199	0.93	-1409
N-1: CAPTAIN JACK-OLINDA 500 KV	0.85	-1897	0.83	-961	0.80	-2093	0.81	-2107	0.93	-1382
N-1: CAPTJACK-KFALLS 500 KV	0.85	-1925	0.83	-981	0.79	-2139	0.81	-2192	0.93	-1411
N-1: CASCADE CROSSING 500 KV	0.84	-1957	0.82	-1002	0.78	-2159	0.80	-2242	0.92	-1442
N-1: CHIEF JO-COULEE 500 KV	0.84	-1913	0.82	-1016	0.79	-2137	0.80	-2298	0.92	-1423
N-1: CHIEF JO-MONROE 500 KV	0.84	-1953	0.82	-1015	0.78	-2147	0.80	-2297	0.92	-1439
N-1: CHIEF JO-SICKLER 500 KV	0.84	-1937	0.82	-1016	0.79	-2143	0.80	-2298	0.92	-1430
N-1: COULEE-HANFORD 500 KV	0.85	-1865	0.82	-1010	0.80	-2032	0.81	-2287	0.93	-1361
N-1: COULEE-SCHULTZ 500 KV	0.85	-1889	0.82	-1012	0.79	-2103	0.80	-2289	0.92	-1391
N-1: COVINGTON4-RAVER 500 KV	0.84	-1972	0.82	-1018	0.78	-2183	0.80	-2302	0.92	-1452
N-1: COVINGTON5-RAVER 500 KV	0.84	-1972	0.82	-1018	0.78	-2183	0.80	-2302	0.92	-1452
N-1: COYOTE-LONGHORN 500 KV	0.84	-1967	0.82	-1017	0.78	-2174	0.80	-2301	0.92	-1448
N-1: CUSTERW-MONROE 500 KV	0.85	-1802	0.82	-1015	0.80	-2055	0.80	-2296	0.92	-1346
N-1: DIXONVILLE-MERIDIAN 500 KV	0.85	-1918	0.83	-976	0.79	-2115	0.81	-2187	0.93	-1402
N-1: DRYCREEK-LOLO 230 KV	0.84	-1965	0.82	-1016	0.78	-2173	0.80	-2299	0.92	-1446
N-1: DRYCREEK-N LEWISTON 230 KV	0.84	-1956	0.82	-1020	0.78	-2155	0.80	-2301	0.92	-1440
N-1: DRYCREEK-WALA AVA 230 KV	0.85	-1914	0.82	-1028	0.79	-2083	0.80	-2295	0.92	-1414
N-1: DWORSHAK-HATWAI 500 KV + RAS	0.87	-1636	0.82	-1098	0.70	-1982	0.80	-2407	0.94	-1150
N-1: DWORSHAK-TAFT 500 KV + RAS	0.87	-1501	0.82	-1089	0.70	-2007	0.80	-2399	0.93	-1082
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.84	-1966	0.82	-1018	0.78	-2180	0.80	-2303	0.92	-1453
N-1: ECHO LAKE-RAVER 500 KV	0.84	-1944	0.82	-1016	0.79	-2149	0.80	-2300	0.92	-1434
N-1: ECHO LAKE-SCHULTZ 500 KV	0.84	-1958	0.82	-1016	0.78	-2155	0.80	-2297	0.92	-1443
N-1: ECHO LAKE-SNOK TAP 500 KV	0.85	-1857	0.82	-1015	0.79	-2080	0.80	-2296	0.92	-1380
N-1: GARRISON-TAFT #2 500 KV	0.9	-1416	0.82	-1012	0.88	-1568	0.81	-2256	0.94	-943
N-1: GOLDHILL-PLACER 115 KV	0.84	-1974	0.82	-1019	0.78	-2185	0.80	-2305	0.92	-1453
N-1: GRASSLAND-COYOTE 500 KV	0.84	-1946	0.82	-1009	0.79	-2153	0.80	-2289	0.92	-1433
N-1: GRASSLAND-SLATT 500 KV	0.84	-1961	0.82	-1015	0.78	-2160	0.80	-2283	0.92	-1442
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.85	-1899	0.83	-966	0.80	-2089	0.81	-2170	0.93	-1383
N-1: GRIZZLY-MALIN 500 KV	0.85	-1908	0.83	-957	0.80	-2092	0.81	-2125	0.93	-1389
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.86	-1861	0.83	-924	0.81	-2042	0.81	-2042	0.93	-1335
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.85	-1905	0.83	-955	0.80	-2091	0.81	-2118	0.93	-1387
N-1: GRIZZLY-ROUND BU 500 KV	0.84	-1966	0.82	-1016	0.78	-2173	0.80	-2296	0.92	-1447
N-1: HANFORD-LOW MON 500 KV	0.84	-1938	0.82	-1012	0.78	-2088	0.80	-2292	0.92	-1427
N-1: HANFORD-VANTAGE 500 KV	0.85	-1917	0.82	-1011	0.79	-2097	0.80	-2292	0.92	-1405
N-1: HANFORD-WAUTOMA 500 KV	0.84	-1957	0.82	-1014	0.79	-2151	0.80	-2295	0.92	-1440
N-1: HATWAI 500/230 KV XFMR + RAS	0.84	-1957	0.82	-1019	0.76	-2079	0.80	-2302	0.92	-1441
N-1: HATWAI-LOLO 230 KV	0.84	-1952	0.82	-1023	0.78	-2146	0.80	-2302	0.92	-1438
N-1: HATWAI-LOW GRAN 500 KV + RAS	0.86	-1678	0.82	-982	0.77	-1074	0.81	-2346	0.93	-1290
N-1: HATWAI-N LEWISTON 230 KV	0.84	-1963	0.82	-1019	0.78	-2174	0.80	-2301	0.92	-1443
N-1: HELLS CANYON-BROWNEE 230 KV	0.85	-1871	0.82	-833	0.80	-2073	0.82	-2057	0.93	-1368
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.85	-1928	0.82	-1042	0.79	-2136	0.80	-2264	0.93	-1414
N-1: HEMINGWAY-GRASSLAND 500 KV	0.89	-1678	0.84	-730	0.85	-1814	0.83	-1519	0.95	-1158
N-1: HEMINGWAY-GRASSLAND 500 KV + PTSN SHUNT	0.88	-1722	0.83	-796	0.84	-1877	0.83	-1673	0.95	-1205
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.85	-1891	0.84	-880	0.80	-2097	0.82	-1534	0.93	-1379

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: HILL TOP 345/230 XFMR	0.84	-1941	0.82	-997	0.79	-2154	0.81	-2236	0.92	-1430
N-1: HORSE HV-MCNARY 230 KV	0.84	-1966	0.82	-1012	0.78	-2173	0.80	-2296	0.92	-1447
N-1: HOT SPRINGS-TAFT 500 KV	0.88	-1569	0.82	-1015	0.84	-1863	0.81	-2283	0.94	-1195
N-1: HUMBOLDT-COYOTE CK 345 KV	0.84	-1975	0.82	-1037	0.78	-2193	0.81	-2233	0.92	-1460
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.84	-1981	0.82	-1026	0.78	-2196	0.80	-2328	0.92	-1465
N-1: ING500-CUSTERW 500 KV	0.84	-1891	0.82	-1017	0.79	-2130	0.80	-2299	0.92	-1407
N-1: JOHN DAY-MARION 500 KV	0.84	-1953	0.82	-1008	0.79	-2148	0.80	-2273	0.92	-1438
N-1: JOHN DAY-ROCK CK 500 KV	0.85	-1913	0.82	-994	0.80	-2083	0.81	-2260	0.93	-1393
N-1: JOHN DAY-SLATT 500 KV	0.84	-1963	0.82	-1007	0.78	-2168	0.80	-2262	0.92	-1446
N-1: Kfalls-Meridian 500 KV	0.84	-1962	0.82	-1011	0.78	-2163	0.80	-2282	0.92	-1443
N-1: Knight-WAUTOMA 500 KV	0.85	-1903	0.82	-994	0.80	-2069	0.81	-2255	0.93	-1387
N-1: LAGRANDE-NORTH POWDER 230 KV	0.85	-1932	0.82	-964	0.79	-2145	0.81	-2246	0.92	-1423
N-1: LANES-MARION 500 KV	0.84	-1950	0.82	-1009	0.79	-2149	0.80	-2277	0.92	-1436
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.84	-1949	0.82	-1015	0.78	-2119	0.80	-2298	0.92	-1436
N-1: LIT GOOSE-LOW MON 500 KV	0.84	-1938	0.82	-1014	0.78	-2098	0.80	-2296	0.92	-1429
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.85	-1909	0.82	-1012	0.79	-2003	0.80	-2294	0.92	-1408
N-1: LOW MON-SAC TAP 500 KV	0.85	-1883	0.82	-1008	0.80	-1988	0.81	-2285	0.93	-1381
N-1: MALIN 500/230 XFMR	0.84	-1955	0.82	-1007	0.79	-2154	0.81	-2265	0.92	-1439
N-1: MALIN-HILLTOP 230 KV	0.84	-1933	0.82	-994	0.79	-2150	0.81	-2227	0.92	-1426
N-1: MALIN-ROUND MTN #1 500 KV	0.85	-1927	0.83	-992	0.79	-2144	0.81	-2211	0.92	-1415
N-1: MALIN-ROUND MTN #2 500 KV	0.85	-1927	0.83	-991	0.79	-2144	0.81	-2207	0.93	-1415
N-1: MALIN-SUMMER LAKE 500 KV	0.84	-1964	0.82	-1013	0.78	-2175	0.81	-2164	0.92	-1449
N-1: MAPLE VLY-ROCKY RH 345 KV	0.84	-1962	0.82	-1016	0.78	-2164	0.80	-2300	0.92	-1444
N-1: MARION-PEARL 500 KV	0.84	-1945	0.82	-1011	0.79	-2146	0.80	-2280	0.92	-1432
N-1: MARION-SANTIAM 500 KV	0.84	-1967	0.82	-1017	0.78	-2173	0.80	-2299	0.92	-1448
N-1: MCLOUGLIN-OSTRANDER 230 KV	0.84	-1968	0.82	-1017	0.78	-2177	0.80	-2301	0.92	-1449
N-1: MCNARY 500/230 KV XFMR	0.84	-1972	0.82	-966	0.78	-2178	0.80	-2297	0.92	-1453
N-1: MCNARY S2-MCNARY S3 230 KV	0.84	-1967	0.82	-1016	0.78	-2174	0.80	-2300	0.92	-1448
N-1: MCNARY-BOARD T1 230 KV	0.84	-1970	0.82	-1011	0.78	-2172	0.80	-2286	0.92	-1447
N-1: MCNARY-JOHN DAY 500 KV	0.84	-1944	0.82	-997	0.79	-2149	0.80	-2264	0.92	-1432
N-1: MCNARY-LONGHORN 500 KV	0.85	-1924	0.82	-987	0.79	-2141	0.81	-2295	0.93	-1416
N-1: MCNARY-ROSS 345 KV	0.84	-1967	0.82	-1009	0.78	-2175	0.80	-2291	0.92	-1449
N-1: MCNARY-ROUNDUP 230 KV	0.85	-1920	0.85	-853	0.79	-2125	0.81	-2155	0.93	-1406
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.85	-1880	0.82	-1006	0.80	-1983	0.81	-2280	0.93	-1380
N-1: MIDPOINT-HEMINGWAY 500 KV	0.87	-1826	0.84	-887	0.82	-2016	0.74	-1984	0.94	-1311
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN SHUNT	0.86	-1877	0.84	-892	0.81	-2065	0.73	-2001	0.94	-1343
N-1: MIDPOINT-HUMBOLDT 345 KV	0.84	-1976	0.82	-1038	0.78	-2193	0.81	-2254	0.92	-1462
N-1: NAPA-VINE-PAUL 500 KV	0.84	-1951	0.82	-1015	0.79	-2149	0.80	-2295	0.92	-1436
N-1: OLYMPIA-PAUL 500 KV	0.84	-1972	0.82	-1019	0.78	-2186	0.80	-2305	0.92	-1453
N-1: ONTARIO-CALDWELL 230 KV	0.84	-1957	0.83	-979	0.79	-2159	0.81	-2190	0.92	-1440
N-1: OSTRANDER-KNIGHT 500 KV	0.84	-1959	0.82	-1012	0.78	-2158	0.80	-2287	0.92	-1442
N-1: OSTRANDER-PEARL 500 KV	0.84	-1967	0.82	-1016	0.78	-2175	0.80	-2298	0.92	-1448
N-1: OSTRANDER-TROUTDALE 500 KV	0.84	-1970	0.82	-1018	0.78	-2180	0.80	-2303	0.92	-1450
N-1: OXBOW-BROWNLEE #2 230 KV	0.84	-1968	0.82	-1003	0.78	-2174	0.80	-2288	0.92	-1448

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: OXBOW-LOLO 230 KV	0.85	-1922	0.82	-1003	0.80	-2088	0.80	-2248	0.93	-1405
N-1: PAUL-SATSOP 500 KV	0.84	-1964	0.82	-1017	0.78	-2169	0.80	-2300	0.92	-1445
N-1: PEARL-KEELER 500 KV + RAS	0.85	-1920	0.82	-1009	0.79	-2125	0.80	-2283	0.92	-1408
N-1: PINTO-FOUR CORNER 345 KV	0.84	-1969	0.82	-1019	0.78	-2180	0.80	-2303	0.92	-1451
N-1: PONDEROSA A 500/230 KV XFMR	0.84	-1967	0.82	-1018	0.78	-2176	0.80	-2301	0.92	-1448
N-1: PONDEROSA B 500/230 KV XFMR	0.84	-1966	0.82	-1016	0.78	-2174	0.80	-2298	0.92	-1447
N-1: RAVER-PAUL 500 KV	0.85	-1916	0.82	-1009	0.79	-2124	0.80	-2284	0.92	-1410
N-1: RAVER-TACOMA 500 KV	0.84	-1962	0.82	-1017	0.78	-2166	0.80	-2300	0.92	-1445
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.84	-1973	0.82	-1026	0.78	-2190	0.80	-2332	0.92	-1461
N-1: ROBINSON-HARRY ALLEN 500 KV	0.84	-1962	0.82	-1009	0.78	-2164	0.81	-2263	0.92	-1443
N-1: ROCK CK-WAUTOMA 500 KV	0.85	-1891	0.82	-994	0.80	-2061	0.81	-2260	0.93	-1380
N-1: ROUNDUP-LAGRANDE 230 KV	0.85	-1926	0.83	-937	0.79	-2136	0.81	-2219	0.93	-1412
N-1: SCHULTZ-SICKLER 500 KV	0.84	-1924	0.82	-1015	0.79	-2132	0.80	-2297	0.92	-1421
N-1: SCHULTZ-VANTAGE 500 KV	0.84	-1944	0.82	-1017	0.79	-2139	0.80	-2299	0.92	-1432
N-1: SCHULTZ-WAUTOMA 500 KV	0.85	-1906	0.82	-1011	0.79	-2093	0.80	-2288	0.92	-1389
N-1: SIGURD-GLEN CANYON 230 KV	0.84	-1966	0.82	-1016	0.78	-2171	0.80	-2294	0.92	-1446
N-1: SLATT 500/230 KV XFMR	0.84	-1870	0.82	-1041	0.79	-2094	0.80	-2391	0.92	-1400
N-1: SLATT-LONGHORN 500 KV	0.84	-1964	0.82	-1014	0.78	-2168	0.80	-2293	0.92	-1445
N-1: SNOK TAP-SNOKING 500 KV	0.84	-1959	0.82	-1017	0.78	-2164	0.80	-2301	0.92	-1444
N-1: VANTAGE 500/230 KV XFMR #1	0.84	-1965	0.82	-1016	0.78	-2168	0.80	-2300	0.92	-1446
N-1: VANTAGE 500/230 KV XFMR #2	0.84	-1964	0.82	-1016	0.78	-2168	0.80	-2300	0.92	-1446
N-1: WALLA WALLA-TALBOT 230 KV	0.84	-1943	0.82	-1021	0.79	-2108	0.80	-2294	0.92	-1433
N-1: WALLA WALLA-WALLULA 230 KV	0.84	-1955	0.82	-1010	0.78	-2138	0.80	-2298	0.92	-1441
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.87	-1764	0.82	-956	0.82	-1883	0.81	-2192	0.94	-1277
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.85	-1892	0.83	-979	0.79	-2060	0.81	-2196	0.93	-1386
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.86	-1835	0.83	-940	0.81	-2000	0.81	-2102	0.93	-1338
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.85	-1893	0.82	-982	0.80	-2057	0.81	-2218	0.93	-1385
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.85	-1890	0.83	-975	0.80	-2056	0.81	-2180	0.93	-1384
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.85	-1854	0.82	-975	0.80	-2037	0.81	-2238	0.93	-1360
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.85	-1876	0.82	-991	0.80	-2046	0.81	-2265	0.93	-1372
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.84	-1963	0.82	-1014	0.78	-2169	0.80	-2290	0.92	-1446
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.84	-1968	0.82	-1015	0.78	-2178	0.80	-2294	0.92	-1450
N-2: BETHEL-CEDAR SP 500KV & BETHEL-ROUND BUTTE 230 KV	0.8405	-1967	0.825	-1010	0.78	-2175	0.81	-2263	0.92	-1451
N-2: BETHEL-CEDAR SP 500KV & BETHEL-SANTIAM 230KV	0.8405	-1966	0.824	-1009	0.78	-2175	0.81	-2262	0.92	-1450
N-2: BETHEL-CEDAR SP 500KV & SANTIAM-MIKKALO 500KV	0.8402	-1958	0.824	-1004	0.78	-2167	0.81	-2247	0.92	-1443
N-2: GRASSLAND-CEDAR SP 500KV & SLATT-BUCKLEY 500KV	0.8491	-1910	0.831	-959	0.79	-2117	0.81	-2127	0.9295	-1404
N-2: GRASSLAND-COYOTE 500KV & SLATT-LONGHORN 500KV	0.8405	-1934	0.824	-1003	0.78	-2148	0.81	-2280	0.92	-1424
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.85	-1935	0.8	-794	0.79	-2163	0.83	-1872	0.93	-1421
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.85	-1936	0.8	-795	0.79	-2163	0.83	-1868	0.93	-1421
N-2: BRIDGER-POPULUS #1 & #2 345 KV + RAS	0.88	-1617	0.84	-805	0.84	-1777	0.84	-1451	0.95	-1146
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.89	-1569	0.85	-761	0.85	-1746	0.86	-1193	0.95	-1122
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.81	-1896	0.82	-1071	0.71	-2417	0.78	-2513	0.82	-1660
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.87	-1808	0.82	-840	0.82	-1989	0.82	-1902	0.94	-1302
N-2: BROWNLEE-OXBOW & BROWNLEE-HELLS CANYON 230 KV	0.85	-1870	0.82	-823	0.80	-2075	0.82	-2045	0.93	-1368

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.84	-1949	0.82	-1001	0.78	-2141	0.80	-2244	0.92	-1436
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.84	-1910	0.82	-1013	0.79	-2122	0.80	-2292	0.92	-1415
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.84	-1943	0.82	-1014	0.79	-2137	0.80	-2293	0.92	-1432
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.84	-1943	0.82	-1015	0.79	-2142	0.80	-2297	0.92	-1434
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.84	-1926	0.82	-1015	0.79	-2134	0.80	-2295	0.92	-1424
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.84	-1905	0.82	-1015	0.79	-2131	0.80	-2296	0.92	-1419
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.86	-1765	0.82	-998	0.81	-1884	0.81	-2274	0.93	-1271
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.86	-1769	0.82	-1001	0.81	-1922	0.81	-2265	0.93	-1287
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.85	-1734	0.82	-1014	0.81	-1990	0.80	-2293	0.93	-1306
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.82	-2001	0.81	-1078	0.76	-2299	0.80	-2478	0.91	-1552
N-2: DC-BIPOLE	0.86	-1803	0.83	-918	0.80	-2090	0.82	-1972	0.93	-1384
N-2: DOUBLE PALO VERDE	0.89	-1558	0.83	-565	0.84	-1734	0.83	-1966	0.94	-1142
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.84	-1966	0.82	-1018	0.78	-2180	0.80	-2303	0.92	-1454
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.84	-1955	0.82	-1017	0.78	-2159	0.80	-2302	0.92	-1449
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.8	-1805	0.82	-1062	0.70	-2304	0.80	-2360	0.82	-1542
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV + RAS	0.85	-1774	0.83	-897	0.81	-2030	0.81	-1952	0.93	-1327
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV + RAS	0.86	-1710	0.84	-857	0.82	-1960	0.82	-1892	0.94	-1262
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV + RAS	0.84	-1924	0.83	-990	0.78	-2188	0.81	-2062	0.92	-1442
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.85	-1920	0.82	-1010	0.78	-2002	0.80	-2285	0.92	-1412
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.85	-1916	0.82	-996	0.79	-2103	0.81	-2265	0.93	-1411
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.84	-1975	0.82	-1026	0.78	-2200	0.80	-2299	0.92	-1475
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.84	-1956	0.82	-1009	0.78	-2155	0.80	-2270	0.92	-1441
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV + RAS	0.84	-1629	0.82	-964	0.81	-2023	0.81	-2205	0.92	-1325
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV + RAS	0.84	-1807	0.82	-973	0.80	-2096	0.81	-2214	0.92	-1389
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.84	-1949	0.82	-1001	0.78	-2141	0.80	-2244	0.92	-1436
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.85	-1919	0.82	-995	0.79	-2121	0.80	-2233	0.92	-1409
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.85	-1914	0.82	-986	0.80	-2084	0.81	-2250	0.93	-1394
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.84	-1964	0.82	-1011	0.78	-2168	0.80	-2279	0.92	-1447
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.84	-1959	0.82	-1004	0.78	-2158	0.80	-2276	0.92	-1442
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.84	-1946	0.82	-1008	0.79	-2146	0.80	-2278	0.92	-1433
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV + RAS OPEN 69 KV	0.86	-1704	0.82	-966	0.78	-1059	0.81	-2310	0.94	-1264
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.82	-1809	0.82	-1060	0.78	-2242	0.80	-2328	0.91	-1492
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.86	-1869	0.83	-967	0.80	-2064	0.81	-2211	0.93	-1367
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.84	-1941	0.82	-989	0.79	-2149	0.80	-2255	0.92	-1431
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.84	-1943	0.82	-987	0.79	-2148	0.80	-2251	0.92	-1432
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.84	-1966	0.82	-1003	0.78	-2173	0.80	-2285	0.92	-1448
N-2: MIDPOINT-HEMINGWAY 500 KV & MIDPOINT-KING 230 KV	0.87	-1816	0.84	-877	0.82	-2007	0.74	-1971	0.94	-1290
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.85	-1790	0.82	-1013	0.80	-2040	0.80	-2291	0.93	-1336
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.85	-1921	0.82	-1010	0.79	-2127	0.80	-2285	0.92	-1414
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV + RAS	0.85	-1920	0.82	-1009	0.79	-2126	0.80	-2284	0.92	-1409
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.84	-1967	0.82	-1016	0.78	-2175	0.80	-2296	0.92	-1448
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.84	-1968	0.82	-1016	0.78	-2177	0.80	-2296	0.92	-1449
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.84	-1983	0.82	-1019	0.78	-2198	0.80	-2305	0.92	-1461
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.84	-1925	0.82	-1014	0.79	-2137	0.80	-2295	0.92	-1424

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case VQ Results

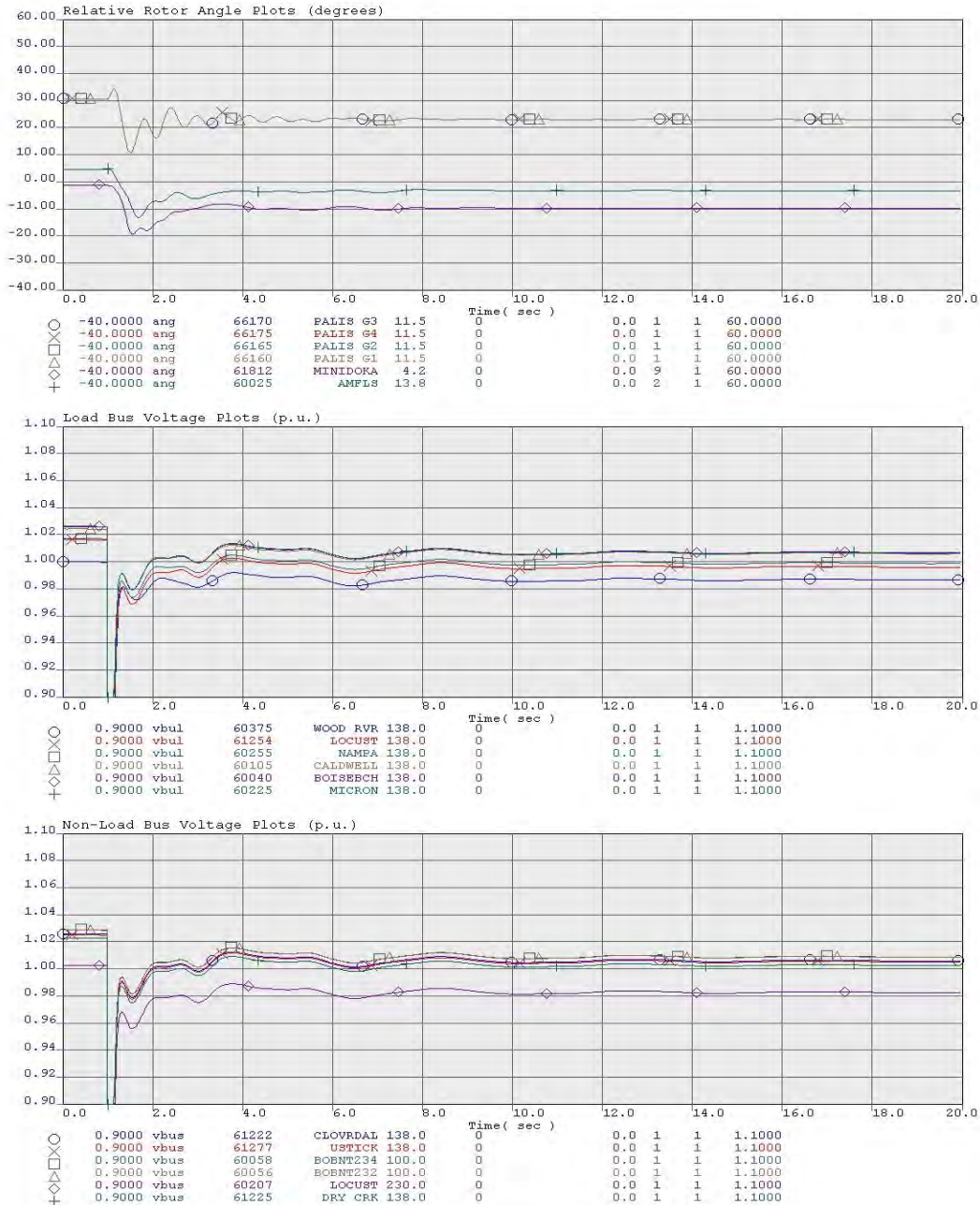
V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency	Bell		Brownlee		Hatwai		Hemingway		Taft	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: RAVER-PAUL & NPAVINE-PAUL 500 KV	0.85	-1914	0.82	-1009	0.79	-2120	0.80	-2282	0.92	-1406
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.85	-1894	0.82	-1006	0.79	-2084	0.80	-2276	0.93	-1388
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.85	-1912	0.82	-1007	0.79	-2116	0.80	-2278	0.92	-1402
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.84	-1941	0.82	-1011	0.79	-2127	0.80	-2288	0.92	-1434
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.84	-1967	0.82	-1017	0.78	-2175	0.80	-2301	0.92	-1450
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.84	-1962	0.82	-1017	0.78	-2167	0.80	-2301	0.92	-1446
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV + RAS	0.86	-1843	0.82	-1009	0.80	-1999	0.81	-2282	0.93	-1348
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV + RAS	0.85	-1909	0.82	-1014	0.79	-2116	0.80	-2295	0.92	-1411
N-2: TAFT-BELL & TAFT-DWORSKAK 500 KV + RAS	0.8	-1276	0.82	-1105	0.70	-1983	0.80	-2385	0.98	-471
N-2: TAFT-BELL 500 KV & BELL-LANCASTER 230 KV + RAS	0.8	-1303	0.82	-1021	0.88	-1315	0.81	-2305	0.94	-771
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV + RAS	0.8	-1575	0.82	-1043	0.85	-1643	0.80	-2366	0.93	-964
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.8	-1389	0.82	-1009	0.87	-1461	0.81	-2276	0.94	-855
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV	0.8	-1384	0.82	-1004	0.89	-1239	0.81	-2261	0.94	-734
N-2: TAFT-DWORSKAK & GARRISON-TAFT #1 500KV + RAS	0.93	-932	0.82	-1107	0.70	-2003	0.80	-2397	0.95	-643
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.85	-1867	0.82	-989	0.80	-2047	0.81	-2252	0.93	-1366
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.85	-1867	0.82	-989	0.80	-2047	0.81	-2252	0.93	-1366
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.84	-1921	0.82	-1010	0.79	-2117	0.80	-2284	0.92	-1424

Appendix C – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, WOH 3400 MW
N-1 Loss of Hemingway-Boardman 500 kV



Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None

Page 1



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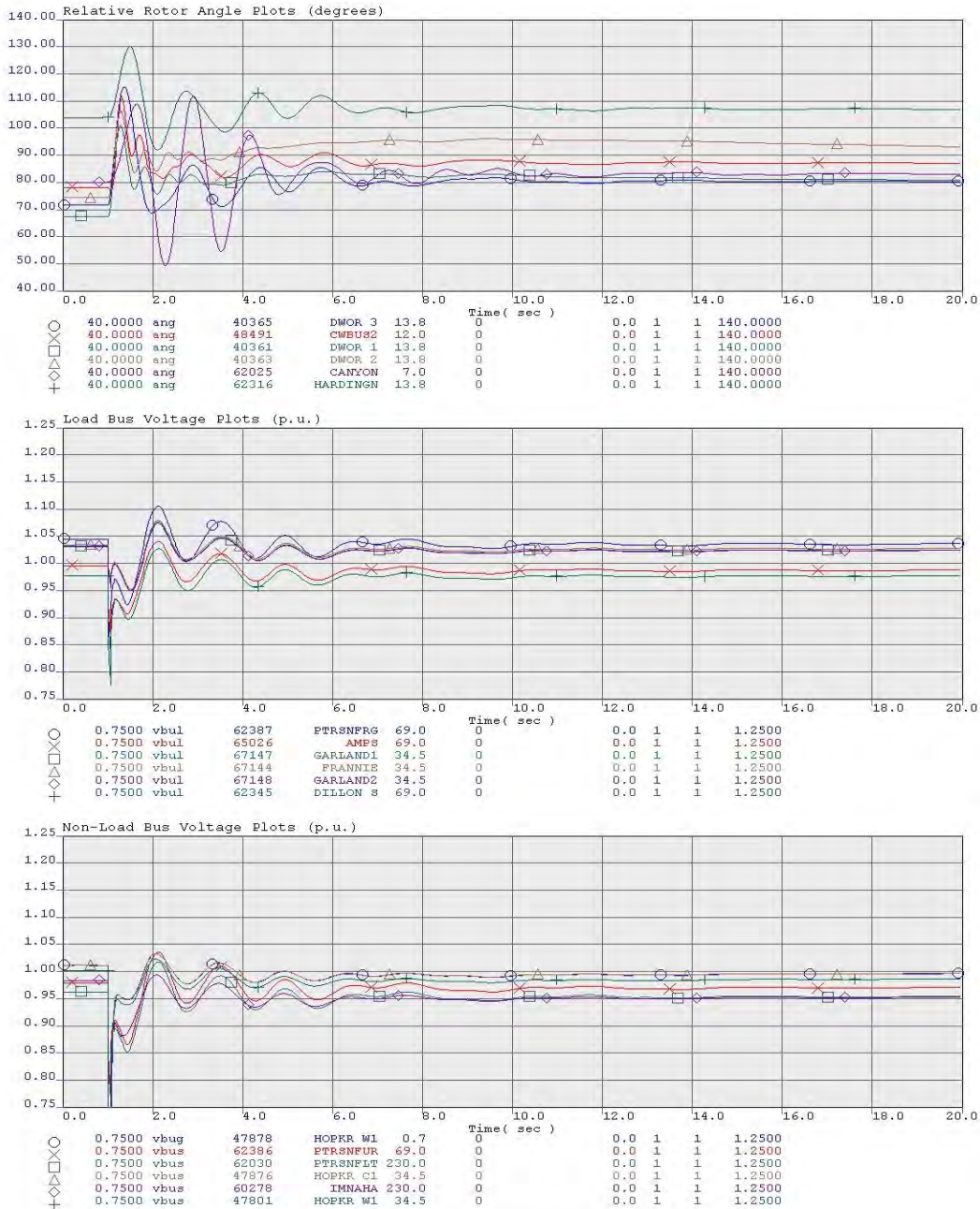
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Figure C6: N-1 Loss of Hemingway-Boardman 500 kV Line (Angle & Voltage Plots)

Appendix C – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, WoH 3400 MW
N-1 Loss of Hatwai-Lower Granite 500 kV



Outage of Hatwai-Lower Granite 500 kV Line
RAS: None

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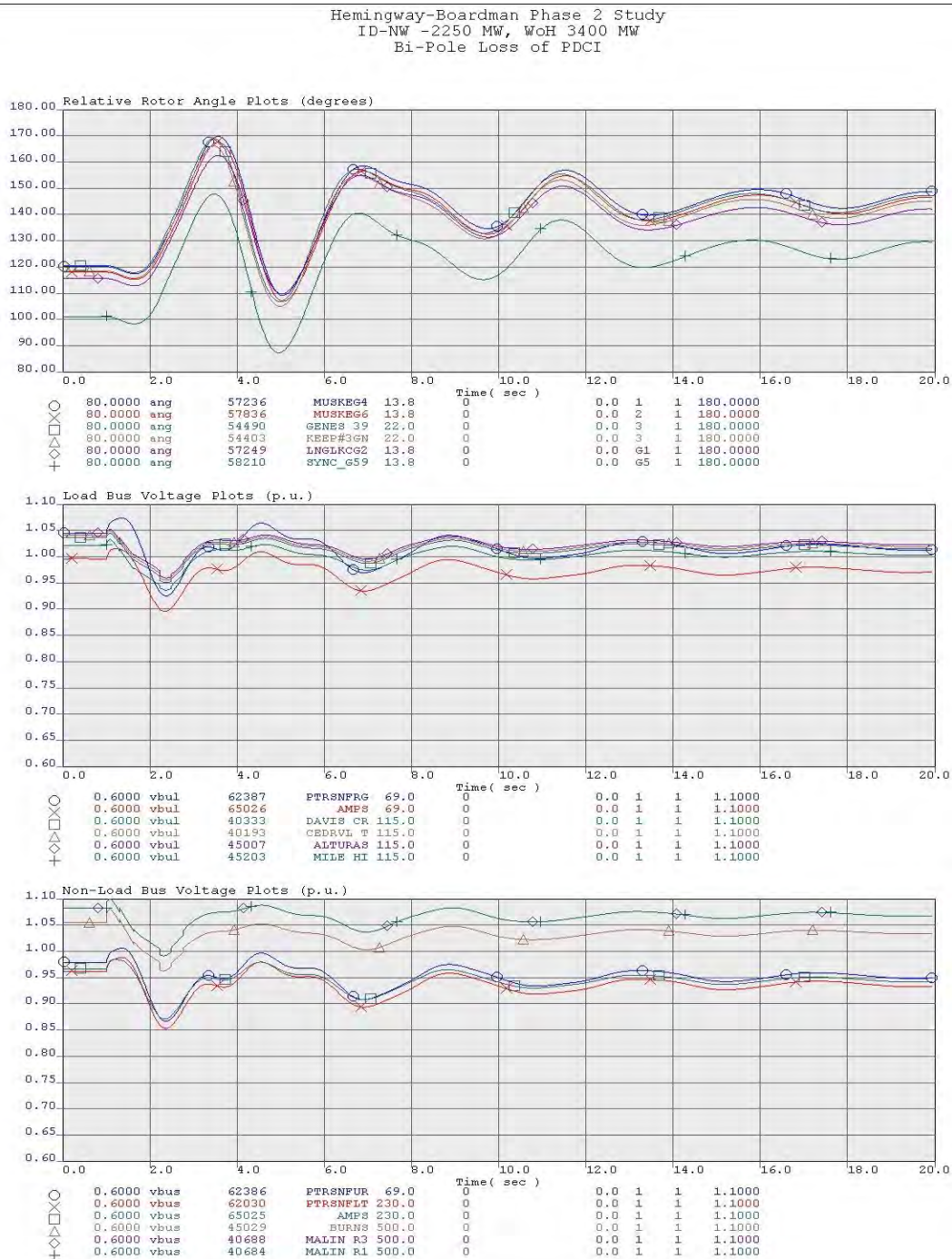
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Figure C7: N-1 Loss of Hatwai-Lower Granite 500 kV Line (Angle & Voltage Plots)

Appendix C – 16la1sa_3400idnw_nv Base Case Transient Stability Plots



Bipole loss of Pacific DC Intertie
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
Northwest Generation Drop (2550 MW)

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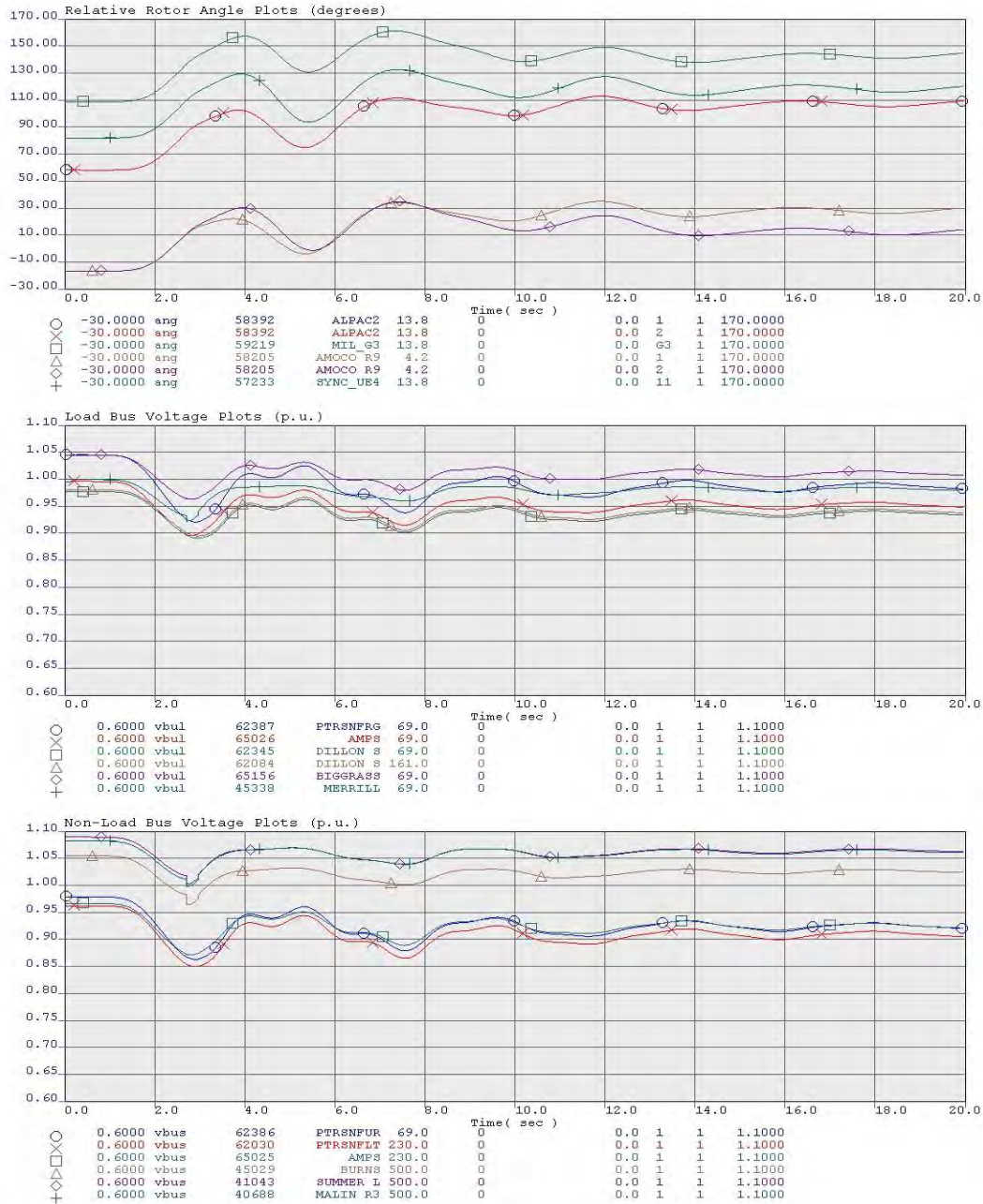
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Figure C8: Bi-Pole Loss of Pacific DC Intertie (Angle & Voltage Plots)

Appendix C – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, WoH 3400 MW
Loss of Two Palo Verde Units



Loss of 2 Palo Verde Units
RAS: With Phoenix Area Load Tripping RAS
FACRI Reactive Switching

Page 1



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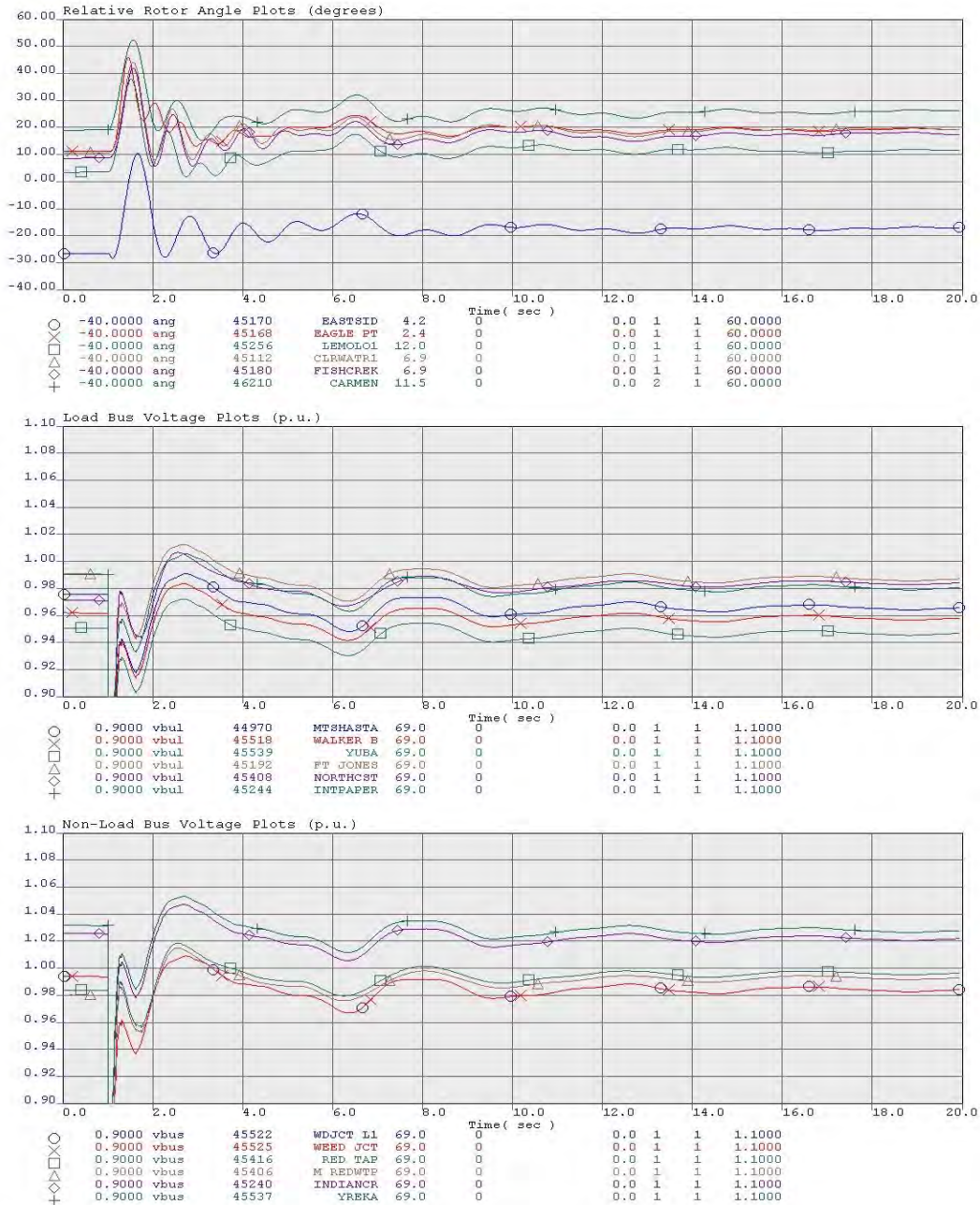
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Figure C9: N-2 Loss of Two Palo Verde Units (Angle & Voltage Plots)

Appendix C – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, WoH 3400 MW
N-2 Loss of Malin-Round Mt #1 & #2 500 kV Lines



3-Phase Fault @ Malin 500 kV with 4 Cycle Clearing
Loss of Malin-Round Mtn #1 & #2 500 kV Lines
Opens Round Mtn-Table Mtn #2 500 kV Line
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
NW Gen Drop 2400 MW

Page 1



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Figure C10: N-2 Loss of Malin-Round Mt #1 & #2 500 kV Lines (Angle & Voltage Plots)

Appendix C - 16hs2a_3400WoH_2250idnw_N Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	Var	None	Wood Rvr 138 15.9%	L Salm 3 13.8 0.829	Wood Rvr 138 15.9%	Palis g4 11.5 59.840	Stable & Damped
N-1 3 Cy 3PH Hatwai 500 kV	Hatwai-Lower Granite 500 kV	8 18	Libby 1-5 Generation Lancaster Generation	Ptrsfnrg 69 11.6%	Ptrsfnflt 230 0.852	Ptrsfnrg 69 11.6%	Hardingn 13.8 59.764	Stable & Damped
Bi-pole Block	PDCI Bipole	Var	FACRI insertion of Ft Rock Series Caps, Malin C1, CaptJack C1 Tracy&Olinda React Switching NW 2550 MW Gen Drop	Ptrsfnrg 69 11.4%	Ptrsfnflt 230 0.854	Ptrsfnrg 69 11.4%	Sync_g19 13.8 59.762	Stable & Damped
N-2	Loss of 2 Palo Verde units	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1	Ptrsfnrg 69 11.8%	Ptrsfnflt 230 0.850	Ptrsfnrg 69 11.8%	Sync_g19 13.8 59.760	Stable & Damped
N-2 4 Cy 3PH Malin 500 kV	Malin-Round Mt #1 500 kV Malin-Round Mt #2 500 kV Round Mt-Table Mt #2 500 kV	Var	Chief Jo Braking Resistor Tracy&Olinda React Switching NW 2400 MW Gen Drop Flash Malin-Round Mt S-Caps	Mtshasta 69 16.0%	Yuba 69 0.799	Mtshasta 69 16.0%	Lakeview 69 59.738	Stable & Damped

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV + RAS	OPEN Shunt TAFT_500.0 (41057) #s
BF 4028 Taft-Dworshak & Taft Reactor 500kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4028 Taft-Dworshak & Taft Reactor 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	SET SWITCHED SHUNT AT BUS BENEWAH_230.0 (48037) TO 201.3 MVR
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN InjectionGroup RAS Libby Gen Drop
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN Load MILCTYDC_230.0 (63010) #D1
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN Bus MILCTYDC_230.0 (63010)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	SET SWITCHED SHUNT AT BUS CUSTER_230.0 (63003) TO -22 MVR
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN Shunt CUSTER_230.0 (63003) #1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	SET SWITCHED SHUNT AT BUS KLAFALLS_230.0 (45161) TO 91.4 MVR
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop By 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop By 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_ 13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_ 13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_ 13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_ 13.8 (42043) #3
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_ 500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_ 500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_ 500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_ 500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_ 500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_ 20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_ 4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_ 13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_ 20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_ 4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_ 13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_ 115.0 (42806) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_ 500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_ 500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO CEN FERY_ 500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_ 500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_ 500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_ 500.0 (40045) TO ALLSTN E_ 230.0 (40043) CKT 2
BF 4708 Hatwai 500 kV Bus + RAS	OPEN Bus HATWAI_ 500.0 (40521)
BF 4708 Hatwai 500 kV Bus + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_ 230.0 (48512) TO 201.3 MVR
BF 4708 Hatwai 500 kV Bus + RAS	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
BF 4708 Hatwai 500 kV Bus + RAS	OPEN Shunt GARRISON_ 500.0 (40459) #s
BF 4708 Hatwai 500 kV Bus + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4708 Hatwai 500 kV Bus + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_ 500.0 (40233) TO CHIEF J2_ 230.0 (40232) CKT 3

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV + RAS	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS N POWDER_34.5 (60313) TO 27 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 13 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 200 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS N POWDER_34.5 (60313) TO 27 MVR
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus IONE_69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_100.0 (44115)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_100.0 (44116)
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_230.0 (44125)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_100.0 (44118)
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_13.8 (44107)

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_ 13.8 (44108)
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_ 230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_ 230.0 (44127)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_ 100.0 (44119)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_ 100.0 (44120)
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_ 13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_ 13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_ 13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_ 13.8 (44112)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_ 345.0 (40721)
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_ 500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_ 500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
Bus: Bell BPA 500 kV	OPEN InjectionGroup RAS Lancaster Gen Drop
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_ 500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_ 500.0 (45095)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_ 230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #2
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #3
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_ 500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_ 500.0 (40601)
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_ 500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_ 230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_ 230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_ 230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_ 230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_ 230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_ 34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_ 34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_ 0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_ 230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_ 34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_ 34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_ 34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_ 0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_ 34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_ 0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_ 34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_ 34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_ 230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_ 34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_ 34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_ 34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_ 34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_ 34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_ 230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_ 34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_ 34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_ 230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_ 34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_ 0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_ 34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_ 34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_ 0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_ 0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_ 0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_ 0.6 (47940)

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_ 0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_ 34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_ 0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_ 34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_ 0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAIVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
N-1: Bell-Coulee 500 kV	OPEN InjectionGroup RAS Lancaster Gen Drop
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: Captain Jack-Olinda 500 kV	SET SWITCHED SHUNT AT BUS WEED JCT_ 115.0 (45335) TO 30.3 MVR
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_ 500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_ 500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_ 500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHELS_ 500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_ 500.0 (40302) TO RAVER_ 500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_ 500.0 (45095) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO LOLO_ 230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO N LEWIST_ 230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO WALA AVA_ 230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-1: Dworshak-Taft 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-1: Dworshak-Taft 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-1: Dworshak-Taft 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_ 500.0 (40381) TO MAPLE VL_ 500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_ 500.0 (40381) TO RAVER_ 500.0 (40869) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-1: Hatwai-Low Gran 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV	CLOSE Shunt OREBASIN_34.5 (66146) #1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	CLOSE Shunt OREBASIN_34.5 (66146) #1
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt MIDPOINT_345.0 (60235) #2
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACJWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_230.0 (41352) TO MCNRY S3_230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_230.0 (40537) TO 52.2 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVEN_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVEN_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN Load MILCTYDC_230.0 (63010) #D1
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN Bus MILCTYDC_230.0 (63010)
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	SET SWITCHED SHUNT AT BUS CUSTER_230.0 (63003) TO -22 MVR
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP_4_26.0 (62047) #1
N-2: Taft-Bell & Taft-Dworskak 500 kV + RAS	SET SWITCHED SHUNT AT BUS GARRISON_500.0 (40459) TO -558 MVR
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN Gen BRIDGER1_22.0 (60086) #1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET LOAD AT BUS BRIDGER1_22.0 (60086) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN Gen BRIDGER2_22.0 (60087) #1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET LOAD AT BUS BRIDGER2_22.0 (60087) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI21_345.0 (61967) CKT 2 TO -0.017307 pu
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI11_345.0 (61968) CKT 1 TO -0.017307 pu
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SERIES CAP REACTANCE AT BRI3MI11_345.0 (61999) TO 3MIKNOLL_345.0 (60084) CKT 1 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV + RAS	CLOSE Shunt BORAH_345.0 (60060) #1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	BYPASS SeriesCap BURNS_500.0 (45029) TO BURSUN11_500.0 (90132) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN Gen BRIDGER1_22.0 (60086) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET LOAD AT BUS BRIDGER1_22.0 (60086) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN Gen BRIDGER2_22.0 (60087) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET LOAD AT BUS BRIDGER2_22.0 (60087) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI21_345.0 (61967) CKT 2 TO -0.017307 pu
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI11_345.0 (61968) CKT 1 TO -0.017307 pu
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SERIES CAP REACTANCE AT BRI3MI11_345.0 (61999) TO 3MIKNOLL_345.0 (60084) CKT 1 TO 50 % of present
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	CLOSE Shunt BORAH_345.0 (60060) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BYPASS SeriesCap BURNS_500.0 (45029) TO BURSUM11_500.0 (90132) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	CLOSE Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt PTRSNFLT_230.0 (62030) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt OREBASIN_230.0 (66145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt FRANNIE2_34.5 (67145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARLAND1_34.5 (67147) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELLSYCN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_ 13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_ 13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS COLV BPA_115.0 (40263) TO 39.3 MVR
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BELL S2_230.0 (40088) TO 407.5 MVR
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS COLV BPA_115.0 (40263) TO 39.3 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS BELL S2_230.0 (40088) TO 407.5 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
	order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV + RAS Open 69 kV	OPEN InjectionGroup RAS Lower Granite Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 kV + RAS Open 69 kV	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 kV + RAS Open 69 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV + RAS Open 69 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Lower Granite-Central Ferry #1 & #2 500 kV + RAS Open 69 kV	OPEN Line MILL CRK_69.0 (45205) TO WAITBURG_69.0 (45323) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV + RAS	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV + RAS	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV + RAS	SET INJECTION GROUP RAS Boundary Gen Drop TO 400 MW in generator merit order by opening
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV + RAS	SET SWITCHED SHUNT AT BUS COLV BPA_115.0 (40263) TO 39.3 MVR
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN Load MILCTYDC_230.0 (63010) #D1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN Bus MILCTYDC_230.0 (63010)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	SET SWITCHED SHUNT AT BUS CUSTER_230.0 (63003) TO -22 MVR
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN Shunt CUSTER_230.0 (63003) #1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500kV + RAS	OPEN Bus HOT SPR_500.0 (40553)
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai-Low Gran 500 kV + RAS	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap MIKKALO_500.0 (43970) TO MKLOSNT2_500.0 (43971) CKT 2
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap SANTIAM_500.0 (40941) TO SANTMKO2_500.0 (43492) CKT 2
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1

Appendix C - 16hs2a_3400WoH_2250idnw_N Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRSSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRSSLND_500.0 (43049) CKT 1

Appendix D

16hs2a_2250idnw_ms Base Case (MSTI & SWIP, SWIP South 1500 MW)

Appendix D– 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

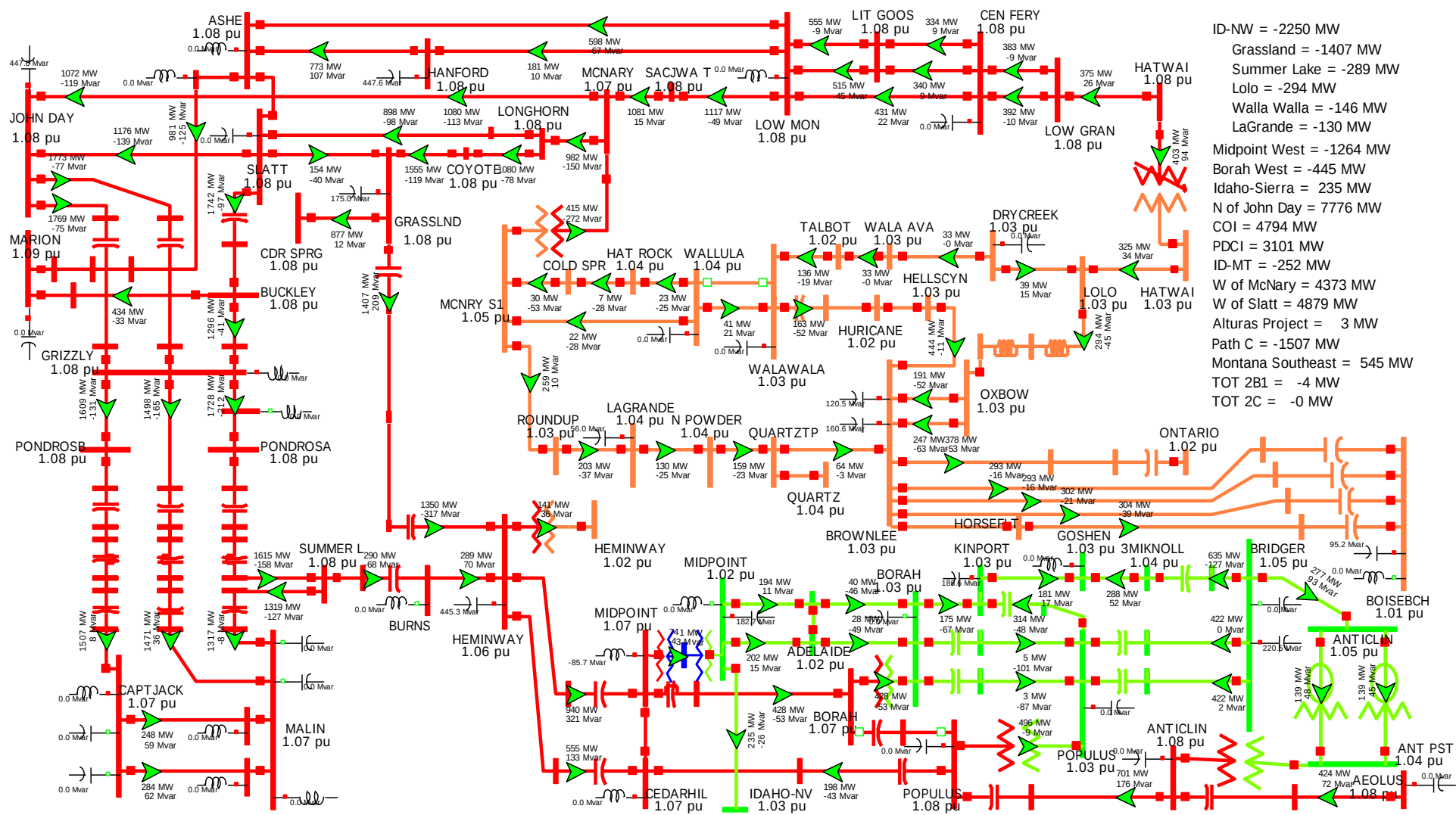


Figure D1: 16hs2sa_2250idnw_N_ms Case **Pre-Contingency**

Appendix D– 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

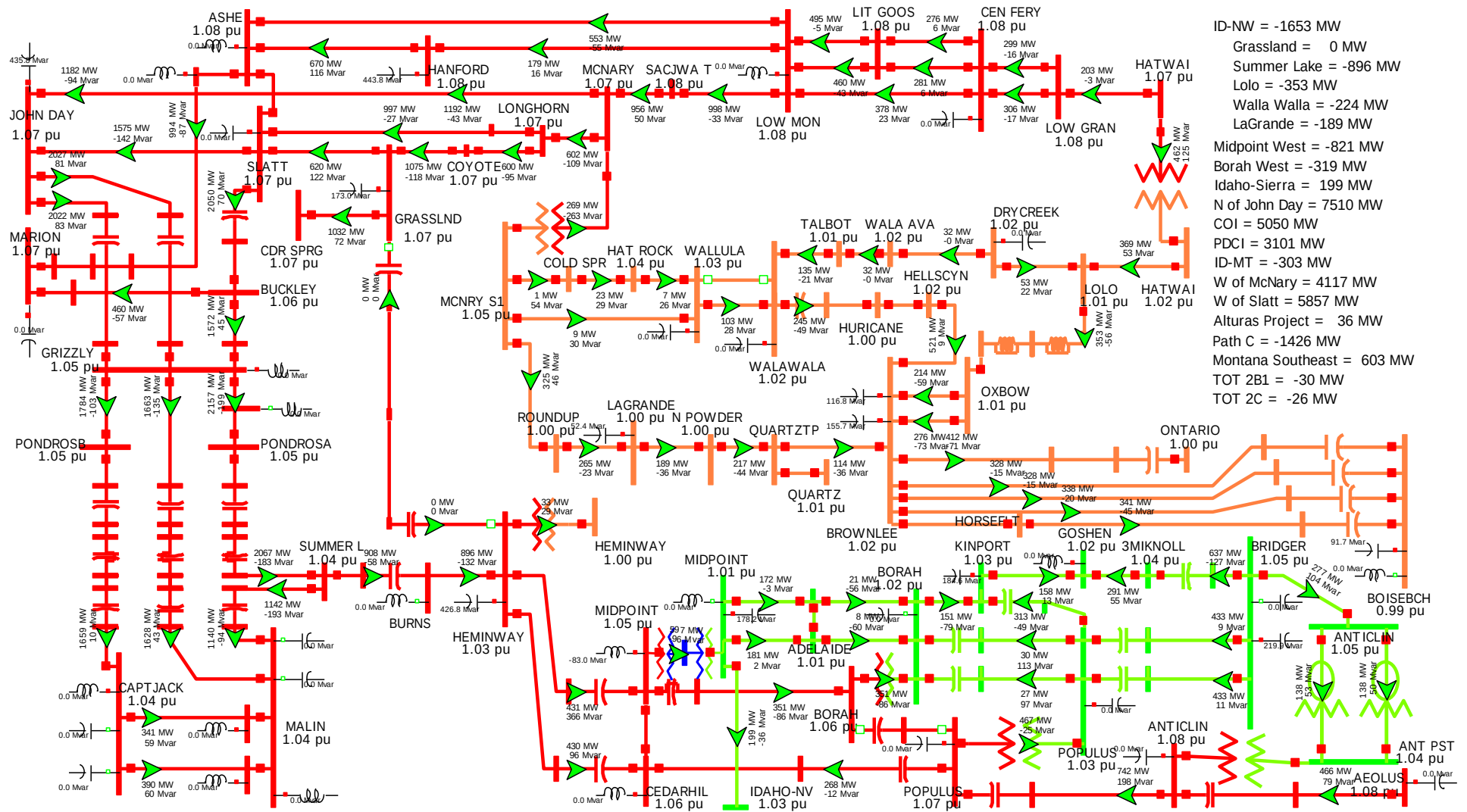


Figure D2: 16hs2sa_2250idnw_N_ms Case **N-1: Hemingway-Grassland 500 kV + PTSN Shunt**

Appendix D– 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

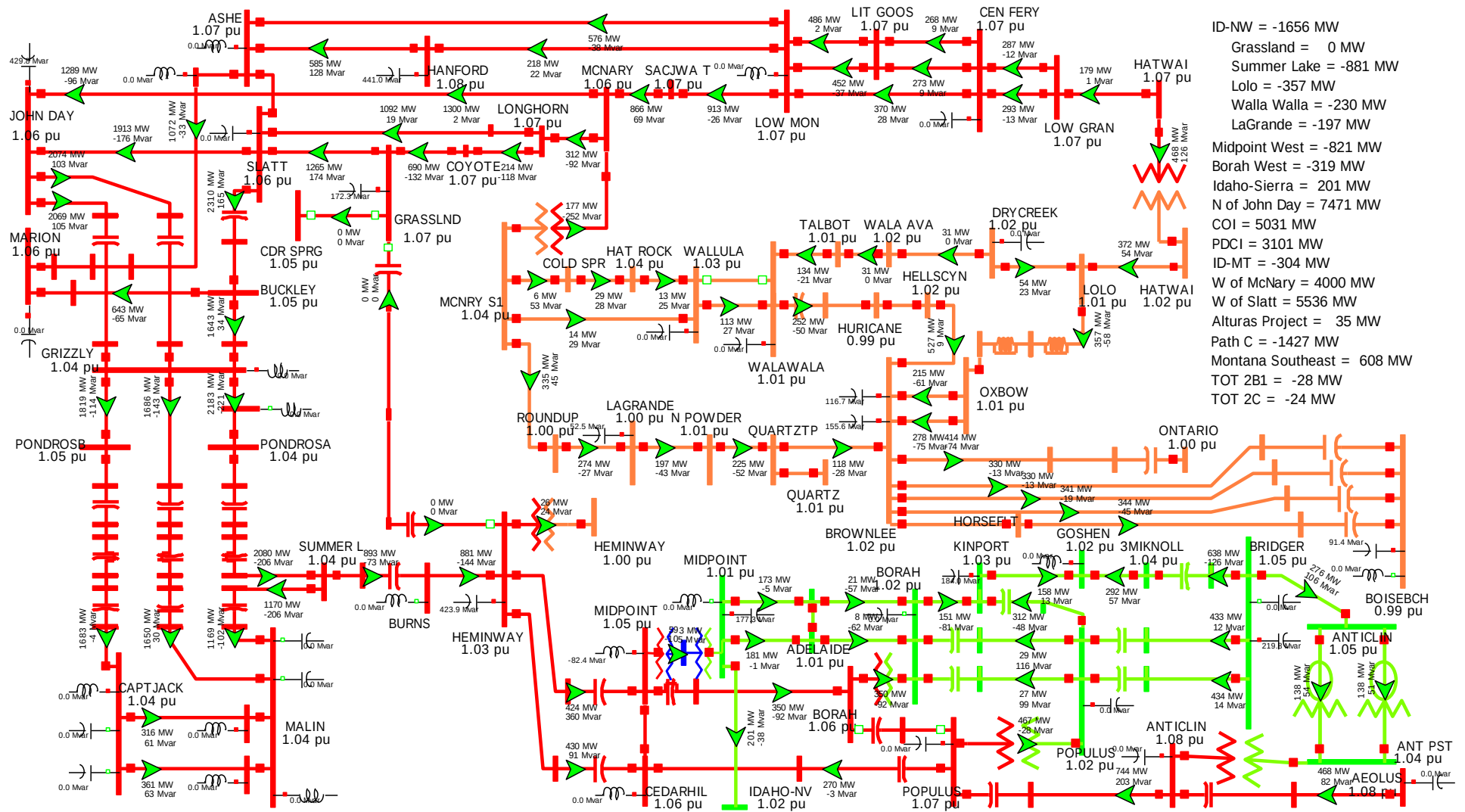


Figure D3: 16hs2sa_2250idnw_N_ms Case BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN

Appendix D- 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

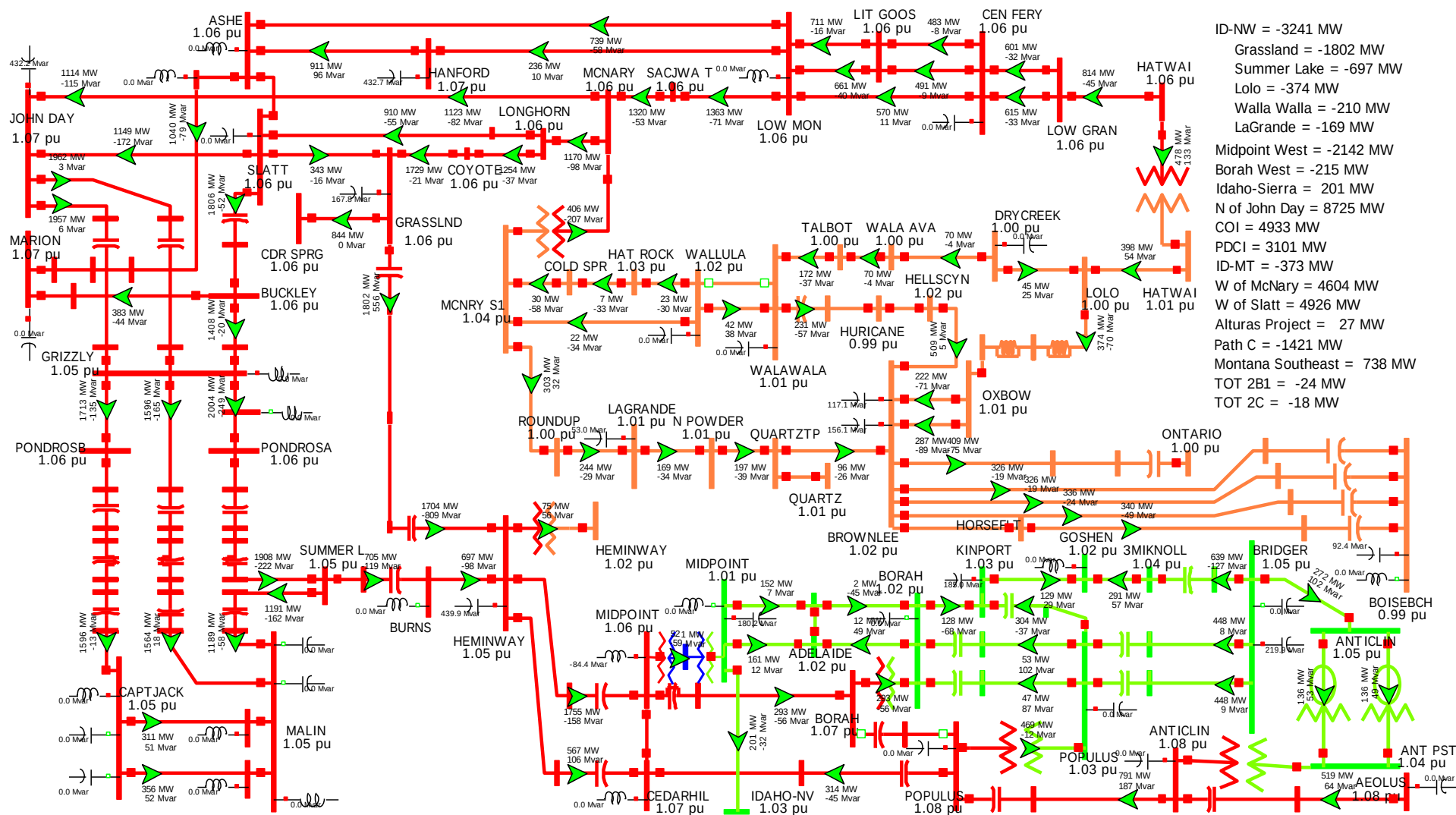


Figure D4: 16hs2sa 2250idnw N ms Case **N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt**

Appendix D– 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

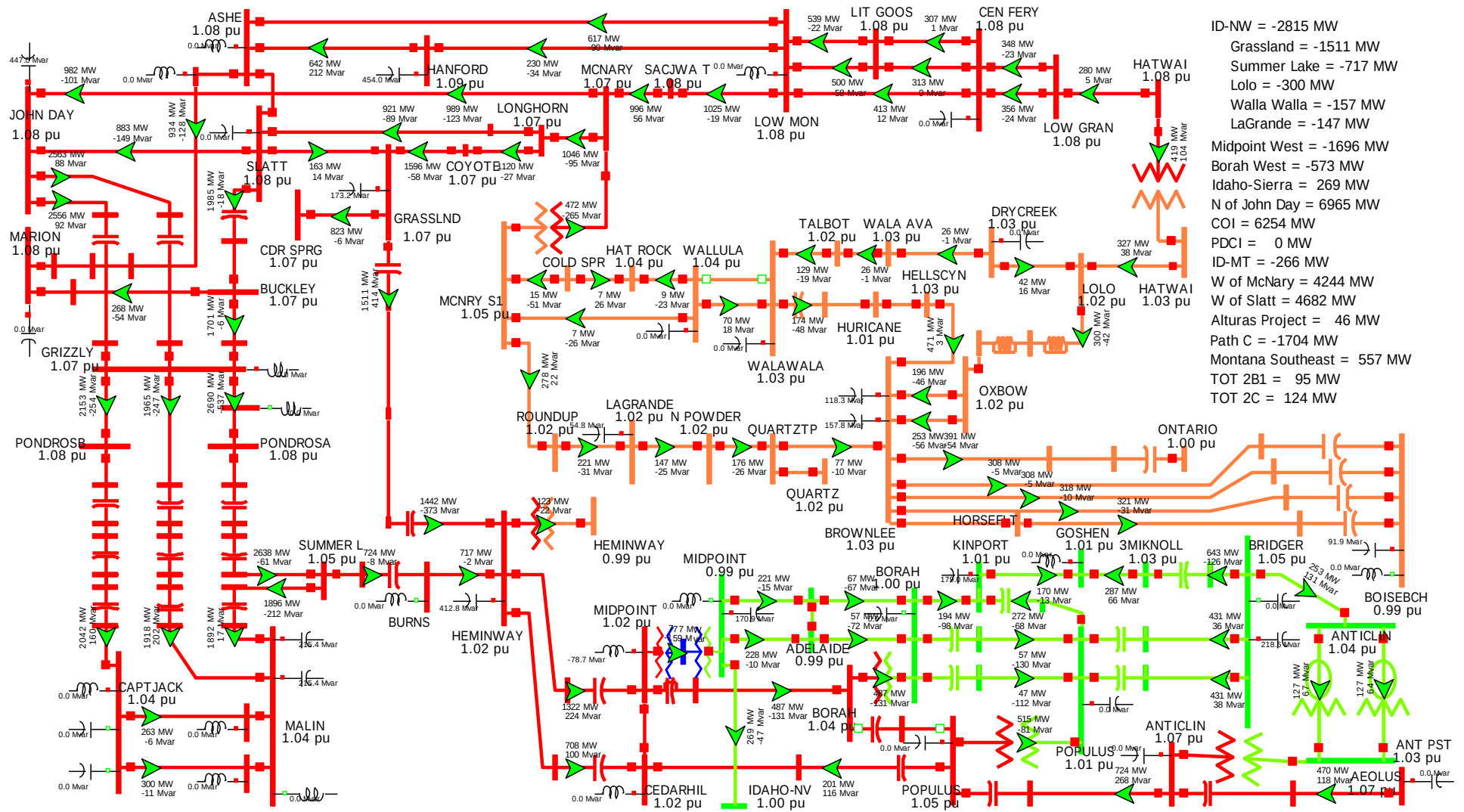


Figure D5: 16hs2sa_2250idnw_N_ms Case N-2: DC-BIPOLE

Appendix D– 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

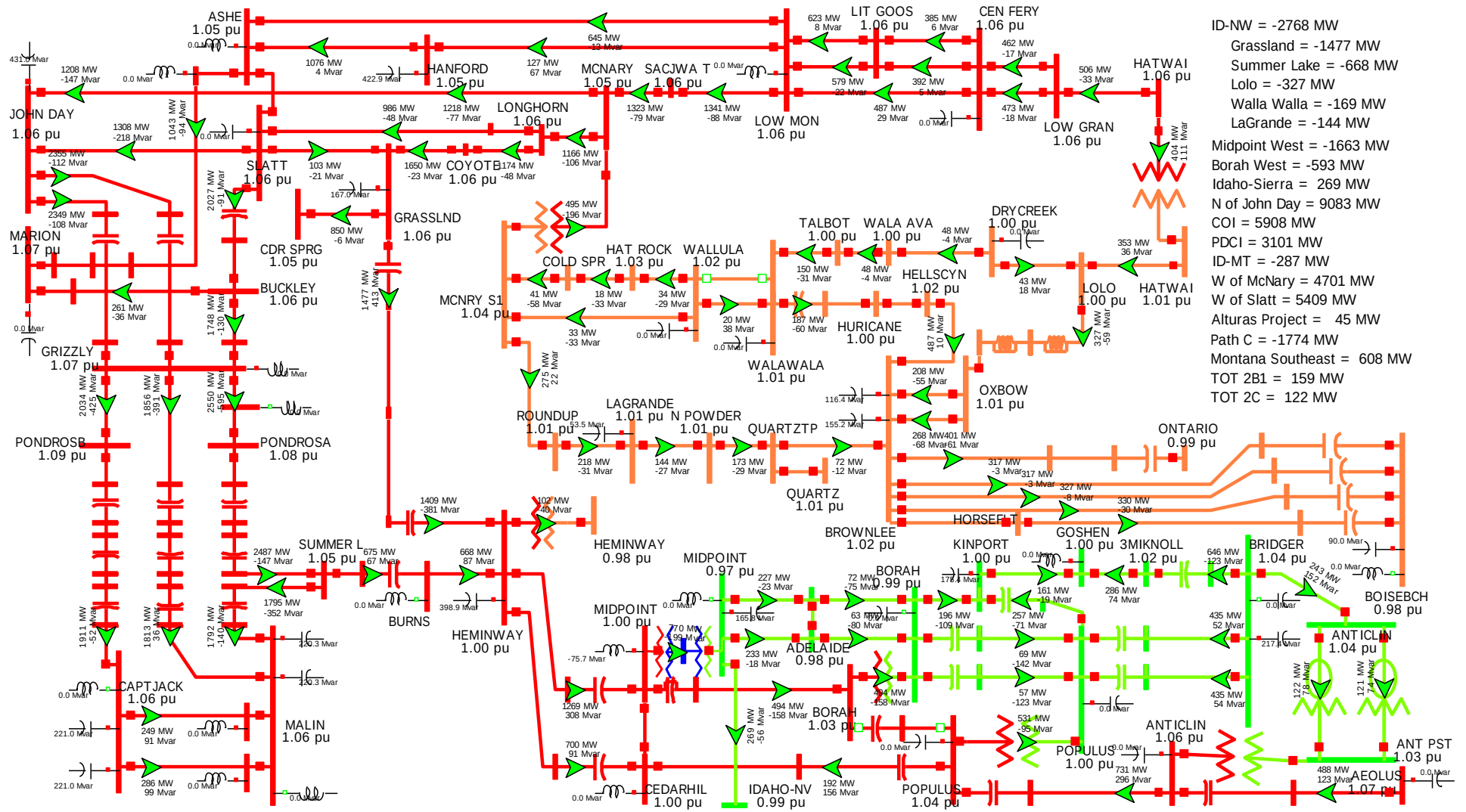


Figure D6: 16hs2sa_2250idnw_N_ms Case N-2: Double Palo Verde

Appendix D– 16hs2sa_2250idnw_N_ms Case Post-Transient Contingency Results

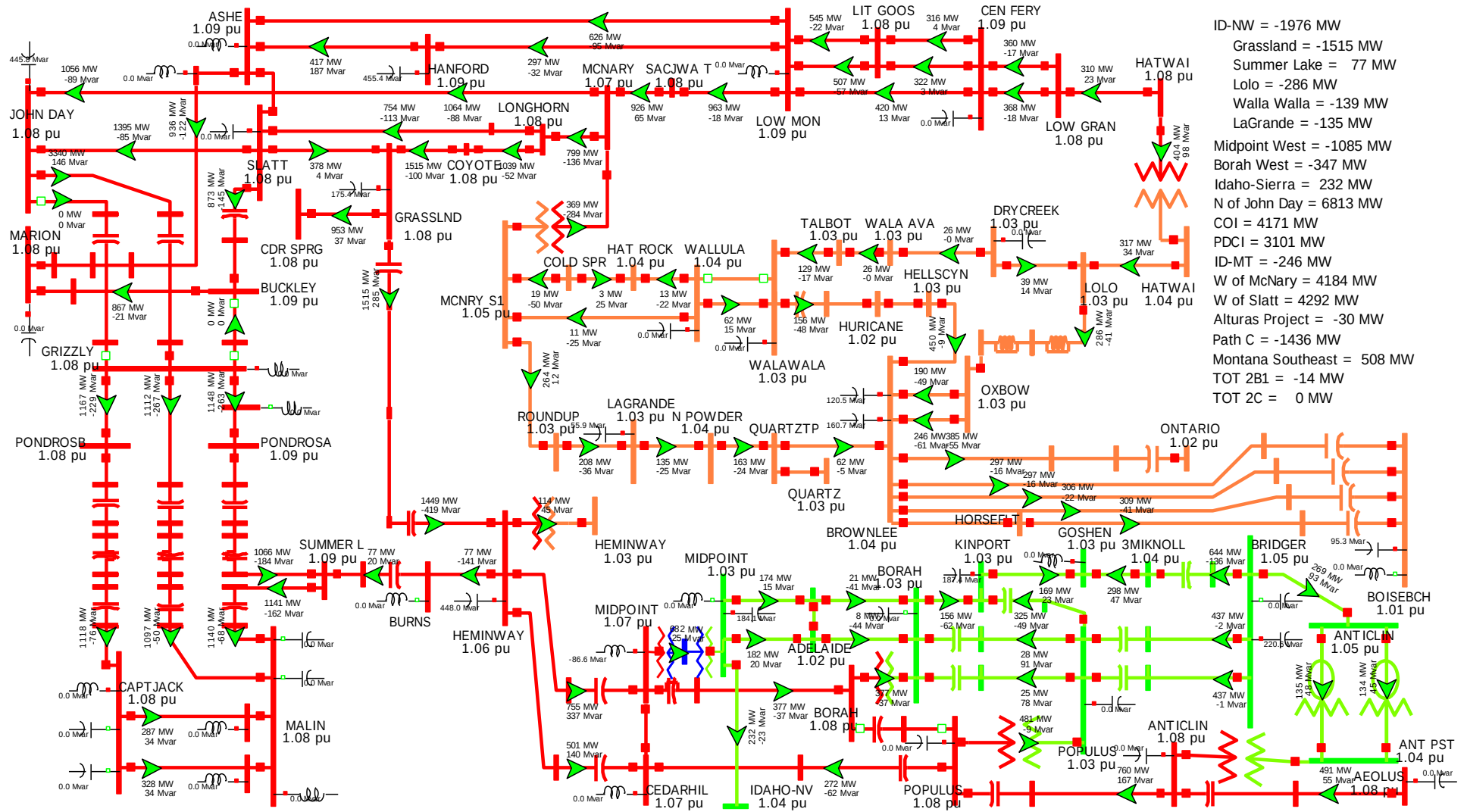


Figure D7: 16hs2sa_2250idnw_N_ms Case N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1550.96	1550	100.1%	1782.5	87.0%
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	MERIDINP (45197) -> MERIDINP (45195) CKT 2 at MERIDINP	Branch MVA	362.71	676.03	650	104.0%	780.0	86.7%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1552.06	1550	100.1%	1782.5	87.1%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	636.27	1204.25	978.99	123.0%	1287.7	93.5%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	306.62	777.51	722.94	107.5%	1265.2	61.5%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1595.95	1550	103.0%	1782.5	89.5%
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1584.96	1550	102.3%	1782.5	88.9%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1708.65	2936.12	2441.96	120.2%	3235.5	90.7%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1708.65	2936.12	2199.94	133.5%	3279.9	89.5%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1707.51	2929.07	2666.9	109.8%	4000.0	73.2%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at ROUND MT	Branch Amp	1698.77	2918.34	2667.01	109.4%	4000.0	73.0%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1560.59	1550	100.7%	1782.5	87.6%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1662.21	2840.25	2699.69	105.2%	4000.0	71.0%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1654.87	2824.6	2699.69	104.6%	4000.0	70.6%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1607.22	1550	103.7%	1782.5	90.2%
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1560.85	1550	100.7%	1782.5	87.6%
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1567.85	1550	101.2%	1782.5	88.0%
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1708.65	2970.18	2441.96	121.6%	3235.5	91.8%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1708.65	2970.18	2199.94	135.0%	3279.9	90.6%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1707.51	2962.82	2666.9	111.1%	4000.0	74.1%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1698.77	2952.35	2667.01	110.7%	4000.0	73.8%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1572.08	1550	101.4%	1782.5	88.2%
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1580.09	1550	101.9%	1782.5	88.6%
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.18	326.36	320	102.0%	370.0	88.2%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	682.79	1039.75	950	109.4%	1286.0	80.9%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.18	333.11	320	104.1%	370.0	90.0%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	682.79	1051.56	950	110.7%	1286.0	81.8%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1051.11	1009.11	104.2%	1285.2	81.8%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1553.51	1550	100.2%	1782.5	87.2%
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1584.42	1550	102.2%	1782.5	88.9%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	DWOR 2 (40363)	% Δ Volts	1.010	1.070				5.94%
BF 4708 Hatwai 500 kV Bus	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1642.28	1550	106.0%	1782.5	92.1%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1622.33	1550	104.7%	1782.5	91.0%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1574.89	1550	101.6%	1782.5	88.4%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1553.04	1550	100.2%	1782.5	87.1%
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1581.28	1550	102.0%	1782.5	88.7%
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1579.72	1550	101.9%	1782.5	88.6%
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1561.55	1550	100.7%	1782.5	87.6%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1580.51	1550	102.0%	1782.5	88.7%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1590.19	1550	102.6%	1782.5	89.2%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1555.09	1550	100.3%	1782.5	87.2%
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1587.51	1550	102.4%	1782.5	89.1%
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	TOWNSEND (62500) -> TWSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1573.59	1550	101.5%	1782.5	88.3%
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1611.9	1550	104.0%	1782.5	90.4%
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1565.36	1550	101.0%	1782.5	87.8%
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.49	1550	100.1%	1782.5	87.0%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1584.42	1550	102.2%	1782.5	88.9%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1581.77	1550	102.0%	1782.5	88.7%
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1568.24	1550	101.2%	1782.5	88.0%
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1574.76	1550	101.6%	1782.5	88.3%
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1724.95	1550	111.3%	1782.5	96.8%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1295.85	1237.04	104.8%	1395.9	92.8%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	929.19	919.99	101.0%	1046.8	88.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1555.42	1550	100.3%	1782.5	87.3%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1599.51	1550	103.2%	1782.5	89.7%
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations							
BF Lolo 230kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1568.69	1550	101.2%	1782.5	88.0%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1734.93	1550	111.9%	1782.5	97.3%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1306.2	1237.04	105.6%	1395.9	93.6%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	936.15	919.99	101.8%	1046.8	89.4%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1023.5	1009.11	101.4%	1285.2	79.6%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	PTRSNFLT (62030)	% Δ Volts	1.000	0.950				5.00%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1733.4	1550	111.8%	1782.5	97.2%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1302.84	1237.04	105.3%	1395.9	93.3%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	932.23	919.99	101.3%	1046.8	89.1%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1022.88	1009.11	101.4%	1285.2	79.6%
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.88	1550	100.1%	1782.5	87.1%
BF PGE Grassland-Slatt 500kV & Boardman Plant	No Violations							
Bus: Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1030.57	1009.11	102.1%	1285.2	80.2%
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1553.61	1550	100.2%	1782.5	87.2%
Bus: Dixonville 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1557.75	1550	100.5%	1782.5	87.4%
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	No Violations							
Bus: Rock Creek 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1574.43	1550	101.6%	1782.5	88.3%
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1584.77	1550	102.2%	1782.5	88.9%
N-1: Allston-Keeler 500 kV + RAS	No Violations							

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1557.03	1550	100.5%	1782.5	87.4%
N-1: Alvey-Marion 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.92	1550	100.1%	1782.5	87.1%
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1095.53	1009.11	108.6%	1285.2	85.2%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1555.01	1550	100.3%	1782.5	87.2%
N-1: Ashe-Slatt 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1579.29	1550	101.9%	1782.5	88.6%
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.44	1550	100.1%	1782.5	87.0%
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1552.21	1550	100.1%	1782.5	87.1%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	249.76	822.5	785.7	104.7%	926.3	88.8%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	249.76	822.5	785.7	104.7%	926.3	88.8%
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1708.65	2569.7	2441.96	105.2%	3235.5	79.4%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1708.65	2569.7	2199.94	116.8%	3279.9	78.3%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1819.11	2428.57	2199.94	110.4%	3280.5	74.0%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1803.72	2408.03	2199.94	109.5%	3280.5	73.4%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2004.23	2641.4	2477.87	106.6%	4000.0	66.0%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1034.04	1009.11	102.5%	1285.2	80.5%
N-1: Cedar Hill-Robinson 500 kV (SWIP)	No Violations							
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1560.19	1550	100.7%	1782.5	87.5%
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1552.57	1550	100.2%	1782.5	87.1%
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	636.27	1162.18	978.99	118.7%	1287.7	90.3%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Dixonville-Meridian 500 kV	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	306.62	727.89	722.94	100.7%	1265.2	57.5%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1649.26	1550	106.4%	1782.5	92.5%
N-1: Dworshak-Taft 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1595.95	1550	103.0%	1782.5	89.5%
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.88	1550	100.1%	1782.5	87.1%
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1564.14	1550	100.9%	1782.5	87.7%
N-1: Grizzly-Malin 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1554.02	1550	100.3%	1782.5	87.2%
N-1: Grizzly-Malin 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1749.71	2408.31	2400.04	100.3%	3799.0	63.4%
N-1: Grizzly-Ponderosa A-Summer L 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1594.92	1550	102.9%	1782.5	89.5%
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1554.4	1550	100.3%	1782.5	87.2%
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1749.71	2407.12	2400.04	100.3%	3799.0	63.4%
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1574.72	1550	101.6%	1782.5	88.3%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1563.47	1550	100.9%	1782.5	87.7%
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	933.91	919.99	101.5%	1046.8	89.2%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1717.09	1550	110.8%	1782.5	96.3%
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1290.98	1237.04	104.4%	1395.9	92.5%
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	924.24	919.99	100.5%	1046.8	88.3%
N-1: Hemingway-Grassland 500 kV + FACRI	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1618.46	1550	104.4%	1782.5	90.8%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1749.71	2843.6	2400.04	118.5%	3799.0	74.9%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1743.73	2826.45	2400.04	117.8%	3799.0	74.4%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1723.86	1550	111.2%	1782.5	96.7%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1284.96	1237.04	103.9%	1395.9	92.1%
N-1: Hemingway-Summer Lake 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1560.7	1550	100.7%	1782.5	87.6%
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1573.68	1550	101.5%	1782.5	88.3%
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1566.61	1550	101.1%	1782.5	87.9%
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1574.07	1550	101.6%	1782.5	88.3%
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1708.65	2938.03	2441.96	120.3%	3235.5	90.8%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1708.65	2938.03	2199.94	133.6%	3279.9	89.6%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALROU21	Branch Amp	1707.51	2930.7	2666.9	109.9%	4000.0	73.3%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1698.77	2920.51	2667.01	109.5%	4000.0	73.0%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALROU11	Branch Amp	1662.21	2909.68	2699.69	107.8%	4000.0	72.7%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1654.87	2896.78	2699.69	107.3%	4000.0	72.4%
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.39	1550	100.1%	1782.5	87.0%
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1575.93	1550	101.7%	1782.5	88.4%
N-1: Midpoint-Hemingway 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1591.37	1550	102.7%	1782.5	89.3%
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Midpoint-Townsend 500 kV (MSTI)	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	992.01	919.99	107.8%	1046.8	94.8%
N-1: Midpoint-Townsend 500 kV (MSTI)	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1256.17	1237.04	101.5%	1395.9	90.0%
N-1: Midpoint-Townsend 500 kV (MSTI)	MIDHEM11 (61988) -> MIDPOINT (60240) CKT 1 at MIDPOINT	Branch Amp	1182.83	1883.33	1732.05	108.7%	2338.3	80.5%
N-1: Midpoint-Townsend 500 kV (MSTI)	PTRSNFLT (62030)	% Δ Volts	1.000	0.930				7.00%
N-1: Midpoint-Townsend 500 kV (MSTI)	AMPS (65025)	% Δ Volts	1.000	0.940				6.00%
N-1: Midpoint-Townsend 500 kV (MSTI)	PTRSNFUR (62386)	% Δ Volts	1.010	0.950				5.94%
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	741.86	989.82	919.99	107.6%	1046.8	94.6%
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1082.18	1254.45	1237.04	101.4%	1395.9	89.9%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	MIDHEM11 (61988) -> MIDPOINT (60240) CKT 1 at MIDPOINT	Branch Amp	1182.83	1877.64	1732.05	108.4%	2338.3	80.3%
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1568.04	1550	101.2%	1782.5	88.0%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.18	349.07	320	109.1%	370.0	94.3%
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	682.79	1177.33	950	123.9%	1286.0	91.5%
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.18	324.84	320	101.5%	370.0	87.8%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	682.79	1034.73	950	108.9%	1286.0	80.5%
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1551.99	1550	100.1%	1782.5	87.1%
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	91.85	161	150	107.3%	180.0	89.4%
N-1: Robinson-Harry Allen 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	296.31	429.81	415.69	103.4%	483.5	88.9%
N-1: Robinson-Harry Allen 500 kV	CHCGO PK (32224) -> HIGGINS (32232) CKT 1 at CHCGO PK	Branch Amp	533.36	662.04	652.66	101.4%	893.6	74.1%
N-1: Rock Ck-Wautoma 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1573.55	1550	101.5%	1782.5	88.3%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1819.11	3259.15	2199.94	148.1%	3280.5	99.3%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	1808.64	3244.97	2667.01	121.7%	3280.5	98.9%
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUND MT	Branch Amp	1819.11	3259.15	2667.01	122.2%	4000.0	81.5%
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	2004.23	2971.66	2667.01	111.4%	4000.0	74.3%
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2004.23	2971.66	2477.87	119.9%	4000.0	74.3%
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at VACA-DIX	Branch Amp	1977.58	2950.84	2667.01	110.6%	4000.0	73.8%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1501.76	2665.77	2229.96	119.5%	3555.9	75.0%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1624.35	1550	104.8%	1782.5	91.1%

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Ashe-Marion & Buckley-Marion 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1553.65	1550	100.2%	1782.5	87.2%
N-2: Ashe-Marion & Slatt-Buckley 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1580.25	1550	102.0%	1782.5	88.7%
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1557.29	1550	100.5%	1782.5	87.4%
N-2: Ashe-Marion & Slatt-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1554.43	1550	100.3%	1782.5	87.2%
N-2: Ashe-Slatt & McNary-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1589.15	1550	102.5%	1782.5	89.2%
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1586.02	1550	102.3%	1782.5	89.0%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	No Violations							
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1046.61	1009.11	103.7%	1285.2	81.4%
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	919.13	1033.79	1009.11	102.4%	1285.2	80.4%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1555	1550	100.3%	1782.5	87.2%
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1555.62	1550	100.4%	1782.5	87.3%
N-2: Bridger-Populus #1 & #2 345 kV	No Violations							
N-2: Broadview-Townsend #1 & #2 500 kV + RAS	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1621	1550	104.6%	1782.5	90.9%
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1565.16	1550	101.0%	1782.5	87.8%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1587.43	1550	102.4%	1782.5	89.1%
N-2: Coulee-Schultz #1 & #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1580	1550	101.9%	1782.5	88.6%
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	SCATERGD (26066) -> OLYMPC (26087) CKT 2 at OLYMPC	Branch Amp	811.04	910.52	876.07	103.9%	1001.6	90.9%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1749.71	2926.47	2400.04	121.9%	3799.0	77.0%
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1743.73	2913.84	2400.04	121.4%	3799.0	76.7%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1819.11	2362.56	2199.94	107.4%	3280.5	72.0%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1803.72	2342.59	2199.94	106.5%	3280.5	71.4%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1708.65	2296.77	2199.94	104.4%	3279.9	70.0%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2004.23	2540.07	2477.87	102.5%	4000.0	63.5%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1531.36	2159.92	2134	101.2%	3499.9	61.7%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1514.76	2136.61	2134	100.1%	3499.9	61.0%
N-2: DC-BIPOLE	ROBINSON (64895)	% Δ Volts	1.080	1.020				5.56%
N-2: DC-BIPOLE	YORCANY (12091)	% Δ Volts	1.000	0.950				5.00%
N-2: Double Palo Verde	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1629.76	1550	105.1%	1782.5	91.4%
N-2: Double Palo Verde	HESPERUS (79071) -> COYOTE G (79191) CKT 1 at HESPERUS	Branch Amp	353.74	434.36	431.76	100.6%	441.8	98.3%
N-2: Double Palo Verde	GLCRWND2 (62397) -> SHELBY T (62128) CKT 1 at GLCRWND2	Branch Amp	398.83	401.75	401.63	100.0%	530.2	75.8%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1749.71	2767.78	2400.04	115.3%	3799.0	72.9%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1743.73	2752.74	2400.04	114.7%	3799.0	72.5%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Double Palo Verde	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1819.11	2227.13	2199.94	101.2%	3280.5	67.9%
N-2: Double Palo Verde	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1803.72	2208.32	2199.94	100.4%	3280.5	67.3%
N-2: Double Palo Verde	SHELBY T (62128) -> SHELBY 2 (62027) CKT 1 at SHELBY T	Branch Amp	398.43	401.67	401.63	100.0%	1001.6	40.1%
N-2: Double Palo Verde	YORKCANY (12091)	% Δ Volts	1.000	0.920				8.00%
N-2: Double Palo Verde	ROBINSON (64895)	% Δ Volts	1.080	1.000				7.41%
N-2: Double Palo Verde	CIMARRON (12148)	% Δ Volts	1.000	0.930				7.00%
N-2: Double Palo Verde	MONTROSE (79049)	% Δ Volts	1.000	0.930				7.00%
N-2: Double Palo Verde	PTRSNFLT (62030)	% Δ Volts	1.000	0.930				7.00%
N-2: Double Palo Verde	RAINVL_T (12130)	% Δ Volts	1.000	0.930				7.00%
N-2: Double Palo Verde	RAINVL1 (12129)	% Δ Volts	1.000	0.930				7.00%
N-2: Double Palo Verde	SPRINGER (12077)	% Δ Volts	1.000	0.930				7.00%
N-2: Double Palo Verde	PTRSNFUR (62386)	% Δ Volts	1.010	0.940				6.93%
N-2: Double Palo Verde	ROBINSON (64885)	% Δ Volts	1.030	0.960				6.80%
N-2: Double Palo Verde	CEDARHIL (60159)	% Δ Volts	1.070	1.000				6.54%
N-2: Double Palo Verde	MIDPOINT (60240)	% Δ Volts	1.070	1.000				6.54%
N-2: Double Palo Verde	BACA (10026)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	BULLOCK (79079)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	DOUGHSPN (79182)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	GUNVAL (79184)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	HAPPYCANY (79082)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	LOSTCANY (79045)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	NORTHMSA (79085)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	PEACHVLY (72801)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	SPRCKTAP (79115)	% Δ Volts	0.990	0.930				6.06%
N-2: Double Palo Verde	AMPS (65025)	% Δ Volts	1.000	0.940				6.00%
N-2: Double Palo Verde	BIGGRASS (65155)	% Δ Volts	1.000	0.940				6.00%
N-2: Double Palo Verde	DILLON S (62084)	% Δ Volts	1.000	0.940				6.00%
N-2: Double Palo Verde	EMPIRETS (79075)	% Δ Volts	1.000	0.940				6.00%
N-2: Double Palo Verde	TOWAOC (79122)	% Δ Volts	1.000	0.940				6.00%
N-2: Double Palo Verde	ARRIBA (10016)	% Δ Volts	1.010	0.950				5.94%
N-2: Double Palo Verde	ARRIBA_T (10018)	% Δ Volts	1.010	0.950				5.94%
N-2: Double Palo Verde	CLIFTON (70113)	% Δ Volts	1.010	0.950				5.94%
N-2: Double Palo Verde	GALLINAT (10484)	% Δ Volts	1.010	0.950				5.94%
N-2: Double Palo Verde	GRANDJCT (79036)	% Δ Volts	1.010	0.950				5.94%
N-2: Double Palo Verde	STORRIE (12079)	% Δ Volts	1.010	0.950				5.94%
N-2: Double Palo Verde	HORIZON (70233)	% Δ Volts	1.020	0.960				5.88%
N-2: Double Palo Verde	VALENCIA (10357)	% Δ Volts	1.020	0.960				5.88%
N-2: Double Palo Verde	WBK 25 (50742)	% Δ Volts	1.020	0.960				5.88%
N-2: Double Palo Verde	HEMINWAY (60155)	% Δ Volts	1.060	1.000				5.66%
N-2: Double Palo Verde	BLUEDOOR (79073)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	CORTEZ (79012)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	E.CORTEZ (79074)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	GARNET M (79103)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	GARNETAP (79104)	% Δ Volts	0.990	0.940				5.05%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Double Palo Verde	GRANDJCT (79034)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	GRANDJCT (79035)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	LOSTCANY (79044)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	MCKENZIX (79193)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	MONTROSE (79048)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	SOCANAL (79192)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	STRNELSN (79183)	% Δ Volts	0.990	0.940				5.05%
N-2: Double Palo Verde	VALENCIA (10356)	% Δ Volts	0.990	0.940				5.05%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	No Violations							
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1593.07	1550	102.8%	1782.5	89.4%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1749.71	3391.49	2400.04	141.3%	3799.0	89.3%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1418.46	3235.36	2700.04	119.8%	4000.0	80.9%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1558.8	1550	100.6%	1782.5	87.5%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1639.66	3210.84	2400.04	133.8%	4099.2	78.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1625.28	3197.94	2400.04	133.2%	4099.2	78.0%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1639.66	3168.64	2400.04	132.0%	4099.2	77.3%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON12	Branch Amp	1625.28	3157.73	2400.04	131.6%	4099.2	77.0%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1557.04	1550	100.5%	1782.5	87.4%
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1579	1550	101.9%	1782.5	88.6%
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1865.91	3190.86	2900.03	110.0%	4350.0	73.4%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	JOHN DAY (40585) -> GRIJOH12 (90065) CKT 1 at JOHN DAY	Branch Amp	1890.75	3568.7	3500.01	102.0%	3500.01	102.0%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH11 (90064) -> GRIZZLY (40489) CKT 1 at GRIJOH11	Branch Amp	1882.74	3561.71	3500.01	101.8%	3500.0	101.8%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH12	Branch Amp	1882.74	3561.71	3000.03	118.7%	4050.0	87.9%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1573.47	1550	101.5%	1782.5	88.3%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.18	345.57	320	108.0%	370.0	93.4%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	682.79	1177.49	950	123.9%	1286.0	91.6%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CLATSOP (40243) -> LWSCCLARK (45314) CKT 1 at CLATSOP	Branch MVA	79.27	95.94	94	102.1%	139.0	69.0%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CARLTON (40181)	% Δ Volts	1.03	0.97				5.83%
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1622.33	1550	104.7%	1782.5	91.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	91.85	165.78	150	110.5%	180.0	92.1%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1855.4	3801.86	2667.36	142.5%	4099.2	92.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1820.99	3691.81	2667.36	138.4%	4099.2	90.1%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPOLI11	Branch Amp	1820.99	3691.81	2667.36	138.4%	4099.2	90.1%
N-2: Malin-Round Mtn #1 & #2 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	296.31	416.03	415.69	100.1%	483.5	86.1%

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1980.24	3222.95	2992.98	107.7%	4514.9	71.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1980.24	3222.95	2992.98	107.7%	4514.9	71.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1949.99	3189.36	2992.98	106.6%	4514.9	70.6%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1949.99	3189.36	2992.98	106.6%	4514.9	70.6%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1928.22	3151.51	2992.98	105.3%	4514.9	69.8%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025)	% Δ Volts	1.04	0.98				5.77%
N-2: Malin-Round Mtn #1 & #2 500 kV	MTSHASTA (44970)	% Δ Volts	0.99	0.94				5.05%
N-2: Malin-Round Mtn #1 & #2 500 kV	WEED (45524)	% Δ Volts	1.00	0.95				5.00%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1590.49	1550	102.6%	1782.5	89.2%
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1591.85	1550	102.7%	1782.5	89.3%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1566.06	1550	101.0%	1782.5	87.9%
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1566.3	1550	101.1%	1782.5	87.9%
N-2: Paul-Raver & Raver-Covingt4 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1552.53	1550	100.2%	1782.5	87.1%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.18	326.78	320	102.1%	370.0	88.3%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	682.79	1040.29	950	109.5%	1286.0	80.9%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1553.87	1550	100.2%	1782.5	87.2%
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	91.85	170.98	150	114.0%	180.0	95.0%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	691.14	896.89	830.88	107.9%	953.9	94.0%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1855.4	3515.22	2667.36	131.8%	3800.0	92.5%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1820.99	3419.85	2667.36	128.2%	4099.2	83.4%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPOLI11	Branch Amp	1820.99	3408.07	2667.36	127.8%	4099.2	83.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1980.24	3481.61	2992.98	116.3%	4514.9	77.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1980.24	3481.61	2992.98	116.3%	4514.9	77.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at MAXWELL	Branch Amp	1949.99	3462.02	2992.98	115.7%	4514.9	76.7%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1949.99	3462.02	2992.98	115.7%	4514.9	76.7%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1928.22	3429.28	2992.98	114.6%	4514.9	76.0%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	285.71	921.33	825.86	111.6%	976.5	94.4%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	232.64	862.79	825.11	104.6%	975.0	88.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	391.77	468.23	462.88	101.2%	579.9	80.7%

Appendix D - 16hs2a_2250idnw_ms Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2004.23	2598.05	2477.87	104.9%	4000.0	65.0%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							
N-2: Townsend-Garrison #1 & #2 500 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1581.12	1550	102.0%	1782.5	88.7%
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1527.99	1581.12	1550	102.0%	1782.5	88.7%
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.75	-2840	0.77	-2770	0.93	-987	0.70	-2306	0.79	-3282	0.97	-2984	0.88	-4292	0.74	-394
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.75	-2775	0.77	-2713	0.93	-963	0.70	-2288	0.75	-3303	0.97	-3042	0.87	-4435	0.74	-390
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.74	-2895	0.77	-2823	0.93	-1020	0.70	-2312	0.80	-3408	0.97	-3156	0.87	-4551	0.74	-396
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.76	-2736	0.77	-2672	0.93	-960	0.70	-2272	0.86	-2535	0.97	-3004	0.87	-4500	0.74	-386
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.74	-2905	0.77	-2828	0.93	-981	0.70	-2321	0.82	-3366	0.97	-3029	0.83	-4109	0.74	-392
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.74	-2928	0.77	-2849	0.93	-1033	0.70	-2317	0.80	-3488	0.97	-3286	0.86	-4726	0.74	-399
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.75	-2898	0.77	-2806	0.95	-788	0.70	-2315	0.81	-3552	0.97	-3322	0.85	-4640	0.74	-374
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.76	-2459	0.78	-2414	0.93	-852	0.70	-2211	0.83	-2566	0.97	-2508	0.89	-3969	0.75	-365
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.76	-2759	0.77	-2694	0.93	-986	0.70	-2257	0.80	-2921	0.97	-3086	0.87	-4551	0.74	-390
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.77	-2506	0.78	-2454	0.93	-899	0.70	-2188	0.81	-2457	0.98	-2702	0.88	-4221	0.74	-373
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.74	-2939	0.77	-2862	0.93	-1025	0.70	-2324	0.81	-3484	0.97	-3229	0.84	-4302	0.74	-397
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.74	-2937	0.77	-2861	0.93	-1006	0.70	-2326	0.82	-3469	0.97	-3216	0.81	-4142	0.74	-395
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.75	-2928	0.77	-2835	0.96	-883	0.70	-2319	0.81	-3570	0.97	-3341	0.85	-4668	0.74	-386
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.77	-2803	0.79	-2728	0.94	-632	0.70	-2322	0.81	-3472	0.97	-3255	0.86	-4636	0.75	-371
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500 KV	0.78	-2844	0.79	-2766	0.95	-625	0.70	-2334	0.82	-3424	0.97	-3192	0.86	-4355	0.74	-394
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.76	-2640	0.78	-2586	0.93	-931	0.70	-2262	0.83	-2915	0.98	-2447	0.88	-4198	0.74	-381
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.76	-2642	0.78	-2589	0.94	-915	0.70	-2264	0.84	-2759	0.97	-2390	0.90	-3943	0.74	-378
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.79	-2688	0.81	-2636	0.94	-571	0.70	-2320	0.81	-3471	0.97	-3252	0.86	-4585	0.76	-352
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.75	-2860	0.76	-2787	0.93	-1009	0.70	-2308	0.83	-3105	0.97	-2712	0.88	-4245	0.74	-395
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.76	-2724	0.77	-2659	0.93	-978	0.70	-2245	0.81	-2880	0.97	-3061	0.87	-4526	0.74	-388
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.75	-2842	0.77	-2764	0.93	-939	0.70	-2306	0.83	-3268	0.97	-2793	0.86	-4196	0.74	-382
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.74	-2903	0.77	-2830	0.93	-1026	0.70	-2317	0.82	-3271	0.96	-2932	0.87	-4445	0.74	-398
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.74	-2952	0.77	-2874	0.93	-1046	0.70	-2327	0.82	-3432	0.96	-3192	0.86	-4639	0.74	-401
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.75	-2935	0.77	-2864	0.93	-1016	0.70	-2335	0.80	-3497	0.97	-3279	0.86	-4642	0.74	-395
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.75	-3034	0.77	-2956	0.93	-1016	0.70	-2365	0.80	-3619	0.97	-3250	0.86	-4407	0.73	-401
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.75	-2892	0.77	-2812	0.93	-940	0.70	-2318	0.82	-3404	0.97	-3107	0.86	-4262	0.74	-381
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.74	-2945	0.77	-2867	0.93	-1024	0.70	-2325	0.81	-3499	0.97	-3258	0.84	-4372	0.74	-397
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.74	-2961	0.77	-2878	0.93	-1005	0.70	-2328	0.81	-3551	0.97	-3315	0.86	-4578	0.74	-396
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.75	-2964	0.77	-2881	0.93	-1027	0.70	-2328	0.81	-3544	0.97	-3314	0.86	-4690	0.74	-399
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV + RAS	0.75	-3043	0.76	-2967	0.93	-1045	0.70	-2368	0.84	-3370	0.97	-3123	0.87	-4273	0.73	-410
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV + RAS	0.74	-3067	0.77	-2986	0.93	-1045	0.70	-2370	0.82	-3632	0.98	-3052	0.87	-4328	0.73	-410
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.74	-2932	0.77	-2854	0.93	-1031	0.70	-2323	0.82	-3363	0.98	-2968	0.87	-4529	0.74	-399
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.74	-2963	0.77	-2881	0.93	-1039	0.70	-2328	0.81	-3534	0.97	-3289	0.86	-4605	0.74	-400
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.74	-2962	0.77	-2879	0.93	-1023	0.70	-2328	0.81	-3546	0.97	-3300	0.87	-4432	0.74	-398
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.74	-2960	0.77	-2878	0.93	-1022	0.70	-2328	0.81	-3542	0.97	-3292	0.87	-4430	0.74	-398
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV + RAS	0.75	-2952	0.77	-2879	0.93	-1040	0.70	-2347	0.86	-2939	0.98	-2850	0.87	-4321	0.73	-411
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.74	-2914	0.77	-2838	0.93	-1033	0.70	-2320	0.82	-3354	0.97	-3104	0.87	-4549	0.74	-399
BF 4432 OSTRANDER-TROUTDALE & SPLIT OSTRANDER 500 KV	0.74	-2935	0.77	-2857	0.93	-1034	0.70	-2323	0.82	-3400	0.98	-2910	0.87	-4541	0.74	-399
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.74	-2956	0.77	-2877	0.93	-1043	0.70	-2328	0.81	-3465	0.98	-3059	0.86	-4663	0.74	-400
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.74	-2953	0.77	-2875	0.93	-1041	0.70	-2327	0.81	-3467	0.97	-3176	0.86	-4683	0.74	-400
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.74	-2940	0.77	-2861	0.93	-1034	0.70	-2324	0.82	-3404	0.98	-3013	0.87	-4569	0.74	-399
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.74	-2936	0.77	-2857	0.93	-1032	0.70	-2323	0.82	-3423	0.98	-2937	0.87	-4585	0.74	-399
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV + RAS	0.73	-3280	0.76	-3189	0.93	-1108	0.70	-2439	0.82	-4049	0.97	-3425	0.89	-3961	0.73	-431
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.75	-2880	0.77	-2810	0.93	-1016	0.70	-2316	0.84	-3064	0.97	-2964	0.87	-4419	0.74	-396
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV + RAS	0.73	-3316	0.76	-3223	0.92	-1227	0.70	-2439	0.79	-4126	0.97	-3515	0.86	-4642	0.73	-444

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV	0.75	-2875	0.77	-2797	0.93	-965	0.70	-2313	0.83	-3343	0.98	-2888	0.88	-4117	0.74	-388
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV + RAS	0.75	-3003	0.76	-2923	0.93	-1018	0.70	-2350	0.81	-3608	0.97	-3174	0.88	-4033	0.73	-402
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.74	-2942	0.77	-2864	0.93	-1023	0.70	-2325	0.81	-3475	0.97	-3227	0.86	-4608	0.74	-397
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.74	-3026	0.76	-2946	0.93	-1036	0.70	-2354	0.81	-3610	0.97	-3255	0.87	-4410	0.73	-405
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.74	-3045	0.76	-2962	0.93	-1048	0.70	-2356	0.80	-3680	0.97	-3341	0.87	-4488	0.73	-407
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.74	-2933	0.77	-2857	0.93	-1016	0.70	-2323	0.81	-3440	0.97	-3167	0.86	-4582	0.74	-396
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.75	-2976	0.76	-2893	0.93	-1048	0.70	-2330	0.81	-3565	0.97	-3349	0.85	-4812	0.74	-401
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.75	-2881	0.78	-2802	0.93	-940	0.70	-2322	0.82	-3453	0.98	-3052	0.86	-4286	0.74	-381
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.74	-2956	0.77	-2875	0.93	-1028	0.70	-2327	0.81	-3531	0.97	-3291	0.86	-4677	0.74	-398
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.74	-3191	0.76	-3093	0.94	-990	0.70	-2395	0.79	-3959	0.97	-3643	0.85	-4843	0.74	-422
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.74	-2942	0.77	-2865	0.93	-1018	0.70	-2326	0.82	-3471	0.97	-3198	0.87	-4169	0.74	-397
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.75	-2935	0.77	-2857	0.93	-1014	0.70	-2323	0.81	-3492	0.97	-3239	0.86	-4405	0.74	-395
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.74	-2927	0.77	-2851	0.93	-1012	0.70	-2322	0.82	-3413	0.97	-3135	0.86	-4517	0.74	-396
BF 4700 HATWAI 500KV & 230 KV + RAS	0.74	-3206	0.75	-3103	0.94	-991	0.70	-2398	0.80	-3900	0.97	-3577	0.85	-4802	0.74	-422
BF 4708 HATWAI 500 KV BUS	0.75	-2870	0.76	-2767	0.94	-800	0.70	-2308	0.81	-3536	0.97	-3302	0.86	-4520	0.75	-360
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.75	-2966	0.76	-2883	0.93	-1034	0.70	-2329	0.81	-3543	0.97	-3313	0.86	-4592	0.74	-399
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV	0.76	-2849	0.77	-2760	0.94	-839	0.70	-2307	0.81	-3596	0.97	-3361	0.86	-4420	0.75	-365
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.75	-2911	0.77	-2823	0.95	-909	0.70	-2318	0.81	-3559	0.97	-3323	0.85	-4624	0.74	-384
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.75	-2965	0.76	-2884	0.93	-1048	0.70	-2330	0.81	-3496	0.95	-3394	0.86	-4706	0.74	-401
BF 4888 ASHE-SLATT & CGS 500 KV	0.74	-3114	0.77	-3022	0.93	-1004	0.70	-2387	0.81	-3842	0.97	-3417	0.86	-4272	0.73	-404
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.75	-2871	0.77	-2791	0.93	-929	0.70	-2317	0.83	-3308	0.98	-2881	0.86	-3803	0.74	-380
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.75	-2902	0.77	-2821	0.93	-936	0.70	-2318	0.82	-3429	0.97	-3145	0.83	-4054	0.74	-381
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.76	-2794	0.77	-2725	0.93	-950	0.70	-2296	0.84	-3032	0.97	-2643	0.87	-3850	0.74	-385
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.76	-2102	0.79	-2124	0.93	-861	0.70	-2229	0.80	-2725	0.97	-2933	0.87	-4414	0.75	-370
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.76	-2144	0.79	-2169	0.93	-866	0.70	-2243	0.81	-2579	0.98	-2708	0.88	-4258	0.75	-370
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.74	-2909	0.77	-2833	0.93	-1024	0.70	-2319	0.75	-3256	0.97	-3289	0.86	-4746	0.74	-397
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.76	-2740	0.77	-2679	0.93	-960	0.70	-2285	0.84	-3086	0.97	-2712	0.88	-4207	0.74	-386
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.75	-2846	0.77	-2783	0.93	-1037	0.70	-2307	0.81	-3446	0.97	-3090	0.86	-4532	0.74	-400
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.76	-2709	0.77	-2645	0.93	-889	0.70	-2278	0.84	-2952	0.98	-2472	0.87	-3854	0.74	-372
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.75	-2828	0.77	-2755	0.93	-939	0.70	-2307	0.83	-3287	0.97	-2750	0.86	-4089	0.74	-382
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.75	-2862	0.76	-2793	0.93	-1024	0.70	-2306	0.82	-3398	0.97	-2894	0.86	-4478	0.74	-397
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.77	-2404	0.79	-2369	0.94	-804	0.70	-2241	0.84	-2588	0.98	-2396	0.90	-3947	0.75	-358
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.75	-2685	0.78	-2624	0.93	-931	0.70	-2272	0.82	-2944	0.97	-2700	0.88	-4275	0.74	-381
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.74	-2953	0.77	-2871	0.93	-1002	0.70	-2327	0.81	-3536	0.97	-3275	0.87	-4434	0.74	-395
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.74	-2949	0.77	-2871	0.93	-1019	0.70	-2327	0.81	-3506	0.97	-3242	0.87	-4426	0.74	-397
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.74	-2928	0.77	-2851	0.93	-991	0.70	-2322	0.82	-3478	0.97	-3197	0.87	-4235	0.74	-393
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.74	-2920	0.77	-2844	0.93	-973	0.70	-2322	0.82	-3454	0.97	-3148	0.85	-4228	0.74	-390
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.74	-2955	0.77	-2873	0.93	-1016	0.70	-2327	0.81	-3507	0.97	-3269	0.85	-4422	0.74	-397
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.75	-2915	0.77	-2845	0.93	-1008	0.70	-2328	0.81	-3428	0.97	-3146	0.86	-4565	0.74	-394
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.75	-2993	0.76	-2920	0.93	-1007	0.70	-2361	0.82	-3517	0.97	-3175	0.86	-4412	0.74	-399
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.75	-2881	0.78	-2802	0.93	-940	0.70	-2322	0.82	-3453	0.98	-3052	0.86	-4286	0.74	-381
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.75	-2964	0.77	-2883	0.93	-940	0.70	-2350	0.82	-3484	0.97	-3037	0.86	-4011	0.74	-387
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.75	-2830	0.77	-2754	0.93	-941	0.70	-2304	0.84	-3227	0.98	-2773	0.86	-4123	0.74	-383
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.75	-2837	0.77	-2758	0.93	-929	0.70	-2305	0.83	-3297	0.98	-2778	0.85	-4098	0.74	-381
BF 5266 SLATT-BUCKLY 500 KV	0.75	-2771	0.77	-2703	0.93	-974	0.70	-2282	0.84	-3125	0.97	-2759	0.88	-4268	0.74	-389

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.74	-2960	0.77	-2877	0.93	-1019	0.70	-2328	0.81	-3532	0.97	-3293	0.84	-4515	0.74	-397
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.75	-2947	0.77	-2870	0.93	-1004	0.70	-2327	0.81	-3500	0.97	-3242	0.83	-4365	0.74	-395
BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.77	-1990	0.80	-2019	0.95	-594	0.70	-2309	0.84	-2438	0.98	-2432	0.90	-3952	0.77	-312
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.72	-2176	0.75	-2215	0.93	-949	0.70	-2271	0.81	-3237	0.97	-3265	0.86	-4731	0.74	-388
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.70	-2094	0.73	-2074	0.93	-842	0.70	-2293	0.81	-3382	0.97	-3388	0.85	-4830	0.74	-373
BF IPC POPULUS-CHILL-HEMINGWAY 500 KV & HEM 500/230 XFMR	0.70	-2276	0.71	-2256	0.93	-1084	0.70	-1784	0.84	-2179	0.97	-2514	0.89	-3962	0.74	-386
BF LOLO 230KV	0.74	-2916	0.75	-2830	0.93	-971	0.70	-2324	0.82	-3356	0.97	-3157	0.86	-4552	0.74	-386
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.81	-1940	0.83	-1960	0.94	-551	0.70	-2317	0.87	-2129	0.98	-2025	0.93	-3385	0.77	-296
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV+PTSN	0.79	-2019	0.82	-2045	0.95	-599	0.70	-2323	0.87	-2159	0.98	-2048	0.92	-3457	0.76	-311
BF PGE GRASSLAND-COYOTE SP 500KV & CARTY GAS PLANT	0.75	-2913	0.77	-2843	0.93	-1004	0.70	-2333	0.82	-3370	0.97	-3116	0.86	-4550	0.74	-394
BF PGE GRASSLAND-SLATT 500KV & BOARDMAN PLANT	0.74	-3001	0.76	-2923	0.93	-1015	0.70	-2360	0.81	-3588	0.97	-3227	0.86	-4458	0.73	-402
BUS: ALVEY 500 KV + RAS	0.75	-2981	0.76	-2907	0.93	-1071	0.70	-2347	0.87	-2706	0.97	-3275	0.87	-4768	0.74	-416
BUS: BELL BPA 500 KV	0.75	-3000	0.76	-2923	0.95	-964	0.70	-2342	0.81	-3480	0.97	-3258	0.86	-4439	0.74	-420
BUS: BUCKLEY 500 KV	0.75	-2675	0.78	-2615	0.93	-942	0.70	-2263	0.84	-2858	0.98	-2465	0.90	-3954	0.74	-383
BUS: DIXONVILLE 500 KV	0.75	-2695	0.78	-2634	0.93	-942	0.70	-2261	0.85	-2536	0.97	-2987	0.87	-4499	0.74	-383
BUS: HOT SPRINGS 500 KV	0.74	-2954	0.77	-2872	0.93	-981	0.70	-2327	0.81	-3539	0.97	-3310	0.86	-4708	0.74	-395
BUS: KEELER 500 KV + RAS	0.74	-3276	0.76	-3188	0.93	-1116	0.70	-2440	0.83	-3811	0.98	-3102	0.91	-3780	0.73	-432
BUS: ROCK CREEK 500 KV	0.75	-2833	0.77	-2755	0.93	-927	0.70	-2305	0.84	-3250	0.98	-2726	0.86	-4106	0.74	-381
BUS: SICKLER 500 KV	0.74	-2959	0.77	-2877	0.93	-1020	0.70	-2328	0.81	-3539	0.97	-3287	0.87	-4383	0.74	-398
BUS: SUMMER LAKE 500 KV	0.76	-2059	0.79	-2082	0.93	-840	0.70	-2215	0.82	-2541	0.97	-2670	0.88	-4202	0.75	-366
N-1: ALLSTON-KEELER 500 KV + RAS	0.73	-3293	0.76	-3200	0.93	-1118	0.70	-2441	0.81	-4096	0.97	-3482	0.89	-4028	0.73	-432
N-1: ALLSTON-NAPAVINE 500 KV	0.74	-2928	0.77	-2852	0.93	-1013	0.70	-2322	0.82	-3415	0.97	-3139	0.86	-4517	0.74	-396
N-1: ALLSTON-PAUL #2 500 KV	0.74	-2927	0.77	-2851	0.93	-1012	0.70	-2322	0.82	-3414	0.97	-3139	0.86	-4526	0.74	-396
N-1: ALVERY-DIXONVILLE 500 KV	0.75	-2687	0.78	-2625	0.93	-942	0.70	-2260	0.87	-2399	0.97	-2946	0.87	-4467	0.74	-383
N-1: ALVEY-MARION 500 KV	0.76	-2734	0.77	-2670	0.93	-959	0.70	-2275	0.85	-2632	0.98	-2801	0.87	-4338	0.74	-386
N-1: ASHE-HANFORD 500 KV	0.75	-2953	0.77	-2875	0.93	-1019	0.70	-2329	0.81	-3494	0.97	-3275	0.82	-4292	0.74	-397
N-1: ASHE-LOW MON 500 KV	0.74	-2946	0.77	-2866	0.93	-1024	0.70	-2325	0.81	-3503	0.97	-3258	0.86	-4454	0.74	-397
N-1: ASHE-MARION 500 KV	0.75	-2815	0.77	-2741	0.93	-963	0.70	-2299	0.84	-3083	0.97	-2697	0.88	-4142	0.74	-387
N-1: ASHE-SLATT 500 KV	0.75	-2881	0.77	-2802	0.93	-937	0.70	-2319	0.83	-3329	0.97	-3005	0.86	-4177	0.74	-381
N-1: BELL-COULEE 500 KV	0.75	-2967	0.76	-2883	0.94	-956	0.70	-2331	0.81	-3515	0.97	-3281	0.86	-4587	0.73	-403
N-1: BELL-TAFT 500 KV	0.75	-3007	0.76	-2928	0.95	-980	0.70	-2343	0.81	-3483	0.97	-3263	0.86	-4534	0.74	-421
N-1: BIG EDDY-CELILO 500 KV	0.75	-2966	0.76	-2883	0.93	-1041	0.70	-2328	0.81	-3540	0.97	-3312	0.85	-4762	0.74	-400
N-1: BIG EDDY-JOHN DAY 500 KV	0.75	-2962	0.76	-2883	0.93	-1045	0.70	-2329	0.81	-3505	0.96	-3329	0.86	-4728	0.74	-401
N-1: BIG EDDY-KNIGHT 500 KV	0.74	-2921	0.77	-2845	0.93	-1006	0.70	-2320	0.82	-3438	0.98	-2950	0.85	-4562	0.74	-394
N-1: BIG EDDY-OSTRANDER 500 KV	0.74	-2954	0.77	-2876	0.93	-1041	0.70	-2327	0.81	-3480	0.97	-3184	0.86	-4699	0.74	-400
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.75	-2857	0.77	-2783	0.93	-1024	0.70	-2323	0.81	-3504	0.97	-3280	0.86	-4722	0.74	-397
N-1: BRADY-ANTELOPE 230 KV	0.74	-2948	0.77	-2864	0.93	-1016	0.70	-2327	0.81	-3538	0.97	-3312	0.85	-4757	0.74	-399
N-1: BROADVIEW-GARRISON #1 500 KV	0.75	-2998	0.76	-2916	0.93	-1140	0.70	-2333	0.81	-3568	0.97	-3346	0.85	-4834	0.74	-413
N-1: BROWNLEE-ONTARIO 230 KV	0.76	-2769	0.77	-2709	0.93	-1015	0.70	-2320	0.81	-3470	0.97	-3256	0.86	-4693	0.74	-396
N-1: BUCKLEY-GRIZZLY 500 KV	0.75	-2787	0.77	-2718	0.93	-971	0.70	-2287	0.81	-3186	0.98	-2845	0.87	-4433	0.74	-388
N-1: BUCKLEY-MARION 500 KV	0.74	-2923	0.77	-2848	0.93	-1036	0.70	-2320	0.82	-3387	0.97	-3142	0.86	-4580	0.74	-399
N-1: BUCKLEY-SLATT 500 KV	0.75	-2771	0.77	-2703	0.93	-974	0.70	-2282	0.84	-3125	0.97	-2759	0.88	-4268	0.74	-389
N-1: CAPTAIN JACK-OLINDA 500 KV	0.77	-2512	0.78	-2457	0.94	-909	0.70	-2166	0.82	-2392	0.98	-2787	0.88	-4308	0.74	-374
N-1: CAPTJACK-KFALLS 500 KV	0.76	-2743	0.77	-2681	0.93	-968	0.70	-2273	0.75	-3303	0.97	-3114	0.86	-4679	0.74	-387
N-1: CASCADE CROSSING 500 KV	0.75	-2861	0.76	-2789	0.93	-1027	0.70	-2303	0.83	-3176	0.98	-2849	0.88	-4333	0.74	-398

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: CEDAR HILL-ROBINSON 500 KV (SWIP)	0.76	-2686	0.78	-2577	0.93	-1141	0.70	-1784	0.84	-2371	0.97	-2641	0.89	-4116	0.73	-406
N-1: CHIEF JO-COULEE 500 KV	0.75	-2969	0.76	-2886	0.93	-1042	0.70	-2329	0.81	-3542	0.97	-3316	0.86	-4650	0.74	-401
N-1: CHIEF JO-MONROE 500 KV	0.74	-2958	0.77	-2876	0.93	-1032	0.70	-2327	0.81	-3528	0.97	-3279	0.86	-4533	0.74	-399
N-1: CHIEF JO-SICKLER 500 KV	0.74	-2957	0.77	-2875	0.93	-1021	0.70	-2327	0.81	-3537	0.97	-3301	0.86	-4566	0.74	-397
N-1: COULEE-HANFORD 500 KV	0.75	-2928	0.77	-2847	0.93	-944	0.70	-2323	0.81	-3507	0.97	-3243	0.85	-4180	0.74	-386
N-1: COULEE-SCHULTZ 500 KV	0.75	-2938	0.77	-2859	0.93	-996	0.70	-2324	0.81	-3510	0.97	-3259	0.86	-4409	0.74	-393
N-1: COVINGTON4-RAVER 500 KV	0.75	-2968	0.76	-2885	0.93	-1043	0.70	-2329	0.81	-3546	0.97	-3320	0.85	-4738	0.74	-400
N-1: COVINGTON5-RAVER 500 KV	0.75	-2968	0.76	-2885	0.93	-1043	0.70	-2329	0.81	-3545	0.97	-3320	0.85	-4736	0.74	-400
N-1: COYOTE-LONGHORN 500 KV	0.75	-2949	0.77	-2874	0.93	-1019	0.70	-2334	0.81	-3476	0.97	-3239	0.86	-4680	0.74	-396
N-1: CUSTERW-MONROE 500 KV	0.74	-2961	0.77	-2878	0.93	-1008	0.70	-2329	0.81	-3549	0.97	-3315	0.86	-4589	0.74	-397
N-1: DIXONVILLE-MERIDIAN 500 KV	0.76	-2739	0.77	-2674	0.93	-959	0.70	-2272	0.84	-2728	0.97	-3028	0.87	-4520	0.74	-386
N-1: DRYCREEK-LOLO 230 KV	0.75	-2966	0.76	-2883	0.93	-1040	0.70	-2328	0.81	-3541	0.97	-3315	0.85	-4764	0.74	-400
N-1: DRYCREEK-N LEWISTON 230 KV	0.75	-2966	0.76	-2883	0.93	-1039	0.70	-2328	0.81	-3539	0.97	-3312	0.85	-4758	0.74	-399
N-1: DRYCREEK-WALA AVA 230 KV	0.75	-2965	0.76	-2882	0.93	-1037	0.70	-2328	0.81	-3540	0.97	-3312	0.85	-4755	0.74	-399
N-1: DWORSHAK-HATWAI 500 KV + RAS	0.76	-2855	0.76	-2756	0.94	-793	0.70	-2305	0.81	-3566	0.97	-3331	0.86	-4515	0.75	-358
N-1: DWORSHAK-TAFT 500 KV	0.75	-2898	0.77	-2806	0.95	-788	0.70	-2315	0.81	-3552	0.97	-3322	0.85	-4640	0.74	-374
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.75	-2968	0.76	-2885	0.93	-1043	0.70	-2329	0.81	-3538	0.97	-3302	0.86	-4641	0.74	-400
N-1: ECHO LAKE-RAVER 500 KV	0.74	-2960	0.77	-2878	0.93	-1030	0.70	-2327	0.81	-3539	0.97	-3298	0.86	-4669	0.74	-399
N-1: ECHO LAKE-SCHULTZ 500 KV	0.74	-2960	0.77	-2878	0.93	-1037	0.70	-2328	0.81	-3510	0.97	-3273	0.86	-4580	0.74	-400
N-1: ECHO LAKE-SNOK TAP 500 KV	0.74	-2954	0.77	-2872	0.93	-1004	0.70	-2327	0.81	-3540	0.97	-3287	0.86	-4470	0.74	-396
N-1: GARRISON-TAFT #2 500 KV	0.77	-2803	0.79	-2728	0.94	-632	0.70	-2322	0.81	-3472	0.97	-3255	0.86	-4636	0.75	-371
N-1: GOLDHILL-PLACER 115 KV	0.75	-2977	0.76	-2894	0.93	-1047	0.70	-2331	0.81	-3579	0.97	-3344	0.85	-4808	0.74	-400
N-1: GRASSLAND-COYOTE 500 KV	0.75	-2913	0.77	-2843	0.93	-1004	0.70	-2333	0.82	-3370	0.97	-3116	0.86	-4550	0.74	-394
N-1: GRASSLAND-SLATT 500 KV	0.75	-2933	0.77	-2858	0.93	-1037	0.70	-2328	0.81	-3520	0.97	-3260	0.86	-4724	0.74	-399
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.76	-2709	0.77	-2645	0.93	-937	0.70	-2276	0.82	-2971	0.98	-2739	0.88	-4328	0.74	-382
N-1: GRIZZLY-MALIN 500 KV	0.76	-2633	0.77	-2574	0.93	-932	0.70	-2239	0.81	-2811	0.97	-2738	0.88	-4256	0.74	-381
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.76	-2576	0.78	-2529	0.93	-871	0.70	-2279	0.82	-2898	0.98	-2779	0.88	-4322	0.75	-369
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.76	-2619	0.77	-2561	0.93	-929	0.70	-2235	0.82	-2772	0.97	-2716	0.88	-4233	0.74	-380
N-1: GRIZZLY-ROUND BU 500 KV	0.74	-2956	0.77	-2875	0.93	-1040	0.70	-2327	0.81	-3525	0.97	-3269	0.86	-4733	0.74	-400
N-1: HANFORD-LOW MON 500 KV	0.74	-2955	0.77	-2874	0.93	-1034	0.70	-2327	0.81	-3521	0.97	-3275	0.84	-4420	0.74	-399
N-1: HANFORD-VANTAGE 500 KV	0.75	-2947	0.77	-2870	0.93	-1004	0.70	-2327	0.81	-3500	0.97	-3242	0.83	-4366	0.74	-395
N-1: HANFORD-WAUTOMA 500 KV	0.74	-2954	0.77	-2873	0.93	-1033	0.70	-2326	0.82	-3513	0.97	-3271	0.85	-4663	0.74	-398
N-1: HATWAI 500/230 KV XFMR + RAS	0.74	-2968	0.76	-2885	0.93	-1029	0.70	-2329	0.82	-3481	0.97	-3267	0.86	-4697	0.74	-396
N-1: HATWAI-LOLO 230 KV	0.74	-2963	0.76	-2881	0.93	-1031	0.70	-2328	0.81	-3524	0.97	-3296	0.86	-4723	0.74	-398
N-1: HATWAI-LOW GRAN 500 KV	0.75	-2914	0.77	-2825	0.95	-910	0.70	-2318	0.81	-3567	0.97	-3337	0.85	-4654	0.74	-384
N-1: HATWAI-N LEWISTON 230 KV	0.75	-2966	0.76	-2883	0.93	-1039	0.70	-2328	0.81	-3539	0.97	-3312	0.85	-4757	0.74	-400
N-1: HELLS CANYON-BROWNEE 230 KV	0.75	-2835	0.76	-2769	0.93	-953	0.70	-2330	0.83	-3299	0.97	-3096	0.87	-4481	0.74	-386
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.74	-2947	0.76	-2867	0.93	-1011	0.70	-2326	0.82	-3423	0.97	-3218	0.86	-4640	0.74	-395
N-1: HEMINGWAY-GRASSLAND 500 KV	0.79	-1973	0.81	-2000	0.95	-598	0.70	-2299	0.85	-2407	0.98	-2400	0.90	-3882	0.76	-310
N-1: HEMINGWAY-GRASSLAND 500 KV + FACRI	0.74	-2572	0.77	-2555	0.93	-871	0.70	-2394	0.83	-4094	0.97	-3723	0.84	-4962	0.74	-374
N-1: HEMINGWAY-GRASSLAND 500 KV + PTSN SHUNT	0.78	-2128	0.80	-2152	0.95	-649	0.70	-2338	0.84	-2496	0.97	-2525	0.89	-3989	0.75	-325
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.75	-2275	0.78	-2300	0.93	-943	0.70	-2296	0.81	-3229	0.97	-3253	0.86	-4725	0.74	-386
N-1: HILL TOP 345/230 XFMR	0.74	-2936	0.77	-2857	0.93	-1039	0.70	-2321	0.81	-3422	0.97	-3298	0.86	-4743	0.74	-400
N-1: HORSE HV-MCNARY 230 KV	0.74	-2954	0.77	-2873	0.93	-1039	0.70	-2326	0.81	-3525	0.97	-3284	0.86	-4708	0.74	-400
N-1: HOT SPRINGS-TAFT 500 KV	0.74	-2954	0.77	-2872	0.93	-981	0.70	-2327	0.81	-3540	0.97	-3310	0.86	-4708	0.74	-395

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: HUMBOLDT-COYOTE CK 345 KV	0.76	-2744	0.77	-2650	0.93	-1027	0.70	-2236	0.82	-3404	0.97	-3232	0.86	-4683	0.74	-398
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.75	-2997	0.76	-2916	0.93	-1056	0.70	-2326	0.81	-3559	0.97	-3340	0.85	-4812	0.73	-403
N-1: ING500-CUSTERW 500 KV	0.75	-2964	0.77	-2881	0.93	-1029	0.70	-2328	0.81	-3545	0.97	-3315	0.86	-4697	0.74	-399
N-1: JOHN DAY-MARION 500 KV	0.74	-2918	0.77	-2844	0.93	-1029	0.70	-2319	0.82	-3343	0.97	-3064	0.87	-4551	0.74	-398
N-1: JOHN DAY-ROCK CK 500 KV	0.75	-2843	0.77	-2764	0.93	-936	0.70	-2306	0.83	-3304	0.97	-2863	0.86	-4233	0.74	-382
N-1: JOHN DAY-SLATT 500 KV	0.75	-2887	0.77	-2814	0.93	-1030	0.70	-2309	0.82	-3461	0.97	-2950	0.86	-4568	0.74	-398
N-1: Kfalls-MERIDIAN 500 KV	0.75	-2913	0.77	-2837	0.93	-1025	0.70	-2315	0.78	-3548	0.97	-3208	0.86	-4613	0.74	-397
N-1: KNIGHT-WAUTOMA 500 KV	0.75	-2837	0.77	-2760	0.93	-945	0.70	-2305	0.84	-3240	0.98	-2794	0.86	-4185	0.74	-384
N-1: LAGRANDE-NORTH POWDER 230 KV	0.75	-2942	0.76	-2864	0.93	-1021	0.70	-2328	0.81	-3463	0.97	-3264	0.86	-4720	0.74	-397
N-1: LANES-MARION 500 KV	0.74	-2920	0.77	-2846	0.93	-1028	0.70	-2320	0.83	-3307	0.97	-3151	0.86	-4590	0.74	-398
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.75	-2963	0.77	-2881	0.93	-1037	0.70	-2328	0.81	-3539	0.97	-3308	0.85	-4743	0.74	-399
N-1: LIT GOOSE-LOW MON 500 KV	0.74	-2959	0.77	-2877	0.93	-1032	0.70	-2327	0.81	-3535	0.97	-3298	0.86	-4693	0.74	-398
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.74	-2960	0.77	-2877	0.93	-1029	0.70	-2327	0.81	-3539	0.97	-3307	0.85	-4725	0.74	-398
N-1: LOW MON-SAC TAP 500 KV	0.75	-2918	0.77	-2839	0.93	-957	0.70	-2322	0.81	-3479	0.97	-3214	0.85	-4365	0.74	-384
N-1: MALIN 500/230 XFMR	0.74	-2934	0.77	-2854	0.93	-1034	0.70	-2318	0.81	-3510	0.97	-3294	0.86	-4731	0.74	-399
N-1: MALIN-HILLTOP 230 KV	0.74	-2914	0.77	-2835	0.93	-1031	0.70	-2312	0.81	-3463	0.97	-3296	0.86	-4738	0.74	-398
N-1: MALIN-ROUND MTN #1 500 KV	0.76	-2764	0.77	-2699	0.93	-988	0.70	-2258	0.82	-2923	0.97	-3094	0.87	-4557	0.74	-390
N-1: MALIN-ROUND MTN #2 500 KV	0.76	-2755	0.77	-2690	0.93	-985	0.70	-2255	0.81	-2899	0.97	-3082	0.87	-4550	0.74	-390
N-1: MALIN-SUMMER LAKE 500 KV	0.75	-2738	0.77	-2678	0.93	-1034	0.70	-2239	0.80	-3008	0.97	-3051	0.87	-4516	0.74	-398
N-1: MAPLE VLY-ROCKY RH 345 KV	0.75	-2964	0.77	-2882	0.93	-1039	0.70	-2328	0.81	-3537	0.97	-3299	0.86	-4629	0.74	-400
N-1: MARION-PEARL 500 KV	0.74	-2902	0.77	-2833	0.93	-1025	0.70	-2320	0.83	-3140	0.97	-3103	0.86	-4624	0.74	-397
N-1: MARION-SANTIAM 500 KV	0.75	-2987	0.76	-2903	0.93	-1047	0.70	-2334	0.80	-3620	0.97	-3402	0.85	-4848	0.74	-401
N-1: MCLOUGHLIN-OSTRANDER 230 KV	0.75	-2967	0.76	-2884	0.93	-1042	0.70	-2329	0.81	-3530	0.97	-3315	0.86	-4743	0.74	-400
N-1: MCNARY 500/230 KV XFMR	0.75	-2969	0.77	-2885	0.93	-1047	0.70	-2333	0.80	-3580	0.97	-3367	0.85	-4766	0.74	-401
N-1: MCNARY S2-MCNARY S3 230 KV	0.75	-2967	0.76	-2884	0.93	-1043	0.70	-2328	0.81	-3543	0.97	-3314	0.85	-4738	0.74	-400
N-1: MCNARY-BOARD T1 230 KV	0.74	-2943	0.77	-2863	0.93	-1037	0.70	-2321	0.81	-3502	0.97	-3288	0.86	-4759	0.74	-398
N-1: MCNARY-JOHN DAY 500 KV	0.75	-2876	0.77	-2800	0.93	-1012	0.70	-2310	0.83	-3354	0.97	-2935	0.87	-4449	0.74	-395
N-1: MCNARY-LONGHORN 500 KV	0.75	-2940	0.77	-2866	0.93	-1008	0.70	-2333	0.81	-3470	0.97	-3225	0.86	-4632	0.74	-394
N-1: MCNARY-ROSS 345 KV	0.74	-2944	0.77	-2868	0.93	-1040	0.70	-2325	0.81	-3477	0.97	-3231	0.86	-4665	0.74	-400
N-1: MCNARY-ROUNDUP 230 KV	0.75	-2891	0.77	-2822	0.93	-999	0.70	-2327	0.82	-3404	0.97	-3203	0.86	-4668	0.74	-393
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.75	-2902	0.77	-2823	0.93	-951	0.70	-2319	0.82	-3416	0.97	-3129	0.85	-4334	0.74	-383
N-1: MIDPOINT-HEMINGWAY 500 KV	0.70	-2416	0.72	-2111	0.93	-872	0.70	-2299	0.81	-3419	0.97	-3348	0.85	-4805	0.74	-377
N-1: MIDPOINT-HUMBOLDT 345 KV	0.75	-2850	0.77	-2758	0.93	-1046	0.70	-2233	0.81	-3441	0.97	-3268	0.86	-4713	0.74	-400
N-1: MIDPOINT-TOWNSEND 500 KV (MSTI)	0.79	-2416	0.80	-2404	0.99	-770	0.70	-2366	0.88	-2364	0.97	-2108	0.91	-3062	0.77	-230
N-1: MIDPOINT-TOWNSEND 500 KV (MSTI)+PTSN SHUNT	0.79	-2437	0.79	-2424	0.99	-792	0.70	-2369	0.87	-2379	0.98	-2126	0.91	-3090	0.77	-234
N-1: NAPA-VINE-PAUL 500 KV	0.74	-2945	0.77	-2867	0.93	-1025	0.70	-2325	0.81	-3491	0.97	-3245	0.86	-4666	0.74	-398
N-1: OLYMPIA-PAUL 500 KV	0.75	-2973	0.76	-2890	0.93	-1045	0.70	-2330	0.81	-3560	0.97	-3339	0.85	-4811	0.74	-401
N-1: ONTARIO-CALDWELL 230 KV	0.75	-2859	0.77	-2781	0.93	-1026	0.70	-2321	0.81	-3505	0.97	-3283	0.86	-4724	0.74	-398
N-1: OSTRANDER-KNIGHT 500 KV	0.74	-2938	0.77	-2861	0.93	-1033	0.70	-2323	0.82	-3417	0.97	-3138	0.86	-4600	0.74	-399
N-1: OSTRANDER-PEARL 500 KV	0.74	-2960	0.77	-2881	0.93	-1041	0.70	-2328	0.80	-3533	0.97	-3221	0.86	-4749	0.74	-400
N-1: OSTRANDER-TROUTDALE 500 KV	0.75	-2970	0.76	-2887	0.93	-1044	0.70	-2330	0.81	-3530	0.97	-3307	0.86	-4729	0.74	-400
N-1: OXBOW-BROWNEE #2 230 KV	0.74	-2956	0.77	-2876	0.93	-1038	0.70	-2328	0.81	-3536	0.97	-3309	0.85	-4758	0.74	-399
N-1: OXBOW-LOLO 230 KV	0.74	-2911	0.75	-2828	0.93	-972	0.70	-2324	0.82	-3356	0.97	-3158	0.86	-4559	0.74	-386
N-1: PAUL-SATSOP 500 KV	0.74	-2964	0.77	-2881	0.93	-1039	0.70	-2328	0.81	-3527	0.97	-3298	0.86	-4707	0.74	-400
N-1: PEARL-KEELER 500 KV	0.74	-2912	0.77	-2839	0.93	-1004	0.70	-2321	0.83	-3325	0.97	-3041	0.87	-4461	0.74	-394

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: PEARL-KEELER 500 KV + RAS	0.74	-3079	0.77	-2994	0.93	-1049	0.70	-2371	0.82	-3651	0.97	-3233	0.87	-4363	0.73	-411
N-1: PINTO-FOUR CORNER 345 KV	0.75	-2965	0.77	-2882	0.93	-1041	0.70	-2324	0.81	-3537	0.97	-3316	0.85	-4766	0.74	-400
N-1: PONDEROSA A 500/230 KV XFMR	0.75	-2966	0.76	-2884	0.93	-1042	0.70	-2328	0.81	-3537	0.97	-3314	0.85	-4764	0.74	-400
N-1: PONDEROSA B 500/230 KV XFMR	0.75	-2965	0.76	-2883	0.93	-1041	0.70	-2329	0.81	-3541	0.97	-3316	0.85	-4766	0.74	-400
N-1: RAVER-PAUL 500 KV	0.75	-2882	0.77	-2804	0.93	-970	0.70	-2314	0.82	-3386	0.98	-2911	0.87	-4158	0.74	-389
N-1: RAVER-TACOMA 500 KV	0.75	-2965	0.76	-2883	0.93	-1040	0.70	-2328	0.81	-3539	0.97	-3303	0.86	-4671	0.74	-400
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.75	-2965	0.77	-2882	0.93	-1041	0.70	-2318	0.81	-3534	0.97	-3315	0.85	-4765	0.74	-400
N-1: ROBINSON-HARRY ALLEN 500 KV	0.76	-2929	0.77	-2839	0.93	-1138	0.70	-1283	0.83	-2528	0.97	-2739	0.88	-4236	0.73	-409
N-1: ROCK CK-WAUTOMA 500 KV	0.75	-2844	0.77	-2764	0.93	-932	0.70	-2307	0.83	-3310	0.98	-2798	0.86	-4152	0.74	-381
N-1: ROUND MTN-TABLE MTN 500 KV	0.75	-2838	0.76	-2765	0.93	-1004	0.70	-2281	0.81	-3178	0.97	-3196	0.86	-4652	0.74	-393
N-1: ROUNDUP-LAGRANDE 230 KV	0.75	-2931	0.76	-2853	0.93	-1010	0.70	-2328	0.82	-3430	0.97	-3227	0.86	-4688	0.74	-395
N-1: SCHULTZ-SICKLER 500 KV	0.74	-2959	0.77	-2877	0.93	-1021	0.70	-2328	0.81	-3541	0.97	-3291	0.86	-4496	0.74	-398
N-1: SCHULTZ-VANTAGE 500 KV	0.74	-2961	0.77	-2878	0.93	-1021	0.70	-2328	0.81	-3534	0.97	-3298	0.85	-4521	0.74	-397
N-1: SCHULTZ-WAUTOMA 500 KV	0.75	-2927	0.77	-2849	0.93	-978	0.70	-2323	0.82	-3464	0.97	-3172	0.85	-4309	0.74	-391
N-1: SIGURD-GLEN CANYON 230 KV	0.75	-2966	0.76	-2883	0.93	-1041	0.70	-2327	0.81	-3540	0.97	-3316	0.85	-4766	0.74	-400
N-1: SLATT 500/230 KV XFMR	0.74	-3065	0.76	-2981	0.93	-1034	0.70	-2367	0.81	-3698	0.97	-3331	0.86	-4460	0.73	-406
N-1: SLATT-LONGHORN 500 KV	0.75	-2932	0.77	-2857	0.93	-1034	0.70	-2322	0.81	-3468	0.97	-3203	0.86	-4651	0.74	-399
N-1: SNOK TAP-SNOKING 500 KV	0.75	-2968	0.76	-2885	0.93	-1041	0.70	-2329	0.81	-3545	0.97	-3316	0.85	-4715	0.74	-400
N-1: TABLE MTN-TESLA 500 KV	0.75	-2843	0.76	-2768	0.93	-1002	0.70	-2277	0.81	-3239	0.97	-3229	0.86	-4672	0.74	-393
N-1: TABLE MTN-VACA DIXON 500 KV	0.76	-2771	0.77	-2703	0.93	-982	0.70	-2251	0.82	-3013	0.97	-3156	0.86	-4612	0.74	-389
N-1: VANTAGE 500/230 KV XFMR #1	0.75	-2966	0.76	-2883	0.93	-1041	0.70	-2329	0.81	-3541	0.97	-3311	0.85	-4790	0.74	-400
N-1: VANTAGE 500/230 KV XFMR #2	0.75	-2966	0.76	-2883	0.93	-1041	0.70	-2329	0.81	-3541	0.97	-3311	0.85	-4789	0.74	-400
N-1: WALLA WALLA-TALBOT 230 KV	0.74	-2958	0.77	-2875	0.93	-1024	0.70	-2327	0.81	-3534	0.97	-3302	0.86	-4710	0.74	-397
N-1: WALLA WALLA-WALLULA 230 KV	0.74	-2966	0.76	-2883	0.93	-1038	0.70	-2329	0.81	-3533	0.97	-3310	0.85	-4753	0.74	-400
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.76	-2664	0.78	-2605	0.94	-807	0.70	-2283	0.87	-2750	0.99	-2169	0.88	-3453	0.75	-358
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.76	-2756	0.77	-2690	0.93	-954	0.70	-2287	0.85	-2855	0.98	-2420	0.88	-3877	0.74	-386
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.77	-2537	0.78	-2493	0.93	-868	0.70	-2240	0.88	-2500	0.98	-2000	0.91	-3376	0.75	-369
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.76	-2772	0.77	-2708	0.93	-953	0.70	-2292	0.84	-2991	0.98	-2494	0.87	-3996	0.74	-385
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.75	-2710	0.77	-2653	0.93	-946	0.70	-2276	0.85	-2947	0.97	-2394	0.88	-3888	0.74	-384
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.76	-2783	0.77	-2712	0.93	-903	0.70	-2299	0.85	-3128	0.98	-2571	0.86	-3907	0.74	-375
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.75	-2830	0.77	-2754	0.94	-916	0.70	-2309	0.84	-3218	0.98	-2775	0.86	-4050	0.74	-378
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.75	-3109	0.76	-3006	0.98	-817	0.70	-2378	0.81	-3623	0.97	-3352	0.86	-4440	0.73	-441
N-2: BETHEL-CEDAR SP 500KV & BETHEL-ROUND BUTTE 230 KV	0.74	-2900	0.77	-2826	0.93	-1040	0.70	-2311	0.82	-3350	0.97	-3077	0.87	-4524	0.74	-400
N-2: BETHEL-CEDAR SP 500KV & BETHEL-SANTIAM 230KV	0.74	-2896	0.77	-2825	0.93	-1037	0.70	-2310	0.82	-3352	0.97	-3082	0.87	-4532	0.74	-400
N-2: BETHEL-CEDAR SP 500KV & SANTIAM-MIKKALO 500KV	0.75	-2868	0.76	-2796	0.93	-1029	0.70	-2304	0.83	-3191	0.98	-2868	0.88	-4354	0.74	-398
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.74	-2947	0.77	-2870	0.93	-1039	0.70	-2326	0.82	-3444	0.98	-3021	0.86	-4668	0.74	-400
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.74	-2953	0.77	-2875	0.93	-1042	0.70	-2326	0.81	-3471	0.98	-3054	0.86	-4691	0.74	-400
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.78	-2527	0.79	-2483	0.93	-972	0.70	-2308	0.82	-3339	0.97	-3157	0.86	-4613	0.74	-388
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.78	-2520	0.79	-2477	0.93	-971	0.70	-2308	0.81	-3335	0.97	-3154	0.86	-4610	0.74	-387
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.76	-2636	0.78	-2537	0.92	-1035	0.70	-2279	0.81	-3445	0.97	-3245	0.86	-4670	0.74	-421
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.79	-2259	0.81	-2127	0.93	-1002	0.70	-2237	0.82	-3398	0.97	-3208	0.86	-4627	0.74	-422
N-2: BROADVIEW-TOWNSEND #1 & #2 500 KV + RAS	0.73	-3298	0.75	-3221	0.88	-1335	0.70	-2429	0.80	-3872	0.97	-3559	0.85	-4869	0.72	-490
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.76	-2637	0.77	-2580	0.93	-836	0.70	-2316	0.84	-2963	0.98	-2759	0.88	-4115	0.75	-362
N-2: BROWNLEE-OSBOW & BROWNLEE-HELLS CANYON 230 KV	0.76	-2824	0.76	-2763	0.93	-951	0.70	-2329	0.82	-3292	0.97	-3089	0.87	-4475	0.74	-386
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.75	-2871	0.76	-2799	0.93	-1023	0.70	-2309	0.83	-3147	0.98	-2790	0.88	-4316	0.74	-398

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.75	-2941	0.77	-2863	0.93	-1004	0.70	-2325	0.81	-3506	0.97	-3252	0.87	-4269	0.74	-395
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.74	-2950	0.77	-2872	0.92	-1027	0.70	-2326	0.81	-3506	0.97	-3260	0.86	-4411	0.74	-398
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.74	-2958	0.77	-2876	0.93	-1030	0.70	-2327	0.81	-3529	0.97	-3277	0.86	-4494	0.74	-399
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.74	-2953	0.77	-2871	0.93	-1015	0.70	-2326	0.81	-3532	0.97	-3286	0.86	-4459	0.74	-396
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.75	-2967	0.76	-2884	0.93	-1039	0.70	-2329	0.81	-3539	0.97	-3306	0.86	-4564	0.74	-400
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.76	-2880	0.78	-2798	0.94	-838	0.70	-2319	0.81	-3466	0.98	-3055	0.84	-3620	0.74	-371
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.75	-2866	0.76	-2787	0.93	-885	0.70	-2313	0.82	-3433	0.97	-3104	0.88	-3678	0.74	-376
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.74	-2958	0.77	-2875	0.93	-994	0.70	-2328	0.81	-3551	0.97	-3311	0.87	-4520	0.74	-395
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.73	-3305	0.76	-3209	0.92	-1184	0.70	-2431	0.78	-4236	0.97	-3854	0.84	-5185	0.73	-437
N-2: DC-BIPOLE	0.78	-2127	0.78	-2055	0.94	-836	0.70	-1854	0.84	-2487	0.95	-3170	0.88	-4343	0.74	-372
N-2: DOUBLE PALO VERDE	0.86	-1436	0.86	-1440	0.96	-390	0.70	-1741	0.94	-1947	0.99	-1109	0.96	-1651	0.78	-243
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.75	-2968	0.76	-2885	0.93	-1043	0.70	-2329	0.81	-3538	0.97	-3302	0.86	-4640	0.74	-400
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.75	-2965	0.77	-2882	0.93	-1040	0.70	-2329	0.81	-3533	0.97	-3279	0.86	-4503	0.74	-400
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.83	-2687	0.85	-2592	0.93	-431	0.70	-2417	0.82	-3403	0.97	-3122	0.87	-4242	0.77	-391
N-2: GRASSLAND-CEDAR SP 500KV & SLATT-BUCKLEY 500KV	0.76	-2636	0.77	-2578	0.93	-952	0.70	-2247	0.86	-2762	0.98	-2356	0.91	-3759	0.74	-385
N-2: GRASSLAND-COYOTE 500KV & SLATT-LONGHORN 500KV	0.76	-2780	0.78	-2726	0.93	-923	0.70	-2326	0.85	-2989	0.97	-2543	0.89	-3842	0.74	-379
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV + RAS	0.75	-2701	0.77	-2652	0.93	-1040	0.70	-2263	0.80	-2749	0.97	-3015	0.89	-4505	0.74	-417
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV + RAS	0.76	-2678	0.77	-2640	0.94	-972	0.70	-2333	0.79	-2959	0.97	-3095	0.89	-4594	0.73	-407
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV + RAS	0.75	-2891	0.76	-2830	0.93	-1174	0.70	-2263	0.78	-2920	0.97	-3322	0.85	-5171	0.73	-439
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.74	-2947	0.77	-2870	0.93	-1007	0.70	-2328	0.81	-3472	0.97	-3239	0.81	-3418	0.74	-396
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.75	-2874	0.77	-2799	0.93	-984	0.70	-2310	0.82	-3392	0.97	-3050	0.82	-4109	0.74	-389
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.75	-2970	0.76	-2896	0.92	-1079	0.70	-2335	0.82	-3330	0.89	-3237	0.90	-4216	0.73	-408
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.74	-2913	0.77	-2838	0.93	-1033	0.70	-2319	0.82	-3301	0.96	-3074	0.87	-4518	0.74	-399
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV + RAS	0.77	-2599	0.78	-2573	0.94	-925	0.70	-2302	0.84	-2743	0.97	-2736	0.90	-4229	0.74	-395
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV + RAS	0.75	-2991	0.76	-2921	0.93	-1075	0.70	-2371	0.79	-3481	0.97	-3150	0.88	-4589	0.74	-422
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.75	-2871	0.76	-2799	0.93	-1023	0.70	-2309	0.83	-3147	0.98	-2790	0.88	-4316	0.74	-398
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.75	-2808	0.76	-2743	0.93	-996	0.70	-2302	0.85	-2777	0.97	-2855	0.87	-4292	0.74	-393
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.75	-2821	0.77	-2745	0.93	-934	0.70	-2302	0.84	-3228	0.98	-2699	0.87	-4131	0.74	-381
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.74	-2910	0.77	-2838	0.93	-1005	0.70	-2320	0.83	-3313	0.97	-3032	0.87	-4455	0.74	-394
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.74	-2924	0.77	-2847	0.93	-1034	0.70	-2321	0.83	-3320	0.98	-2865	0.87	-4501	0.74	-399
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.74	-2916	0.77	-2839	0.93	-1031	0.70	-2320	0.83	-3341	0.98	-2920	0.87	-4484	0.74	-398
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.74	-2913	0.77	-2836	0.93	-1019	0.70	-2318	0.82	-3368	0.98	-2931	0.87	-4483	0.74	-396
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.76	-2849	0.77	-2760	0.94	-839	0.70	-2307	0.81	-3596	0.97	-3361	0.86	-4420	0.75	-365
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.76	-2669	0.77	-2615	0.93	-1098	0.70	-2148	0.79	-2374	0.97	-3591	0.85	-5146	0.74	-417
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.76	-2700	0.78	-2639	0.93	-884	0.70	-2279	0.86	-3031	0.98	-2404	0.88	-3847	0.74	-371
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.75	-2849	0.77	-2776	0.93	-1005	0.70	-2305	0.83	-3315	0.97	-2876	0.87	-4359	0.74	-394
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.75	-2846	0.76	-2772	0.93	-1007	0.70	-2304	0.83	-3290	0.98	-2726	0.87	-4302	0.74	-394
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.74	-2926	0.77	-2851	0.93	-1036	0.70	-2321	0.82	-3448	0.97	-3175	0.86	-4593	0.74	-399
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.70	-2413	0.72	-2090	0.93	-858	0.70	-2294	0.81	-3411	0.97	-3343	0.85	-4797	0.74	-375
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.74	-2948	0.77	-2869	0.93	-997	0.70	-2327	0.81	-3515	0.97	-3263	0.87	-4326	0.74	-395
N-2: NAPAIVINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.76	-2963	0.78	-2896	0.93	-896	0.70	-2393	0.91	-2838	0.99	-1957	0.93	-2548	0.73	-401
N-2: PAUL-NAPAIVINE & PAUL-ALLSTON #2 500 KV + RAS	0.76	-2965	0.78	-2898	0.93	-896	0.70	-2393	0.91	-2907	0.99	-1991	0.93	-2563	0.73	-401
N-2: PAUL-RAVER & RAVEN-COVINGT4 500 KV	0.75	-2881	0.77	-2803	0.93	-970	0.70	-2314	0.82	-3384	0.98	-2907	0.88	-4096	0.74	-389
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV + RAS	0.74	-3081	0.77	-2996	0.93	-1051	0.70	-2371	0.82	-3650	0.97	-3234	0.87	-4362	0.73	-411
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.74	-2958	0.77	-2879	0.93	-1041	0.70	-2327	0.81	-3516	0.98	-3080	0.86	-4731	0.74	-400

Appendix D - 16hs2a_2250idnw_N_ms Base Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Midpoint		Townsend		Robinson		Malin		John Day		Hanford		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.74	-2957	0.77	-2878	0.93	-1042	0.70	-2327	0.81	-3502	0.97	-3218	0.86	-4731	0.74	-400
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.75	-2972	0.76	-2889	0.93	-1047	0.70	-2330	0.81	-3552	0.97	-3322	0.86	-4689	0.74	-401
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.74	-2950	0.77	-2872	0.93	-1024	0.70	-2326	0.81	-3510	0.97	-3262	0.86	-4541	0.74	-398
N-2: RAVER-PAUL & NAPAIVINE-PAUL 500 KV	0.75	-2874	0.77	-2797	0.93	-964	0.70	-2313	0.83	-3347	0.98	-2888	0.87	-4125	0.74	-388
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.75	-2985	0.77	-2902	0.93	-997	0.70	-2346	0.81	-3584	0.97	-3101	0.89	-3800	0.74	-399
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.75	-2982	0.77	-2899	0.93	-1001	0.70	-2345	0.81	-3579	0.97	-3105	0.89	-3918	0.74	-399
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.74	-2937	0.77	-2860	0.93	-1027	0.70	-2324	0.82	-3464	0.97	-3163	0.86	-4262	0.74	-398
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.75	-2966	0.76	-2883	0.93	-1041	0.70	-2329	0.81	-3538	0.97	-3298	0.86	-4624	0.74	-400
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.75	-2964	0.77	-2881	0.93	-1039	0.70	-2328	0.81	-3535	0.97	-3299	0.86	-4652	0.74	-400
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV + RAS	0.76	-2862	0.77	-2793	0.93	-1167	0.70	-2203	0.77	-2821	0.97	-4026	0.83	-5579	0.74	-426
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV + RAS	0.73	-3292	0.76	-3195	0.93	-1108	0.70	-2431	0.79	-4218	0.97	-3779	0.82	-4562	0.74	-427
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV + RAS	0.74	-3125	0.76	-3034	0.93	-1082	0.70	-2376	0.80	-3863	0.97	-3548	0.85	-4558	0.74	-415
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.74	-3114	0.76	-3032	0.93	-1098	0.70	-2379	0.80	-3361	0.97	-3417	0.89	-3980	0.73	-435
N-2: TAFT-BELL 500 KV & BELL-LANCASTER 230 KV	0.75	-2983	0.76	-2900	0.95	-898	0.70	-2339	0.81	-3498	0.97	-3277	0.86	-4541	0.74	-412
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.75	-3012	0.76	-2933	0.95	-980	0.70	-2344	0.81	-3488	0.97	-3268	0.86	-4493	0.74	-422
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV	0.75	-2983	0.76	-2900	0.95	-898	0.70	-2339	0.81	-3498	0.97	-3277	0.86	-4541	0.74	-412
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.75	-3007	0.76	-2928	0.95	-980	0.70	-2343	0.81	-3483	0.97	-3264	0.86	-4532	0.74	-421
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV	0.75	-3004	0.76	-2924	0.95	-968	0.70	-2342	0.81	-3482	0.97	-3263	0.86	-4529	0.74	-420
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.84	-2392	0.85	-2330	0.95	-450	0.70	-2308	0.81	-3479	0.97	-3262	0.86	-4500	0.78	-312
N-2: TOWNSEND-GARRISON #1 & #2 500 KV	0.81	-2683	0.84	-2482	1.00	-481	0.70	-2327	0.81	-3517	0.97	-3287	0.86	-4676	0.74	-394
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.75	-2813	0.77	-2741	0.94	-910	0.70	-2301	0.84	-3263	0.97	-2845	0.86	-4048	0.74	-377
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.75	-2813	0.77	-2741	0.94	-910	0.70	-2301	0.84	-3263	0.97	-2845	0.86	-4048	0.74	-377
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.74	-2926	0.77	-2851	0.93	-1019	0.70	-2323	0.82	-3427	0.97	-3108	0.87	-4113	0.74	-397

Appendix D – 16hs2a_2250idnw_ms Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, MISTI 1500 MW, SWIP 1950 MW
Loss of Hemingway-Boardman 500 kV Line



Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None

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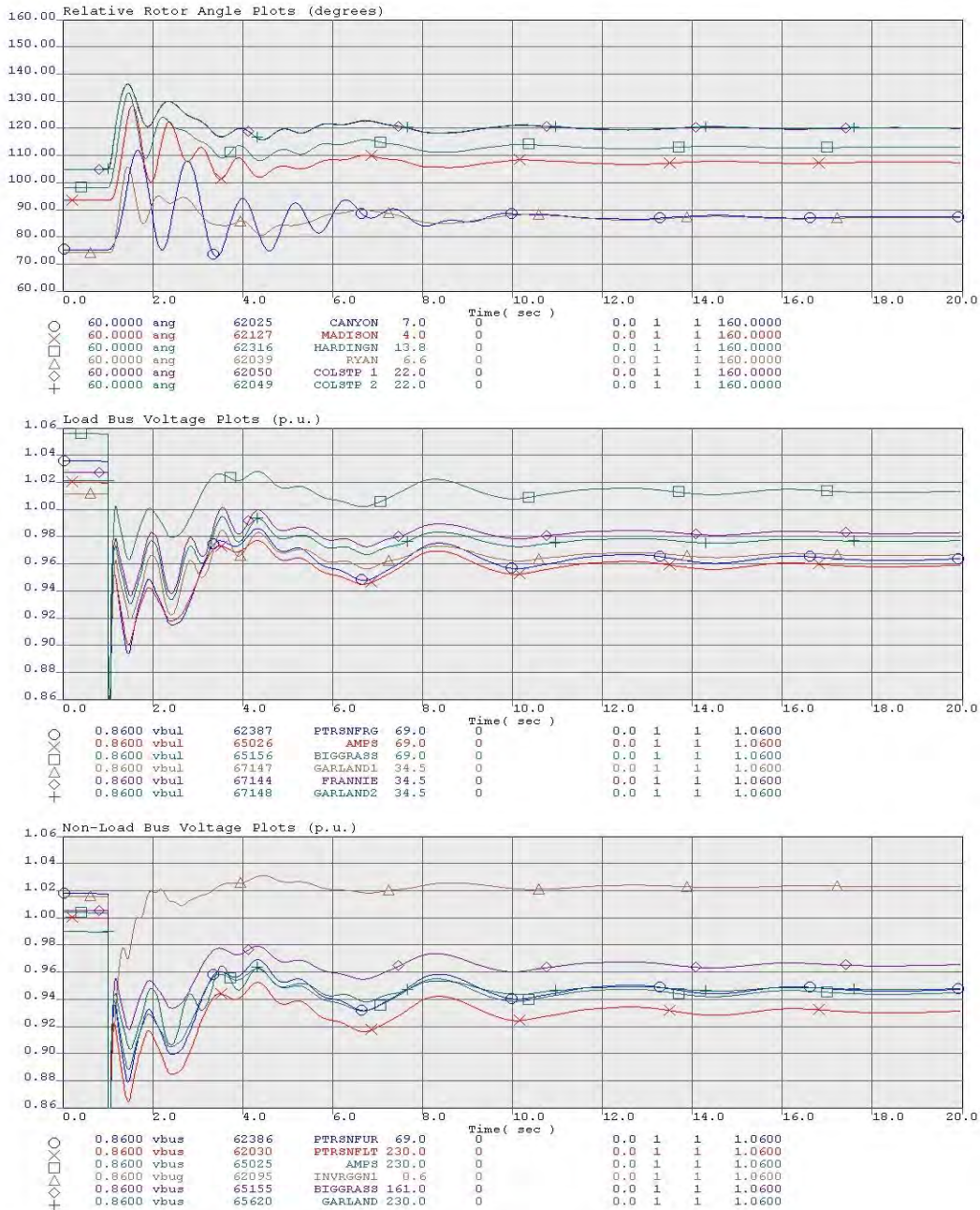
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Figure D8: N-1 Loss of Hemingway-Boardman 500 kV Line (Angle & Voltage Plots)

Appendix D – 16hs2a_2250idnw_ms Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, MISTI 1500 MW, SWIP 1950 MW
Loss of MISTI



Loss of Townsend-Midpoint 500 kV line
3ph fault @ Townsend 500 kV clear in 3 Cycles
RAS: None

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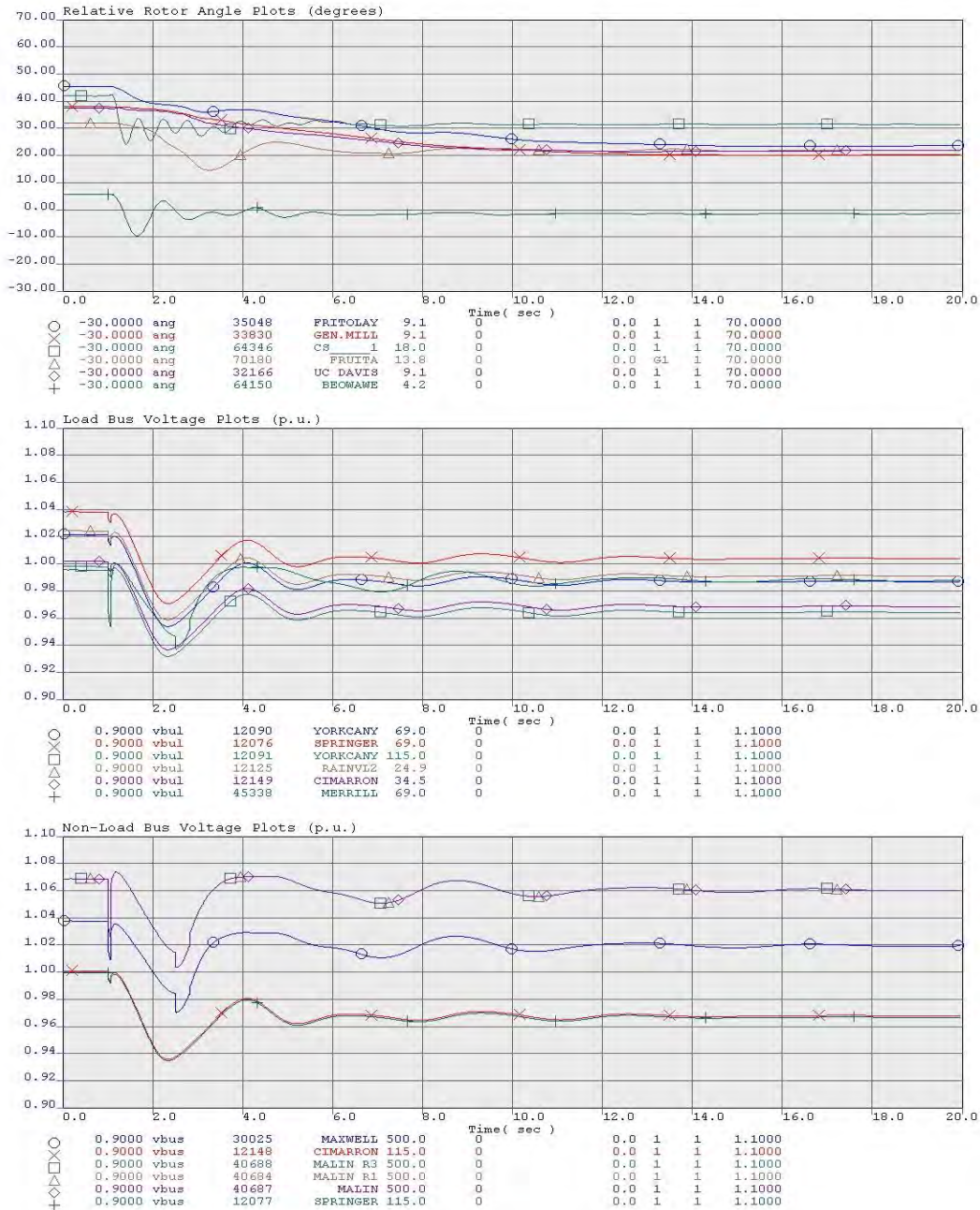
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Figure D9: N-1 Loss of Townsend-Midpoint (MSTI) 500 kV Line (Angle & Voltage Plots)

Appendix D – 16hs2a_2250idnw_ms Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, MISTI 1500 MW, SWIP 1950 MW
Loss of SWIP North



Loss of Robinson-Cedar Hill 500 kV line
3ph fault @ RBSN 500 kV clear in 3 Cycles
RAS: None

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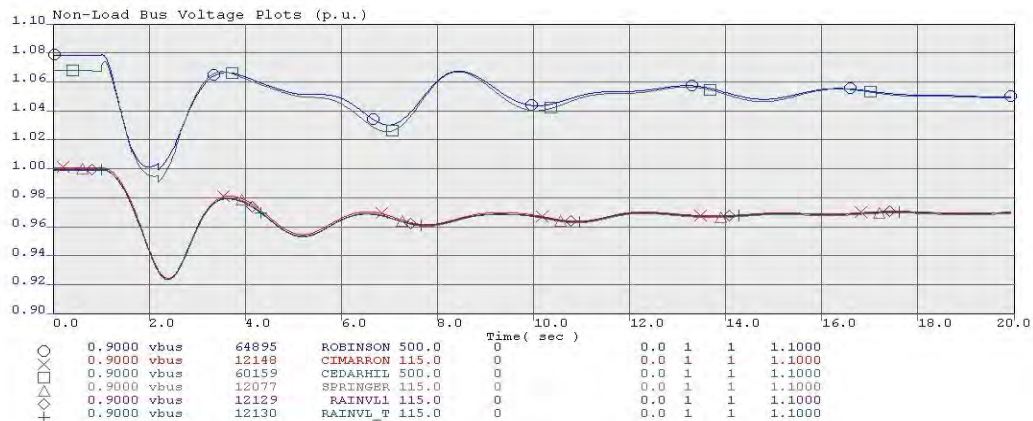
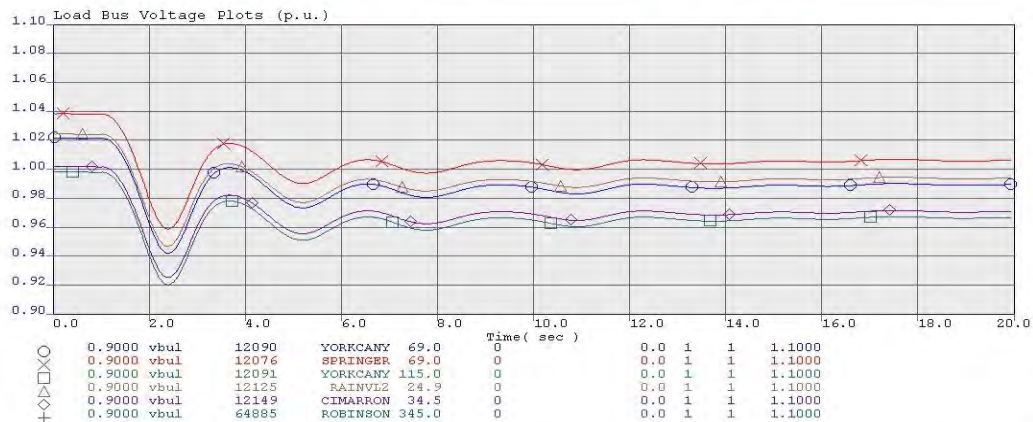
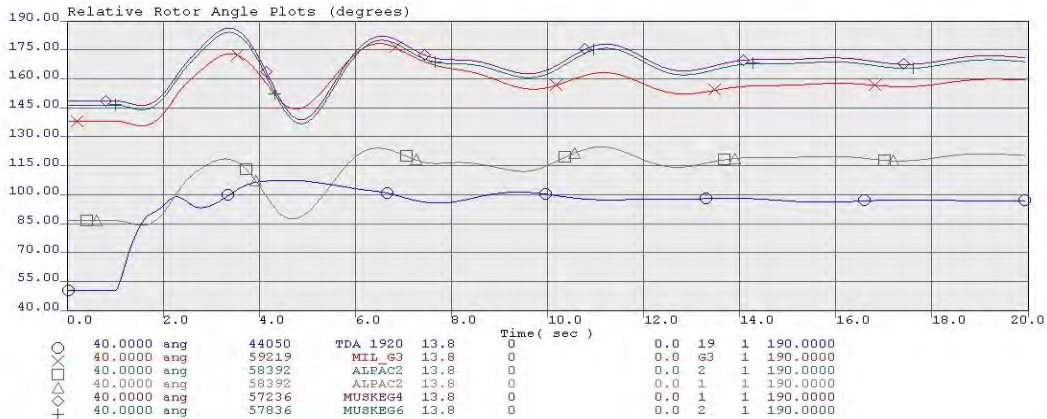
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Figure D10: N-1 Loss of Cedar Hill-Robinson (SWIP North) 500 kV Line (Angle & Voltage Plots)

Appendix D – 16hs2a_2250idnw_ms Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, MISTI 1500 MW, SWIP 1950 MW
Bi-Pole Loss of PDCI

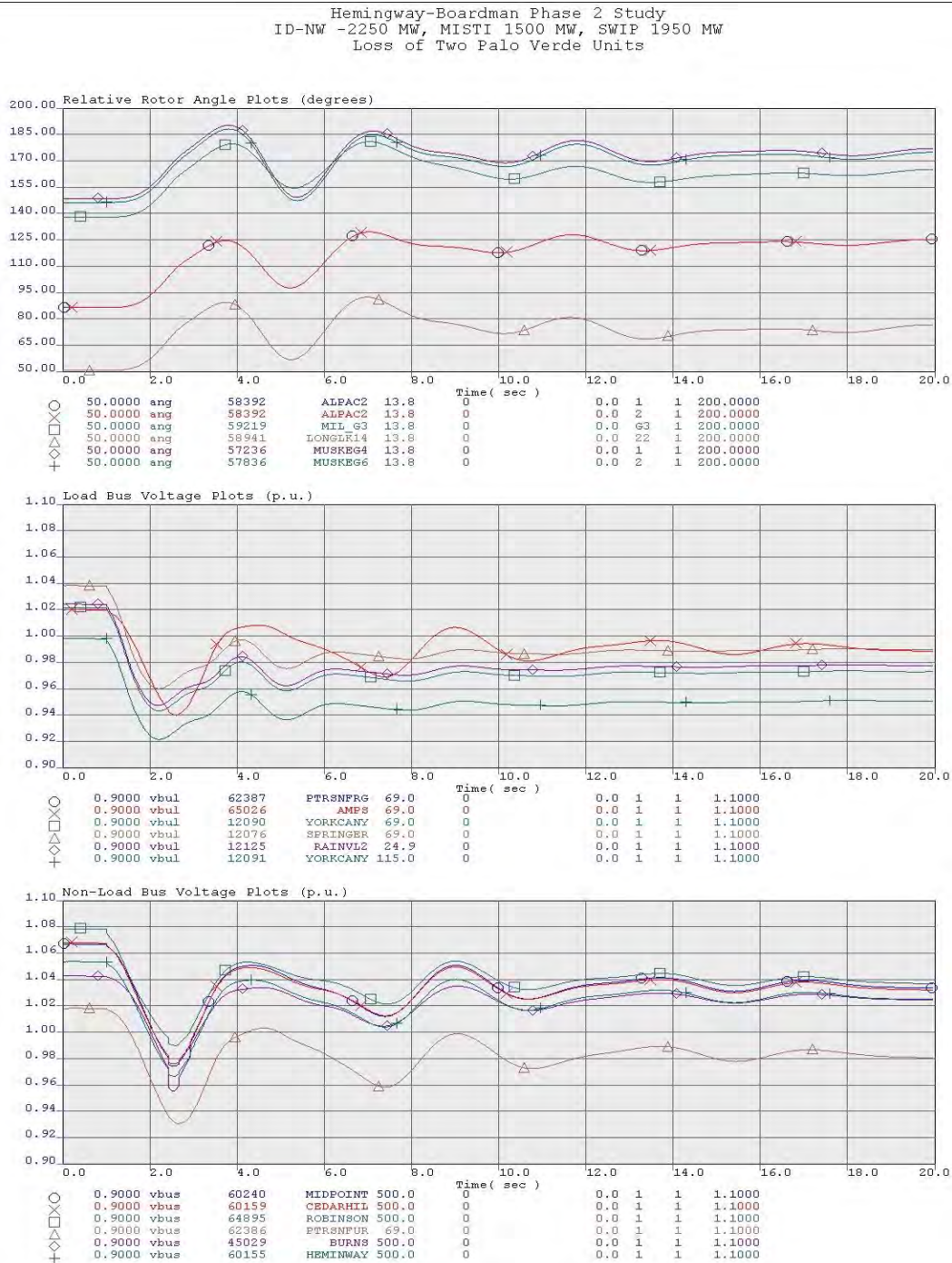


Bipole loss of Pacific DC Intertie
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
Northwest Generation Drop (2550 MW)



Figure D11: Bi-Pole Block – Pacific DC Intertie (Angle & Voltage Plots)

Appendix D – 16hs2a_2250idnw_ms Base Case Transient Stability Plots



Loss of 2 Palo Verde Units
RAS: With Phoenix Area Load Tripping RAS
FACRI Reactive Switching

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Figure D12: N-2 Loss of Two Palo Verde Units (Angle & Voltage Plots)

Appendix D – 16hs2a_2250idnw_ms Base Case Transient Stability Plots

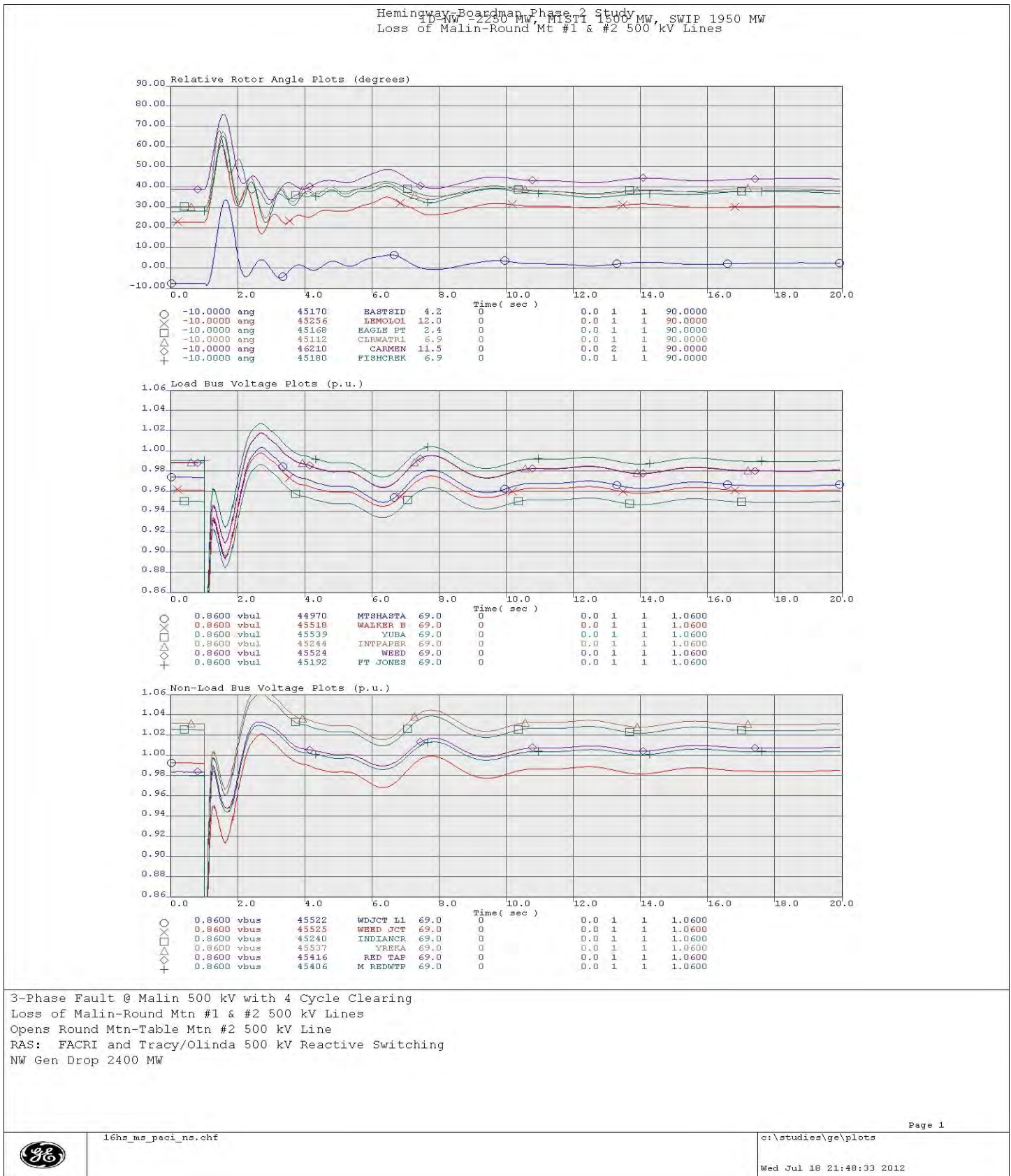


Figure D13: N-2 Loss of Malin-Round Mt #1 & #2 500 kV Lines (Angle & Voltage Plots)

Appendix D - 16hs2a_2250idnw_ms Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1	Wood Rvr 138 11.0%	Logn#4 46.0 0.871	Wood Rvr 138 11.0%	Bridger3 22.0 59.881	Stable & Damped
N-1 3 Cy 3PH Townsend 500 kV	MSTI (Townsend-Midpoint 500 kV)	Var	FACRI insert Ft Rock Series Caps	Ptrsfnrg 69 13.7%	Ptrsfnlt 230 0.865	Ptrsfnrg 69 13.7%	Montana1 13.8 59.822	Stable & Damped
N-1 3 Cy 3PH Robinson 500 kV	SWIPN (CedarHill-Robinson 500 kV)	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1	Yorkcany 69 6.7%	Sprague 69 0.902	Yorkcany 69 6.7%	Cs____1 18.0 59.852	Stable & Damped
Bi-pole Block	PDCI Bipole	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1 Tracy&Olinda React Switching NW 2550 MW Gen Drop	Yorkcany 69 7.8%	Sprague 69 0.907	Yorkcany 69 7.8%	Sync_g19 13.8 59.759	Stable & Damped
N-2	Loss of 2 Palo Verde units	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 & CaptJack Shunt Cap C1	Midpoint 500 8.7%	Goldhill 69 0.886	Ptrsfnrg 69 8.6%	MuskeG4 13.8 59.779	Stable & Damped
N-2 4 Cy 3PH Malin 500 kV	Malin-Round Mt #1 500 kV Malin-Round Mt #2 500 kV Round Mt-Table Mt #2 500 kV	Var	Chief Jo Braking Resistor Tracy&Olinda React Switching NW 2400 MW Gen Drop FACRI FtRock Series Caps Flash Malin-Round Mt S-Caps	Mtshasta 69 15.2%		Mtshasta 69 15.2%	Kno 13g6 13.8 59.753	Stable & Damped

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3

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Contingency Studied	Actions Taken in the Contingency
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_ less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_500.0 (40521)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_230.0 (40519)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line NPULLMAN_115.0 (48291) TO SHAWNEE_115.0 (48383) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48245) TO SPULLMAN_115.0 (48413) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS HOT SPR_500.0 (40553) TO -148.3 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	CLOSE Line LEON_115.0 (48183) TO MOSCITYT_115.0 (48243) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48243) TO MOSCITYT_115.0 (48245) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS N LEWIST_115.0 (48253) TO 44.4 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS THIRHACH_115.0 (48431) TO 91.6 MVR
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3

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Contingency Studied	Actions Taken in the Contingency
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACIWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_115.0 (40893) #2
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_115.0 (40893) #3
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_500.0 (40601)
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_ 0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_ 34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_ 0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_ 34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_ 34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_ 230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_ 34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_ 34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_ 34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_ 34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_ 34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_ 230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_ 34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_ 34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_ 230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_ 34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_ 0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_ 34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_ 34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_ 0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_ 0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_ 0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_ 0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_ 0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_ 34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_ 0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_ 34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_ 0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_ 500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_ 500.0 (43951)

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_500.0 (43041)
N-1: Cedar Hill-Robinson 500 kV (SWIP)	OPEN MultiSectionLine CEDARHIL_500.0 (60159) TO ROBINSON_500.0 (64895) CKT 1
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSEH1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSYCN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Horse Hv-McNary 230 kV	SET SWITCHED SHUNT AT BUS HARVALUM_230.0 (40511) TO 40.7 MVR
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTE CR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIE CR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt MIDPOINT_345.0 (60235) #2
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACIWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_230.0 (40939) #s
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_230.0 (41352) TO MCNRY S3_230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_230.0 (40537) TO 52.2 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO TWNSNDPS_500.0 (62503) CKT 1
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS RIVERTON_230.0 (66305) TO 32.4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS GARLAND1_34.5 (67147) TO 5 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS GARLAND2_34.5 (67148) TO 5 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT DILLON S_69.0 (62345) #1 TO 24 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS BIGGRASS_69.0 (65156) TO 29.4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS FRANNIE_34.5 (67144) TO 4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)	SET SWITCHED SHUNT AT BUS FRANNIE2_34.5 (67145) TO 4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO TWNSNDPS_500.0 (62503) CKT 1
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS RIVERTON_230.0 (66305) TO 32.4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS GARLAND2_34.5 (67148) TO 5 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT DILLON S_69.0 (62345) #1 TO 24 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS BIGGRASS_69.0 (65156) TO 29.4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS FRANNIE_34.5 (67144) TO 4 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS GARLAND1_34.5 (67147) TO 5 MVR
N-1: Midpoint-Townsend 500 kV (MSTI)+PTSN Shunt	SET SWITCHED SHUNT AT BUS FRANNIE2_34.5 (67145) TO 4 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN MultiSectionLine ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Robinson-Harry Allen 500 kV	SET SWITCHED SHUNT AT BUS ROBINSON_500.0 (64895) TO 0 MVR
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSKAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND B_230.0 (43483) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap MIKKALO_500.0 (43970) TO MKLOSNT2_500.0 (43971) CKT 2
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap SANTIAM_500.0 (40941) TO SANTMKO2_500.0 (43492) CKT 2
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Townsend #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Townsend #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Broadview-Townsend #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_ 26.0 (62047) #1
N-2: Broadview-Townsend #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_ 22.0 (62049) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_ 230.0 (60150) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_ 230.0 (60275) TO IMNAHA_ 230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_ 230.0 (48197) TO IMNAHA_ 230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_ 14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_ 230.0 (60275) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_ 230.0 (60150) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_ 230.0 (60150) TO HELSCYN1_ 14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_ 14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_ 345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_ 345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_ 230.0 (40747) TO NOVELTY_ 230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_ 345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_ 345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_ 345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_ 345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO VANTAGE_ 500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_ 13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_ 13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_ 13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_ 13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_ 13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_ 13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_ 13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_ 13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_ 13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_ 13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_ 13.8 (41220) #F
N-2: DC-BIPOLE	OPEN Shunt MALIN_ 500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_ 500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_ 500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_ 500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_ 500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_ 500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_ 500.0 (90070) TO GRIMAL24_ 500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_ 500.0 (90101) TO PONSUM14_ 500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_ 500.0 (90139) TO CAPPON14_ 500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_ 230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_ 230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_ 230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_ 230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_ 230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_ 230.0 (24401) #b

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO NAPAVINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Raver & Raver-Covington 4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Paul-Raver & Raver-Covington 4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL_#_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_500.0 (30005) TO RD MT 1M_500.0 (30065) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 1_ 12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 2_ 12.5 (38830)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 3_ 12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 4_ 12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 5_ 12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_ 13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_ 13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_ 13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_ 13.8 (38715)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_ 13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_ 13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_ 13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA A_ 13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA B_ 13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA D_ 13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA E_ 13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA C_ 13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_ 13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_ 13.2 (38780)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_ 13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_ 13.2 (38805)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_ 13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_ 13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_ 13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_ 13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_ 13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_ 13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_ 13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_ 13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_ 11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_ 11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_ 18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_ 18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_ 18.0 (34604)
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_ 230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	SET SWITCHED SHUNT AT BUS THIRHACH_ 115.0 (48431) TO 91.6 MVR
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_ 115.0 (40087) TO BIGELOW_ 115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_ 230.0 (40624) TO NOXONBPA_ 230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_ 500.0 (40459) #r
N-2: Townsend-Garrison #1 & #2 500 kV	OPEN Line GAR1EAST_ 500.0 (40451) TO TOWNSEND_ 500.0 (62500) CKT 1
N-2: Townsend-Garrison #1 & #2 500 kV	OPEN Line GAR2EAST_ 500.0 (40453) TO TOWNSEND_ 500.0 (62500) CKT 2
N-2: Townsend-Garrison #1 & #2 500 kV	CLOSE Shunt GARRISON_ 500.0 (40459) #r
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 3

Appendix D - 16hs2a_2250idnw_N_ms Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4

Appendix E

16hs2a_2250idnw_N_solo Base Case (Hemingway-Boardman Stand Alone)

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

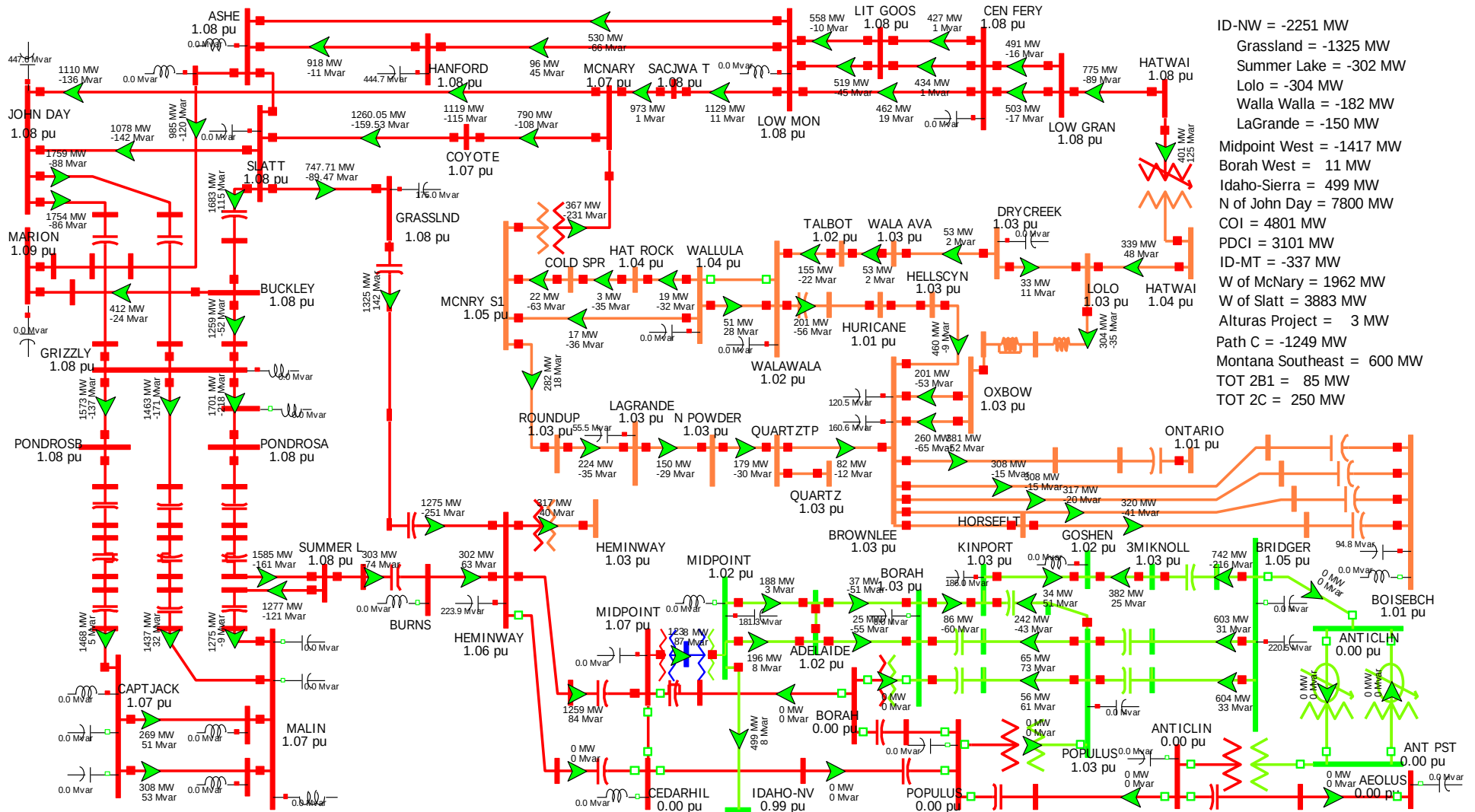


Figure E1: 16hs2sa_2250idnw_N Base Case **Pre-Contingency**

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

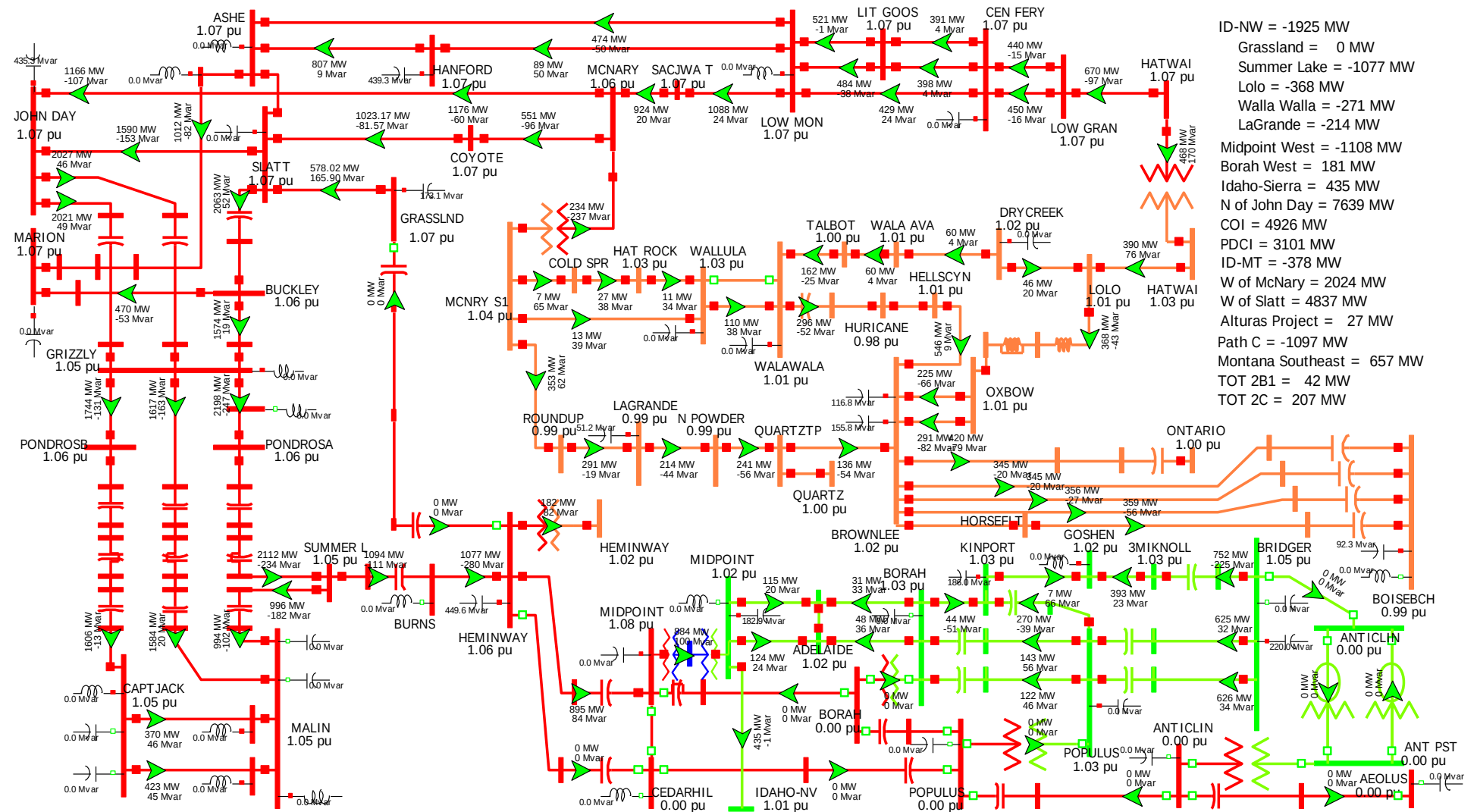


Figure E2: 16hs2sa_2250idnw_N Base Case N-1: Hemingway-Grassland 500 kV Line + PTSN Shunt

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

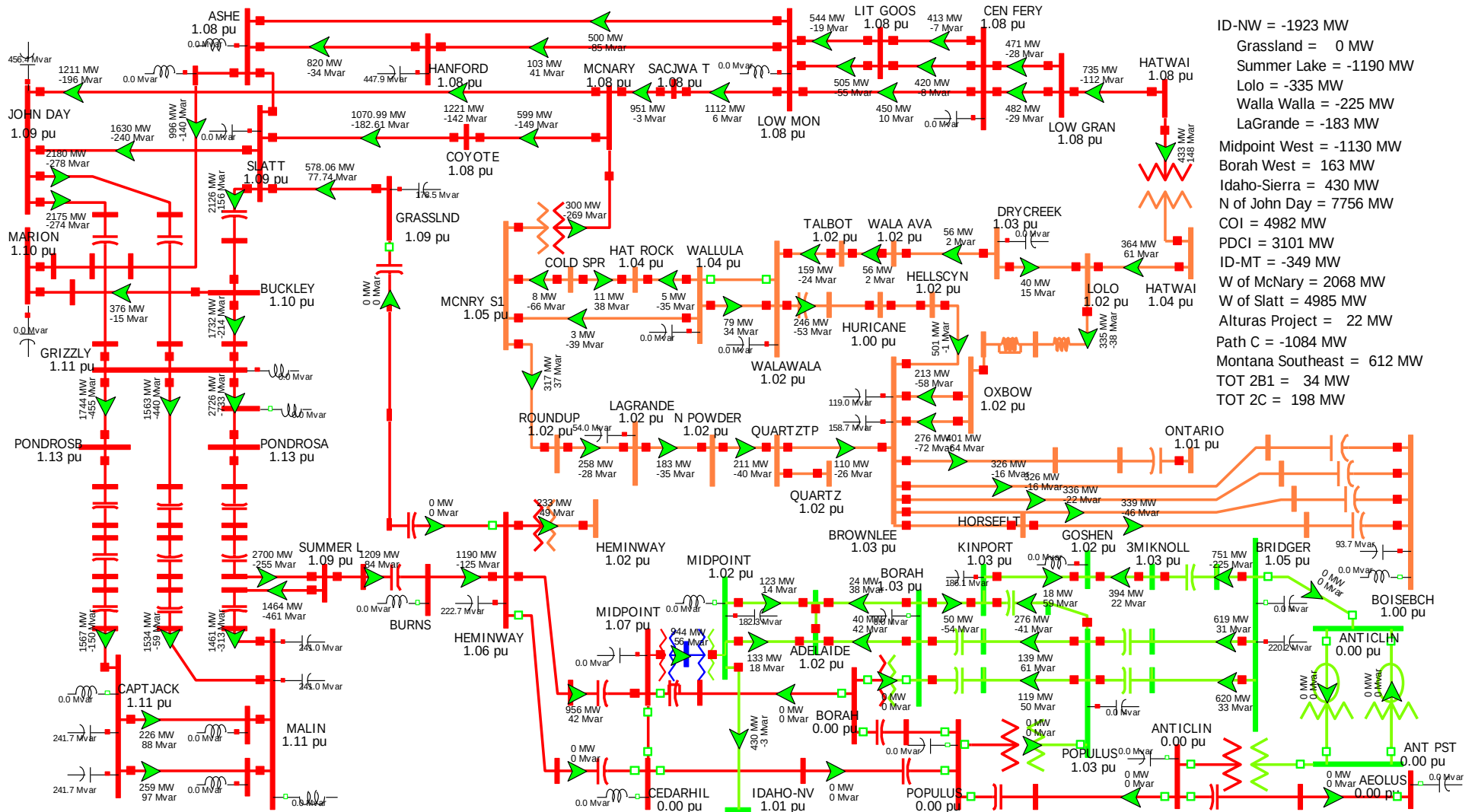


Figure E3: 16hs2sa_2250idnw_N Base Case N-1: Hemingway-Grassland 500 kV Line + FACRI

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

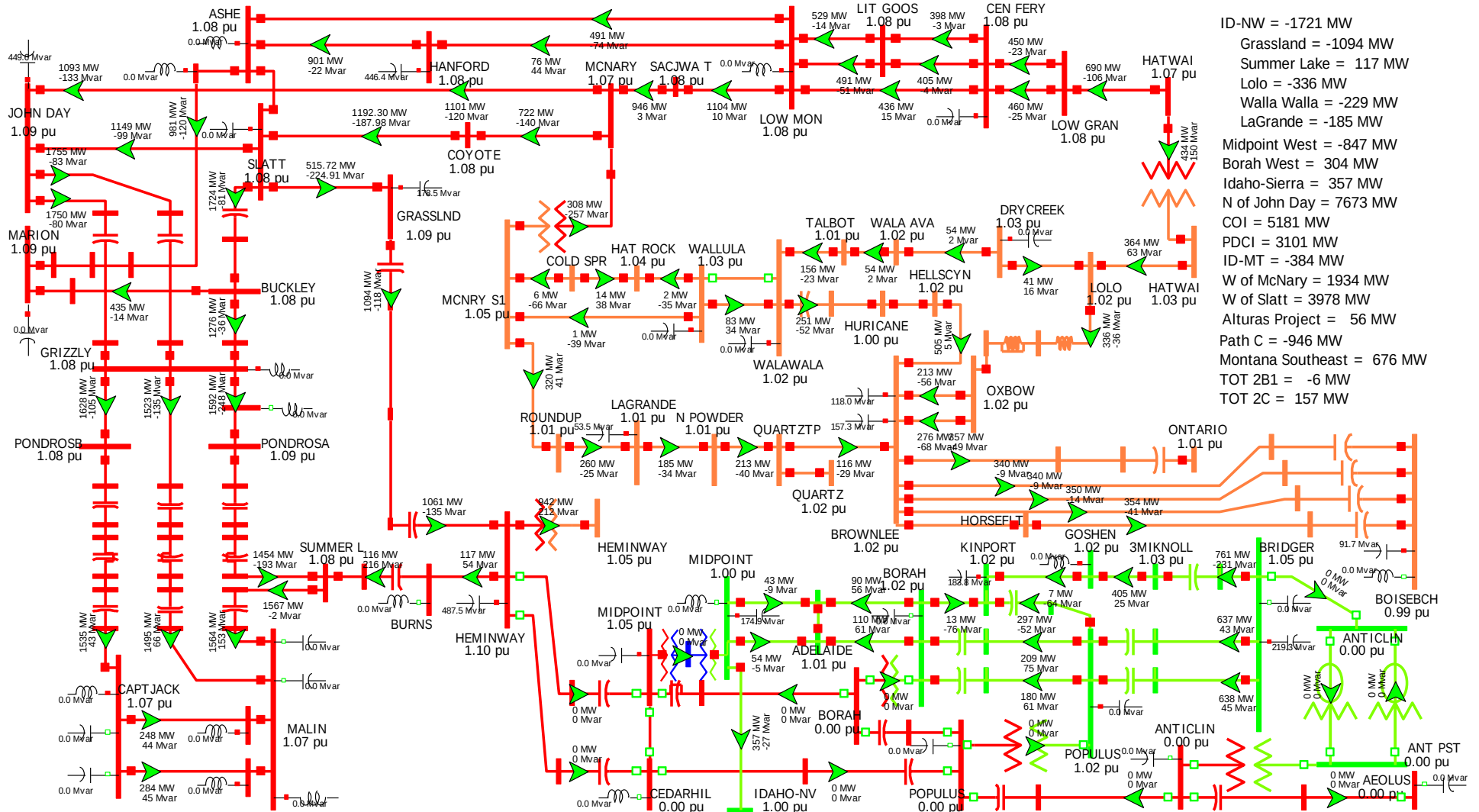


Figure E4: 16hs2sa_2250idnw_N Base Case N-1: Midpoint-Hemingway 500 kV Line + PTSN Shunt

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

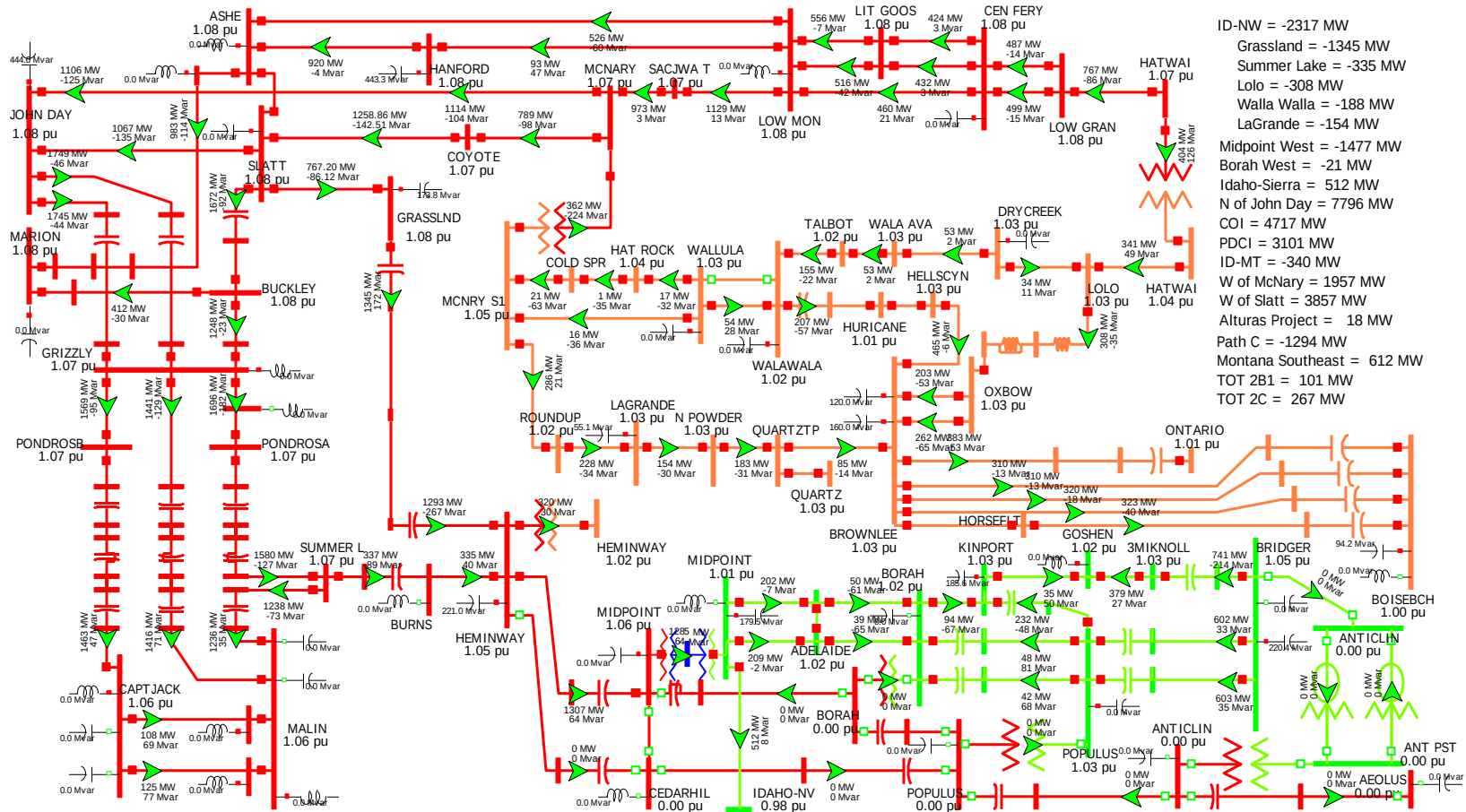


Figure E5: 16hs2sa_2250idnw_N Base Case N-1: Malin-Round Mtn 500 kV Line

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

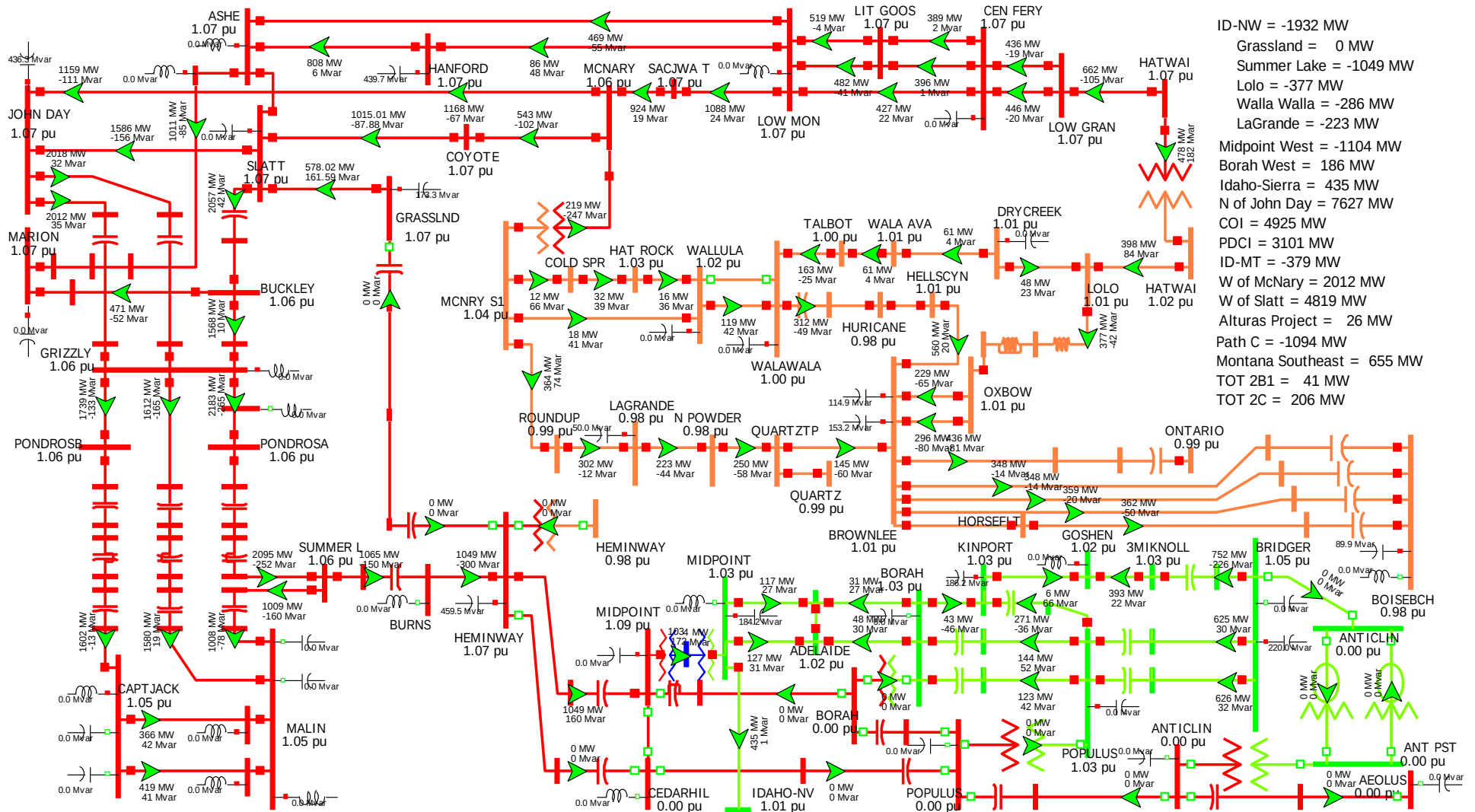


Figure E6: 16hs2sa_2250idnw_N Base Case BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

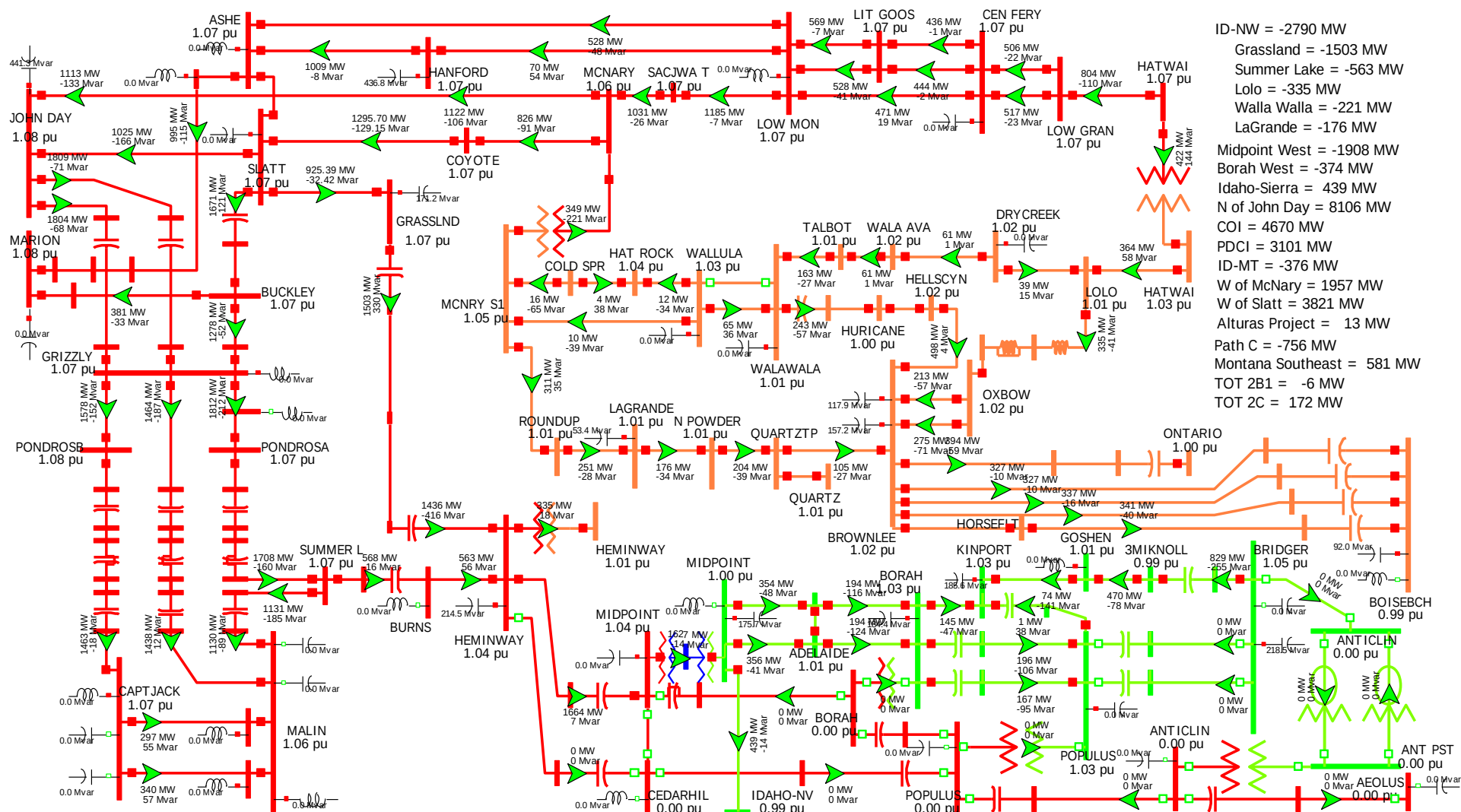


Figure E7: 16hs2sa 2250idnw N Base Case **BF IPC Hemingway-Grassland 500 kV Line & Hemingway 500/230 Xfmr**

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

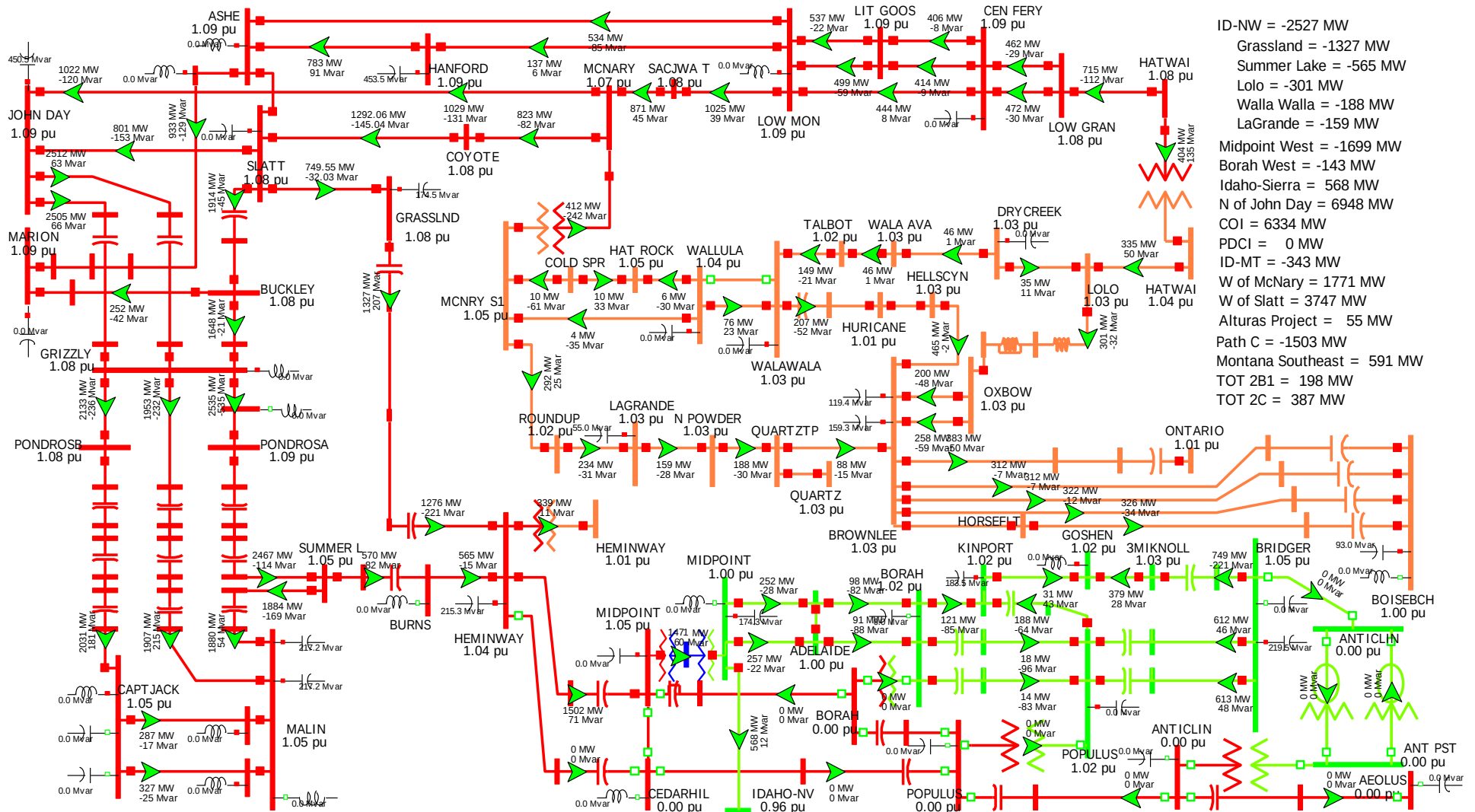


Figure E8: 16hs2sa_2250idnw_N Base Case Bi-Pole Loss of Pacific DC Intertie

ID-NW = -2477 MW
 Grassland = -1295 MW
 Summer Lake = -526 MW
 Lolo = -322 MW
 Walla Walla = -196 MW
 LaGrande = -153 MW
 Midpoint West = -1653 MW
 Borah West = -120 MW
 Idaho-Sierra = 557 MW
 N of John Day = 8907 MW
 COI = 5777 MW
 PDCI = 3101 MW
 ID-MT = -369 MW
 W of McNary = 2099 MW
 W of Slatt = 4399 MW
 Alturas Project = 46 MW
 Path C = -1514 MW
 Montana Southeast = 629 MW
 TOT 2B1 = 234 MW
 TOT 2C = 365 MW

Appendix E – 16hs2sa_2250idnw_solo Base Case Post-Transient Contingency Results

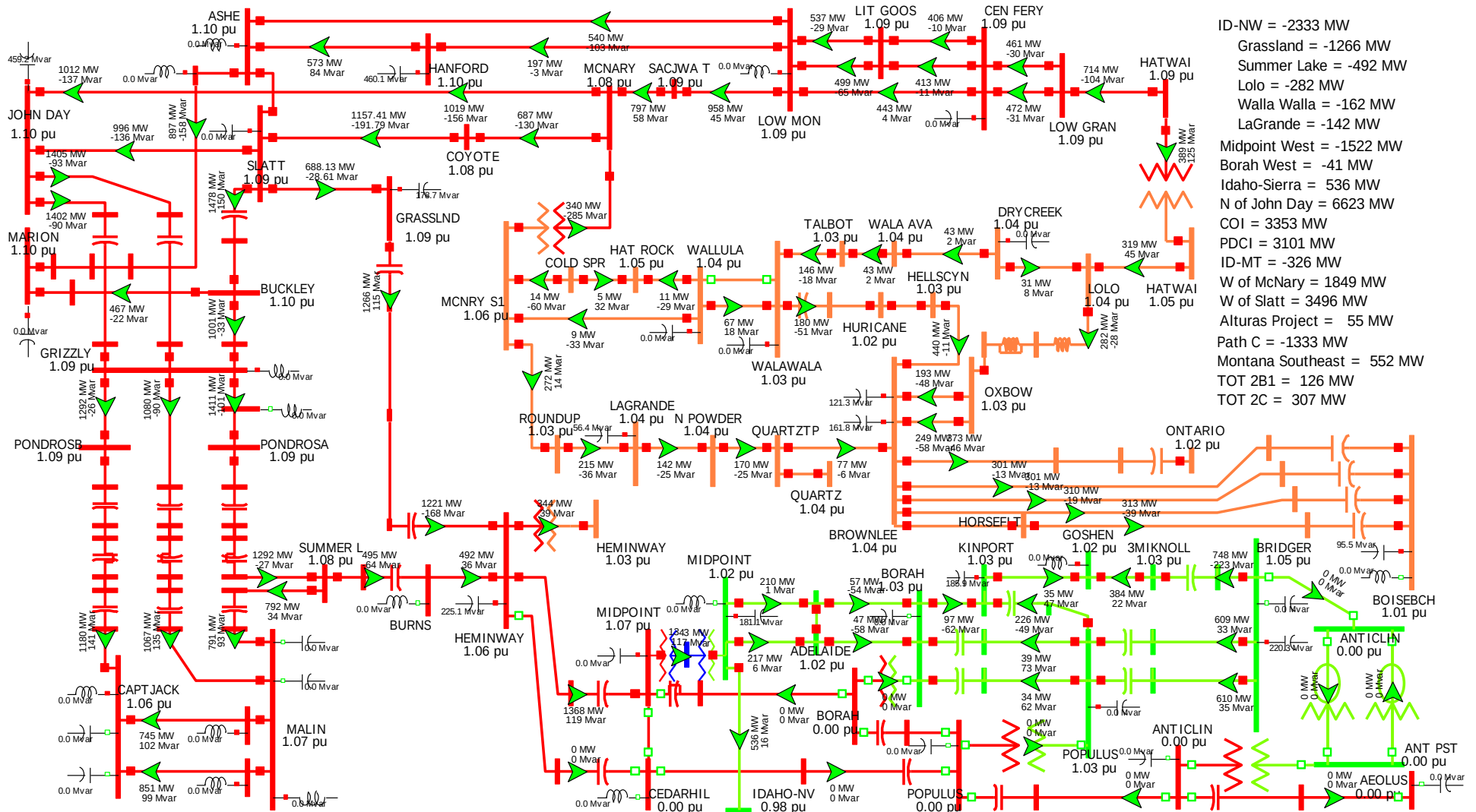


Figure E10: 16hs2sa_2250idnw_N Base Case N-2 Loss of Malin-Round Mtn #1 & #2 500 kV Lines

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	447.3	983.3	979.0	100.4%	1287.7	76.4%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	340.5	794.9	722.9	110.0%	1265.2	62.8%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1701.3	2942.3	2199.7	133.8%	3235.5	90.9%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1701.3	2942.3	2199.7	133.8%	3235.5	90.9%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1700.0	2935.0	2666.9	110.1%	3999.9	73.4%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1691.6	2924.6	2667.0	109.7%	4000.0	73.1%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1654.9	2923.9	2229.7	131.1%	3514.1	83.2%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1654.9	2923.9	2699.7	108.3%	3999.9	73.1%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1647.9	2899.4	2699.7	107.4%	4000.0	72.5%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	PTRSNFUR (62386)	% Δ Volts	0.969	0.918				5.3%
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1701.3	2977.3	2199.7	135.3%	3235.5	92.0%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1701.3	2977.3	2199.7	135.3%	3235.5	92.0%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1700.0	2969.8	2666.9	111.4%	3999.9	74.2%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1691.6	2959.5	2667.0	111.0%	4000.0	74.0%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	275.9	367.4	320.0	114.8%	370.0	99.3%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	646.8	1260.3	950.0	132.7%	1286.0	98.0%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	CLATSOP (40243) -> LWSClARK (45314) CKT 1 at CLATSOP	Branch MVA	84.5	94.5	94.0	100.5%	139.0	68.0%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	275.9	352.1	320.0	110.0%	370.0	95.2%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	646.8	1145.5	950.0	120.6%	1286.0	89.1%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OLYMPIA (40797)	% Δ Volts	1.064	1.001				5.9%
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OLYMPIA (40797)	% Δ Volts	1.064	0.996				6.4%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	821.0	800.0	102.6%	1199.9	68.4%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	946.5	920.0	102.9%	1046.8	90.4%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	946.9	920.0	102.9%	1046.8	90.5%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1305.8	1237.0	105.6%	1396.0	93.5%
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	934.1	920.0	101.5%	1046.8	89.2%
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	807.0	800.0	100.9%	1199.9	67.3%
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1249.4	1237.0	101.0%	1396.0	89.5%
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1392.1	1237.0	112.5%	1396.0	99.7%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	1009.5	920.0	109.7%	1046.8	96.4%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	821.8	800.0	102.7%	1199.9	68.5%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LAGRANDE (40619)	% Δ Volts	0.981	0.925				5.7%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	IMNAHA (60278)	% Δ Volts	0.997	0.944				5.3%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	N POWDER (60313)	% Δ Volts	0.997	0.945				5.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1244.4	1237.0	100.6%	1396.0	89.1%
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1241.1	1237.0	100.3%	1396.0	88.9%
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	859.0	800.0	107.4%	1199.9	71.6%
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	PTRSNFUR (62386)	% Δ Volts	0.969	0.905				6.6%
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	AMPS (65025)	% Δ Volts	0.96	0.899				6.4%
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	PTRSNFLT (62030)	% Δ Volts	0.952	0.892				6.3%
BF IPC Midpoint-Hem 500 kV & Hem 500/230 Xfmr	No Violations							
BF Lolo 230kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1259.5	1237.0	101.8%	1396.0	90.2%
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 2	JONTMB11 (90164)	% Δ Volts	1.027	0.967				5.8%
BF McNary 230 kV SECT 3	MCNARY (40717)	% Δ Volts	1.028	0.946				8.0%
BF McNary 230 kV SECT 3	MCN PH6 (44128)	% Δ Volts	1.03	0.948				8.0%
BF McNary 230 kV SECT 3	MCN TX7 (44121)	% Δ Volts	1.03	0.949				7.9%
BF McNary 230 kV SECT 3	PATTER T (40819)	% Δ Volts	1.024	0.945				7.7%
BF McNary 230 kV SECT 3	BERRIAN (40103)	% Δ Volts	1.023	0.946				7.5%
BF McNary 230 kV SECT 3	H2F (40493)	% Δ Volts	1.022	0.95				7.0%
BF McNary 230 kV SECT 3	FRANKLIN (40443)	% Δ Volts	1.01	0.951				5.8%
BF McNary 230 kV SECT 3	MCNARY (40715)	% Δ Volts	1.007	0.95				5.7%
BF McNary 230 kV SECT 3	UMATILLA (45313)	% Δ Volts	1.007	0.952				5.5%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1317.0	1237.0	106.5%	1396.0	94.3%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	954.4	920.0	103.7%	1046.8	91.2%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	811.1	800.0	101.4%	1199.9	67.6%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	HEMBOA11 (61953)	% Δ Volts	1.078	0.994				7.8%
Bus: Alvey 500 kV + RAS	No Violations							
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	No Violations							

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	84.5	97.6	94.0	103.9%	139.0	70.2%
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Allston-Keeler 500 kV + RAS	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	84.5	97.6	94.0	103.8%	139.0	70.2%
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	885.6	1033.0	1009.1	102.4%	1285.2	80.4%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	QUARTZ (60305) -> NELSN TP (61055) CKT 1 at QUARTZ	Branch Amp	213.9	401.7	400.0	100.4%	491.2	81.8%
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	252.2	837.8	785.7	106.6%	926.3	90.5%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	252.2	837.8	785.7	106.6%	926.3	90.5%
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1701.3	2612.7	2199.7	118.8%	3235.5	80.8%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1701.3	2612.7	2199.7	118.8%	3235.5	80.8%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1817.5	2467.0	2199.9	112.1%	3280.5	75.2%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1802.1	2446.1	2199.9	111.2%	3280.5	74.6%
N-1: Captain Jack-Olinda 500 kV	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1654.9	2537.0	2229.7	113.8%	3514.1	72.2%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2624.7	2477.9	105.9%	3999.9	65.6%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	GLEN DL (45113) -> GRANT PS (45123) CKT 1 at GLEN DL	Branch Amp	340.5	752.3	722.9	104.1%	1265.2	59.5%

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	822.6	800.0	102.8%	1199.9	68.6%
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1245.2	1237.0	100.7%	1396.0	89.2%
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	946.2	920.0	102.9%	1046.8	90.4%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	966.3	920.0	105.0%	1046.8	92.3%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1352.2	1237.0	109.3%	1396.0	96.9%
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	976.0	920.0	106.1%	1046.8	93.2%
N-1: Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	820.5	800.0	102.6%	1199.9	68.4%
N-1: Hemingway-Grassland 500 kV	PTRSNFLT (62386)	% Δ Volts	0.969	0.903				6.8%
N-1: Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.952	0.89				6.5%
N-1: Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts	0.96	0.908				5.4%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1709.8	2928.2	2400.0	122.0%	3199.9	91.5%
N-1: Hemingway-Grassland 500 kV + FACRI	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1244.7	1237.0	100.6%	1396.0	89.2%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1716.2	2943.7	2400.0	122.7%	3800.0	77.5%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1350.3	1237.0	109.2%	1396.0	96.7%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	973.9	920.0	105.9%	1046.8	93.0%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	823.4	800.0	102.9%	1199.9	68.6%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1701.3	2944.9	2199.7	133.9%	3235.5	91.0%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1701.3	2944.9	2199.7	133.9%	3235.5	91.0%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALROU21	Branch Amp	1700.0	2937.4	2666.9	110.1%	3999.9	73.4%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1691.6	2927.5	2667.0	109.8%	4000.0	73.2%
N-1: Malin-Round Mtn #2 500 kV	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1654.9	2919.6	2229.7	130.9%	3514.1	83.1%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1654.9	2919.6	2699.7	108.1%	3999.9	73.0%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1647.9	2906.9	2699.7	107.7%	4000.0	72.7%
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-Coyote-Slatt 500 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1241.9	1237.0	100.4%	1396.0	89.0%
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1243.5	1237.0	100.5%	1396.0	89.1%
N-1: Midpoint-Hemingway 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	855.5	800.0	106.9%	1199.9	71.3%
N-1: Midpoint-Hemingway 500 kV	PTRSNFUR (62386)	% Δ Volts	0.969	0.871				10.1%
N-1: Midpoint-Hemingway 500 kV	PTRSNFLT (62030)	% Δ Volts	0.952	0.86				9.7%
N-1: Midpoint-Hemingway 500 kV	AMPS (65025)	% Δ Volts	0.96	0.879				8.4%
N-1: Midpoint-Hemingway 500 kV	BIGGRASS (65155)	% Δ Volts	0.98	0.928				5.3%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1241.1	1237.0	100.3%	1396.0	88.9%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	856.7	800.0	107.1%	1199.9	71.4%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	PTRSNFUR (62386)	% Δ Volts	0.969	0.907				6.4%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	AMPS (65025)	% Δ Volts	0.96	0.9				6.2%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	PTRSNFLT (62030)	% Δ Volts	0.952	0.894				6.1%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1240.9	1237.0	100.3%	1396.0	88.9%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	858.1	800.0	107.3%	1199.9	71.5%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	PTRSNFUR (62386)	% Δ Volts	0.969	0.911				6.0%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	PTRSNFLT (62030)	% Δ Volts	0.952	0.897				5.8%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	AMPS (65025)	% Δ Volts	0.96	0.906				5.6%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1240.0	1237.0	100.2%	1396.0	88.8%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	858.7	800.0	107.3%	1199.9	71.6%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	AMPS (65025)	% Δ Volts	0.96	0.909				5.3%
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	PTRSNFUR (62386)	% Δ Volts	0.969	0.918				5.3%
N-1: Midpoint-Humboldt 345 kV	CAL S PS (64023) -> CAL SUB (64025) CKT 1 at CAL SUB	Branch MVA	93.3	157.1	150.0	104.7%	180.0	87.3%
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1263.8	1237.0	102.2%	1396.0	90.5%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	275.9	343.8	320.0	107.4%	370.0	92.9%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	646.8	1127.6	950.0	118.7%	1286.0	87.7%
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1817.5	3271.7	2199.9	148.7%	3280.5	99.7%
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUTAB21	Branch Amp	1817.5	3271.7	2667.0	122.7%	4000.0	81.8%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	1807.7	3258.1	2667.0	122.2%	4000.0	81.5%
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	296.2	336.9	326.3	103.2%	416.7	80.8%
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2921.7	2477.9	117.9%	3999.9	73.0%
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	1945.6	2921.7	2667.0	109.6%	4000.0	73.0%
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at TABVAC12	Branch Amp	1919.0	2901.2	2667.0	108.8%	4000.0	72.5%
N-1: Table Mtn-Tesla 500 kV	VACTES11 (30044) -> TESLA (30040) CKT 1 at VACTES11	Branch Amp	1420.3	2325.5	2230.0	104.3%	3555.9	65.4%
N-1: Table Mtn-Vaca Dixon 500 kV	PEASE (32200) -> E.MRY J1 (32288) CKT 1 at PEASE	Branch Amp	404.8	449.4	441.8	101.7%	507.1	88.6%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Table Mtn-Vaca Dixon 500 kV	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	296.2	357.3	326.3	109.5%	416.7	85.7%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1496.3	2642.4	2230.0	118.5%	3555.9	74.3%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	822.2	800.0	102.8%	1199.9	68.5%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV + RAS	MIDPOINT (60240) -> MPSNT501 (60237) CKT 1 at MPSNT501	Branch MVA	1241.0	1641.3	1500.0	109.4%	1650.0	99.5%
N-2: Bridger-Populus #1 & #2 345 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	800.0	800.0	100.0%	1199.9	66.7%
N-2: Bridger-Populus #1 & #2 345 kV + RAS	MIDHEM11 (61988) -> MIDPOINT (60240) CKT 1 at MIDHEM11	Branch Amp	1382.4	1813.9	1732.1	104.7%	3600.0	50.4%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MIDPOINT (60240) -> MPSNT501 (60237) CKT 1 at MPSNT501	Branch MVA	1241.0	1632.2	1500.0	108.8%	1650.0	98.9%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	850.4	800.0	106.3%	1199.9	70.9%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	MIDHEM11 (61988) -> MIDPOINT (60240) CKT 1 at MIDHEM11	Branch Amp	1382.4	1831.9	1732.1	105.8%	3600.0	50.9%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	BIGGRASS (65155)	% Δ Volts	0.98	0.91				7.1%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	AMPS (65025)	% Δ Volts	0.96	0.891				7.2%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	PTRSNFLT (62386)	% Δ Volts	0.969	0.902				6.9%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	PTRSNFLT (62030)	% Δ Volts	0.952	0.889				6.6%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SPAR CYN (66765)	% Δ Volts	0.987	0.938				5.0%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	LAGRANDE (40619)	% Δ Volts	0.981	0.927				5.5%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	PILOT RK (45413)	% Δ Volts	0.986	0.935				5.2%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	ATHENA (45015)	% Δ Volts	0.986	0.936				5.1%
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	769.9	940.2	920.0	102.2%	1046.8	89.8%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1709.8	2711.2	2400.0	113.0%	3199.9	84.7%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: DC-BIPOLE	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	296.2	332.6	326.3	101.9%	416.7	79.8%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1817.5	2378.2	2199.9	108.1%	3280.5	72.5%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1802.1	2358.1	2199.9	107.2%	3280.5	71.9%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1716.2	2725.1	2400.0	113.5%	3800.0	71.7%
N-2: DC-BIPOLE	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1701.3	2310.2	2199.7	105.0%	3235.5	71.4%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1701.3	2310.2	2199.7	105.0%	3235.5	71.4%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1624.0	2312.5	2134.0	108.4%	3499.9	66.1%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDVIN11	Branch Amp	1602.3	2278.7	2134.0	106.8%	3499.9	65.1%
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	1580.4	2249.9	2134.0	105.4%	3499.9	64.3%
N-2: DC-BIPOLE	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1654.9	2244.9	2229.7	100.7%	3514.1	63.9%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2508.5	2477.9	101.2%	3999.9	62.7%
N-2: DC-BIPOLE	YORKCANY (12091)	% Δ Volts	0.999	0.943				5.6%
N-2: DC-BIPOLE	SPRINGER (12077)	% Δ Volts	1.001	0.947				5.4%
N-2: DC-BIPOLE	CIMARRON (12148)	% Δ Volts	1.002	0.948				5.4%
N-2: DC-BIPOLE	RAINVL_T (12130)	% Δ Volts	1.007	0.955				5.2%
N-2: DC-BIPOLE	RAINVL1 (12129)	% Δ Volts	1.007	0.955				5.2%
N-2: Double Palo Verde	HESPERUS (79071) -> COYOTE G (79191) CKT 1 at HESPERUS	Branch Amp	345.1	433.5	431.8	100.4%	441.8	98.1%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1709.8	2477.4	2400.0	103.2%	3199.9	77.4%
N-2: Double Palo Verde	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	801.6	800.0	100.2%	1199.9	66.8%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1716.2	2496.6	2400.0	104.0%	3800.0	65.7%
N-2: Double Palo Verde	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1624.0	2164.6	2134.0	101.4%	3499.9	61.8%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1716.2	3134.9	2400.0	130.6%	3800.0	82.5%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1370.5	2972.4	2700.0	110.1%	4000.0	74.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1594.3	2959.9	2400.0	123.3%	3800.0	77.9%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1579.8	2945.5	2400.0	122.7%	3800.0	77.5%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1594.3	2952.8	2400.0	123.0%	3800.0	77.7%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1579.8	2941.5	2400.0	122.6%	3800.0	77.4%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1805.8	3057.1	2900.0	105.4%	4350.0	70.3%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH12	Branch Amp	1867.4	3397.5	3000.0	113.2%	4050.0	83.9%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	No Violations							
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1870.3	3771.5	2667.4	141.4%	4099.2	92.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1834.9	3661.7	2667.4	137.3%	4099.2	89.3%

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1834.9	3661.7	2667.4	137.3%	4099.2	89.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1963.7	3175.6	2993.0	106.1%	4514.9	70.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1963.7	3175.6	2993.0	106.1%	4514.9	70.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1934.0	3143.0	2993.0	105.0%	4514.9	69.6%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at MAXWELL	Branch Amp	1934.0	3143.0	2993.0	105.0%	4514.9	69.6%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1912.8	3106.2	2993.0	103.8%	4514.9	68.8%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	HORSE HV (40547)	% Δ Volts	1.033	0.979				5.2%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	HORSE HV (40547)	% Δ Volts	1.033	0.98				5.1%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1121.0	1248.6	1237.0	100.9%	1396.0	89.4%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	866.0	800.0	108.2%	1199.9	72.2%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	PTRSNFUR (62386)	% Δ Volts	0.969	0.895				7.6%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	PTRSNFLT (62030)	% Δ Volts	0.952	0.882				7.4%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	AMPS (65025)	% Δ Volts	0.96	0.89				7.3%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	DILLON S (62084)	% Δ Volts	0.975	0.913				6.4%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	BIGGRASS (65155)	% Δ Volts	0.98	0.918				6.3%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	GARLAND1 (67147)	% Δ Volts	1.017	0.963				5.3%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	SHERDNMT (62158)	% Δ Volts	0.98	0.928				5.3%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	275.9	345.3	320.0	107.9%	370.0	93.3%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	646.8	1132.1	950.0	119.2%	1286.0	88.0%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	665.5	870.9	830.9	104.8%	926.3	94.0%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1870.3	3513.4	2667.4	131.7%	4099.2	85.7%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1834.9	3419.7	2667.4	128.2%	4099.2	83.4%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1834.9	3405.5	2667.4	127.7%	4099.2	83.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1963.7	3457.6	2993.0	115.5%	4514.9	76.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1963.7	3457.6	2993.0	115.5%	4514.9	76.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1934.0	3438.9	2993.0	114.9%	4514.9	76.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1934.0	3438.9	2993.0	114.9%	4514.9	76.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1912.8	3406.9	2993.0	113.8%	4514.9	75.5%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							

Appendix E - 16hs2a_2250idnw_solo Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	288.7	921.6	825.9	111.6%	976.5	94.4%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	235.3	863.1	825.1	104.6%	975.0	88.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	388.6	466.4	462.9	100.8%	579.9	80.4%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	ADDY (40017)	% Δ Volts	1.016	0.961				5.4%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	METCHIP (48223)	% Δ Volts	1.012	0.959				5.2%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	ORIN (48301)	% Δ Volts	1.007	0.955				5.2%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	ARDEN (48015)	% Δ Volts	1.009	0.957				5.2%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	COLV AVA (48083)	% Δ Volts	1.006	0.955				5.1%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	722.8	802.7	800.0	100.3%	1199.9	66.9%
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.86	-921	0.92	-2915	0.77	-1830	0.98	-2424	0.83	-2926	0.94	-1480	0.71	-612	0.76	-342
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.86	-899	0.92	-2983	0.77	-1774	0.98	-2010	0.81	-2894	0.93	-1831	0.71	-606	0.76	-336
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.86	-930	0.92	-3185	0.77	-1854	0.98	-2171	0.83	-3109	0.94	-1502	0.70	-625	0.76	-342
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.86	-889	0.92	-3048	0.77	-1748	0.98	-1985	0.87	-2457	0.94	-1691	0.71	-609	0.76	-331
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.85	-923	0.89	-2761	0.77	-1862	0.98	-1983	0.88	-2938	0.93	-1850	0.71	-603	0.76	-335
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.86	-941	0.91	-3279	0.76	-1877	0.98	-2277	0.84	-3161	0.93	-1977	0.70	-628	0.76	-345
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.86	-979	0.92	-3023	0.76	-1938	0.98	-2309	0.85	-3219	0.93	-2004	0.73	-566	0.77	-295
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.87	-771	0.95	-2331	0.79	-1454	0.99	-1230	0.88	-1928	0.94	-1303	0.72	-569	0.77	-304
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.86	-908	0.92	-3130	0.77	-1774	0.98	-2501	0.85	-2583	0.93	-1883	0.71	-615	0.76	-335
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.87	-803	0.94	-2569	0.79	-1503	0.98	-1477	0.86	-1835	0.94	-1445	0.72	-581	0.77	-312
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.86	-940	0.90	-2952	0.77	-1886	0.98	-2641	0.86	-3125	0.93	-1965	0.70	-625	0.76	-343
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.86	-942	0.89	-2749	0.77	-1897	0.98	-2206	0.86	-3134	0.93	-1963	0.71	-616	0.76	-339
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.86	-974	0.93	-2857	0.76	-1925	0.98	-2271	0.86	-3186	0.93	-1993	0.76	-476	0.77	-276
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.85	-951	0.91	-3281	0.76	-1903	0.98	-2316	0.85	-3216	0.93	-2012	0.77	-480	0.76	-314
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500 KV	0.86	-944	0.92	-2942	0.76	-1888	0.98	-2231	0.86	-3127	0.93	-1974	0.80	-396	0.76	-311
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.86	-859	0.93	-2753	0.78	-1648	0.98	-1560	0.87	-2585	0.93	-1659	0.71	-601	0.76	-326
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.86	-851	0.94	-2512	0.78	-1664	0.98	-1413	0.89	-2323	0.94	-1510	0.71	-594	0.76	-322
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.85	-944	0.92	-3093	0.76	-1887	0.98	-2269	0.85	-3173	0.93	-1995	0.80	-397	0.77	-296
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.86	-915	0.93	-2779	0.77	-1813	0.98	-1682	0.88	-2667	0.93	-1508	0.70	-619	0.76	-341
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.86	-899	0.92	-3102	0.77	-1745	0.98	-2041	0.85	-2539	0.93	-1849	0.71	-612	0.76	-334
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.85	-904	0.92	-2720	0.77	-1826	0.98	-1800	0.89	-2833	0.93	-1778	0.71	-599	0.76	-324
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.85	-931	0.92	-2965	0.76	-1848	0.97	-1959	0.87	-2858	0.93	-1849	0.70	-625	0.76	-344
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.86	-949	0.92	-3169	0.76	-1892	0.98	-2109	0.86	-3079	0.93	-1892	0.70	-632	0.76	-348
BF 4231 MCNARY-COYOTE-SLATT 500 KV & MCNARY 500/230 KV XFMR	0.86	-900	0.92	-2980	0.78	-1933	0.98	-2218	0.85	-3245	0.93	-1973	0.70	-629	0.76	-345
BF 4234 MCNARY-COYOTE-SLATT & MCNARY-HERMCALP 500 KV	0.85	-985	0.93	-2700	0.76	-2048	0.98	-2184	0.87	-3385	0.93	-2016	0.70	-626	0.76	-354
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.85	-931	0.92	-2708	0.77	-1874	0.98	-2068	0.87	-3023	0.93	-1882	0.71	-597	0.77	-321
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.86	-942	0.91	-3018	0.76	-1894	0.98	-2236	0.86	-3142	0.93	-1981	0.70	-625	0.76	-343
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.86	-950	0.92	-3067	0.76	-1910	0.98	-2307	0.85	-3221	0.93	-2009	0.70	-622	0.76	-344
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.86	-950	0.91	-3212	0.76	-1908	0.98	-2304	0.85	-3209	0.93	-2006	0.70	-627	0.76	-345
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV	0.85	-921	0.93	-2851	0.77	-1829	0.98	-1844	0.89	-2651	0.92	-1320	0.71	-612	0.76	-336
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV + RAS	0.85	-989	0.92	-2856	0.76	-2018	0.99	-2105	0.87	-3333	0.93	-1819	0.70	-629	0.76	-361
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.86	-940	0.93	-3031	0.76	-1877	0.99	-1948	0.86	-2955	0.93	-1762	0.70	-627	0.76	-345
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTONS 500 KV	0.86	-949	0.92	-3107	0.76	-1905	0.98	-2274	0.85	-3180	0.93	-1999	0.70	-629	0.76	-346
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.86	-947	0.92	-2957	0.76	-1906	0.98	-2268	0.85	-3184	0.93	-1996	0.70	-621	0.76	-343
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.86	-947	0.92	-2965	0.76	-1905	0.98	-2257	0.86	-3164	0.93	-1992	0.70	-621	0.76	-343
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV + RAS	0.85	-976	0.92	-2993	0.76	-1982	0.98	-2135	0.87	-2998	0.93	-1618	0.70	-643	0.76	-369
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.86	-945	0.92	-3200	0.76	-1880	0.98	-2194	0.86	-3093	0.92	-1715	0.70	-631	0.76	-347
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.86	-949	0.92	-3186	0.76	-1897	0.98	-2167	0.85	-3075	0.93	-1870	0.70	-631	0.76	-347
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.86	-948	0.92	-3208	0.76	-1896	0.98	-2180	0.86	-3109	0.94	-1816	0.70	-631	0.76	-347
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.85	-943	0.92	-3098	0.76	-1884	0.99	-2009	0.87	-3015	0.93	-1835	0.70	-629	0.76	-345
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.85	-941	0.92	-3089	0.76	-1879	0.99	-1935	0.86	-3028	0.93	-1864	0.70	-628	0.76	-345
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV + RAS	0.85	-1058	0.95	-2273	0.75	-2206	0.98	-2402	0.86	-3833	0.93	-1988	0.70	-641	0.75	-385
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.85	-929	0.93	-2945	0.77	-1842	0.98	-1923	0.88	-2723	0.92	-1339	0.70	-622	0.76	-341
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV + RAS	0.85	-1080	0.91	-3362	0.74	-2230	0.97	-2879	0.82	-4095	0.92	-2368	0.70	-680	0.75	-400
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV	0.85	-919	0.93	-2596	0.77	-1844	0.98	-1960	0.87	-2926	0.93	-1873	0.71	-604	0.76	-332
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV + RAS	0.85	-966	0.94	-2584	0.76	-1964	0.98	-2214	0.86	-3313	0.93	-2026	0.70	-621	0.76	-351
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.86	-943	0.92	-3138	0.77	-1889	0.98	-2206	0.86	-3124	0.93	-1955	0.70	-625	0.76	-343
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.85	-976	0.92	-3004	0.76	-1985	0.98	-2301	0.86	-3334	0.93	-1995	0.70	-628	0.76	-355
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.85	-981	0.92	-3075	0.76	-1996	0.98	-2398	0.85	-3426	0.93	-2064	0.70	-632	0.76	-357
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.86	-939	0.92	-3055	0.76	-1881	0.98	-2124	0.87	-3043	0.93	-1899	0.70	-621	0.76	-342
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.86	-953	0.91	-3274	0.76	-1915	0.98	-2336	0.85	-3227	0.93	-2018	0.70	-632	0.76	-347
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.86	-850	0.92	-2692	0.78	-1834	0.99	-2055	0.87	-3075	0.93	-1847	0.71	-598	0.76	-321

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.86	-945	0.91	-3228	0.76	-1901	0.98	-2276	0.85	-3178	0.93	-1996	0.70	-626	0.76	-343
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.85	-1072	0.91	-3269	0.74	-2152	0.98	-2774	0.83	-3817	0.93	-2234	0.72	-594	0.76	-353
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.86	-941	0.93	-2514	0.76	-1885	0.98	-2123	0.87	-3057	0.93	-1937	0.71	-616	0.76	-342
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.85	-935	0.91	-3053	0.77	-1887	0.98	-2214	0.86	-3131	0.93	-1973	0.70	-623	0.76	-341
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.85	-938	0.92	-3084	0.76	-1879	0.98	-2121	0.87	-3041	0.93	-1899	0.70	-621	0.76	-341
BF 4700 HATWAI 500KV & 230 KV + RAS	0.86	-1098	0.91	-3236	0.73	-2171	0.98	-2735	0.83	-3788	0.93	-2219	0.72	-588	0.76	-349
BF 4708 HATWAI 500 KV BUS	0.86	-982	0.93	-2710	0.75	-1947	0.98	-2259	0.86	-3198	0.93	-1992	0.75	-513	0.78	-261
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.86	-948	0.91	-3078	0.76	-1904	0.98	-2268	0.85	-3173	0.93	-1994	0.70	-624	0.76	-345
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV + RAS	0.86	-910	0.92	-2899	0.78	-1912	0.98	-2392	0.85	-3364	0.93	-2056	0.72	-567	0.77	-307
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.86	-891	0.92	-2977	0.78	-1866	0.98	-2324	0.85	-3259	0.93	-2017	0.73	-555	0.77	-299
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.86	-954	0.92	-3240	0.76	-1906	0.97	-2273	0.86	-3137	0.93	-1981	0.70	-633	0.76	-348
BF 4888 ASHE-SLATT & CGS 500 KV	0.85	-998	0.92	-2704	0.76	-2093	0.98	-2477	0.85	-3634	0.93	-2081	0.70	-619	0.76	-356
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.85	-904	0.91	-2403	0.77	-1855	0.99	-1815	0.87	-2863	0.93	-1758	0.71	-592	0.76	-322
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.86	-913	0.90	-2558	0.77	-1893	0.98	-2126	0.87	-3095	0.93	-1943	0.71	-596	0.76	-323
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.86	-888	0.93	-2448	0.77	-1770	0.99	-1549	0.89	-2573	0.93	-1524	0.71	-601	0.76	-328
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.88	-743	0.93	-2985	0.79	-1076	0.98	-1926	0.84	-2516	0.93	-1773	0.72	-583	0.77	-315
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.88	-787	0.93	-2856	0.79	-1136	0.98	-1773	0.85	-2348	0.94	-1638	0.72	-583	0.77	-314
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.86	-931	0.91	-3288	0.76	-1853	0.98	-2709	0.76	-3077	0.93	-2016	0.70	-626	0.76	-343
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.86	-792	0.95	-2132	0.81	-1635	0.99	-1074	0.91	-2017	0.94	-1250	0.74	-537	0.78	-278
BF 5006 SLATT-COYOTE-MCNARY & SLATT-GRASSLAND 500 KV	0.85	-878	0.94	-2527	0.80	-1758	0.98	-1664	0.89	-2742	0.93	-1705	0.72	-570	0.77	-303
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.86	-860	0.93	-2352	0.78	-1724	0.99	-1470	0.91	-2468	0.94	-1467	0.72	-582	0.77	-314
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.85	-901	0.92	-2569	0.77	-1804	0.98	-1716	0.89	-2835	0.93	-1763	0.71	-599	0.76	-325
BF 5021 SLATT-JOHN DAY & SLATT-COYOTE-MCNARY 500 KV	0.85	-941	0.92	-2876	0.77	-1884	0.98	-1936	0.87	-3171	0.93	-1942	0.70	-625	0.76	-343
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.87	-770	0.94	-2562	0.79	-1482	0.98	-1463	0.88	-2230	0.94	-1469	0.72	-567	0.77	-302
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.86	-869	0.93	-2836	0.78	-1706	0.98	-2172	0.87	-2611	0.93	-1694	0.71	-602	0.76	-325
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.86	-946	0.92	-2900	0.76	-1903	0.98	-2239	0.86	-3161	0.93	-1993	0.71	-616	0.76	-342
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.86	-946	0.92	-2897	0.76	-1900	0.98	-2220	0.86	-3147	0.93	-1985	0.70	-623	0.76	-343
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.86	-936	0.93	-2572	0.77	-1878	0.98	-2125	0.86	-3078	0.93	-1946	0.71	-604	0.76	-335
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.85	-934	0.91	-2789	0.77	-1880	0.98	-2080	0.87	-3045	0.93	-1908	0.71	-602	0.76	-333
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.86	-948	0.91	-2985	0.76	-1903	0.98	-2226	0.86	-3141	0.93	-1974	0.71	-618	0.76	-341
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.86	-850	0.92	-2692	0.78	-1834	0.99	-2055	0.87	-3075	0.93	-1847	0.71	-598	0.76	-321
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.85	-967	0.93	-2466	0.76	-1959	0.98	-2020	0.88	-3122	0.93	-1901	0.71	-597	0.76	-332
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.85	-899	0.92	-2622	0.77	-1809	0.98	-1777	0.89	-2785	0.93	-1744	0.71	-598	0.76	-325
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.85	-900	0.92	-2604	0.77	-1822	0.99	-1784	0.89	-2854	0.93	-1769	0.71	-591	0.76	-322
BF 5266 SLATT-BUCKLY 500 KV	0.86	-889	0.93	-2836	0.77	-1753	0.98	-1790	0.88	-2716	0.93	-1688	0.71	-611	0.76	-334
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.86	-950	0.91	-3112	0.76	-1909	0.98	-2262	0.86	-3159	0.93	-1986	0.70	-622	0.76	-342
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.86	-941	0.89	-3079	0.76	-1904	0.98	-2228	0.86	-3159	0.93	-1974	0.71	-616	0.76	-340
BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.91	-487	0.94	-2693	0.80	-1278	0.98	-1636	0.89	-2303	0.94	-1580	0.74	-533	0.78	-272
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.91	-599	0.91	-3267	0.75	-1140	0.98	-2705	0.85	-2991	0.93	-2005	0.71	-604	0.76	-331
BF IPC MIDPOINT-HEM 500 KV & ADEL-MIDPOINT 345 KV + PTSN	0.88	-739	0.91	-3329	0.78	-1436	0.98	-2771	0.85	-2882	0.93	-1995	0.75	-484	0.79	-237
BF LOLO 230KV	0.87	-960	0.92	-3069	0.74	-1905	0.98	-2112	0.86	-2992	0.93	-1924	0.71	-609	0.76	-328
BF MCNARY 230 KV SECT 1	0.86	-1001	0.92	-3173	0.75	-2015	0.98	-2459	0.84	-3453	0.93	-2086	0.70	-629	0.76	-355
BF MCNARY 230 KV SECT 2	0.86	-979	0.92	-3178	0.76	-1968	0.98	-2807	0.83	-3355	0.96	-1880	0.70	-630	0.76	-352
BF MCNARY 230 KV SECT 3	0.86	-959	0.92	-3031	0.76	-1938	0.98	-2705	0.86	-3223	0.93	-1985	0.70	-630	0.76	-351
BF PGE SLATT-GRASSLAND 500 KV & BOARDMAN COAL GEN	0.86	-828	0.94	-2452	0.82	-1552	0.98	-1588	0.89	-2485	0.94	-1591	0.73	-537	0.77	-287
BUS: ALVEY 500 KV + RAS	0.85	-997	0.91	-3472	0.75	-2020	0.98	-2544	0.86	-2976	0.94	-1887	0.70	-653	0.75	-375
BUS: BELL BPA 500 KV	0.86	-950	0.93	-2996	0.76	-1909	0.98	-2277	0.85	-3170	0.93	-1993	0.72	-583	0.76	-354
BUS: BUCKLEY 500 KV	0.86	-861	0.94	-2561	0.77	-1673	0.99	-1451	0.89	-2420	0.93	-1333	0.71	-602	0.76	-328
BUS: DIXONVILLE 500 KV	0.86	-876	0.92	-3037	0.77	-1715	0.98	-1951	0.87	-2373	0.94	-1724	0.71	-605	0.76	-328
BUS: HOT SPRINGS 500 KV	0.86	-948	0.91	-3231	0.76	-1904	0.98	-2298	0.85	-3205	0.93	-2003	0.71	-602	0.76	-341
BUS: KEELER 500 KV + RAS	0.85	-1059	0.95	-2185	0.75	-2201	0.99	-2041	0.89	-3488	0.94	-1694	0.70	-643	0.75	-386
BUS: SICKLER 500 KV	0.86	-946	0.92	-2891	0.76	-1903	0.98	-2242	0.86	-3159	0.93	-1988	0.71	-618	0.76	-342

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BUS: SUMMER LAKE 500 KV	0.89	-725	0.94	-2775	0.79	-1046	0.98	-1714	0.85	-2285	0.94	-1611	0.72	-577	0.77	-311
N-1: ALLSTON-KEELER 500 KV + RAS	0.85	-1063	0.95	-2399	0.74	-2217	0.98	-2932	0.86	-3883	0.93	-2036	0.70	-644	0.75	-386
N-1: ALLSTON-NAPAVINE 500 KV	0.85	-938	0.92	-3078	0.76	-1879	0.98	-2118	0.87	-3039	0.93	-1897	0.70	-621	0.76	-341
N-1: ALLSTON-PAUL #2 500 KV	0.85	-938	0.92	-3083	0.76	-1879	0.98	-2118	0.87	-3039	0.93	-1898	0.70	-621	0.76	-341
N-1: ALVERY-DIXONVILLE 500 KV	0.86	-882	0.92	-3052	0.77	-1731	0.98	-1974	0.87	-2405	0.93	-1815	0.71	-607	0.76	-330
N-1: ALVEY-MARION 500 KV	0.86	-895	0.93	-2971	0.77	-1767	0.98	-1903	0.87	-2527	0.93	-1710	0.71	-610	0.76	-333
N-1: ASHE-HANFORD 500 KV	0.86	-949	0.90	-2880	0.76	-1910	0.98	-2698	0.86	-3157	0.93	-1987	0.70	-622	0.76	-342
N-1: ASHE-LOW MON 500 KV	0.86	-939	0.91	-3105	0.76	-1892	0.98	-2243	0.86	-3142	0.93	-1982	0.70	-626	0.76	-343
N-1: ASHE-MARION 500 KV	0.86	-896	0.93	-2625	0.77	-1788	0.99	-1609	0.89	-2618	0.93	-1546	0.71	-605	0.76	-331
N-1: ASHE-SLATT 500 KV	0.85	-908	0.92	-2625	0.77	-1863	0.99	-1863	0.88	-2921	0.93	-1792	0.71	-597	0.76	-323
N-1: BELL-COULEE 500 KV	0.86	-948	0.92	-3096	0.76	-1904	0.98	-2285	0.85	-3178	0.93	-1998	0.72	-591	0.76	-342
N-1: BELL-TAFT 500 KV	0.86	-953	0.92	-3150	0.76	-1911	0.98	-2286	0.85	-3171	0.93	-1995	0.72	-592	0.76	-356
N-1: BIG EDDY-CELILO 500 KV	0.86	-950	0.91	-3306	0.76	-1909	0.98	-2308	0.85	-3210	0.93	-2007	0.70	-631	0.76	-346
N-1: BIG EDDY-JOHN DAY 500 KV	0.86	-952	0.91	-3259	0.76	-1906	0.97	-2317	0.85	-3175	0.93	-1994	0.70	-632	0.76	-347
N-1: BIG EDDY-KNIGHT 500 KV	0.86	-934	0.92	-3081	0.77	-1875	0.98	-2097	0.87	-3054	0.93	-1918	0.70	-619	0.76	-339
N-1: BIG EDDY-OSTRANDER 500 KV	0.85	-948	0.92	-3217	0.76	-1896	0.98	-2207	0.86	-3123	0.93	-1909	0.70	-630	0.76	-347
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.86	-876	0.91	-3270	0.77	-1780	0.98	-2265	0.85	-3148	0.93	-1989	0.70	-626	0.76	-343
N-1: BRADY-ANTELOPE 230 KV	0.86	-946	0.91	-3283	0.76	-1897	0.98	-2295	0.85	-3198	0.93	-2001	0.70	-585	0.76	-344
N-1: BROADVIEW-GARRISON #1 500 KV	0.86	-955	0.91	-3271	0.76	-1915	0.98	-2326	0.85	-3230	0.93	-2017	0.76	-516	0.77	-285
N-1: BROWNLEE-ONTARIO 230 KV	0.86	-836	0.91	-3234	0.79	-1669	0.98	-2233	0.86	-3106	0.93	-1977	0.70	-624	0.76	-342
N-1: BUCKLEY-GRIZZLY 500 KV	0.86	-895	0.93	-2988	0.77	-1778	0.98	-1933	0.86	-2805	0.93	-1808	0.71	-610	0.76	-333
N-1: BUCKLEY-MARION 500 KV	0.85	-940	0.92	-3138	0.76	-1865	0.98	-2120	0.86	-3023	0.93	-1579	0.70	-629	0.76	-346
N-1: BUCKLEY-SLATT 500 KV	0.86	-889	0.93	-2840	0.77	-1753	0.98	-1790	0.88	-2716	0.93	-1688	0.71	-611	0.76	-334
N-1: CAPTAIN JACK-OLINDA 500 KV	0.87	-850	0.93	-2865	0.78	-1611	0.98	-1797	0.86	-2029	0.94	-1684	0.72	-591	0.76	-318
N-1: CAPTJACK-KFALLS 500 KV	0.86	-880	0.92	-3130	0.77	-1717	0.98	-2018	0.80	-2835	0.93	-2034	0.71	-607	0.76	-330
N-1: CHIEF JO-COULEE 500 KV	0.86	-950	0.91	-3124	0.76	-1907	0.98	-2281	0.85	-3180	0.93	-1998	0.70	-627	0.76	-346
N-1: CHIEF JO-MONROE 500 KV	0.86	-946	0.93	-2962	0.76	-1900	0.98	-2254	0.86	-3151	0.93	-1989	0.70	-624	0.76	-344
N-1: CHIEF JO-SICKLER 500 KV	0.86	-948	0.91	-3075	0.76	-1904	0.98	-2278	0.85	-3180	0.93	-1996	0.70	-621	0.76	-342
N-1: COULEE-HANFORD 500 KV	0.85	-941	0.92	-2695	0.77	-1901	0.98	-2174	0.86	-3149	0.93	-1952	0.72	-588	0.76	-327
N-1: COULEE-SCHULTZ 500 KV	0.85	-941	0.93	-2801	0.77	-1890	0.98	-2206	0.86	-3140	0.93	-1975	0.71	-608	0.76	-336
N-1: COVINGTON4-RAVER 500 KV	0.86	-951	0.91	-3274	0.76	-1911	0.98	-2317	0.85	-3216	0.93	-2011	0.70	-631	0.76	-347
N-1: COVINGTON5-RAVER 500 KV	0.86	-951	0.91	-3272	0.76	-1911	0.98	-2317	0.85	-3215	0.93	-2011	0.70	-631	0.76	-347
N-1: CUSTERW-MONROE 500 KV	0.86	-950	0.92	-3088	0.76	-1912	0.98	-2310	0.85	-3223	0.93	-2010	0.70	-623	0.76	-344
N-1: DIXONVILLE-MERIDIAN 500 KV	0.86	-888	0.92	-3060	0.77	-1748	0.98	-2001	0.85	-2585	0.93	-1766	0.71	-608	0.76	-331
N-1: DRYCREEK-LOLO 230 KV	0.86	-950	0.91	-3307	0.76	-1909	0.98	-2311	0.85	-3211	0.93	-2008	0.70	-630	0.76	-346
N-1: DRYCREEK-N LEWISTON 230 KV	0.86	-952	0.91	-3299	0.76	-1910	0.98	-2307	0.85	-3208	0.93	-2006	0.70	-630	0.76	-346
N-1: DRYCREEK-WALA AVA 230 KV	0.86	-953	0.91	-3290	0.76	-1910	0.98	-2304	0.85	-3207	0.93	-2005	0.70	-629	0.76	-345
N-1: DWORSHAK-HATWAI 500 KV + RAS	0.86	-987	0.93	-2663	0.76	-1942	0.98	-2239	0.86	-3196	0.93	-1984	0.75	-514	0.78	-260
N-1: DWORSHAK-TAFT 500 KV	0.86	-976	0.92	-2920	0.76	-1929	0.98	-2284	0.86	-3187	0.93	-1995	0.75	-509	0.77	-282
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.86	-952	0.91	-3156	0.76	-1911	0.98	-2295	0.85	-3210	0.93	-2008	0.70	-631	0.76	-347
N-1: ECHO LAKE-RAVER 500 KV	0.86	-948	0.91	-3192	0.76	-1904	0.98	-2287	0.85	-3183	0.93	-2004	0.70	-627	0.76	-345
N-1: ECHO LAKE-SCHULTZ 500 KV	0.86	-947	0.91	-3077	0.76	-1901	0.98	-2248	0.86	-3148	0.93	-1989	0.70	-628	0.76	-345
N-1: ECHO LAKE-SNOK TAP 500 KV	0.86	-947	0.92	-2948	0.76	-1904	0.98	-2250	0.86	-3167	0.93	-1996	0.71	-617	0.76	-342
N-1: GARRISON-TAFT #2 500 KV	0.85	-945	0.91	-3158	0.76	-1891	0.98	-2276	0.85	-3170	0.93	-1996	0.79	-434	0.76	-306
N-1: GOLDHILL-PLACER 115 KV	0.86	-953	0.91	-3345	0.76	-1914	0.98	-2342	0.85	-3249	0.93	-2024	0.70	-632	0.76	-346
N-1: GRASSLAND-COYOTE 500 KV	0.86	-951	0.91	-3309	0.76	-1910	0.98	-2312	0.85	-3212	0.93	-2009	0.70	-631	0.76	-346
N-1: GRASSLAND-SLATT 500 KV	0.85	-874	0.93	-2834	0.80	-1715	0.98	-1792	0.88	-2697	0.93	-1737	0.72	-573	0.77	-305
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.86	-872	0.93	-2884	0.78	-1720	0.98	-1781	0.87	-2639	0.93	-1703	0.71	-602	0.76	-326
N-1: GRIZZLY-MALIN 500 KV	0.86	-860	0.93	-2854	0.78	-1670	0.98	-1773	0.85	-2500	0.94	-1634	0.71	-602	0.76	-326
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.86	-821	0.93	-2874	0.78	-1598	0.98	-2232	0.86	-2569	0.94	-1669	0.72	-584	0.77	-314
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.86	-856	0.93	-2812	0.78	-1661	0.98	-2172	0.86	-2450	0.94	-1616	0.71	-601	0.76	-325
N-1: GRIZZLY-ROUND BU 500 KV	0.86	-950	0.91	-3293	0.76	-1902	0.98	-2705	0.85	-3193	0.93	-2000	0.70	-631	0.76	-346

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: HANFORD-LOW MON 500 KV	0.86	-946	0.91	-3061	0.76	-1900	0.98	-2261	0.85	-3167	0.93	-1989	0.70	-628	0.76	-345
N-1: HANFORD-VANTAGE 500 KV	0.86	-941	0.89	-3078	0.76	-1904	0.98	-2227	0.86	-3158	0.93	-1973	0.71	-615	0.76	-340
N-1: HANFORD-WAUTOMA 500 KV	0.86	-945	0.91	-3197	0.76	-1899	0.98	-2265	0.85	-3173	0.93	-1988	0.70	-628	0.76	-345
N-1: HATWAI 500/230 KV XFMR + RAS	0.86	-977	0.91	-3263	0.75	-1932	0.98	-2263	0.85	-3151	0.93	-1989	0.70	-631	0.76	-342
N-1: HATWAI-LOLO 230 KV	0.86	-956	0.91	-3273	0.76	-1914	0.98	-2288	0.85	-3185	0.93	-1999	0.70	-628	0.76	-344
N-1: HATWAI-LOW GRAN 500 KV	0.86	-892	0.92	-3002	0.78	-1870	0.98	-2344	0.85	-3273	0.93	-2026	0.73	-556	0.77	-300
N-1: HATWAI-N LEWISTON 230 KV	0.86	-952	0.91	-3301	0.76	-1911	0.98	-2308	0.85	-3209	0.93	-2007	0.70	-630	0.76	-346
N-1: HELLS CANYON-BROWNEE 230 KV	0.86	-816	0.92	-3010	0.78	-1725	0.98	-2025	0.87	-2905	0.93	-1889	0.71	-601	0.76	-328
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.85	-1006	0.92	-3143	0.75	-1911	0.98	-2166	0.86	-3050	0.93	-1950	0.70	-618	0.76	-338
N-1: HEMINGWAY-GRASSLAND 500 KV	0.88	-682	0.94	-2625	0.82	-1270	0.98	-1580	0.89	-2261	0.94	-1548	0.74	-521	0.78	-267
N-1: HEMINGWAY-GRASSLAND 500 KV + FACRI	0.87	-774	0.91	-3220	0.78	-1422	0.98	-2751	0.87	-3232	0.93	-2028	0.72	-579	0.77	-313
N-1: HEMINGWAY-GRASSLAND 500 KV + PTSN SHUNT	0.88	-688	0.94	-2641	0.82	-1282	0.98	-1589	0.89	-2274	0.94	-1554	0.74	-529	0.78	-269
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.88	-798	0.91	-3270	0.78	-1171	0.98	-2688	0.85	-2980	0.93	-1997	0.71	-605	0.76	-330
N-1: HILL TOP 345/230 XFMR	0.85	-948	0.91	-3300	0.76	-1886	0.98	-2294	0.85	-3116	0.93	-1998	0.70	-630	0.76	-346
N-1: HORSE HV-MCNARY 230 KV	0.86	-941	0.91	-3259	0.76	-1895	0.98	-2276	0.85	-3173	0.93	-1989	0.70	-630	0.76	-346
N-1: HOT SPRINGS-TAFT 500 KV	0.86	-948	0.91	-3231	0.76	-1904	0.98	-2298	0.85	-3205	0.93	-2003	0.71	-602	0.76	-341
N-1: HUMBOLDT-COYOTE CK 345 KV	0.86	-1027	0.91	-3223	0.76	-1978	0.98	-2228	0.85	-2991	0.93	-1939	0.70	-639	0.76	-350
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.86	-964	0.91	-3329	0.76	-1941	0.98	-2317	0.85	-3194	0.93	-2007	0.70	-638	0.76	-352
N-1: ING500-CUSTERW 500 KV	0.86	-950	0.91	-3219	0.76	-1909	0.98	-2305	0.85	-3209	0.93	-2006	0.70	-627	0.76	-345
N-1: JOHN DAY-MARION 500 KV	0.85	-936	0.92	-3115	0.76	-1865	0.98	-2048	0.87	-2968	0.93	-1605	0.70	-627	0.76	-345
N-1: JOHN DAY-ROCK CK 500 KV	0.85	-902	0.92	-2737	0.77	-1827	0.99	-1798	0.87	-2874	0.93	-1787	0.71	-598	0.76	-324
N-1: JOHN DAY-SLATT 500 KV	0.86	-932	0.91	-3142	0.76	-1827	0.98	-2006	0.86	-3092	0.93	-1938	0.70	-628	0.76	-345
N-1: Kfalls-MERIDIAN 500 KV	0.86	-934	0.92	-3205	0.76	-1863	0.98	-2210	0.83	-3184	0.94	-1561	0.70	-626	0.76	-343
N-1: KNIGHT-WAUTOMA 500 KV	0.85	-902	0.92	-2682	0.77	-1815	0.98	-1802	0.89	-2800	0.93	-1758	0.71	-599	0.76	-326
N-1: LAGRANDE-NORTH POWDER 230 KV	0.87	-914	0.91	-3268	0.76	-1887	0.98	-2247	0.86	-3105	0.93	-1979	0.70	-624	0.76	-342
N-1: LANES-MARION 500 KV	0.85	-940	0.92	-3164	0.76	-1876	0.98	-2149	0.87	-2968	0.94	-1759	0.70	-627	0.76	-344
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.86	-949	0.91	-3283	0.76	-1907	0.98	-2300	0.85	-3207	0.93	-2004	0.70	-629	0.76	-345
N-1: LIT GOOSE-LOW MON 500 KV	0.86	-947	0.91	-3249	0.76	-1904	0.98	-2287	0.85	-3183	0.93	-2000	0.70	-628	0.76	-344
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.86	-946	0.91	-3263	0.76	-1904	0.98	-2297	0.85	-3207	0.93	-2003	0.70	-626	0.76	-344
N-1: LOW MON-SAC TAP 500 KV	0.85	-939	0.92	-2824	0.77	-1885	0.98	-2149	0.85	-3070	0.93	-1907	0.71	-602	0.76	-324
N-1: MALIN 500/230 XFMR	0.86	-943	0.91	-3284	0.76	-1882	0.98	-2285	0.85	-3175	0.93	-1980	0.70	-629	0.76	-345
N-1: MALIN-HILLTOP 230 KV	0.86	-938	0.91	-3286	0.77	-1863	0.98	-2283	0.85	-3129	0.93	-1995	0.70	-627	0.76	-344
N-1: MALIN-ROUND MTN #1 500 KV	0.86	-910	0.92	-3135	0.77	-1778	0.98	-2076	0.85	-2589	0.93	-1887	0.71	-615	0.76	-335
N-1: MALIN-ROUND MTN #2 500 KV	0.86	-907	0.92	-3125	0.77	-1771	0.98	-2060	0.85	-2557	0.93	-1878	0.71	-615	0.76	-335
N-1: MALIN-SUMMER LAKE 500 KV	0.86	-940	0.92	-3101	0.76	-1739	0.98	-2039	0.83	-2718	0.93	-1814	0.70	-628	0.76	-344
N-1: MAPLE VLY-ROCKY RH 345 KV	0.86	-949	0.92	-3133	0.76	-1906	0.98	-2287	0.85	-3182	0.93	-2001	0.70	-629	0.76	-346
N-1: MARION-PEARL 500 KV	0.85	-936	0.91	-3153	0.77	-1861	0.98	-2106	0.87	-2833	0.92	-1384	0.70	-625	0.76	-343
N-1: MARION-SANTIAM 500 KV	0.86	-957	0.91	-3360	0.76	-1926	0.98	-2375	0.85	-3249	0.93	-2088	0.70	-632	0.76	-347
N-1: MCLOUGLIN-OSTRANDER 230 KV	0.86	-951	0.91	-3292	0.76	-1910	0.98	-2292	0.85	-3194	0.93	-1963	0.70	-631	0.76	-347
N-1: MCNARY 500/230 KV XFMR	0.86	-892	0.91	-3325	0.77	-1884	0.98	-2363	0.85	-3251	0.93	-2005	0.70	-632	0.76	-347
N-1: MCNARY S2-MCNARY S3 230 KV	0.86	-950	0.91	-3267	0.76	-1908	0.98	-2312	0.85	-3213	0.93	-2007	0.70	-631	0.76	-347
N-1: MCNARY-BOARD T1 230 KV	0.85	-941	0.91	-3308	0.76	-1885	0.98	-2275	0.85	-3141	0.93	-1990	0.70	-629	0.76	-344
N-1: MCNARY-COYOTE-SLATT 500 KV	0.85	-946	0.92	-2950	0.77	-1953	0.98	-2169	0.87	-3207	0.93	-1974	0.70	-623	0.76	-341
N-1: MCNARY-JOHN DAY 500 KV	0.86	-903	0.92	-2987	0.77	-1826	0.98	-1926	0.88	-2929	0.93	-1859	0.70	-627	0.76	-344
N-1: MCNARY-ROSS 345 KV	0.86	-937	0.92	-3188	0.77	-1886	0.98	-2215	0.86	-3123	0.93	-1952	0.70	-630	0.76	-346
N-1: MCNARY-ROUNDUP 230 KV	0.88	-833	0.92	-3181	0.78	-1803	0.98	-2166	0.86	-3040	0.93	-1948	0.71	-615	0.76	-337
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.85	-935	0.92	-2772	0.77	-1879	0.98	-2094	0.87	-3035	0.93	-1894	0.71	-601	0.76	-324
N-1: MIDPOINT-HEMINGWAY 500 KV	0.88	-732	0.91	-3314	0.78	-1429	0.98	-2326	0.85	-2875	0.93	-1990	0.74	-482	0.78	-251
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN SHUNT	0.88	-740	0.91	-3340	0.77	-1439	0.98	-2776	0.85	-2891	0.93	-1997	0.74	-495	0.78	-255
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN & BORA SHUNT	0.88	-768	0.91	-3353	0.76	-1480	0.98	-2788	0.85	-2911	0.93	-2002	0.74	-501	0.78	-257
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN & BORA & MLCK SHUNT	0.88	-772	0.91	-3375	0.76	-1487	0.98	-2797	0.85	-2919	0.93	-2006	0.74	-522	0.78	-261
N-1: MIDPOINT-HUMBOLDT 345 KV	0.85	-1028	0.92	-3202	0.75	-1999	0.98	-2647	0.85	-2976	0.93	-1936	0.70	-639	0.76	-350

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: NAPA-VINE-PAUL 500 KV	0.86	-944	0.91	-3219	0.76	-1892	0.98	-2229	0.86	-3139	0.93	-1974	0.70	-626	0.76	-343
N-1: OLYMPIA-PAUL 500 KV	0.86	-953	0.91	-3352	0.76	-1915	0.98	-2345	0.85	-3232	0.93	-2029	0.70	-632	0.76	-347
N-1: ONTARIO-CALDWELL 230 KV	0.86	-905	0.91	-3273	0.77	-1788	0.98	-2268	0.85	-3148	0.93	-1992	0.70	-627	0.76	-344
N-1: OSTRANDER-KNIGHT 500 KV	0.85	-942	0.92	-3151	0.76	-1882	0.98	-2129	0.86	-3034	0.93	-1872	0.70	-628	0.76	-345
N-1: OSTRANDER-PEARL 500 KV	0.86	-949	0.91	-3260	0.76	-1901	0.98	-2224	0.84	-3185	0.93	-1983	0.70	-630	0.76	-346
N-1: OSTRANDER-TROUTDALE 500 KV	0.86	-953	0.91	-3273	0.76	-1912	0.98	-2273	0.86	-3156	0.93	-1970	0.70	-632	0.76	-347
N-1: OXBOW-BROWNLEE #2 230 KV	0.86	-937	0.91	-3302	0.77	-1893	0.98	-2304	0.85	-3205	0.93	-2005	0.70	-630	0.76	-346
N-1: OXBOW-LOLO 230 KV	0.87	-949	0.92	-3075	0.75	-1894	0.98	-2113	0.86	-2992	0.93	-1924	0.71	-610	0.76	-328
N-1: PAUL-SATSOP 500 KV	0.86	-949	0.91	-3253	0.76	-1907	0.98	-2283	0.85	-3177	0.93	-1987	0.70	-630	0.76	-346
N-1: PEARL-KEELER 500 KV + RAS	0.85	-993	0.93	-2889	0.76	-2027	0.98	-2259	0.86	-3373	0.93	-1905	0.70	-631	0.76	-361
N-1: PINTO-FOUR CORNER 345 KV	0.86	-956	0.91	-3288	0.76	-1919	0.98	-2301	0.85	-3182	0.93	-2001	0.70	-633	0.76	-349
N-1: PONDEROSA A 500/230 KV XFMR	0.86	-952	0.91	-3308	0.76	-1909	0.98	-2310	0.85	-3207	0.93	-2006	0.70	-631	0.76	-347
N-1: PONDEROSA B 500/230 KV XFMR	0.86	-950	0.91	-3309	0.76	-1907	0.98	-2312	0.85	-3210	0.93	-2008	0.70	-631	0.76	-346
N-1: RAVER-PAUL 500 KV	0.86	-921	0.92	-2633	0.77	-1849	0.98	-1994	0.86	-2979	0.93	-1904	0.71	-606	0.76	-333
N-1: RAVER-TACOMA 500 KV	0.86	-950	0.91	-3196	0.76	-1908	0.98	-2294	0.85	-3197	0.93	-2002	0.70	-630	0.76	-346
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.85	-965	0.91	-3269	0.76	-1946	0.98	-2263	0.85	-3112	0.93	-1978	0.70	-639	0.76	-355
N-1: ROBINSON-HARRY ALLEN 500 KV	0.86	-912	0.91	-3303	0.77	-1780	0.98	-2312	0.85	-3227	0.93	-2016	0.70	-625	0.76	-344
N-1: ROCK CK-WAUTOMA 500 KV	0.85	-902	0.92	-2656	0.77	-1826	0.99	-1807	0.87	-2872	0.93	-1779	0.71	-593	0.76	-323
N-1: ROUND MTN-TABLE MTN 500 KV	0.86	-925	0.92	-3184	0.77	-1831	0.98	-2182	0.85	-2843	0.93	-1943	0.70	-620	0.76	-339
N-1: ROUNDUP-LAGRANDE 230 KV	0.87	-901	0.92	-3201	0.76	-1871	0.98	-2199	0.86	-3071	0.93	-1961	0.70	-620	0.76	-339
N-1: SCHULTZ-SICKLER 500 KV	0.86	-946	0.92	-2988	0.76	-1905	0.98	-2255	0.86	-3164	0.93	-1991	0.70	-620	0.76	-343
N-1: SCHULTZ-VANTAGE 500 KV	0.86	-951	0.91	-3112	0.76	-1909	0.98	-2264	0.85	-3172	0.93	-1986	0.70	-623	0.76	-342
N-1: SCHULTZ-WAUTOMA 500 KV	0.86	-937	0.91	-2906	0.77	-1888	0.98	-2112	0.87	-3059	0.93	-1918	0.71	-605	0.76	-334
N-1: SIGURD-GLEN CANYON 230 KV	0.86	-950	0.91	-3309	0.76	-1907	0.98	-2313	0.85	-3211	0.93	-2009	0.70	-630	0.76	-346
N-1: SLATT 500/230 KV XFMR	0.85	-989	0.92	-3034	0.76	-2022	0.98	-2360	0.85	-3429	0.93	-2058	0.70	-628	0.76	-357
N-1: SNOK TAP-SNOKING 500 KV	0.86	-951	0.91	-3242	0.76	-1910	0.98	-2309	0.85	-3213	0.93	-2008	0.70	-630	0.76	-346
N-1: TABLE MTN-TESLA 500 KV	0.86	-927	0.91	-3216	0.77	-1839	0.98	-2221	0.85	-2919	0.93	-1963	0.70	-619	0.76	-338
N-1: TABLE MTN-VACA DIXON 500 KV	0.86	-912	0.92	-3161	0.77	-1795	0.98	-2147	0.85	-2698	0.93	-1924	0.71	-614	0.76	-334
N-1: VANTAGE 500/230 KV XFMR #1	0.86	-950	0.91	-3319	0.76	-1910	0.98	-2313	0.85	-3214	0.93	-2010	0.70	-631	0.76	-346
N-1: VANTAGE 500/230 KV XFMR #2	0.86	-950	0.91	-3318	0.76	-1910	0.98	-2313	0.85	-3214	0.93	-2010	0.70	-631	0.76	-346
N-1: WALLA WALLA-TALBOT 230 KV	0.86	-958	0.91	-3240	0.76	-1908	0.98	-2287	0.85	-3180	0.93	-1998	0.70	-625	0.76	-342
N-1: WALLA WALLA-WALLULA 230 KV	0.86	-939	0.91	-3290	0.76	-1909	0.98	-2304	0.85	-3202	0.93	-2006	0.70	-629	0.76	-346
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.86	-832	0.94	-1834	0.79	-1687	0.99	-1084	0.93	-2132	0.94	-1241	0.73	-552	0.77	-297
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.86	-883	0.94	-2378	0.77	-1733	0.99	-1349	0.90	-2331	0.93	-1130	0.71	-603	0.76	-330
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.86	-812	0.95	-1929	0.79	-1544	0.99	-940	0.93	-1922	0.94	-1121	0.72	-576	0.77	-312
N-2: ASHE-MARION & SLATT-COYOTE-MCNARY 500 KV	0.85	-886	0.94	-2259	0.78	-1819	0.99	-1416	0.91	-2556	0.93	-1505	0.71	-600	0.76	-327
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.86	-872	0.94	-2421	0.78	-1685	0.99	-1346	0.91	-2475	0.93	-1459	0.71	-600	0.76	-328
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.85	-856	0.92	-2353	0.79	-1772	0.99	-1499	0.90	-2594	0.94	-1583	0.72	-587	0.77	-318
N-2: ASHE-SLATT & SLATT-COYOTE-MCNARY 500 KV	0.85	-860	0.93	-1979	0.79	-1870	0.99	-1457	0.91	-2656	0.94	-1543	0.72	-586	0.77	-317
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.86	-1030	0.92	-3044	0.75	-2051	0.98	-2574	0.84	-3548	0.93	-2131	0.81	-370	0.78	-247
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.86	-945	0.92	-3190	0.76	-1889	0.98	-2165	0.86	-3076	0.94	-1767	0.70	-630	0.76	-346
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.86	-948	0.92	-3215	0.76	-1895	0.98	-2188	0.86	-3117	0.93	-1885	0.70	-631	0.76	-347
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.85	-679	0.92	-3122	0.81	-1382	0.98	-2103	0.86	-2935	0.93	-1916	0.71	-609	0.76	-331
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.85	-678	0.92	-3120	0.81	-1375	0.98	-2099	0.87	-2916	0.93	-1914	0.71	-609	0.76	-331
N-2: BRIDGER-POPULUS #1 & #2 345 KV + RAS	0.88	-741	0.93	-2546	0.82	-1282	0.98	-1823	0.89	-2715	0.93	-1783	0.71	-538	0.76	-338
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV + RAS	0.88	-688	0.94	-2461	0.86	-1069	0.98	-1755	0.89	-2625	0.93	-1746	0.72	-497	0.76	-335
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.84	-1050	0.90	-3726	0.74	-2140	0.98	-3302	0.82	-3897	0.93	-2282	0.70	-710	0.78	-468
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.86	-845	0.94	-2589	0.77	-1631	0.98	-1650	0.90	-2451	0.93	-1677	0.72	-566	0.77	-298
N-2: BROWNLEE-OSBOW & BROWNLEE-HELLS CANYON 230 KV	0.86	-806	0.92	-3003	0.79	-1711	0.98	-2017	0.87	-2898	0.93	-1883	0.71	-600	0.76	-327
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.86	-925	0.93	-2872	0.76	-1820	0.98	-1844	0.87	-2724	0.93	-1145	0.70	-625	0.76	-345
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.86	-941	0.93	-2625	0.77	-1888	0.98	-2173	0.86	-3129	0.93	-1967	0.71	-608	0.76	-338
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.86	-944	0.93	-2799	0.76	-1893	0.98	-2220	0.86	-3140	0.93	-1979	0.70	-620	0.76	-343

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.86	-946	0.93	-2915	0.76	-1901	0.98	-2246	0.86	-3152	0.93	-1989	0.70	-624	0.76	-344
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.86	-946	0.92	-2936	0.76	-1900	0.98	-2252	0.86	-3154	0.93	-1988	0.71	-617	0.76	-341
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.86	-948	0.91	-3021	0.76	-1904	0.98	-2264	0.85	-3172	0.93	-1992	0.70	-625	0.76	-345
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.85	-919	0.91	-2381	0.77	-1891	0.99	-1958	0.88	-3030	0.93	-1854	0.74	-537	0.77	-307
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.85	-919	0.95	-1613	0.77	-1849	0.98	-1936	0.88	-2951	0.93	-1856	0.74	-541	0.77	-310
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.86	-949	0.93	-2989	0.76	-1910	0.98	-2294	0.85	-3218	0.93	-2007	0.71	-617	0.76	-343
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.85	-1080	0.90	-3892	0.74	-2234	0.97	-3208	0.80	-4227	0.92	-2466	0.70	-674	0.75	-395
N-2: DC-BIPOLE	0.86	-850	0.92	-3301	0.78	-1623	0.96	-2439	0.86	-2361	0.93	-1976	0.71	-596	0.76	-337
N-2: DOUBLE PALO VERDE	0.87	-490	0.95	-1007	0.80	-1565	0.99	-1222	0.94	-2112	0.95	-1445	0.76	-479	0.77	-284
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.86	-952	0.91	-3154	0.76	-1911	0.98	-2727	0.85	-3210	0.93	-2008	0.70	-631	0.76	-347
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.86	-950	0.92	-2993	0.76	-1908	0.98	-2260	0.85	-3179	0.93	-1997	0.70	-630	0.76	-346
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.86	-997	0.91	-3323	0.75	-2023	0.98	-2541	0.84	-3514	0.93	-2120	0.76	-556	0.74	-451
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV + RAS	0.85	-965	0.91	-3533	0.76	-1912	0.98	-2443	0.79	-3027	0.93	-1927	0.70	-657	0.75	-387
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV + RAS	0.86	-927	0.91	-3578	0.76	-1853	0.98	-2501	0.78	-3253	0.93	-2015	0.70	-643	0.76	-376
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV + RAS	0.85	-1068	0.87	-4404	0.74	-2007	0.98	-2721	0.77	-3130	0.93	-2063	0.70	-682	0.75	-405
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.86	-950	0.89	-2236	0.76	-1907	0.98	-2219	0.86	-3138	0.93	-1972	0.71	-614	0.76	-341
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.86	-913	0.89	-2723	0.77	-1843	0.98	-2042	0.87	-3017	0.93	-1880	0.71	-613	0.76	-333
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.86	-968	0.94	-2897	0.76	-1906	0.93	-2151	0.86	-2994	0.93	-1798	0.70	-641	0.76	-355
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.85	-937	0.93	-3037	0.76	-1861	0.97	-2479	0.87	-2929	0.93	-1588	0.70	-628	0.76	-346
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV + RAS	0.86	-899	0.93	-3107	0.78	-1815	0.98	-2011	0.84	-2908	0.93	-1730	0.70	-629	0.76	-361
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV + RAS	0.85	-997	0.91	-3417	0.75	-2048	0.98	-2903	0.80	-3591	0.93	-2076	0.70	-657	0.75	-384
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.86	-925	0.93	-2872	0.76	-1820	0.98	-1844	0.87	-2724	0.93	-1145	0.70	-625	0.76	-345
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.86	-911	0.92	-2869	0.77	-1791	0.98	-1825	0.89	-2450	0.92	-925	0.71	-615	0.76	-338
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.86	-889	0.92	-2670	0.78	-1805	0.99	-2127	0.89	-2804	0.93	-1729	0.71	-597	0.76	-323
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.85	-939	0.93	-3035	0.76	-1869	0.99	-1895	0.86	-2929	0.94	-1634	0.70	-629	0.76	-346
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.85	-928	0.93	-3017	0.77	-1860	0.99	-1937	0.86	-2953	0.93	-1796	0.70	-628	0.76	-345
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.85	-932	0.92	-3020	0.77	-1861	0.98	-2051	0.86	-2975	0.93	-1845	0.70	-624	0.76	-342
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 + RAS	0.85	-974	0.91	-3296	0.76	-2038	0.98	-2632	0.83	-3643	0.93	-2163	0.70	-740	0.77	-387
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.85	-1002	0.90	-3935	0.76	-1899	0.97	-2974	0.80	-2351	0.93	-2276	0.70	-667	0.75	-379
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.86	-836	0.93	-2335	0.79	-1704	0.99	-1765	0.91	-2473	0.94	-1516	0.72	-583	0.77	-314
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.85	-886	0.92	-2859	0.78	-1797	0.98	-1849	0.87	-2873	0.93	-1804	0.70	-622	0.76	-340
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.85	-885	0.93	-2830	0.78	-1794	0.98	-1807	0.88	-2817	0.93	-1780	0.70	-622	0.76	-341
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.86	-925	0.92	-3129	0.77	-1871	0.98	-2145	0.86	-3073	0.93	-1925	0.70	-629	0.76	-345
N-2: MIDPOINT-HEMINGWAY 500 KV & MIDPOINT-KING 230 KV	0.89	-663	0.92	-3187	0.78	-1303	0.98	-2179	0.86	-2702	0.93	-1925	0.75	-460	0.79	-227
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.85	-945	0.93	-2698	0.76	-1900	0.98	-2648	0.86	-3149	0.93	-1981	0.71	-614	0.76	-341
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.85	-976	0.95	-1502	0.77	-2002	1.00	-1134	0.94	-2595	0.96	-1289	0.72	-576	0.76	-356
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV + RAS	0.85	-976	0.95	-1495	0.77	-2003	1.00	-1149	0.94	-2624	0.96	-1312	0.72	-575	0.76	-356
N-2: PAUL-RAVER & RAVEN-COVINGT4 500 KV	0.86	-920	0.93	-2577	0.77	-1848	0.98	-1981	0.86	-2976	0.93	-1903	0.71	-606	0.76	-333
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV + RAS	0.85	-994	0.93	-2891	0.76	-2028	0.98	-2258	0.85	-3351	0.93	-1901	0.70	-631	0.76	-361
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGHLN 230 KV	0.86	-948	0.91	-3227	0.76	-1899	0.99	-2086	0.86	-3159	0.93	-1946	0.70	-630	0.76	-346
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLN 230 KV	0.86	-948	0.92	-3229	0.76	-1899	0.98	-2217	0.86	-3144	0.93	-1889	0.70	-631	0.76	-346
N-2: RAVEN-COVINGTON #1 & #2 500 KV	0.86	-953	0.91	-3219	0.76	-1914	0.98	-2322	0.85	-3224	0.93	-2018	0.70	-633	0.76	-347
N-2: RAVEN-ECHO LAKE & RAVEN-SCHULTZ 500 KV	0.86	-945	0.92	-3033	0.76	-1898	0.98	-2243	0.86	-3150	0.93	-1992	0.70	-624	0.76	-344
N-2: RAVEN-PAUL & NAPAVINE-PAUL 500 KV	0.85	-918	0.93	-2603	0.77	-1844	0.98	-1960	0.87	-2932	0.93	-1880	0.71	-604	0.76	-332
N-2: RAVEN-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.85	-959	0.95	-2304	0.76	-1950	0.98	-2118	0.86	-3242	0.93	-2017	0.71	-612	0.76	-347
N-2: RAVEN-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.85	-958	0.94	-2470	0.76	-1947	0.98	-2143	0.85	-3266	0.93	-2022	0.70	-615	0.76	-348
N-2: RAVEN-SCHULTZ #1 & #2 500 KV	0.85	-938	0.93	-2679	0.76	-1876	0.98	-2116	0.85	-3056	0.93	-1952	0.71	-619	0.76	-342
N-2: RAVEN-TACOMA & RAVEN-COVINGT4 500 KV	0.86	-950	0.92	-3130	0.76	-1908	0.98	-2284	0.85	-3194	0.93	-2002	0.70	-630	0.76	-346
N-2: RAVEN-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.86	-949	0.91	-3169	0.76	-1906	0.98	-2287	0.85	-3181	0.93	-1999	0.70	-629	0.76	-346
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV + RAS	0.85	-1045	0.88	-4321	0.75	-2010	0.97	-3383	0.79	-2765	0.92	-2559	0.70	-680	0.75	-385
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV + RAS	0.84	-1115	0.88	-3505	0.73	-2326	0.97	-3312	0.80	-4454	0.92	-2507	0.70	-665	0.75	-398
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV + RAS	0.85	-1010	0.91	-3194	0.75	-2058	0.98	-2604	0.83	-3630	0.93	-2159	0.70	-641	0.76	-365

Appendix E - 16hs2a_2250idnw_solo Base Case VQ Results

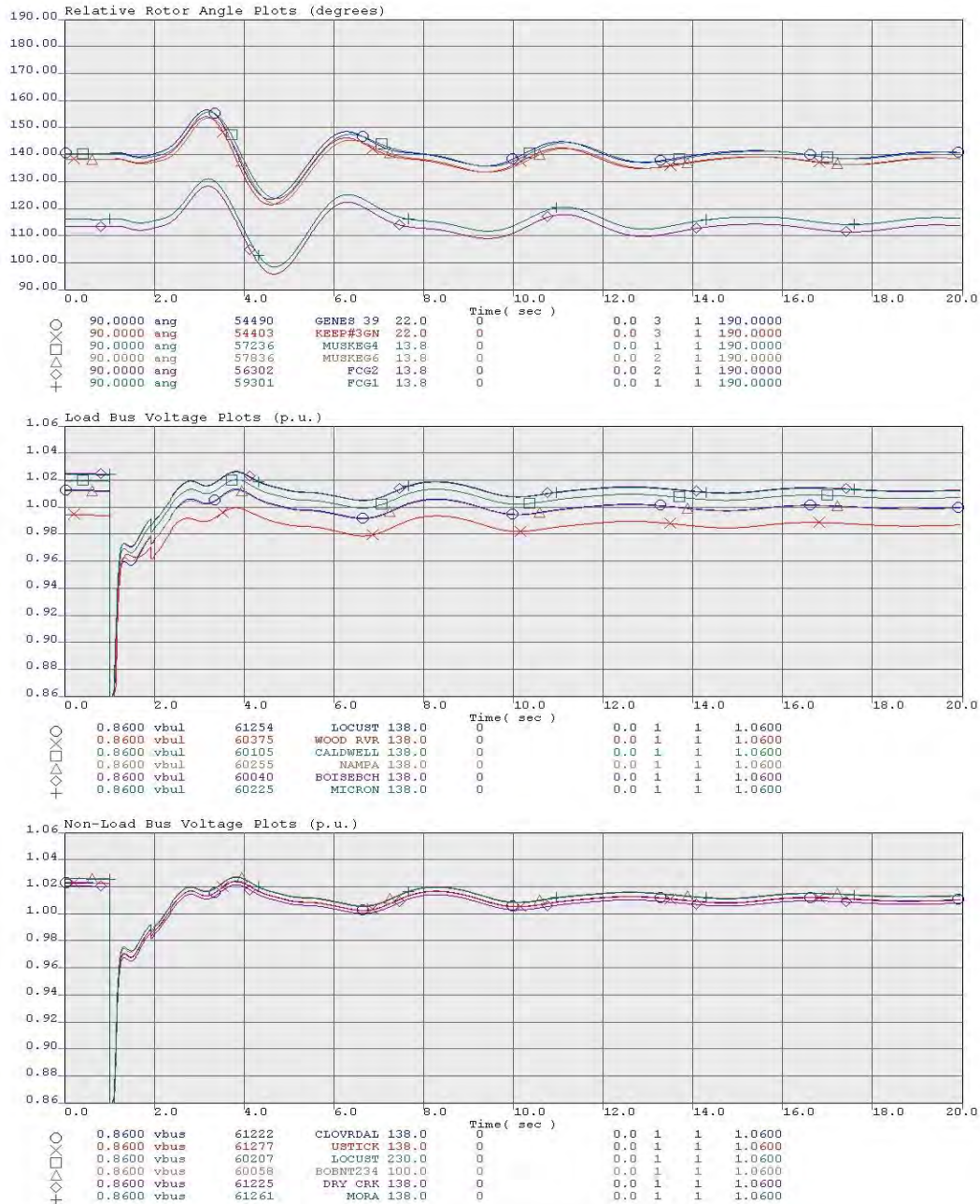
V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.85	-1063	0.93	-2931	0.74	-2191	0.98	-2771	0.82	-3513	0.93	-2237	0.70	-654	0.75	-398
N-2: TAFT-BELL 500 KV & BELL-LANCASTER 230 KV	0.8547	-949	0.92	-3129	0.76	-1908	0.98	-2733	0.85	-3209	0.93	-2004	0.74	-546	0.76	-342
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.8551	-955	0.92	-3075	0.76	-1917	0.98	-2293	0.85	-3181	0.93	-1997	0.72	-593	0.76	-358
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV	0.8547	-949	0.92	-3129	0.76	-1908	0.98	-2300	0.85	-3209	0.93	-2004	0.74	-546	0.76	-342
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.8549	-953	0.92	-3150	0.76	-1912	0.98	-2288	0.85	-3173	0.93	-1995	0.72	-592	0.76	-356
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV	0.8549	-952	0.92	-3155	0.76	-1911	0.98	-2290	0.85	-3174	0.93	-1996	0.73	-580	0.76	-354
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.8569	-979	0.92	-2926	0.76	-1935	0.98	-2298	0.85	-3216	0.93	-2000	0.75	-509	0.78	-279
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.8511	-888	0.92	-2546	0.78	-1802	0.98	-1786	0.89	-2803	0.93	-1733	0.72	-583	0.77	-317
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.8511	-888	0.92	-2546	0.78	-1802	0.98	-1786	0.89	-2803	0.93	-1733	0.72	-583	0.77	-317
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.8539	-934	0.93	-2512	0.77	-1868	0.98	-2060	0.87	-3024	0.93	-1935	0.71	-615	0.76	-341

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Hemingway-Boardman 500 kV Line



Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None

Page 1



16hs_solo_hmwy_gras.chf

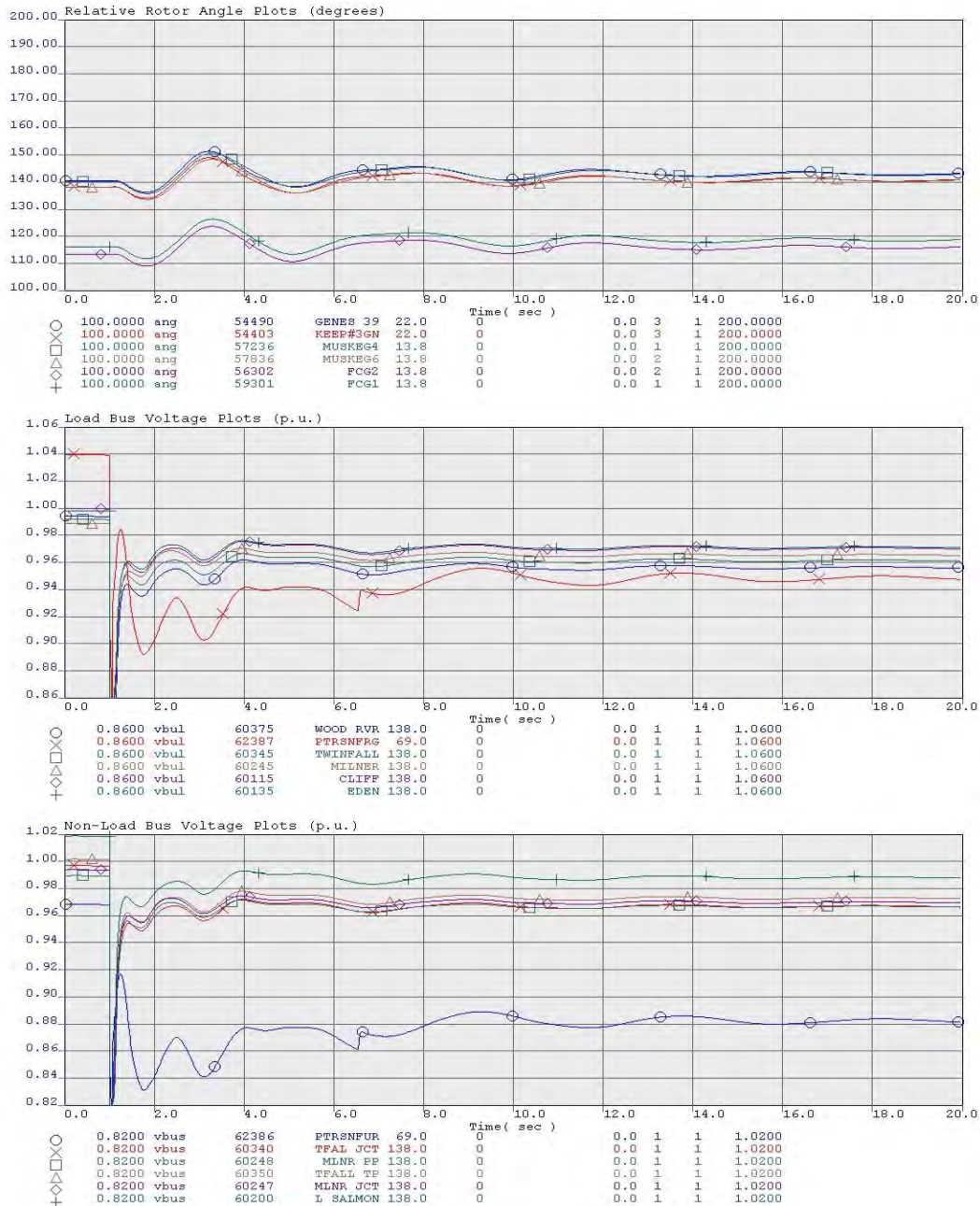
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Tue Jul 17 11:54:02 2012

Figure E11: N-1 Loss of Hemingway-Boardman 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Midpoint-Hemingway 500 kV Line



Loss of Hemingway-Midpoint 500 kV line
3ph fault @ MPSN 500 kV clear in 3 Cycles
RAS: None

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16hs_solo_hmwy_mpsn.chf

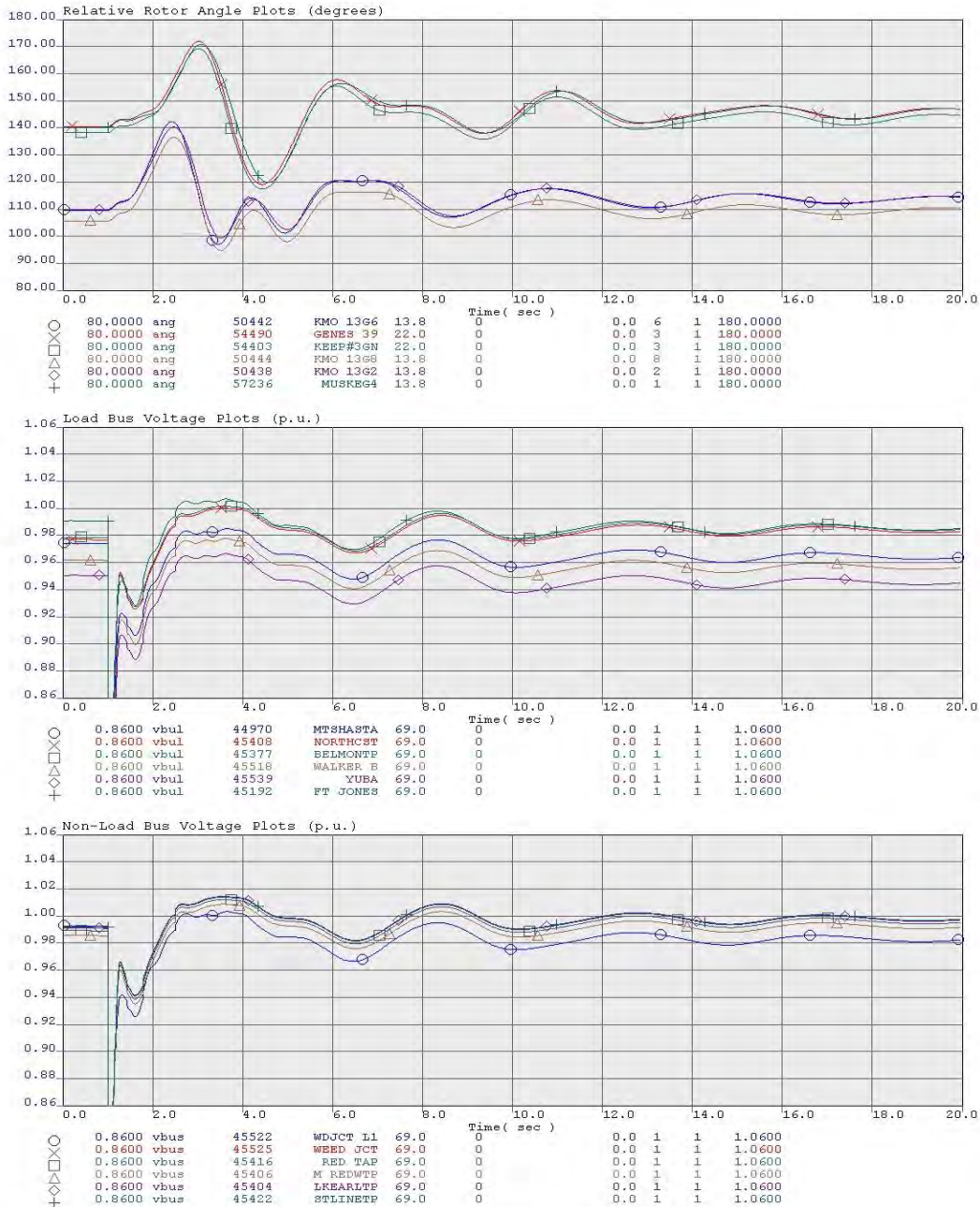
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Figure E12: N-1 Loss of Hemingway-Midpoint 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Captain Jack-Olinda 500 kV Line



Loss of Captain Jack-Olinda 500 kV line
3-Phase Fault @ Captain Jack 500 kV with 4 Cycle Clearing
RAS: Insert Table Mtn 500 kV shunt Capacitors

Page 1



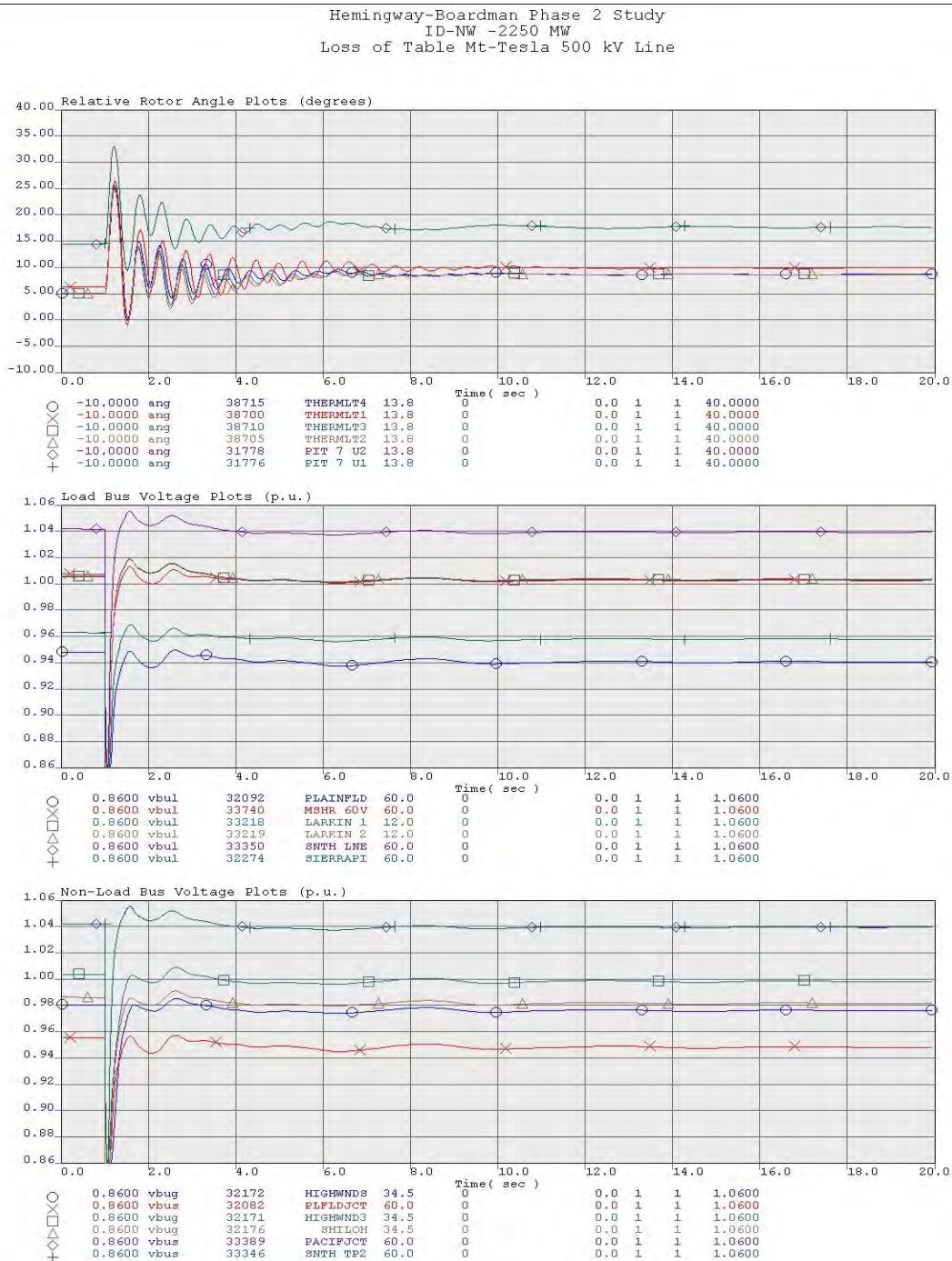
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Figure E13: N-1 Loss of Captain Jack-Olinda 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



Outage of Table Mtn-Tesla 500 kV Line
3-Phase Fault @ Table Mtn 500 kV with 4 Cycle Clearing
RAS: None

Page 1



16hs_solo_tbm_tsla.chf

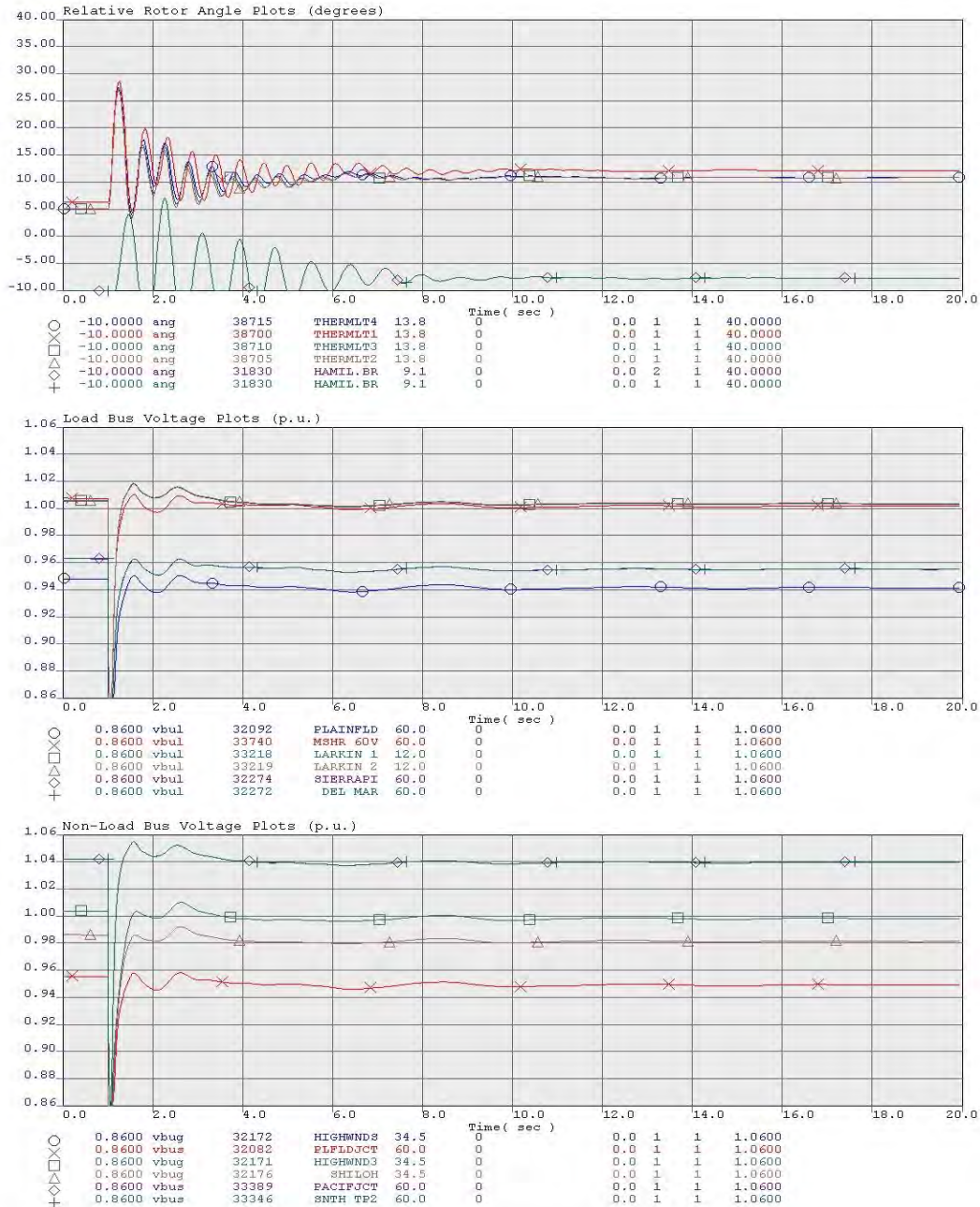
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Tue Jul 17 12:50:45 2012

Figure E14: N-1 Loss of Table Mtn-Tesla 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Table Mt-Vaca Dixon 500 kV Line



Outage of Table Mtn-Vaca Dixon 500 kV Line
3-Phase Fault @ Table Mtn 500 kV with 4 Cycle Clearing
RAS: None

Page 1



16hs_solo_tbtmt_vdxn.chf

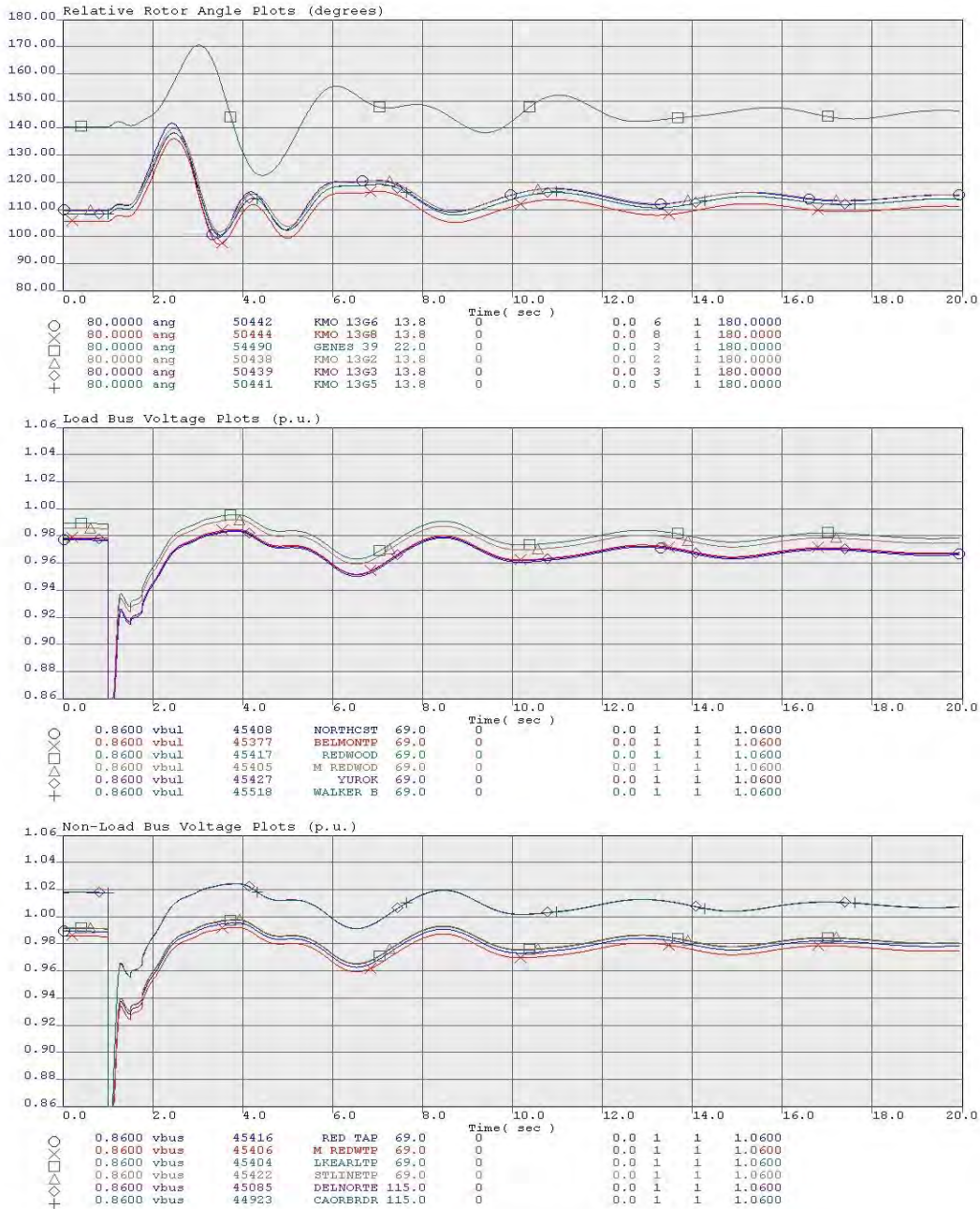
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Tue Jul 17 12:54:58 2012

Figure E15: N-1 Loss of Table Mt-Vaca Dixon 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Grizzly-Captain Jack 500 kV Line



Loss of Captain Jack-Grizzly 500 kV line
3-Phase Fault @ Captain Jack 500 kV with 4 Cycle Clearing
RAS: None

Page 1



16hs_solo_gzly_capj.chf

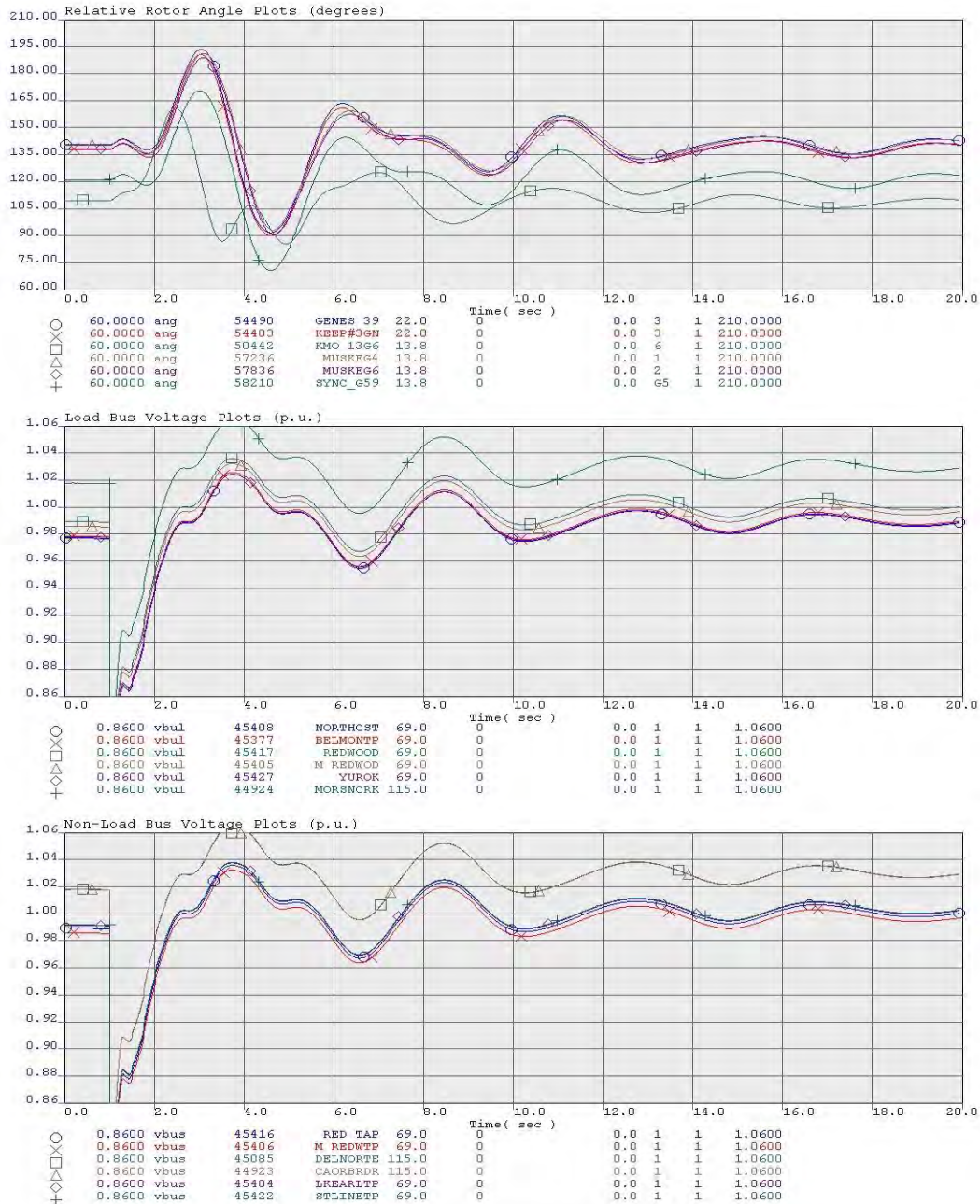
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Tue Jul 17 13:30:56 2012

Figure E16: N-1 Loss of Grizzly-Captain Jack 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of John Day-Grizzly #1 500 kV Line



Loss of John Day-Grizzly #1 500 kV line
3-Phase Fault @ John Day 500 kV with 4 Cycle Clearing
RAS: None

Page 1



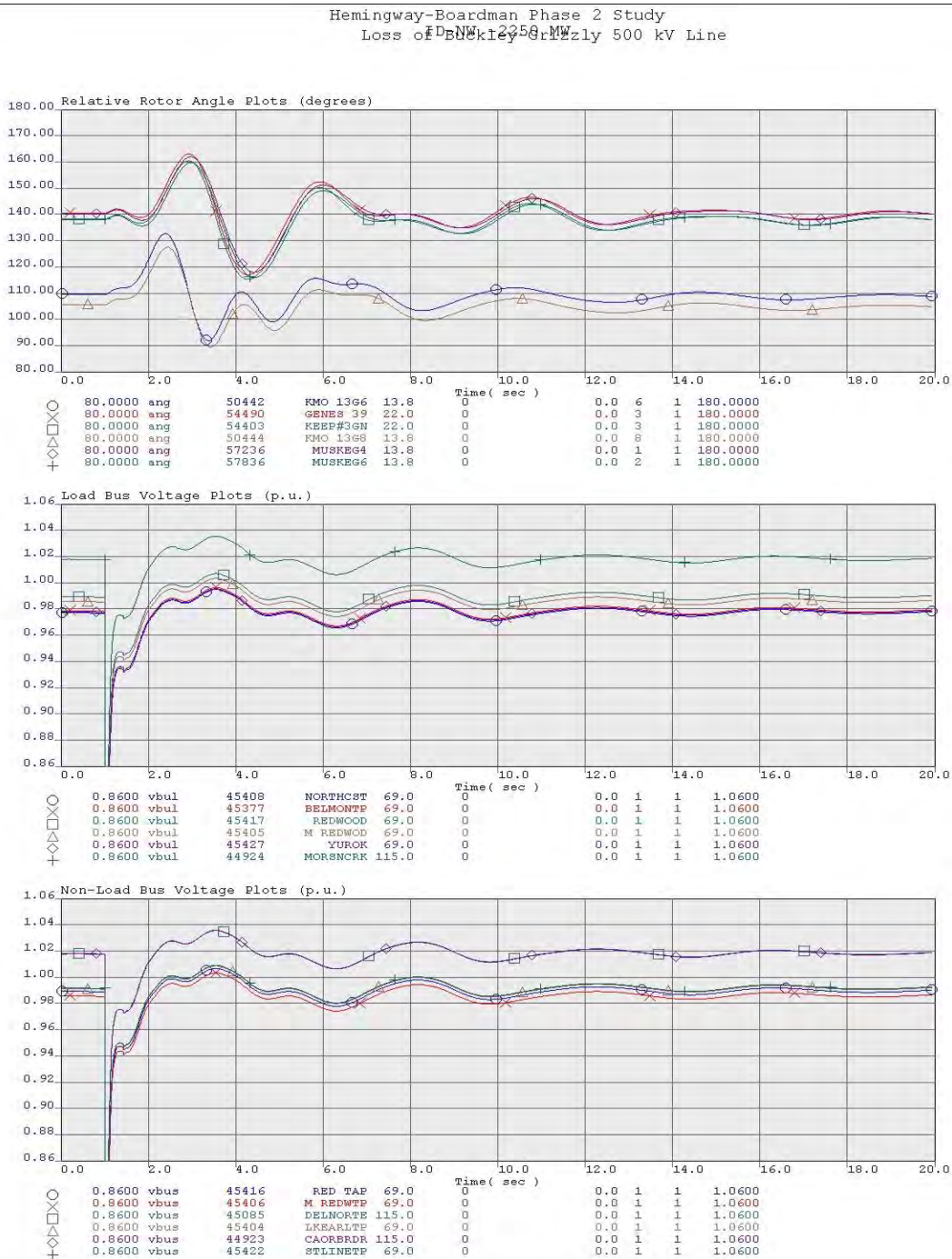
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Tue Jul 17 13:28:46 2012

Figure E17: N-1 Loss of John Day-Grizzly #1 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



Loss of Buckley-Grizzly 500 kV line
3-Phase Fault @ Buckley 500 kV with 4 Cycle Clearing
RAS: None

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16hs_solo_bkly_gzly.chf

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Tue Jul 17 13:24:47 2012

Figure E18: N-1 Loss of Buckley-Grizzly 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



Loss of Slatt-Buckley 500 kV line
3-Phase Fault @ Slatt 500 kV with 4 Cycle Clearing
RAS: None

Page 1



16hs_solo_slatt_bkly.chf

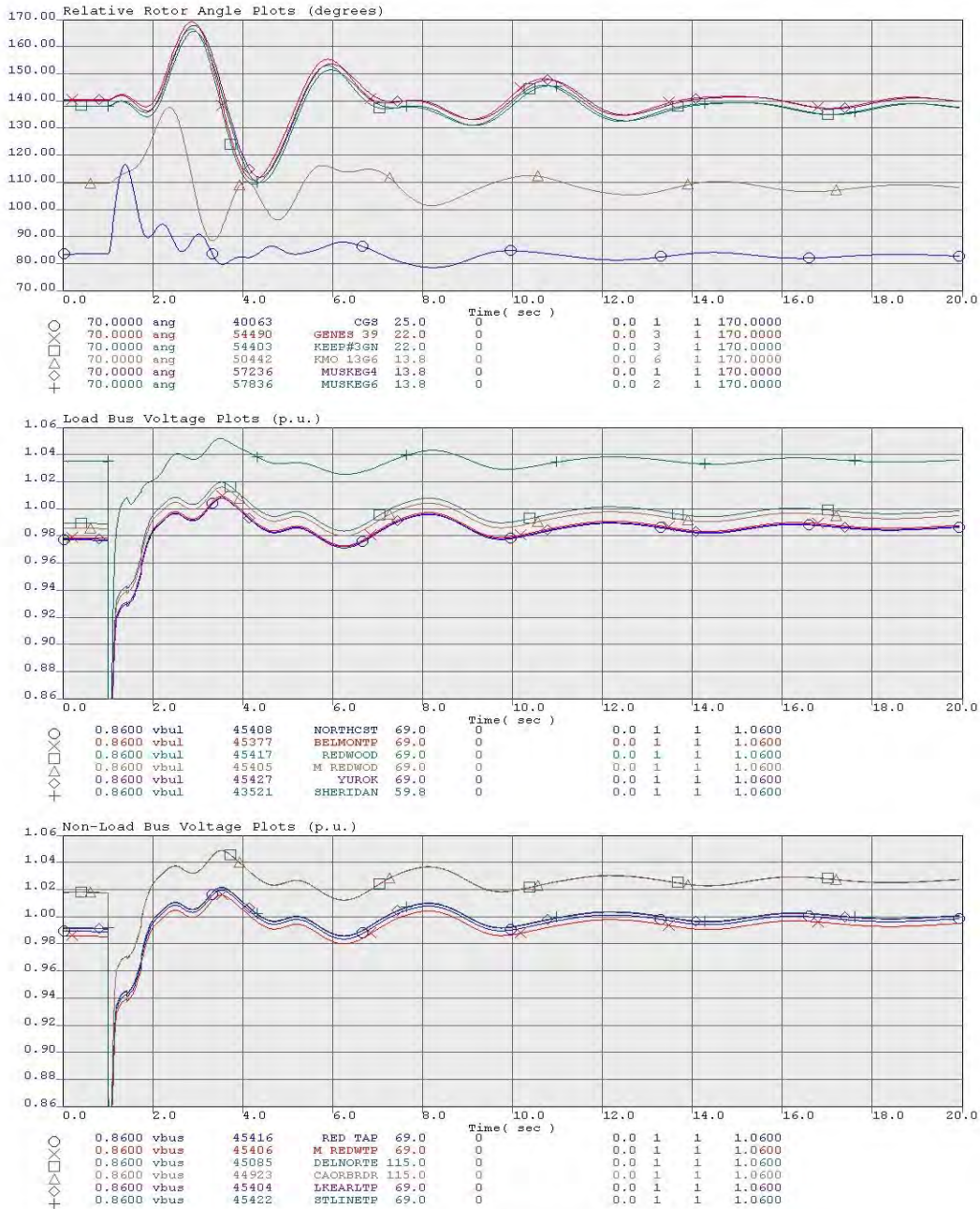
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Tue Jul 17 13:37:49 2012

Figure E19: N-1 Loss of Buckley-Slatt 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of Ashe-Slatt 500 kV Line



Loss of Ashe-Slatt 500 kV line
3-Phase Fault @ Ashe 500 kV with 4 Cycle Clearing
RAS: None

Page 1



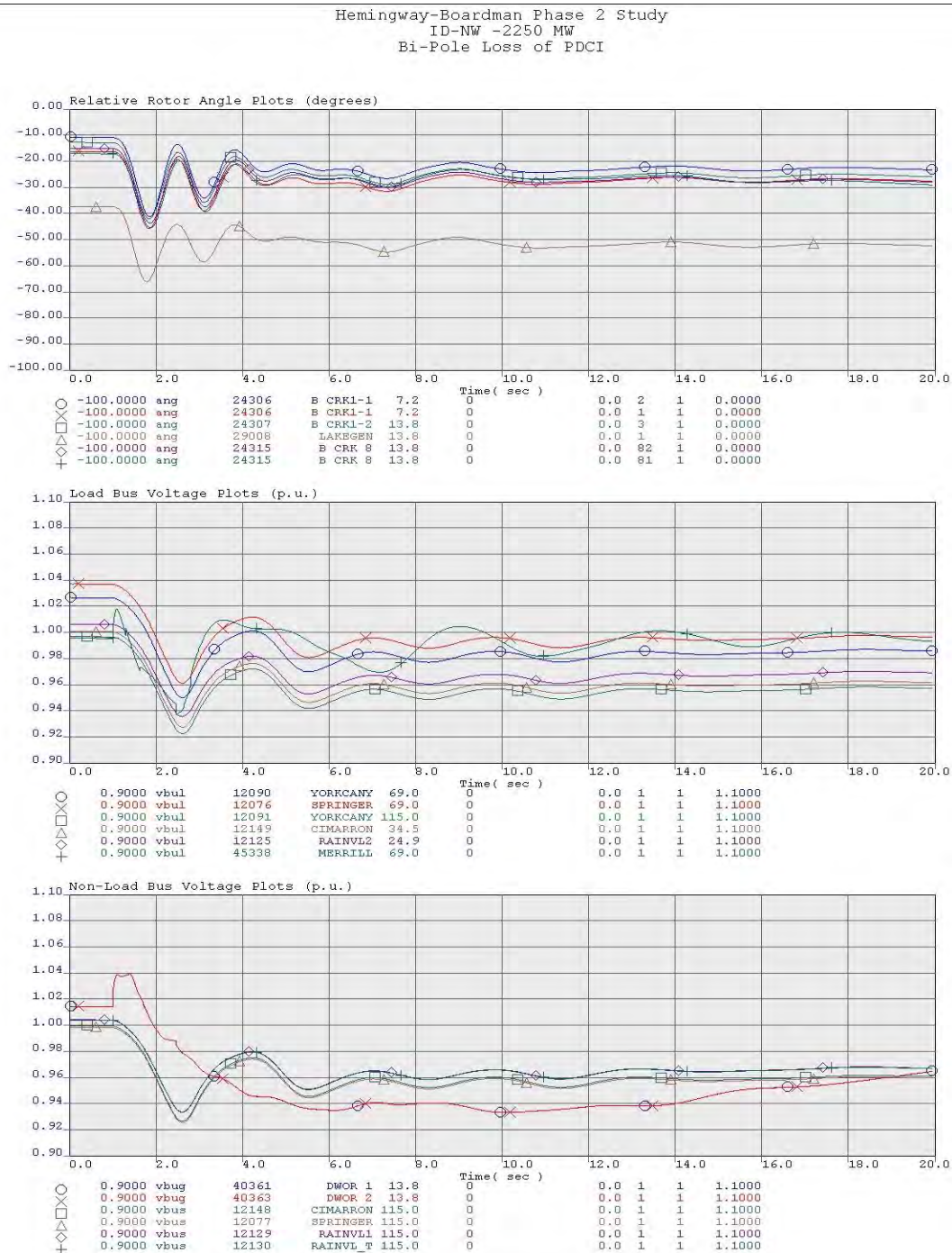
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Tue Jul 17 13:41:12 2012

Figure E20: N-1 Loss of Ashe-Slatt 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



Bipole loss of Pacific DC Intertie
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
Northwest Generation Drop (2550 MW)

Figure E21: Bi-Pole Block - Pacific DC Intertie (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

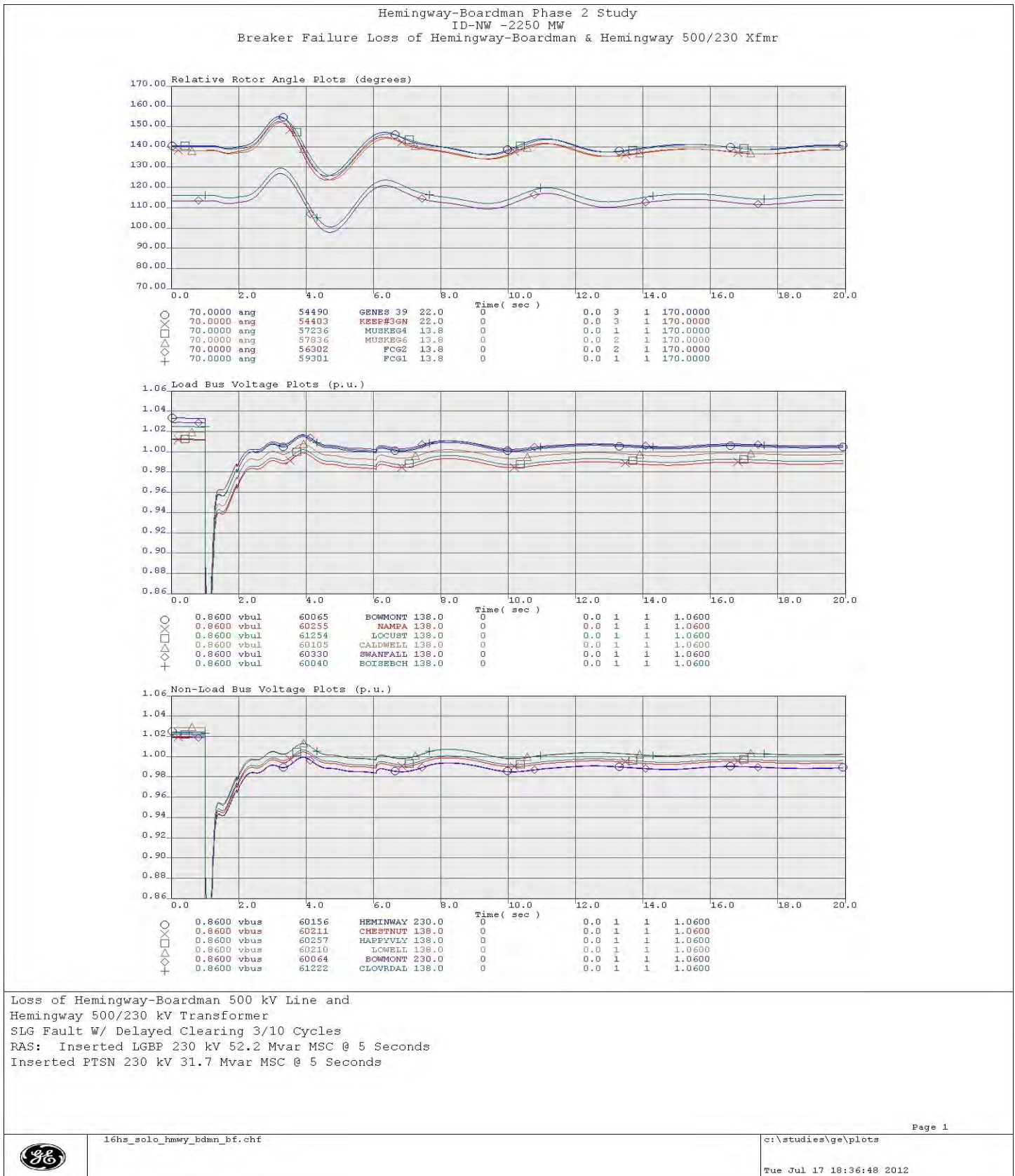
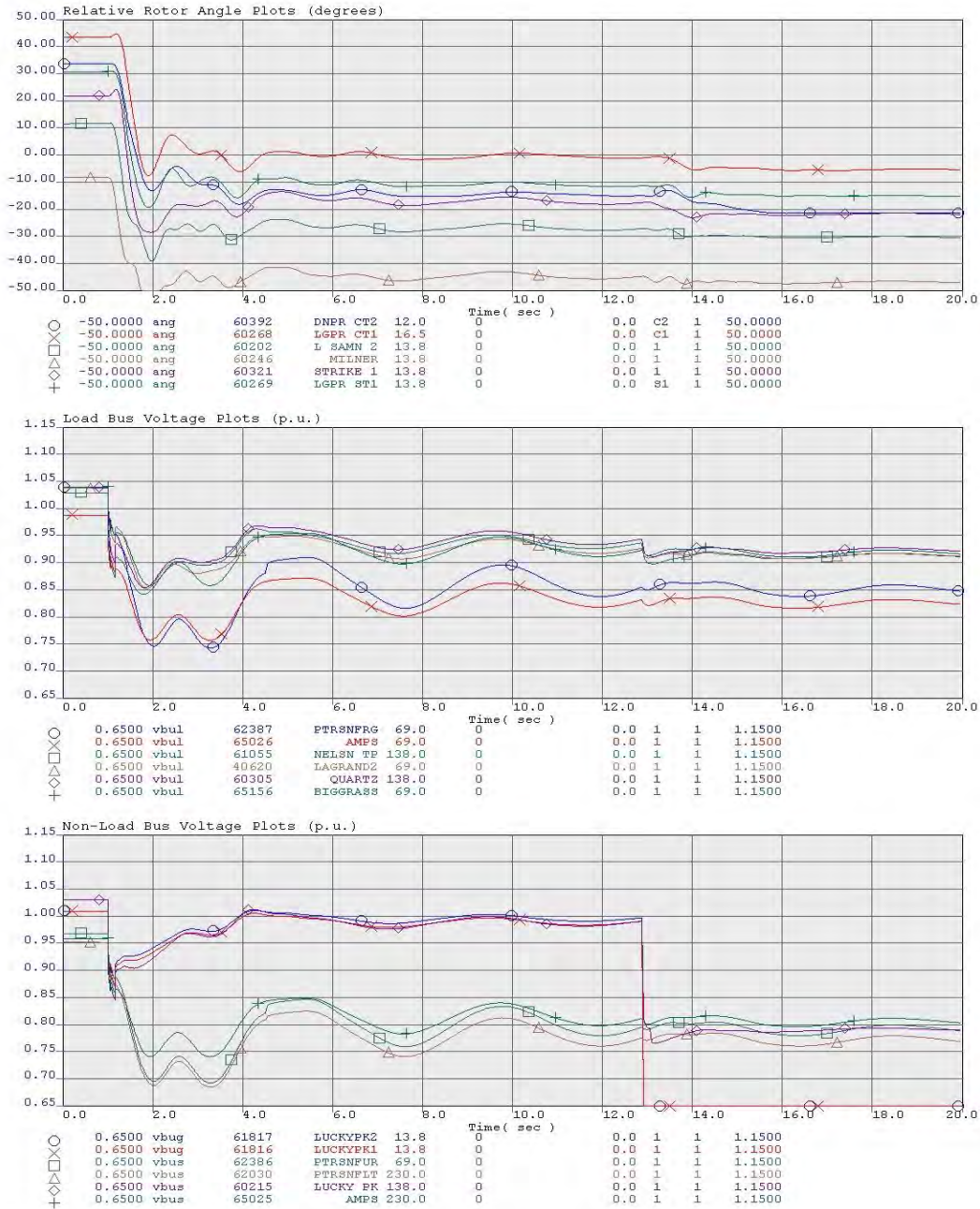


Figure E22: Breaker Failure Loss of Hemingway-Boardman & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Breaker Failure Loss of Midpoint-Hemingway & Hemingway 500/230 Xfmr



Loss of Hemingway-Midpoint 500 kV Line and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: None

Page 1



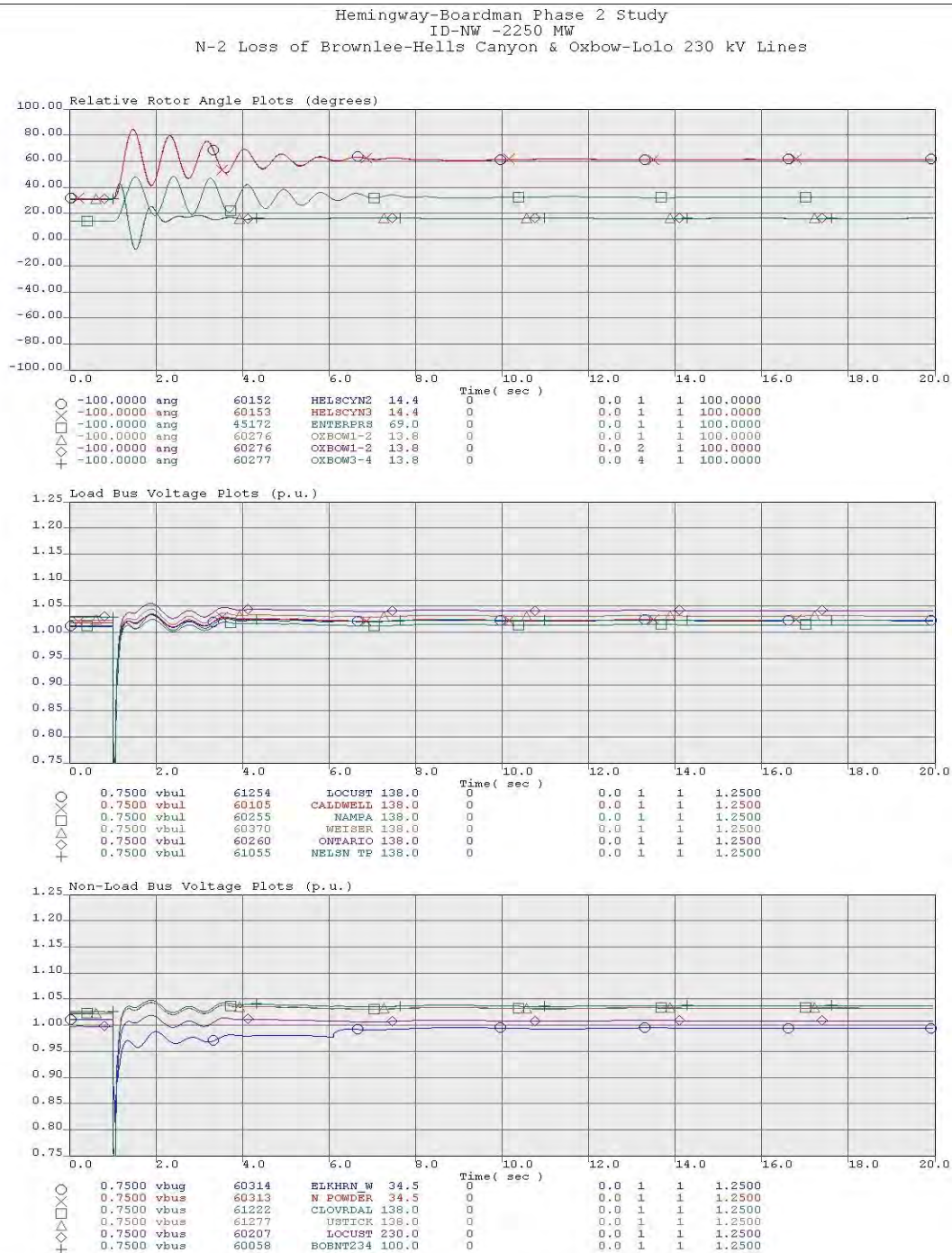
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Figure E23: Breaker Failure Loss of Midpoint-Hemingway & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



Outage of Brownlee-Hells Canyon 230 and Oxbow-Lolo 230 Lines
LLG fault @ OBPR 230 kV clear in 4 cycles
RAS: Trip 1 HellsCyn Unit @ 5 cyc (95 MW)
Inserted PTSN 230 kV 31.7 Mvar MSC @ 5 Seconds

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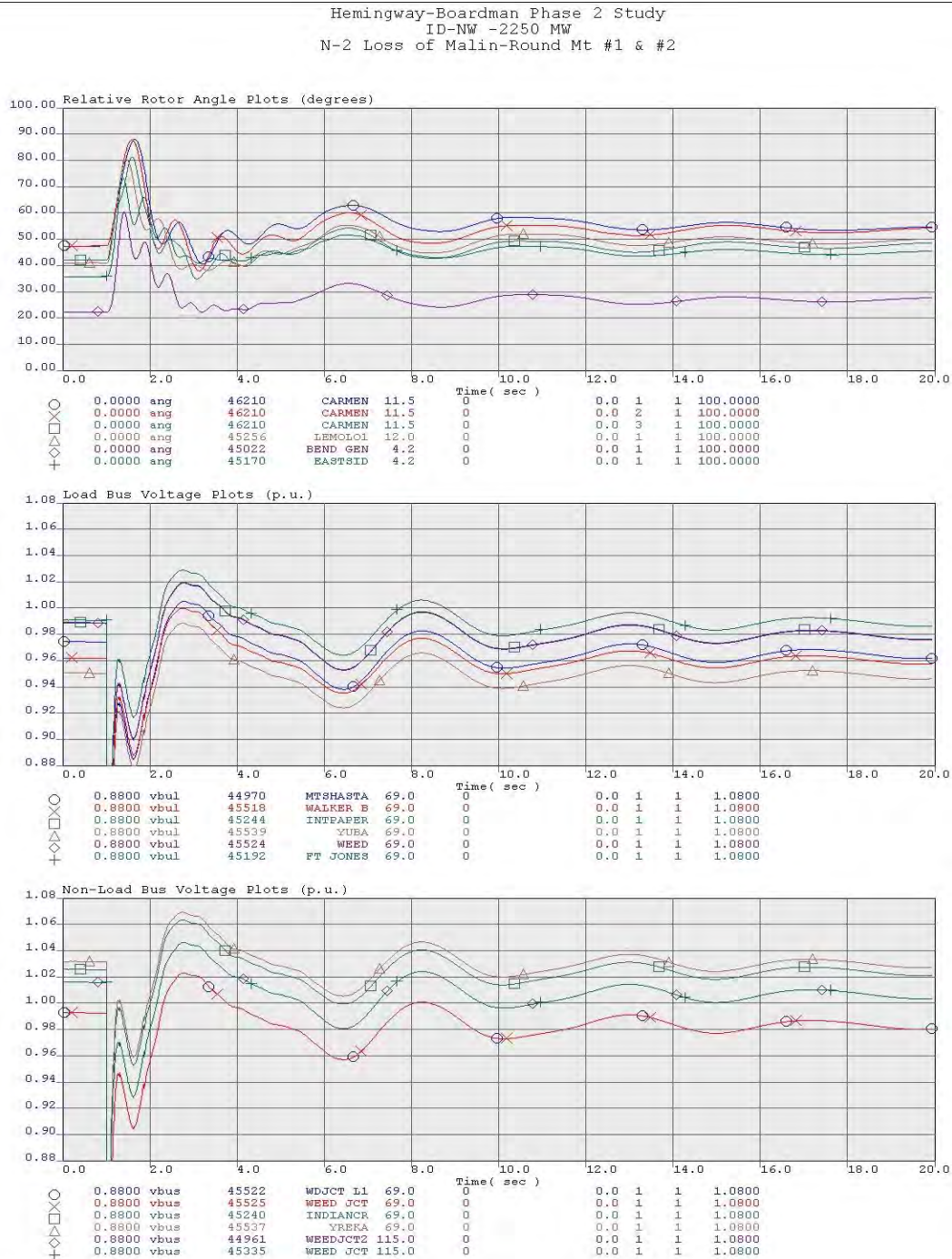
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Wed Jul 18 07:55:08 2012

Figure E24: N-2 Loss of Brownlee-Hells Canyon & Oxbow-Lolo 230 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



3-Phase Fault @ Malin 500 kV with 4 Cycle Clearing
Loss of Malin-Round Mtn #1 & #2 500 kV Lines
Opens Round Mtn-Table Mtn #2 500 kV Line
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
NW Gen Drop 2400 MW

Page 1



16hs_solo_paci_ns.chf

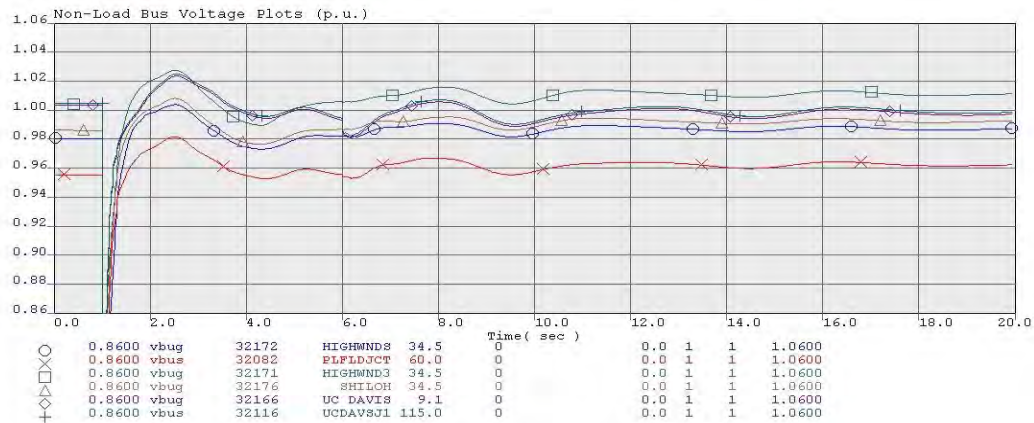
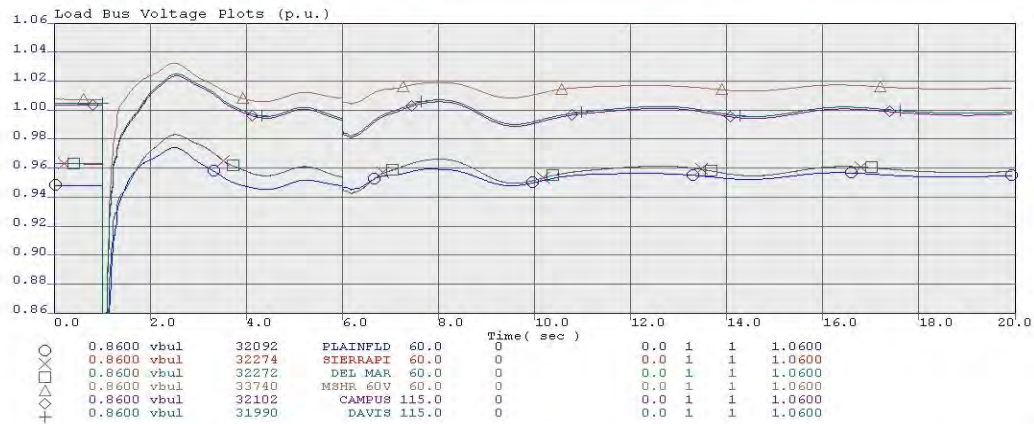
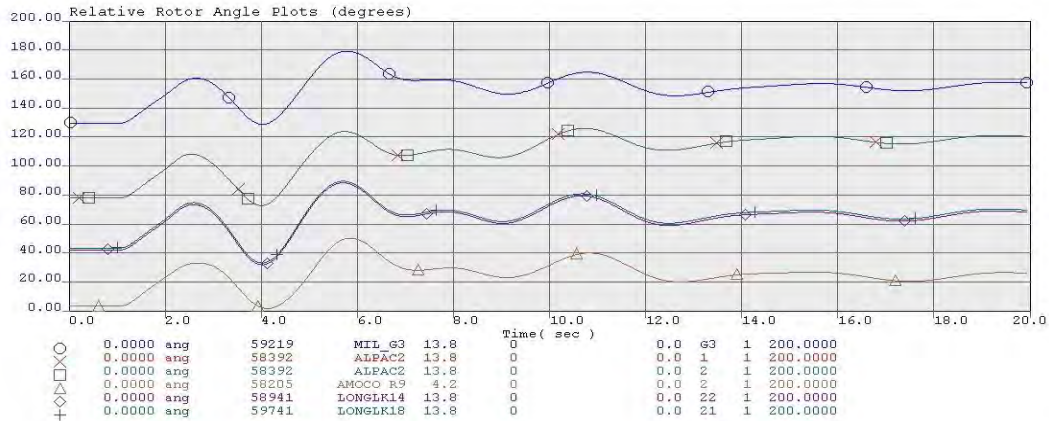
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Wed Jul 18 08:03:52 2012

Figure E25: N-2 Loss of Malin-Round Mt #1 & #2 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Table Mt-Telsa & Table Mt-Vaca Dixon 500 kV



3-Phase Fault @ Table Mt 500 kV with 4 Cycle Clearing
Loss of Table Mtn-Tesla and Table Mtn-Vaca Dixon 500 kV Lines
RAS: NW Gen Drop 2400 MW

Page 1



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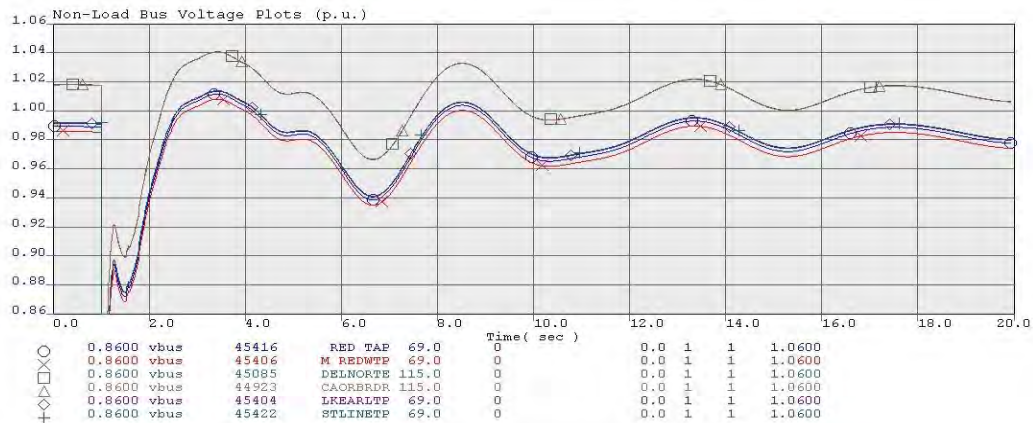
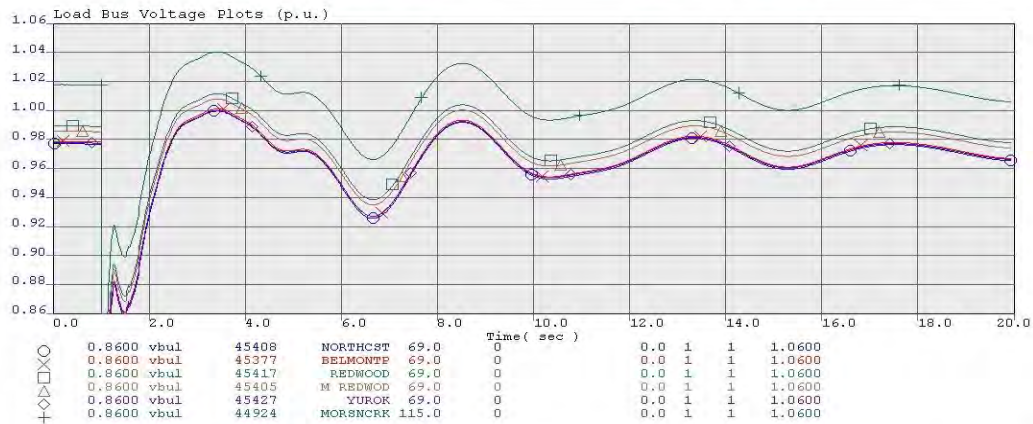
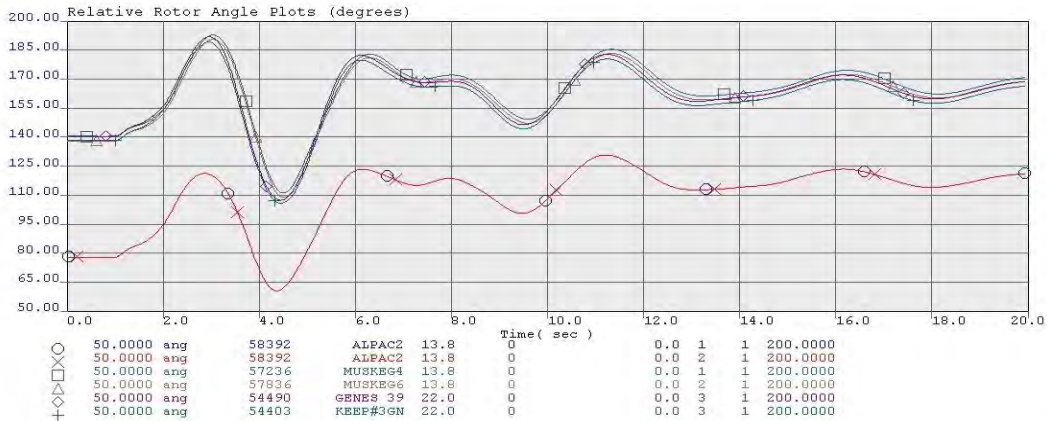
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Figure E26: N-2 Loss of Table Mt-Tesla & Table Mt-Vaca Dixon 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Grizzly-CaptJack & Grizzly-Malin 500 kV



3-Phase Fault @ Grizzly 500 kV with 4 Cycle Clearing
Loss of Grizzly-Captain Jack and
Grizzly-Malin 500 kV Lines
RAS: NW Gen Drop 2400 MW

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16hs_solo_gzcg_gzmn_n-2.chf

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Figure E27: N-2 Loss of Grizzly-Captain Jack & Grizzly-Malin 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

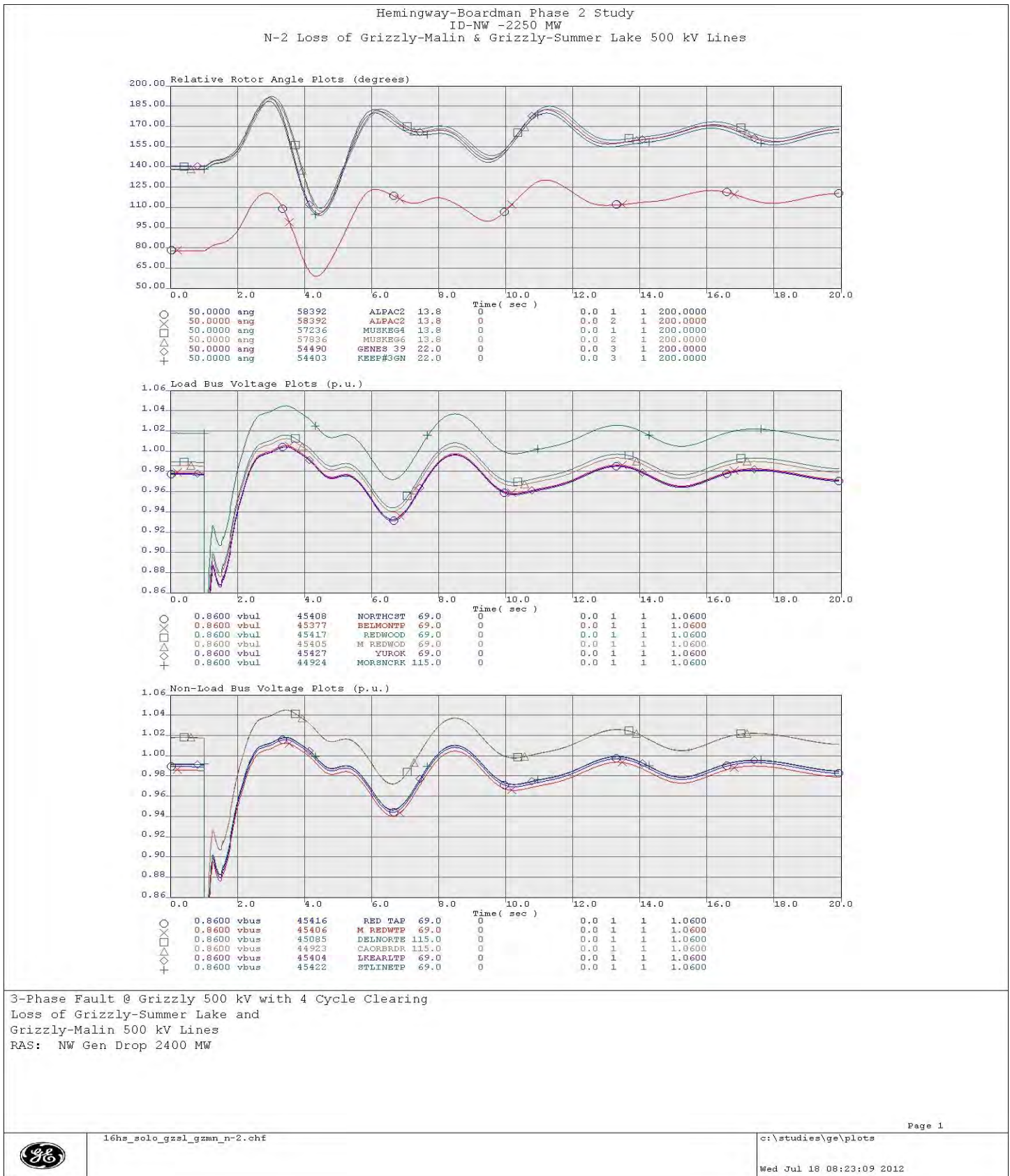
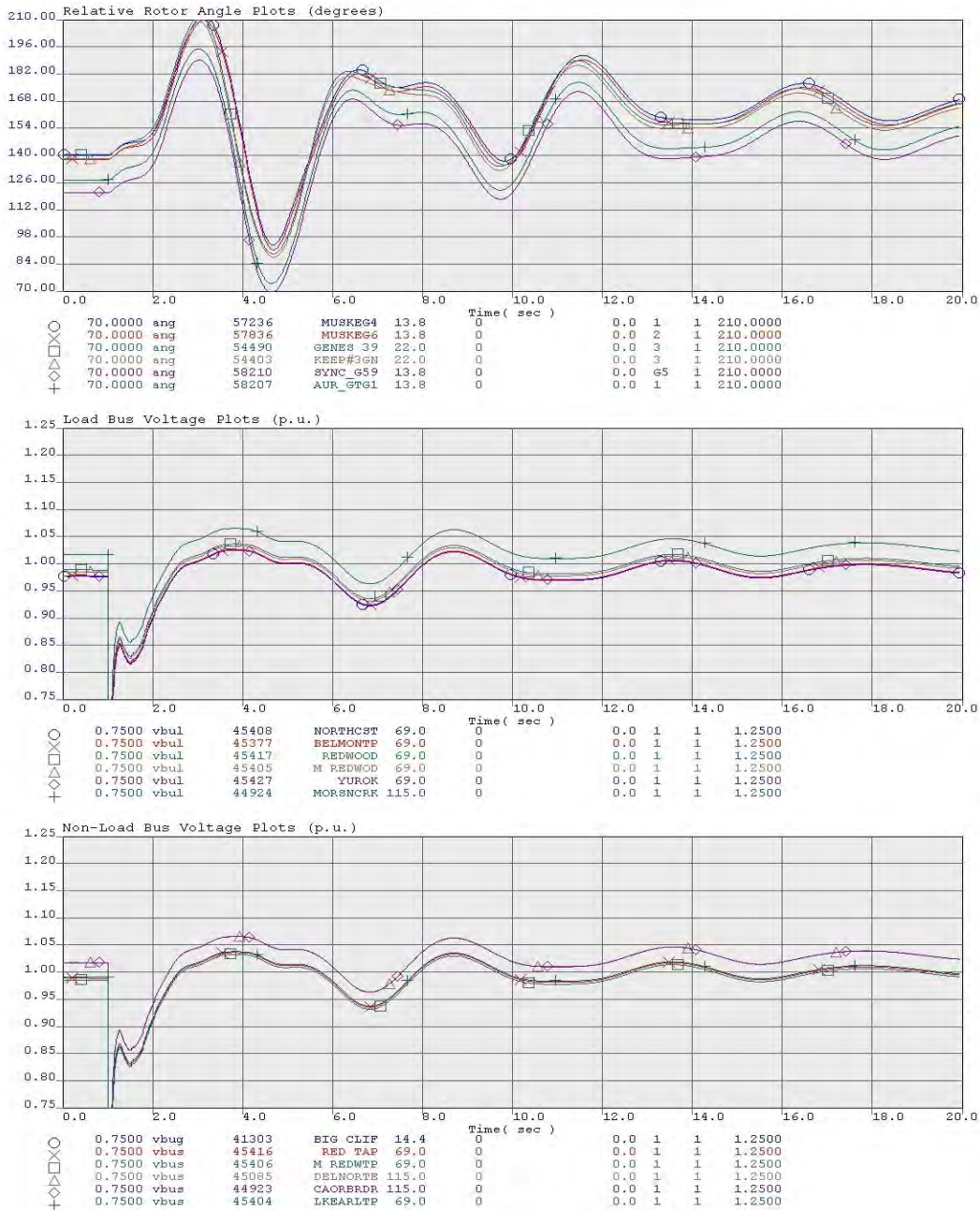


Figure E28: N-2 Loss of Grizzly-Malin & Grizzly-Summer Lake 500 kV Lines (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
Loss of John Day-Grizzly #1 & #2 500 kV Lines



3-Phase Fault @ John Day 500 kV with 4 Cycle Clearing
Loss of John Day-Grizzly #1 and
John Day-Grizzly #2 500 kV Lines
RAS: NW Gen Drop 2400 MW

Page 1



16hs_solo_jdygzl2_n-2.chf

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Figure E29: N-2 Loss of John Day-Grizzly #1 & #2 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

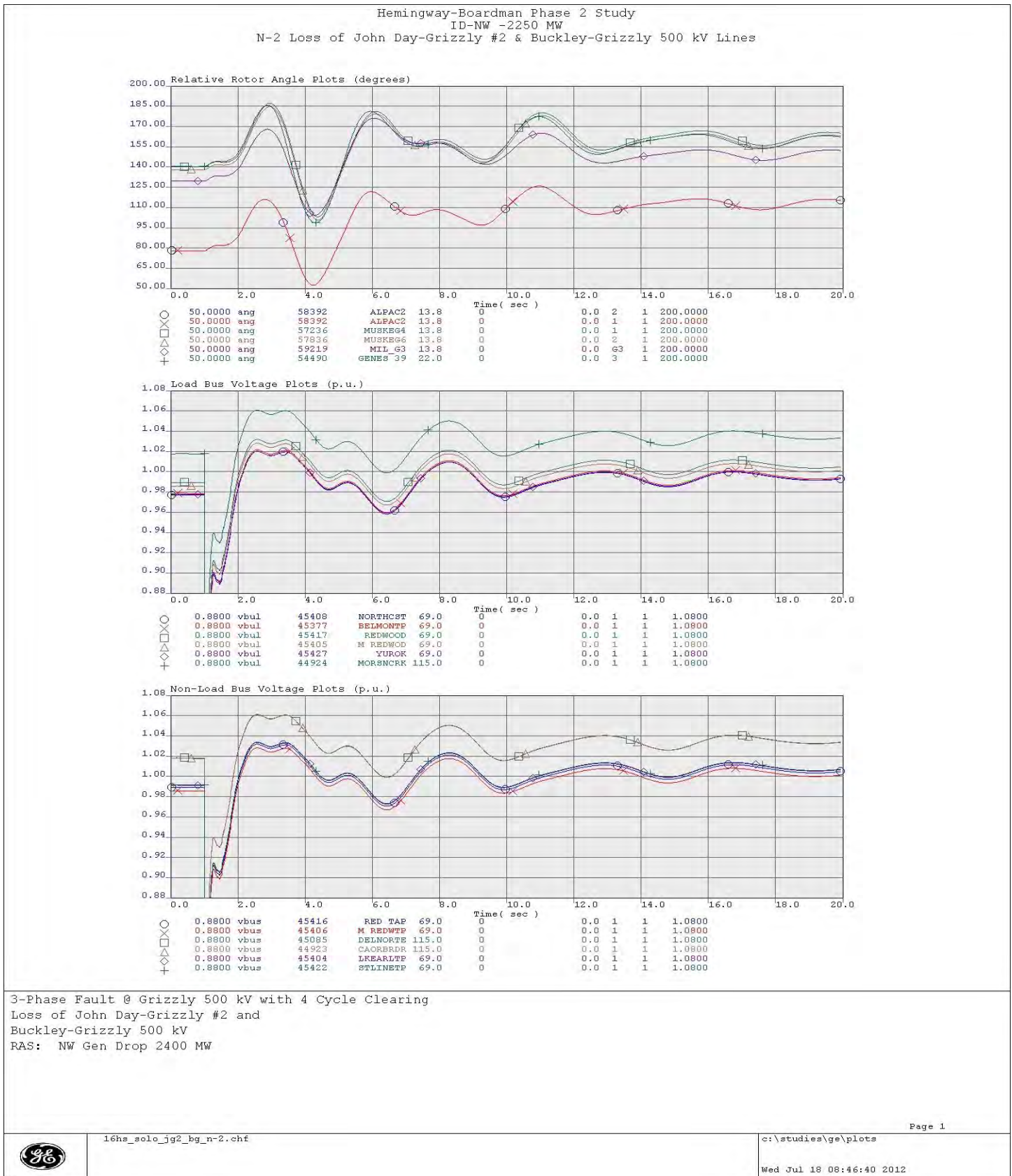
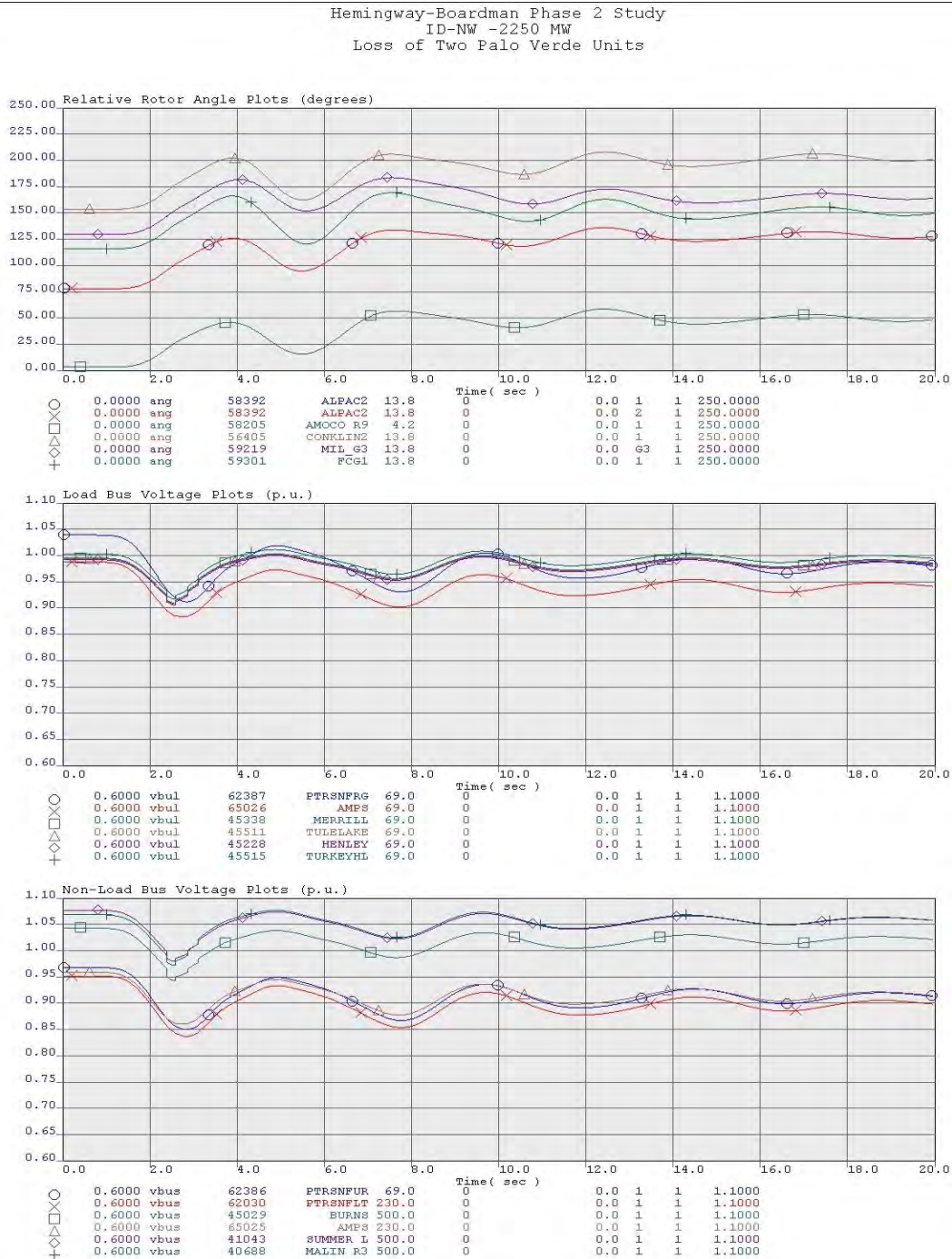


Figure E30: N-2 Loss of John Day-Grizzly #2 & Buckley-Grizzly 500 kV Lines (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots



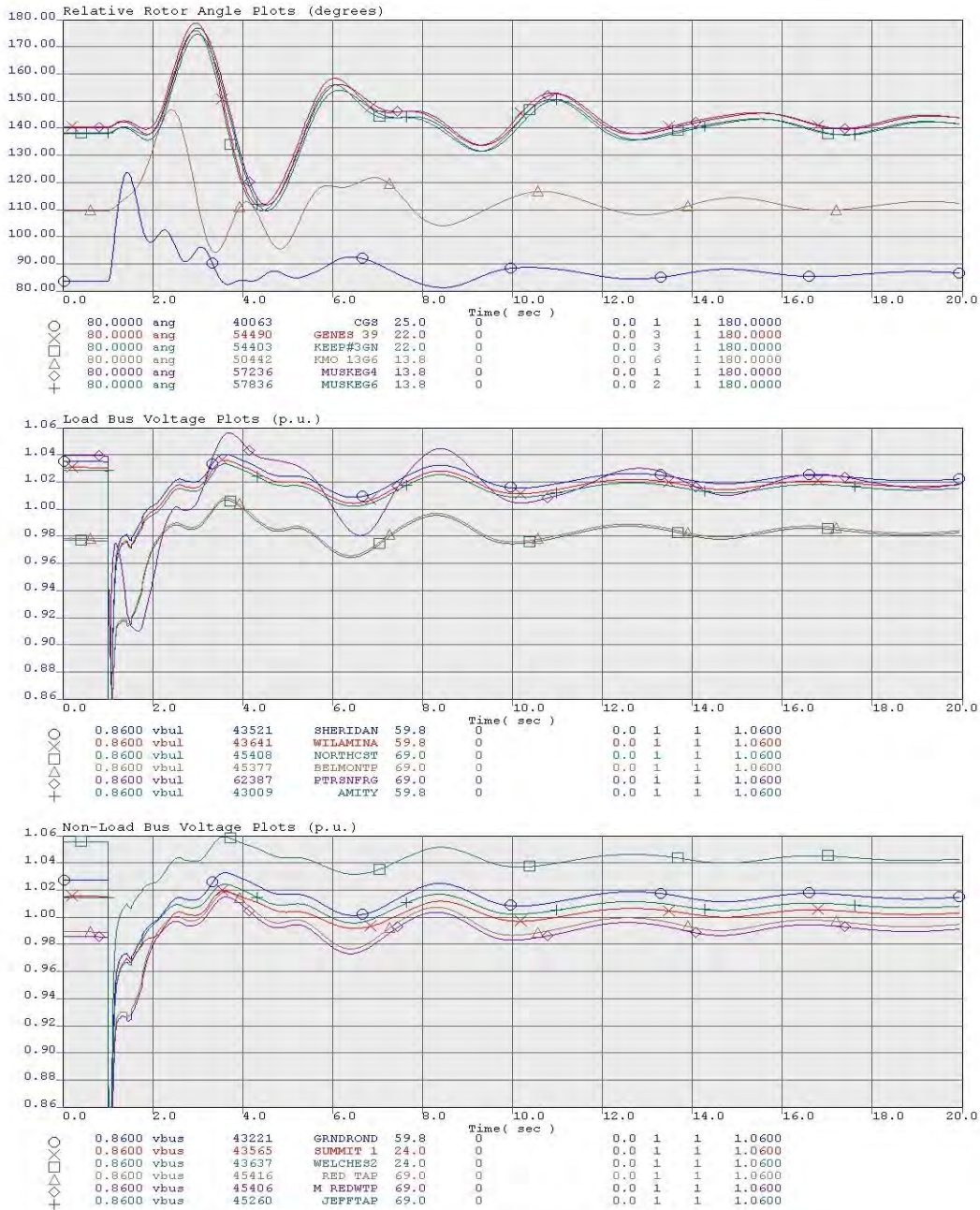
Loss of 2 Palo Verde Units
RAS: With Phoenix Area Load Tripping RAS
FACRI Reactive Switching



Figure E31: N-2 Loss of Two Palo Verde Units (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Ashe-Slatt & Ashe-Marion 500 kV Lines



Loss of Ashe-Slatt and
Slatt-Longhorn 500 kV Lines
3-Phase Fault @ Ashe 500 kV with 4 Cycle Clearing
RAS: None

Page 1



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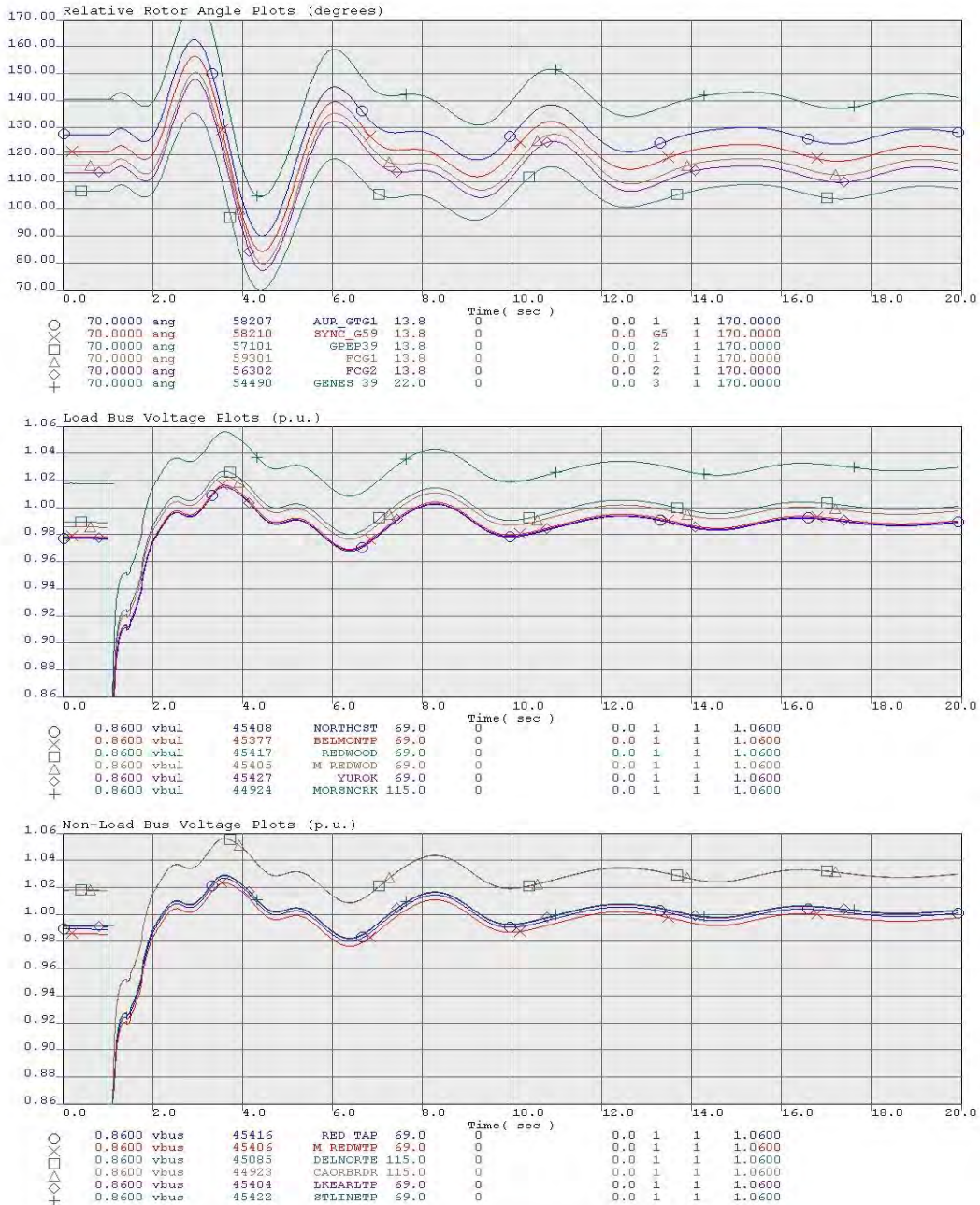
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Figure E32: N-2 Loss of Ashe-Slatt & Ashe-Marion 500 kV (Angle & Voltage Plots)

Appendix E – 16hs2a_2250idnw_solo Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW
N-2 Loss of Slatt-Ashe & Slatt-Longhorn 500 kV Lines



Loss of Ashe-Slatt and
Slatt-Longhorn 500 kV Lines
3-Phase Fault @ Slatt 500 kV with 4 Cycle Clearing
RAS: None

Page 1



16hs_solo_sltaash_sltlhn_n-2.chf

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Wed Jul 18 12:10:45 2012

Figure E33: N-2 Loss of Slatt-Ashe & Slatt-McNary 500 kV Lines (Angle & Voltage Plots)

Appendix E - 16hs2a_2250idnw_solo Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1	Locust 138 13.0%	Ptrsnf1t 230 0.849	Locust 138 13.0%	Bridger2 22.0 59.874	Stable & Damped
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Midpoint 500 kV		None	Wood Rvr 138 15.4%	Ptrsnf1t 230 0.819	Wood Rvr 138 15.4%	Bridger3 22.0 59.828	Stable & Damped
N-1 4 Cy 3PH Capt Jack 500 kV	Captain Jack-Olinda 500 kV	Var 90	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1 Insert Table Rock C1&C2	Mtshasta 69 16.4%	Yuba 69 0.794	Mtshasta 69 16.4%	Kmo 13g6 13.8 59.834	Stable & Damped
N-1 4 Cy 3PH Table Mt 500 kV	Table Mt-Tesla 500 kV		None	Highwnds 34.5 9.9%	Plainfld 60 0.817	Plainfld 60 13.8%	Honeylke 9.1 59.805	Stable & Damped
N-1 4 Cy 3PH Table Mt 500 kV	Table Mt-Vaca Dixon 500 kV		None	Highwnds 34.5 14.4%	Plainfld 60 0.817	Plainfld 60 13.8%	Honeylke 9.1 59.791	Stable & Damped
N-1 4 Cy 3PH Capt Jack 500 kV	Grizzly-Captain Jack 500 kV	Var	FACRI insertion of Malin Shunt Cap C1 & Capt Jack Shunt Cap C1	Northcst 69 18.1%	Yuba 69 0.786	Northcst 69 18.1%	Boyle 1 11.0 59.850	Stable & Damped
N-1 4 Cy 3PH John Day 500 kV	John Day-Grizzly #1 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1&C2 & Capt Jack Shunt Cap C1	Northcst 69 24.4%	Northcst 69 0.739 Less Than 20 cycles	Northcst 69 24.4%	Kmo 13g6 13.8 59.732	Stable & Damped
N-1 4 Cy 3PH Buckley 500 kV	Buckley-Grizzly 500 kV	Var	FACRI insertion of Ft Rock Series Caps	Northcst 69 13.7%	Goldhill 69 0.831	Northcst 69 13.7%	Kmo 13g6 13.8 59.849	Stable & Damped
N-1 4 Cy 3PH Slatt 500 kV	Slatt-Buckley 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 , & Capt Jack Shunt Cap C1	Northcst 69 17.9%	Goldhill 69 0.794	Northcst 69 17.9%	Kmo 13g6 13.8 59.780	Stable & Damped
N-1 4 Cy 3PH Ashe 500 kV	Ashe-Slatt 500 kV	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1	Northcst 69 13.1%	Goldhill 69 0.834	Northcst 69 13.1%	Kmo 13g6 13.8 59.814	Stable & Damped

Appendix E - 16hs2a_2250idnw_solo Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
Bi-pole Block	PDCI Bipole	Var	FACRI insertion of Ft Rock Series Caps and Malin Shunt Cap C1 Tracy&Olinda React Switching NW 2550 MW Gen Drop	Dwor 1 13.8 7.9%	Lwis Anm 69 0.829	Yorkcany 69 7.5%	Sync_g19 13.8 59.762	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Grassland 500 kV Hemingway 500/230 Xfmr	Var	FACRI insertion of Ft Rock Series Caps	Bowmont 138 15.1%	Locust 138 0.852	Heminway 230 15.5%	Bridger2 22.0 59.872	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Midpoint 500 kV Hemingway 500/230 Xfmr		FACRI insertion of Ft Rock Series Caps & Malin C1	Luckypk2 13.8 51.5%	Luckypk2 13.8 0.490	Ptrsfnrg 69.0 28.6%	Luckypk1 13.8 59.782	Stable & Damped
N-2 4 Cy LLG Oxbow 230 kV	Brownlee-Hells Canyon 230 kV Oxbow-Lolo 230 kV	5	Tripped 1 Hells Cyn Unit (110 MW)	Locust 138 10.0%	Ptrsnflt 0.892	Elkhrn_w 34.5 11.3%	Oxbow1-2 13.8 59.753	Stable & Damped
N-2 4 Cy 3PH Malin 500 kV	Malin-Round Mt #1 500 kV Malin-Round Mt #2 500 kV Round Mt-Table Mt #2 500 kV	Var	Chief Jo Braking Resistor Tracy&Olinda React Switching NW 2400 MW Gen Drop Flash Malin-Round Mt S-Caps	Mtshasta 69 15.8%	Yuba 0.805	Mtshasta 69 15.8%	Kmo 13g6 13.8 59.750	Stable & Damped
N-2 4 Cy 3PH Table Mt 500 kV	Table Mt-Tesla 500 kV Table Mt-Vaca Dixon 500 kV		FACRI insert Ft Rock Series Caps Chief Jo Braking Resistor Tracy&Olinda React Switching NW 2400 MW Gen Drop	Plainfld 60 14.0%	Plainfld 60 0.815	Highwnds 34.5 15.1%	Honeylke 9.1 59.610	Stable & Damped
N-2 4 Cy 3PH Grizzly 500 kV	Grizzly-CaptJack 500 kV Grizzly-Malin 500 kV	Var	FACRI insertion of Malin C1 and CaptJack C1 Shunt Capacitors NW 2400 MW Gen Drop	Northcst 69 20.7%	Goldhill 69 0.771 Less Than 40 cycles	Northcst 69 20.7%	Kmo 13g6 13.8 59.672	Stable & Damped
N-2 4 Cy 3PH Grizzly 500 kV	Grizzly-Malin 500 kV Grizzly-Summer Lake 500 kV	Var	FACRI insertion of Malin C1 and CaptJack C1 Shunt Capacitors NW 2400 MW Gen Drop	Northcst 69 20.4%	Goldhill 69 0.774 Less Than 40 cycles	Northcst 69 20.4%	Kmo 13g6 13.8 59.662	Stable & Damped

Appendix E - 16hs2a_2250idnw_solo Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-2 4 Cy 3PH John Day 500 kV	John Day-Grizzly #1 500 kV	Var	FACRI insert Ft Rock Series Caps, Malin C1&C2, CaptJack C1 NW 2400 MW Gen Drop	Northcst 69 24.3%	Big Clif 14.4 0.701 Less Than 40 cycles	Big Clif 14.4 29.8%	Sync_g19 13.8 59.581	Stable & Damped
N-2 4 Cy 3PH Grizzly 500 kV	John Day-Grizzly #2 500 kV Buckley-Grizzly 500 kV	Var	FACRI insert Ft Rock Series Caps, Malin C1, CaptJack C1 NW 2400 MW Gen Drop	Northcst 69 19.7%	Goldhill 69 0.781	Northcst 69 19.7%	Kmo 13g6 13.8 59.632	Stable & Damped
N-2	Loss of 2 Palo Verde units	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1&C2 & CaptJack Sh Cap C1	Ptrsnfgr 69 12.3%	Ptrsnfll 230 0.837	Ptrsnfgr 69 12.3%	Sync_g19 13.8 59.755	Stable & Damped
N-2 4 Cy 3PH Ashe 500 kV	Ashe-Slatt 500 kV Ashe-Marion 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 & CaptJack Sh Cap C1	Sheridan 59.8 12.9%	Stayton 69 0.825	Sheridan 59.8 12.9%	Kmo 13g6 13.8 59.806	Stable & Damped
N-2 4 Cy 3PH Slatt 500 kV	Slatt-Ashe 500 kV Slatt-McNary 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 & CaptJack Sh Cap C1	Northcst 69 17.9%	Goldhill 69 0.794	Northcst 69 17.9%	Kmo 13g6 13.8 59.780	Stable & Damped

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Bus COYOTE_500.0 (43123)
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Bus COYO S1_13.8 (43119)
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Bus COYO G1_18.0 (43111)
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Bus COYO M2_1.0 (48519)
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Bus COYO S2_13.8 (48518)
BF 4231 McNary-Coyote-Slatt 500 kV & McNary 500/230 kV Xfmr	OPEN Bus COYO G2_18.0 (48516)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 4234 McNary-Coyote-Slatt & McNary-Hermcalp 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Shunt SANTIAM_230.0 (40939) #s
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_500.0 (40521)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_230.0 (40519)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line NPULLMAN_115.0 (48291) TO SHAWNEE_115.0 (48383) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48245) TO SPULLMAN_115.0 (48413) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS HOT SPR_500.0 (40553) TO -148.3 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	CLOSE Line LEON_115.0 (48183) TO MOSCCITY_115.0 (48243) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48243) TO MOSCITYT_115.0 (48245) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS N LEWIST_115.0 (48253) TO 44.4 MVR
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5006 Slatt-Coyote-McNary & Slatt-Grassland 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5021 Slatt-John Day & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus IONE_69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_100.0 (44115)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_100.0 (44116)

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Contingency Studied	Actions Taken in the Contingency
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_ 230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_ 230.0 (44125)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_ 230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_ 230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_ 100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_ 13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_ 13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_ 100.0 (44118)
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_ 13.8 (44107)
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_ 13.8 (44108)
BF McNary 230 kV SECT 2	SET SWITCHED SHUNT AT BUS JONESCYN_ 230.0 (47814) TO 52.2 MVR
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_ 230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_ 230.0 (44127)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_ 100.0 (44119)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_ 100.0 (44120)
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_ 13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_ 13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_ 13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_ 13.8 (44112)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_ 345.0 (40721)
BF McNary 230 kV SECT 3	SET SWITCHED SHUNT AT BUS ECHO OWF_ 34.5 (44890) TO 6 MVR
BF McNary 230 kV SECT 3	CLOSE Shunt 9CWIND 2_ 34.5 (47316) #ZS
BF McNary 230 kV SECT 3	SET SWITCHED SHUNT AT BUS 9CWIND 2_ 34.5 (47316) TO 10.6 MVR
BF McNary 230 kV SECT 3	CLOSE Shunt 9CWIND 1_ 34.5 (47315) #ZS
BF McNary 230 kV SECT 3	SET SWITCHED SHUNT AT BUS 9CWIND 1_ 34.5 (47315) TO 10.6 MVR
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_ 500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_ 500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_ 500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_ 500.0 (45095)
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_ 500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_ 500.0 (40601)
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Chief Jo-Sickler 500 kv	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kv	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kv	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kv	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kv	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
N-1: CusterW-Monroe 500 kv	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kv	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kv	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kv	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kv	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kv + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kv + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kv + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Dworshak-Taft 500 kv	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kv	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kv	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kv	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kv	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kv	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Goldhill-Placer 115 kv	OPEN Bus HORSHE1_115.0 (32229)
N-1: Goldhill-Placer 115 kv	OPEN Bus HORSESH1_115.0 (32230)
N-1: Goldhill-Placer 115 kv	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kv	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kv	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kv	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kv	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kv	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kv	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kv	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kv	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kv	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kv	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kv	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kv	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kv	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kv	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kv Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kv Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kv Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Lolo 230 kv	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kv	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kv	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kv	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kv	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kv	OPEN Line HELLSYCN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kv	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kv	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kv	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kv	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kv	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kv + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Grassland 500 kv + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Grassland 500 kv + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kv + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Horse Hv-McNary 230 kV	SET SWITCHED SHUNT AT BUS HARVALUM_230.0 (40511) TO 40.7 MVR
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTE CR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIE CR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACIWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_230.0 (40939) #s
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_230.0 (41352) TO MCNRY S3_230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Coyote-Slatt 500 kV	OPEN Bus COYOTE_500.0 (43123)
N-1: McNary-Coyote-Slatt 500 kV	OPEN Bus COYO S1_13.8 (43119)
N-1: McNary-Coyote-Slatt 500 kV	OPEN Bus COYO G1_18.0 (43111)
N-1: McNary-Coyote-Slatt 500 kV	OPEN Bus COYO M2_1.0 (48519)
N-1: McNary-Coyote-Slatt 500 kV	OPEN Bus COYO S2_13.8 (48518)
N-1: McNary-Coyote-Slatt 500 kV	OPEN Bus COYO G2_18.0 (48516)
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACIWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS OREBASIN_34.5 (66146) TO 20 MVR
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS OREBASIN_34.5 (66146) TO 20 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	SET SWITCHED SHUNT AT BUS OREBASIN_34.5 (66146) TO 20 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	CLOSE Shunt BORAH_345.0 (60060) #1
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR

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Contingency Studied	Actions Taken in the Contingency
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	CLOSE Shunt MILLCKT2_13.8 (62333) #1
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	CLOSE Shunt MILLCKT1_13.8 (62332) #1
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	SET SWITCHED SHUNT AT BUS OREBASIN_34.5 (66146) TO 20 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	CLOSE Shunt BORAH_345.0 (60060) #1
N-1: Midpoint-Hemingway 500 kV + PTSN & BORA & MLCK Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	SET SWITCHED SHUNT AT BUS DILLON_S_69.0 (62345) TO 27.9 MVR
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	OPEN Line ADELAIDE_345.0 (60006) TO MIDPOINT_345.0 (60235) CKT 2
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_230.0 (40537) TO 52.2 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY_E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H_ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA_PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H_ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus COYOTE_500.0 (43123)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO S1_13.8 (43119)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO G1_18.0 (43111)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO M2_1.0 (48519)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO S2_13.8 (48518)
N-2: Ashe-Marion & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO G2_18.0 (48516)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Bus COYOTE_500.0 (43123)
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO S1_13.8 (43119)
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO G1_18.0 (43111)
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO M2_1.0 (48519)
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO S2_13.8 (48518)
N-2: Ashe-Slatt & Slatt-Coyote-McNary 500 kV	OPEN Bus COYO G2_18.0 (48516)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL_SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61996) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN Gen BRIDGER1_22.0 (60086) #1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET LOAD AT BUS BRIDGER1_22.0 (60086) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #1 & #2 345 kV + RAS	OPEN Gen BRIDGER2_22.0 (60087) #1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET LOAD AT BUS BRIDGER2_22.0 (60087) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI21_345.0 (61967) CKT 2 TO -0.017307 pu
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI11_345.0 (61968) CKT 1 TO -0.017307 pu
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SERIES CAP REACTANCE AT BRI3MI11_345.0 (61999) TO 3MIKNOLL_345.0 (60084) CKT 1 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV + RAS	CLOSE Shunt BORAH_345.0 (60060) #1
N-2: Bridger-Populus #1 & #2 345 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN Gen BRIDGER1_22.0 (60086) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET LOAD AT BUS BRIDGER1_22.0 (60086) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	OPEN Gen BRIDGER2_22.0 (60087) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET LOAD AT BUS BRIDGER2_22.0 (60087) TO 60 % of present MW (cnst pf)
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI21_345.0 (61967) CKT 2 TO -0.017307 pu
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SERIES CAP REACTANCE AT POPULUS_345.0 (67790) TO POPBRI11_345.0 (61968) CKT 1 TO -0.017307 pu
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	SET SERIES CAP REACTANCE AT BRI3MI11_345.0 (61999) TO 3MIKNOLL_345.0 (60084) CKT 1 TO 50 % of present
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV + RAS	CLOSE Shunt BORAH_345.0 (60060) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELLSYCN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAFS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS SPRINGER_115.0 (12077) TO 20 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Double Palo Verde	OPEN Shunt NIC 500_500.0 (50703) #v
N-2: Double Palo Verde	OPEN Shunt CKY 500_500.0 (50045) #v
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Load MILCTYDC_230.0 (63010) #D1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO NAPAVINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Raver & Raver-Covington 4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covington 4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_500.0 (30005) TO RD MT 1M_500.0 (30065) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1

Appendix E - 16hs2a_2250idnw_solo Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT_1_12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT_2_12.5 (38830)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT_3_12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT_4_12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT_5_12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_13.8 (38715)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA_A_13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA_B_13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA_D_13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA_E_13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA_C_13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_18.0 (34604)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Shunt NIC 500_500.0 (50703) #v
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF IPC Midpoint-Hem 500 kV & Hem 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hem 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_24.0 (43047) #1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR

Appendix F

16hs2a_2250idnw_nww Base Case (Walla Walla Area, 100% Wind)

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

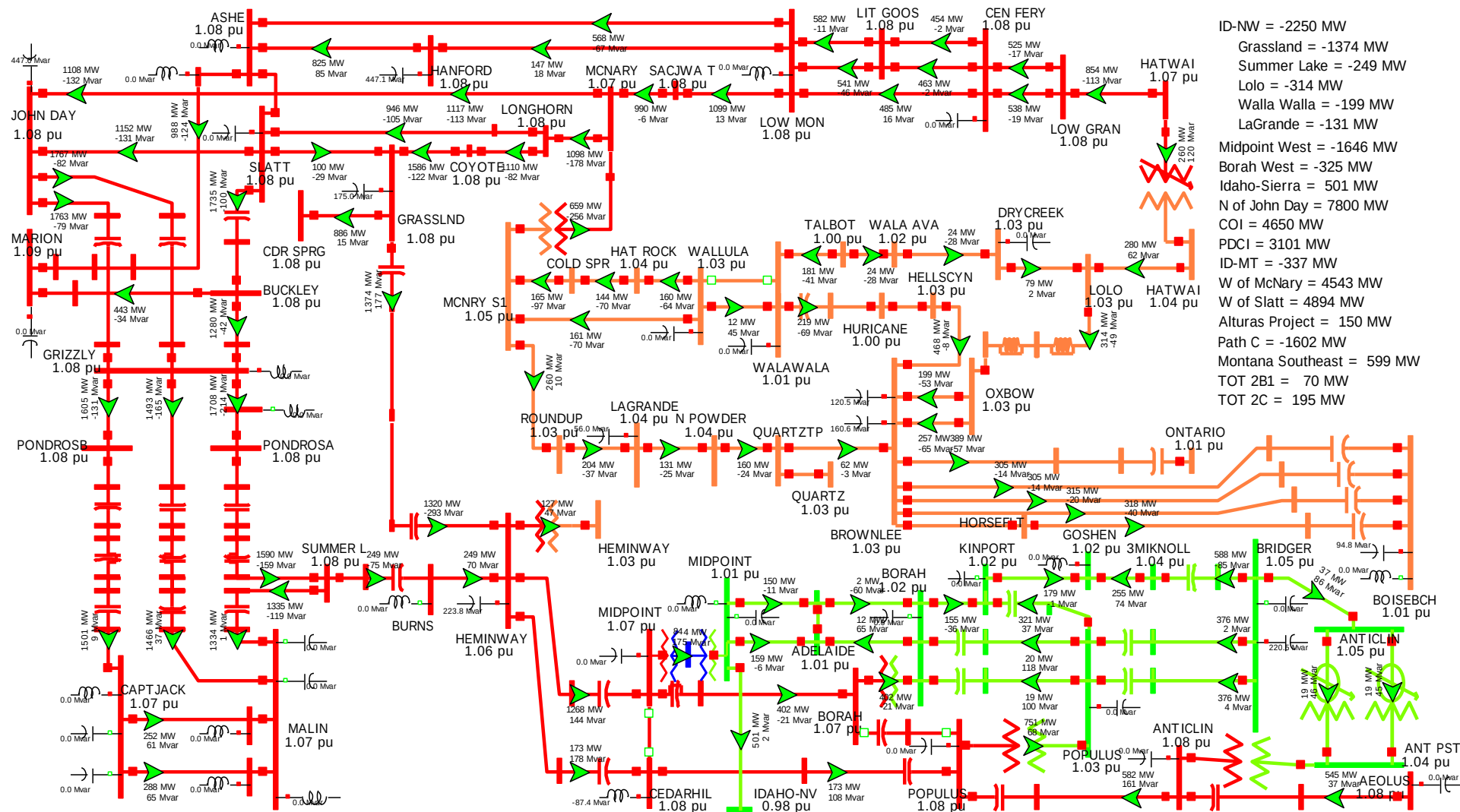


Figure F1: 16hs2sa 2250idnw N nww Case **Pre-Contingency**

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

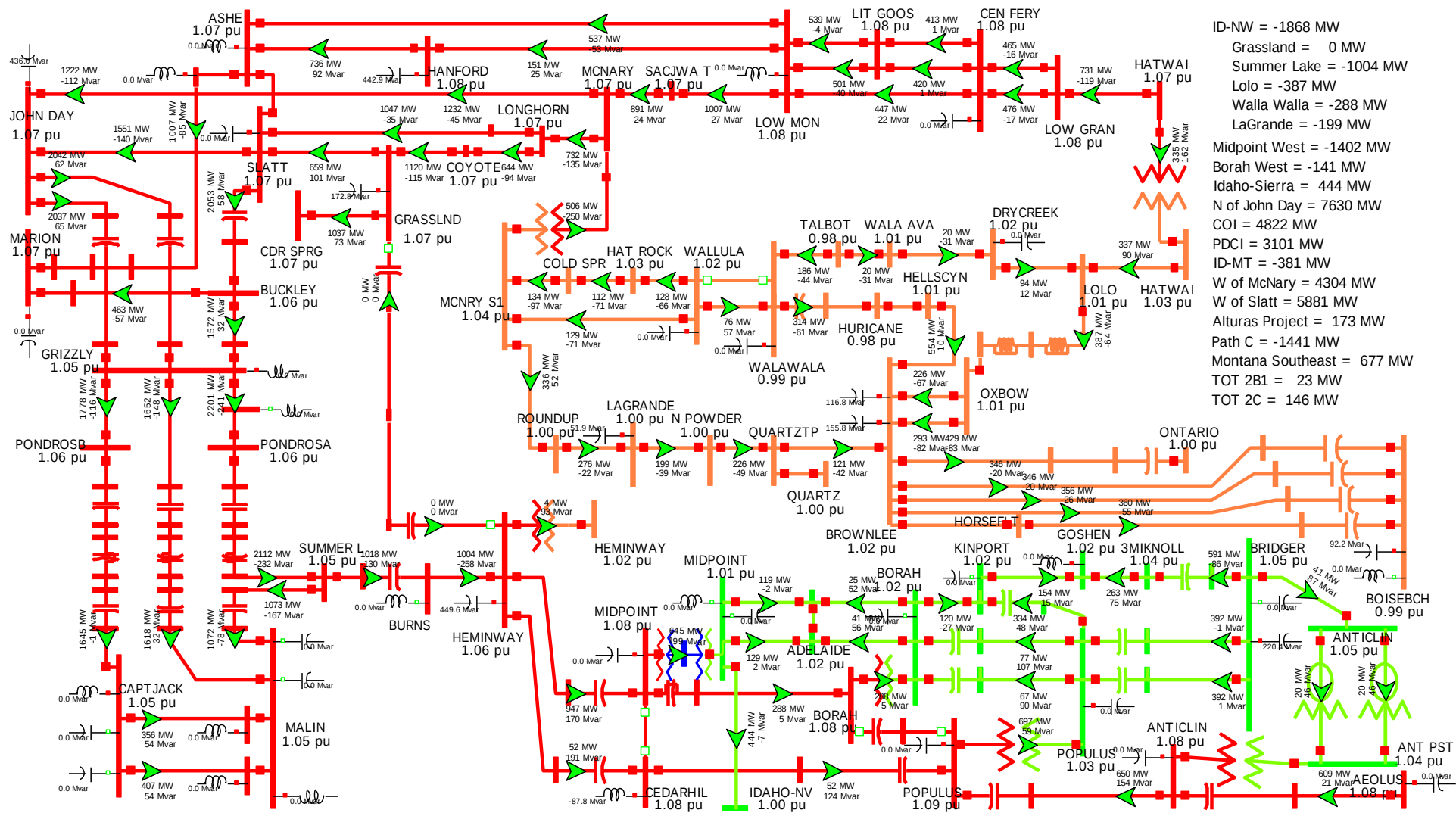


Figure F2: 16hs2sa_2250idnw_N_nww Case N-1: Hemingway-Grassland 500 kV + PTSN Shunt

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

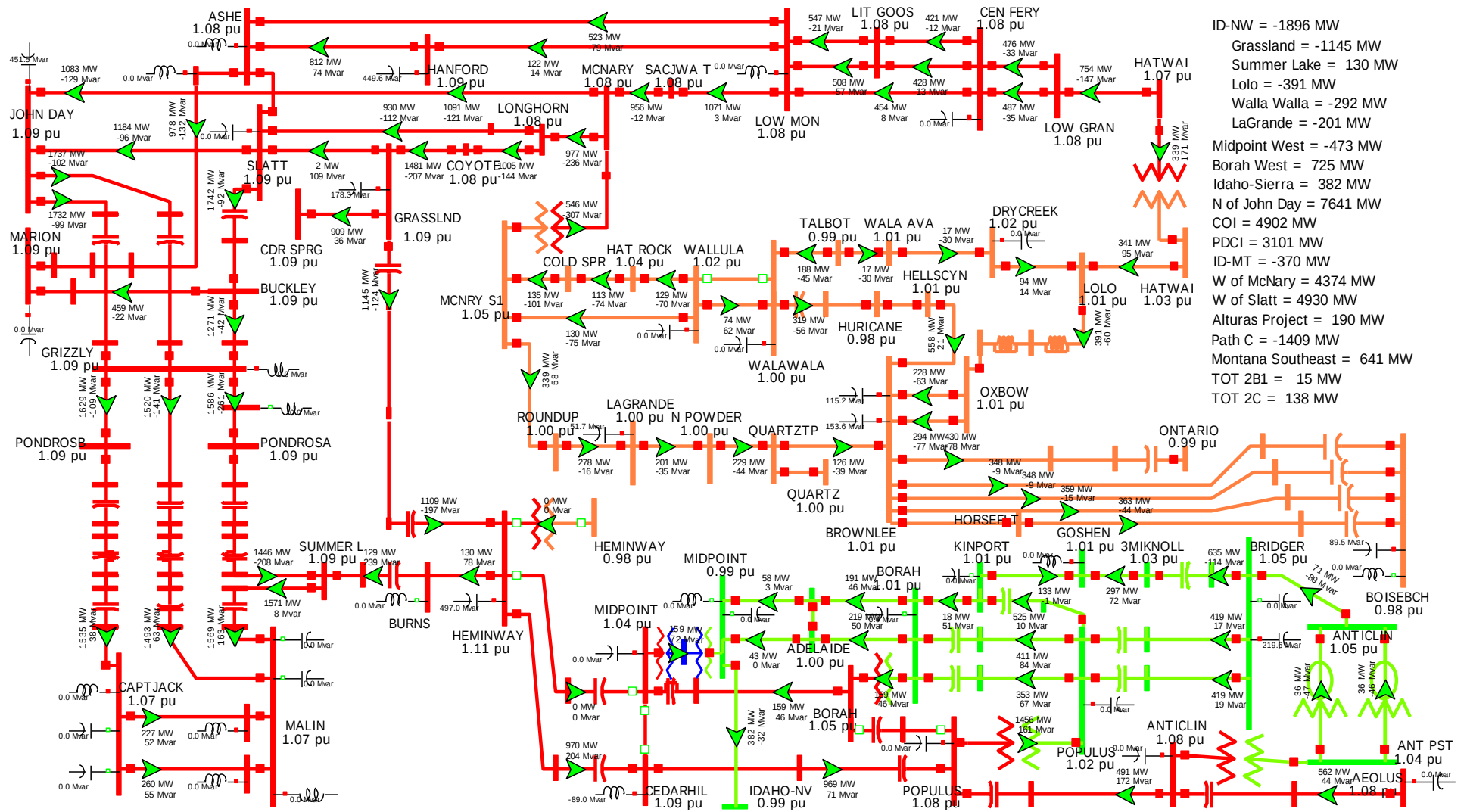


Figure F3: 16hs2sa_2250idnw_N_nww Case BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

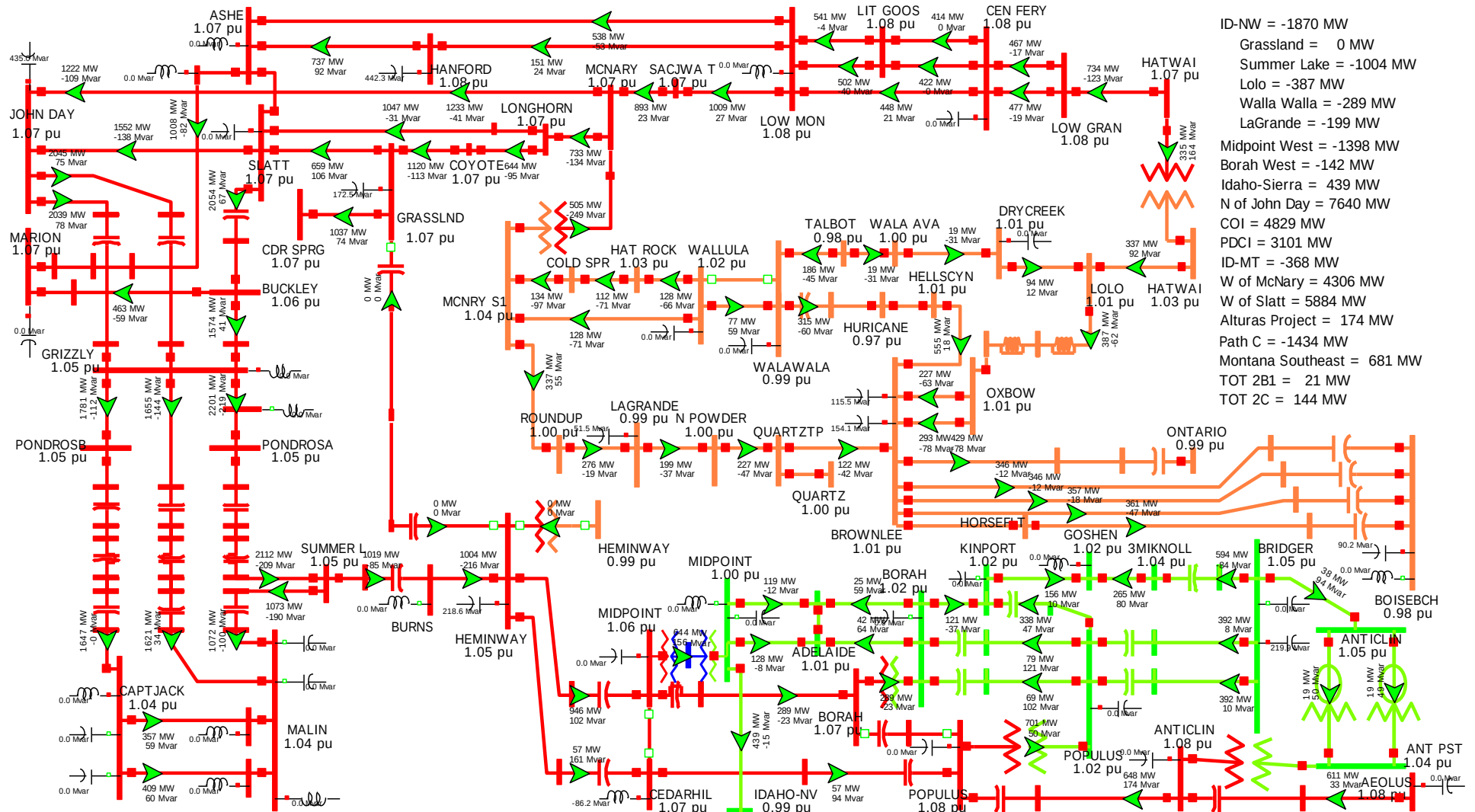


Figure F4: 16hs2sa_2250idnw_N_nww Case BF IPC Hemingway-Grassland 500 kv & Hemingway 500/230 Xfmr

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

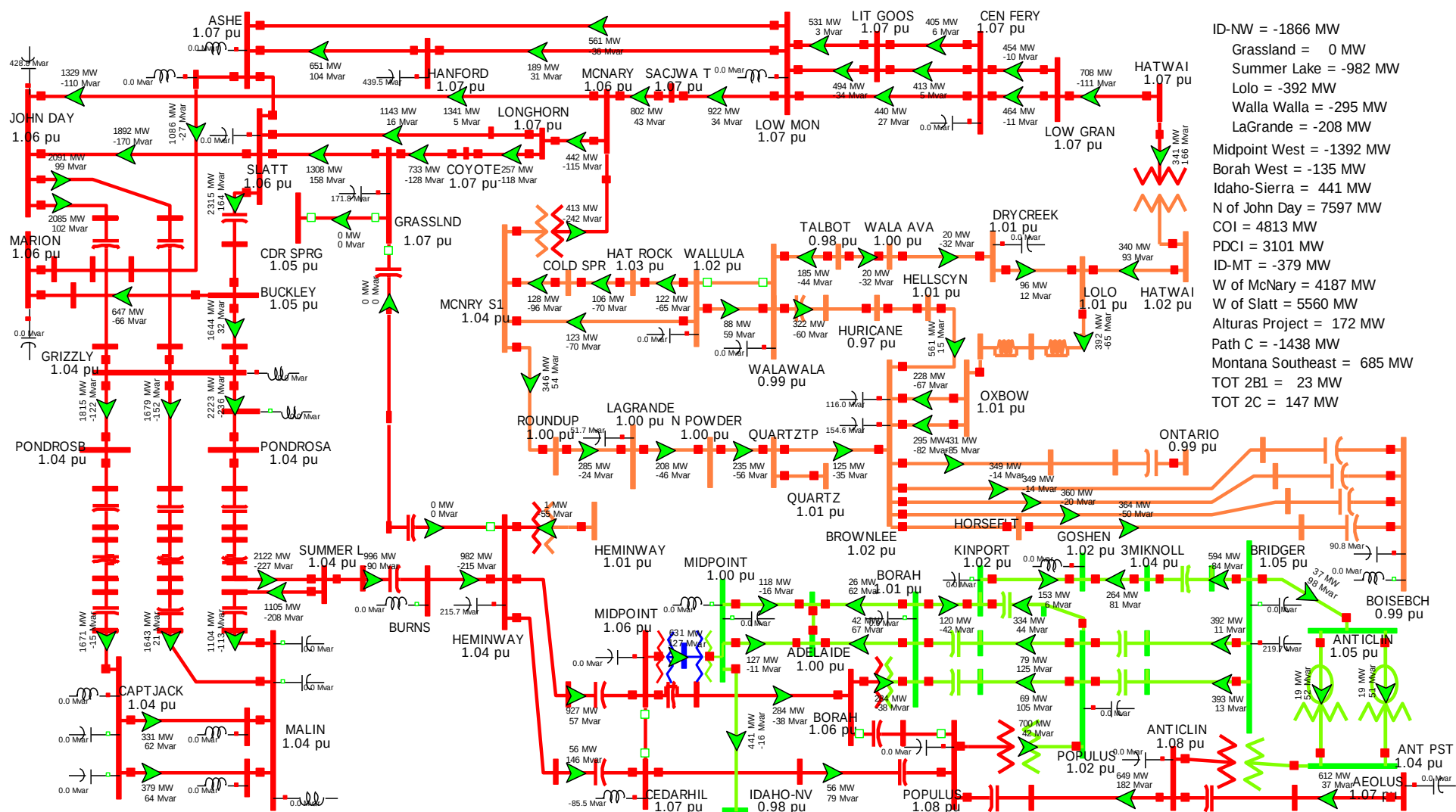


Figure F5: 16hs2sa 2250idnw N nww Case **BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV**

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

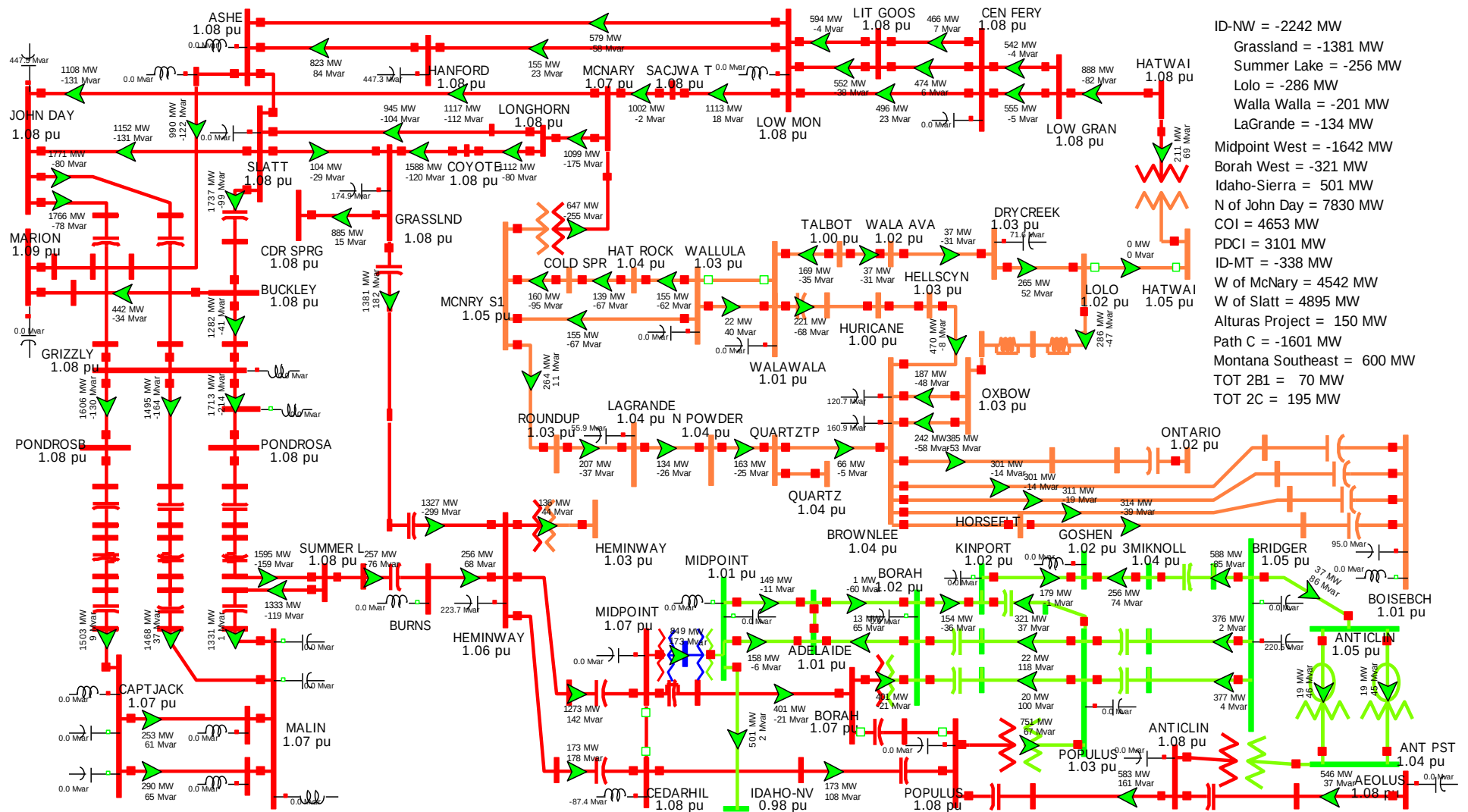


Figure F6: 16hs2sa_2250idnw_N_nww Case N-1: Hatwai-Lolo 230 kV

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

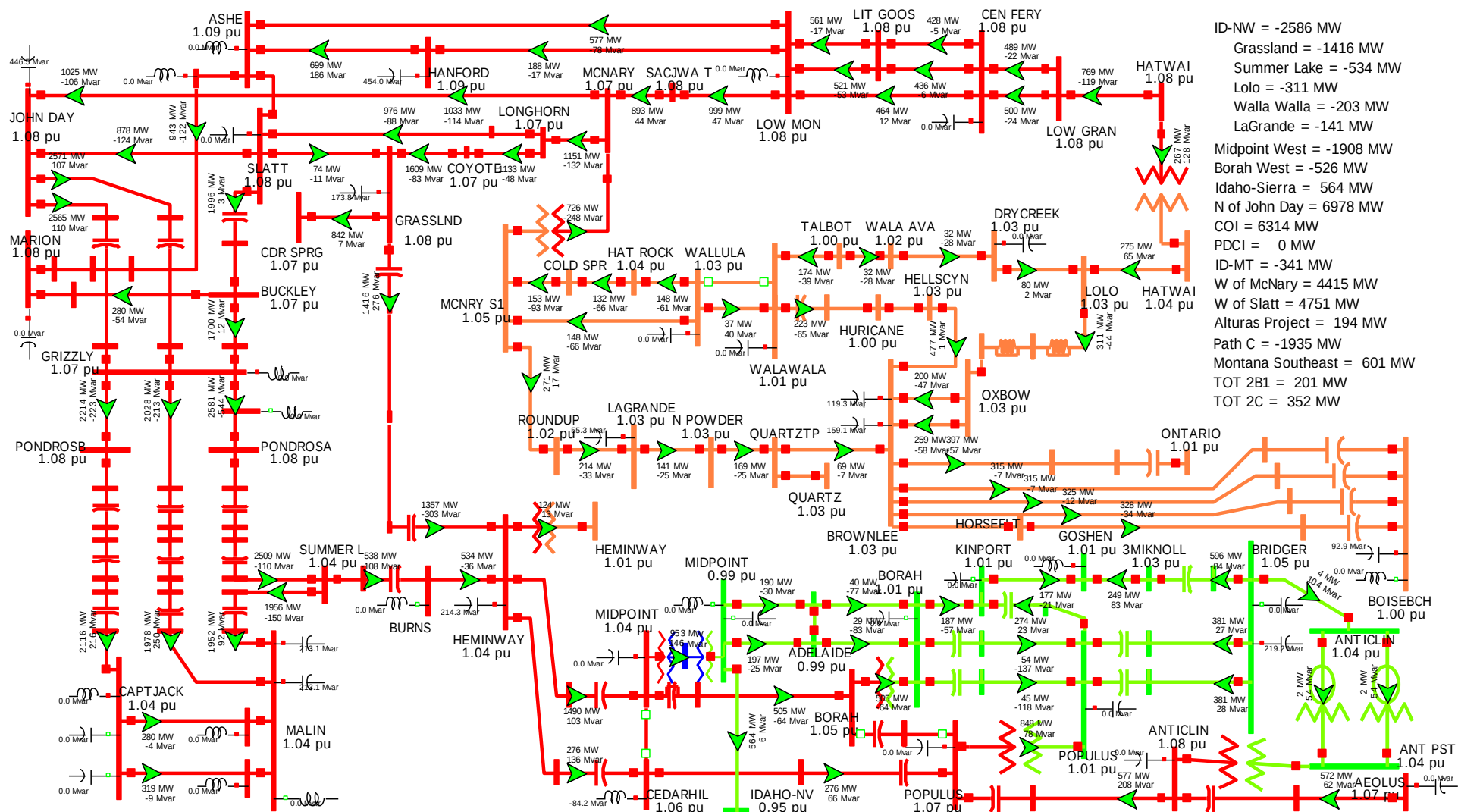


Figure F7: 16hs2sa 2250idnw N nww Case **N-2: DC-BIPOLE**

Appendix F– 16hs2sa_2250idnw_N_nww Case Post-Transient Contingency Results

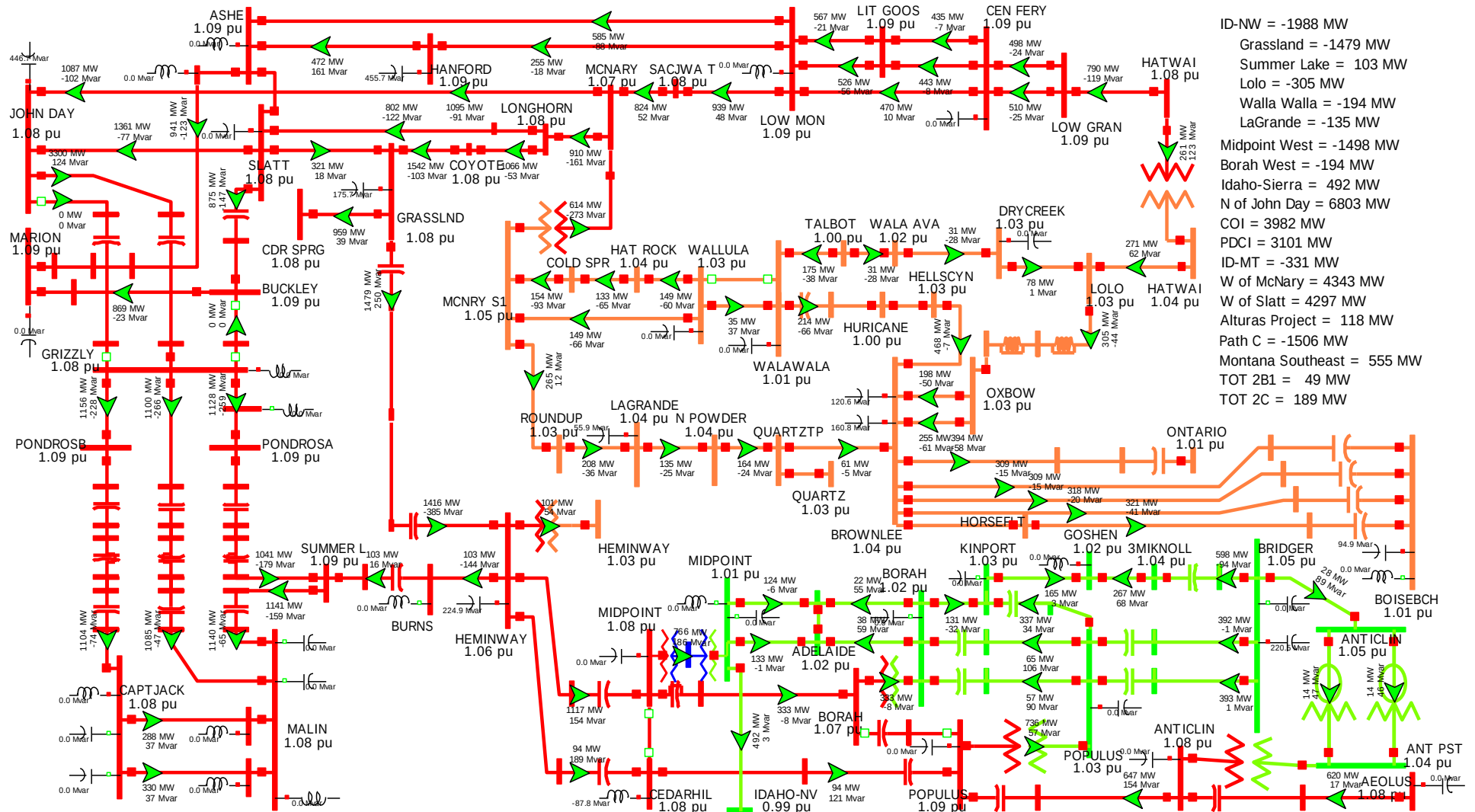


Figure F8: 16hs2sa_2250idnw_N_nww Case N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS

Appendix F - 16hs2a_2250idnw_nww Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	MERIDINP (45197) -> MERIDINP (45195) CKT 2 at MERIDINP	Branch MVA	370.6	685.8	650.0	105.5%	780.0	87.9%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	641.1	1208.3	979.0	123.4%	1287.7	93.8%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	308.7	780.4	722.9	108.0%	1265.2	61.7%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1648.6	2850.8	2442.0	116.7%	3235.5	88.1%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1648.6	2850.8	2199.9	129.6%	3235.5	88.1%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1648.0	2844.4	2666.9	106.7%	4000.0	71.1%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at ROUND MT	Branch Amp	1638.9	2833.2	2667.0	106.2%	4000.0	70.8%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALROU11	Branch Amp	1604.3	2772.0	2699.7	102.7%	4000.0	69.3%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1596.7	2755.9	2699.7	102.1%	4000.0	68.9%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1648.6	2907.0	2442.0	119.0%	3235.5	89.8%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1648.6	2907.0	2199.9	132.1%	3279.9	88.6%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1648.0	2900.0	2666.9	108.7%	4000.0	72.5%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1638.9	2889.5	2667.0	108.3%	4000.0	72.2%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1248.5	1237.0	100.9%	1395.9	89.4%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	ATHENA (45015)	% Δ Volts	0.99	0.94				5.32%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40619)	% Δ Volts	0.99	0.94				5.32%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PILOT RK (45413)	% Δ Volts	0.99	0.94				5.32%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	BUCKAROO (45027)	% Δ Volts	1.00	0.95				5.26%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	MISSIONT (47191)	% Δ Volts	1.00	0.95				5.26%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PENDLBPA (41247)	% Δ Volts	1.00	0.95				5.26%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PENDLT T (41248)	% Δ Volts	1.00	0.95				5.26%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PENDLTON (45235)	% Δ Volts	1.00	0.95				5.26%
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	268.2	343.2	320.0	107.2%	370.0	92.7%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	653.0	1141.0	950.0	120.1%	1286.0	88.7%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	268.2	351.5	320.0	109.8%	370.0	95.0%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	653.0	1158.7	950.0	122.0%	1286.0	90.1%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1034.2	1009.1	102.5%	1285.2	80.5%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1270.7	1237.0	102.7%	1395.9	91.0%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ATHENA (45015)	% Δ Volts	0.99	0.93				6.45%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PILOT RK (45413)	% Δ Volts	0.99	0.93				6.45%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	MISSIONT (47191)	% Δ Volts	1.00	0.94				6.38%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLTON (45235)	% Δ Volts	1.00	0.94				6.38%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	MCKAY (45322)	% Δ Volts	1.01	0.95				6.32%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ICE HAR2 (40567)	% Δ Volts	1.03	0.97				6.19%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SACJAWEA (40911)	% Δ Volts	1.03	0.97				6.19%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SACJWA T (40915)	% Δ Volts	1.03	0.97				6.19%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40619)	% Δ Volts	0.99	0.94				5.32%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	BUCKAROO (45027)	% Δ Volts	1.00	0.95				5.26%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLBPA (41247)	% Δ Volts	1.00	0.95				5.26%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLT T (41248)	% Δ Volts	1.00	0.95				5.26%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	809.5	800.0	101.2%	1199.9	67.5%
BF 4708 Hatwai 500 kV Bus	PTRSNFLT (62030)	% Δ Volts	0.96	0.90				6.67%
BF 4708 Hatwai 500 kV Bus	PTRSNFUR (62386)	% Δ Volts	0.97	0.91				6.59%
BF 4708 Hatwai 500 kV Bus	AMPS (65025)	% Δ Volts	0.96	0.91				5.49%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	795.5	933.2	920.0	101.4%	1046.8	89.1%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1008.2	920.0	109.6%	1046.8	96.3%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations							
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1238.3	1237.0	100.1%	1395.9	88.7%
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1376.2	1237.0	111.2%	1395.9	98.6%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1022.1	920.0	111.1%	1046.8	97.6%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	826.2	800.0	103.3%	1199.9	68.9%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.96	0.88				9.09%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.97	0.90				7.78%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.96	0.90				6.67%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1384.0	1237.0	111.9%	1395.9	99.1%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1032.1	920.0	112.2%	1046.8	98.6%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	803.3	800.0	100.4%	1199.9	66.9%
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations							
BF Lolo 230kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1280.2	1237.0	103.5%	1395.9	91.7%
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 2	JONTMB11 (90164)	% Δ Volts	1.03	0.97				6.19%
BF McNary 230 kV SECT 3	FRANKLIN (40443)	% Δ Volts	1.00	0.94				6.38%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1394.1	1237.0	112.7%	1395.9	99.9%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1038.4	920.0	112.9%	1046.8	99.2%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1009.9	1009.1	100.1%	1285.2	78.6%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	833.0	800.0	104.1%	1199.9	69.4%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	PTRSNFLT (62030)	% Δ Volts	0.96	0.88				9.09%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	PTRSNFUR (62386)	% Δ Volts	0.97	0.89				8.99%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	AMPS (65025)	% Δ Volts	0.96	0.89				7.87%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	BIGGRASS (65155)	% Δ Volts	0.98	0.93				5.38%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	DILLON S (62084)	% Δ Volts	0.98	0.93				5.38%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1392.0	1237.0	112.5%	1395.9	99.7%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1035.8	920.0	112.6%	1046.8	98.9%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1009.6	1009.1	100.0%	1285.2	78.6%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	835.1	800.0	104.4%	1199.9	69.6%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	AMPS (65025)	% Δ Volts	0.96	0.91				5.49%
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	No Violations							
BF PGE Grassland-Slatt 500kV & Boardman Plant	No Violations							
Bus: Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1015.5	1009.1	100.6%	1285.2	79.0%
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Allston-Keeler 500 kV + RAS	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1080.8	1009.1	107.1%	1285.2	84.1%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	281.3	851.0	785.7	108.3%	926.3	91.9%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	281.3	851.0	785.7	108.3%	926.3	91.9%
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1648.6	2530.5	2442.0	103.6%	3235.5	78.2%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1648.6	2530.5	2199.9	115.0%	3279.9	77.2%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1804.1	2433.4	2199.9	110.6%	3280.5	74.2%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1788.8	2412.8	2199.9	109.7%	3280.5	73.5%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1974.9	2632.0	2477.9	106.2%	4000.0	65.8%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1019.1	1009.1	101.0%	1285.2	79.3%
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	641.1	1164.7	979.0	119.0%	1287.7	90.5%
N-1: Dixonville-Meridian 500 kV	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	308.7	729.1	722.9	100.9%	1265.2	57.6%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	811.4	800.0	101.4%	1199.9	67.6%
N-1: Dworshak-Hatwai 500 kV + RAS + PTSN	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	813.7	800.0	101.7%	1199.9	67.8%
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	CLARKSTN (40239) -> N LEWIST (48253) CKT 1 at CLARKSTN	Branch Amp	357.8	436.9	431.3	101.3%	464.9	94.0%
N-1: Hatwai-Lolo 230 kV	N LEWIST (48253) -> CLEARWTR (48075) CKT 1 at CLEARWTR	Branch Amp	415.8	615.4	569.8	108.0%	618.0	99.6%
N-1: Hatwai-Low Gran 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1007.8	920.0	109.5%	1046.8	96.3%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	795.5	1006.7	920.0	109.4%	1046.8	96.2%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1375.5	1237.0	111.2%	1395.9	98.5%
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1022.1	920.0	111.1%	1046.8	97.6%
N-1: Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	825.7	800.0	103.2%	1199.9	68.8%
N-1: Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.96	0.89				7.87%
N-1: Hemingway-Grassland 500 kV	PTRSNFUR (62386)	% Δ Volts	0.97	0.90				7.78%
N-1: Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts	0.96	0.90				6.67%
N-1: Hemingway-Grassland 500 kV + FACRI	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1250.9	1237.0	101.1%	1395.9	89.6%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1722.3	2886.9	2400.0	120.3%	3799.0	76.0%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1716.1	2867.9	2400.0	119.5%	3799.0	75.5%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1370.4	1237.0	110.8%	1395.9	98.2%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	1017.5	920.0	110.6%	1046.8	97.2%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	827.2	800.0	103.4%	1199.9	68.9%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1648.6	2852.9	2442.0	116.8%	3235.5	88.2%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1648.6	2852.9	2199.9	129.7%	3279.9	87.0%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALROU21	Branch Amp	1648.0	2846.3	2666.9	106.7%	4000.0	71.2%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1638.9	2835.7	2667.0	106.3%	4000.0	70.9%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1604.3	2826.7	2699.7	104.7%	4000.0	70.7%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1596.7	2813.5	2699.7	104.2%	4000.0	70.3%
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1247.0	1237.0	100.8%	1395.9	89.3%
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	PTRSNFLT (62030)	% Δ Volts	0.96	0.91				5.49%
N-1: Midpoint-Hemingway 500 kV	PTRSNFUR (62386)	% Δ Volts	0.97	0.92				5.43%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	No Violations							
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1283.0	1237.0	103.7%	1395.9	91.9%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	268.2	343.3	320.0	107.3%	370.0	92.8%
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	653.0	1141.4	950.0	120.1%	1286.0	88.8%
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	268.2	343.3	320.0	107.3%	370.0	92.8%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	653.0	1141.4	950.0	120.1%	1286.0	88.8%
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1804.1	3245.9	2199.9	147.5%	3280.5	98.9%
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUND MT	Branch Amp	1804.1	3245.9	2667.0	121.7%	4000.0	81.1%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	1794.2	3232.3	2667.0	121.2%	4000.0	80.8%
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	1974.9	2956.1	2667.0	110.8%	4000.0	73.9%
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1974.9	2956.1	2477.9	119.3%	4000.0	73.9%
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at TABVAC12	Branch Amp	1948.9	2935.9	2667.0	110.1%	4000.0	73.4%
N-1: Table Mtn-Tesla 500 kV	VACTES11 (30044) -> TESLA (30040) CKT 1 at VACTES11	Branch Amp	1382.9	2291.6	2230.0	102.8%	3555.9	64.4%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1501.4	2665.9	2230.0	119.5%	3555.9	75.0%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	795.5	920.2	920.0	100.0%	1046.8	87.9%
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	718.2	813.1	800.0	101.6%	1199.9	67.8%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts	0.96	0.90				6.67%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts	0.97	0.91				6.59%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	AMPS (65025)	% Δ Volts	0.96	0.91				5.49%
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1036.5	1009.1	102.7%	1285.2	80.7%
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	902.8	1018.8	1009.1	101.0%	1285.2	79.3%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	BROONT12 (61981) -> ONTARIO (60265) CKT 1 at BROONT12	Branch Amp	954.7	1593.3	1590.0	100.2%	2328.0	68.4%
N-2: Bridger-Populus #1 & #2 345 kV	No Violations							
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	POPBR11 (61968)	% Δ Volts	1.00	1.05				4.76%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	AMPS (65025)	% Δ Volts	0.96	1.01				4.95%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	795.5	978.7	920.0	106.4%	1046.8	93.5%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1804.1	2427.9	2199.9	110.4%	3280.5	74.0%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1722.3	2794.0	2400.0	116.4%	3799.0	73.5%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1788.8	2407.3	2199.9	109.4%	3280.5	73.4%
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1716.1	2780.1	2400.0	115.8%	3799.0	73.2%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1648.6	2324.3	2199.9	105.7%	3279.9	70.9%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1974.9	2592.6	2477.9	104.6%	4000.0	64.8%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1552.8	2260.7	2134.0	105.9%	3499.9	64.6%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1532.9	2228.5	2134.0	104.4%	3499.9	63.7%
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	1511.1	2199.5	2134.0	103.1%	3499.9	62.8%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1722.3	2586.0	2400.0	107.7%	3799.0	68.1%
N-2: Double Palo Verde	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1804.1	2223.8	2199.9	101.1%	3280.5	67.8%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1716.1	2567.8	2400.0	107.0%	3799.0	67.6%
N-2: Double Palo Verde	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1788.8	2205.0	2199.9	100.2%	3280.5	67.2%
N-2: Double Palo Verde	PTRSNFLT (62030)	% Δ Volts	0.96	0.90				6.67%
N-2: Double Palo Verde	PTRSNFUR (62386)	% Δ Volts	0.97	0.91				6.59%
N-2: Double Palo Verde	AMPS (65025)	% Δ Volts	0.96	0.91				5.49%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts	0.97	1.03				5.83%
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	No Violations							
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1140.0	1263.4	1237.0	102.1%	1395.9	90.5%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1722.3	3327.5	2400.0	138.6%	3799.0	87.6%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1434.1	3238.7	2700.0	119.9%	4000.0	81.0%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1632.0	3154.9	2400.0	131.5%	4099.2	77.0%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1617.7	3141.6	2400.0	130.9%	4099.2	76.6%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1632.0	3191.9	2400.0	133.0%	4099.2	77.9%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1617.7	3181.4	2400.0	132.6%	4099.2	77.6%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	1858.7	3164.7	2900.0	109.1%	4350.0	72.8%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	JOHN DAY (40585) -> GRIJOH12 (90065) CKT 1 at JOHN DAY	Branch Amp	1884.6	3521.1	3500.0	100.6%	3500.01	100.6%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH11 (90064) -> GRIZZLY (40489) CKT 1 at GRIJOH11	Branch Amp	1876.4	3513.7	3500.0	100.4%	3500.0	100.4%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH12	Branch Amp	1876.4	3513.7	3000.0	117.1%	4050.0	86.8%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	268.2	339.8	320.0	106.2%	370.0	91.8%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	653.0	1141.8	950.0	120.2%	1286.0	88.8%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	77.6	94.3	94.0	100.3%	139.0	67.8%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CARLTON (40181)	% Δ Volts	1.03	0.97				6.19%
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	795.5	942.5	920.0	102.4%	1046.8	90.0%
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	No Violations							
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1815.9	3730.1	2667.4	139.8%	4099.2	91.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1782.9	3622.5	2667.4	135.8%	4099.2	88.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1782.9	3622.5	2667.4	135.8%	4099.2	88.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1971.4	3204.2	2993.0	107.1%	4514.9	71.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1971.4	3204.2	2993.0	107.1%	4514.9	71.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1941.7	3171.7	2993.0	106.0%	4514.9	70.2%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1941.7	3171.7	2993.0	106.0%	4514.9	70.2%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1920.4	3134.6	2993.0	104.7%	4514.9	69.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025)	% Δ Volts	1.04	0.98				6.12%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	AMPS (65025)	% Δ Volts	0.96	0.91				5.49%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	PTRSNFLT (62030)	% Δ Volts	0.96	0.91				5.49%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	PTRSNFUR (62386)	% Δ Volts	0.97	0.92				5.43%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	268.2	344.9	320.0	107.8%	370.0	93.2%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	653.0	1146.0	950.0	120.6%	1286.0	89.1%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							

Appendix F - 16hs2a_2250idnw_nww Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	690.1	911.4	830.9	109.7%	953.9	95.5%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	BRDGVLE (31110) -> FRUTLDJT (31120) CKT 1 at BRDGVLE	Branch Amp	290.4	330.8	328.1	100.8%	371.4	89.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1815.9	3451.6	2667.4	129.4%	4099.2	84.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1782.9	3358.6	2667.4	125.9%	4099.2	81.9%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1782.9	3346.2	2667.4	125.5%	4099.2	81.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1971.4	3503.0	2993.0	117.0%	4514.9	77.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1971.4	3503.0	2993.0	117.0%	4514.9	77.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1941.7	3484.4	2993.0	116.4%	4514.9	77.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1941.7	3484.4	2993.0	116.4%	4514.9	77.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1920.4	3452.0	2993.0	115.3%	4514.9	76.5%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	285.4	921.2	825.9	111.5%	976.5	94.3%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	232.3	862.7	825.1	104.6%	975.0	88.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	389.6	467.0	462.9	100.9%	579.9	80.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1974.9	2545.1	2477.9	102.7%	4000.0	63.6%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.83	-1072	0.89	-3830	0.75	-2488	0.97	-2862	0.80	-3200	0.91	-1646	0.75	-592	0.75	-351
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.83	-1057	0.88	-3975	0.76	-2446	0.97	-2964	0.76	-3249	0.89	-2073	0.75	-586	0.75	-346
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.82	-1090	0.88	-4081	0.75	-2531	0.97	-2384	0.81	-3323	0.93	-1578	0.75	-603	0.75	-353
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.83	-1048	0.88	-4041	0.76	-2408	0.97	-2245	0.87	-2488	0.85	-2309	0.75	-585	0.75	-340
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.82	-1081	0.84	-3646	0.75	-2532	0.98	-2171	0.83	-3266	0.86	-2379	0.76	-582	0.75	-346
BF 4019 CAPT JACK-MALIN #2 & MALIN 500/230 XFMR	0.82	-1089	0.87	-4221	0.75	-2519	0.97	-2505	0.82	-3312	0.85	-2493	0.75	-604	0.75	-354
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.82	-1132	0.87	-4106	0.76	-2587	0.97	-2597	0.81	-3502	0.84	-2645	0.77	-541	0.76	-301
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.84	-969	0.90	-3525	0.77	-2200	0.98	-1693	0.84	-2493	0.88	-1924	0.77	-551	0.76	-318
BF 4064 CAPT JACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.83	-1069	0.88	-4097	0.76	-2438	0.97	-2331	0.82	-2837	0.86	-2404	0.75	-595	0.75	-346
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.84	-1006	0.89	-3770	0.76	-2250	0.98	-1928	0.82	-2375	0.87	-2100	0.76	-570	0.76	-328
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.82	-1095	0.85	-3942	0.75	-2559	0.97	-2485	0.81	-3405	0.85	-2559	0.75	-602	0.75	-353
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.82	-1096	0.84	-3782	0.75	-2564	0.97	-2458	0.82	-3385	0.85	-2526	0.75	-595	0.75	-349
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.82	-1130	0.87	-4027	0.76	-2582	0.97	-3245	0.81	-3491	0.84	-2626	0.77	-535	0.76	-300
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.82	-1113	0.87	-4385	0.75	-2591	0.97	-2622	0.82	-3493	0.84	-2670	0.75	-614	0.75	-354
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500 KV	0.82	-1109	0.87	-4156	0.75	-2584	0.97	-2567	0.81	-3454	0.84	-2616	0.78	-537	0.75	-351
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.83	-1019	0.89	-3753	0.76	-2329	0.97	-1778	0.84	-2841	0.86	-2146	0.76	-577	0.75	-335
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.83	-1013	0.91	-3510	0.76	-2331	0.97	-1686	0.85	-2671	0.88	-1994	0.76	-571	0.76	-331
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.82	-1107	0.87	-4243	0.75	-2575	0.97	-3248	0.81	-3470	0.84	-2642	0.77	-545	0.75	-337
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.83	-1076	0.89	-3788	0.75	-2487	0.97	-1958	0.84	-3021	0.84	-2073	0.75	-599	0.75	-352
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.83	-1053	0.88	-4028	0.76	-2378	0.97	-2252	0.83	-2678	0.86	-2262	0.75	-590	0.75	-344
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.83	-1062	0.88	-3696	0.76	-2495	0.97	-2714	0.84	-3180	0.87	-2274	0.76	-575	0.75	-333
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.82	-1090	0.88	-3981	0.75	-2524	0.96	-2231	0.83	-3196	0.86	-2391	0.75	-604	0.75	-355
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.82	-1104	0.87	-4163	0.75	-2563	0.97	-3016	0.83	-3352	0.84	-2501	0.74	-609	0.75	-358
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.82	-983	0.89	-3979	0.76	-2517	0.98	-2412	0.81	-3428	0.85	-2519	0.75	-597	0.75	-348
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.82	-1088	0.88	-3855	0.75	-2642	0.97	-2463	0.82	-3544	0.85	-2567	0.75	-594	0.75	-356
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.82	-1084	0.87	-3732	0.76	-2547	0.98	-2927	0.82	-3333	0.85	-2454	0.76	-577	0.76	-332
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.82	-1097	0.86	-4011	0.75	-2565	0.97	-2509	0.82	-3429	0.84	-2582	0.75	-602	0.75	-353
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.82	-1104	0.88	-4104	0.75	-2580	0.97	-2566	0.81	-3467	0.84	-2616	0.75	-599	0.75	-354
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.82	-1104	0.87	-4218	0.75	-2578	0.97	-2572	0.81	-3457	0.84	-2619	0.75	-604	0.75	-355
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV + RAS	0.83	-1085	0.88	-3915	0.75	-2505	0.98	-2076	0.85	-2963	0.81	-1813	0.75	-594	0.75	-348
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV + RAS	0.82	-1089	0.88	-3986	0.75	-2533	0.98	-2151	0.84	-3211	0.85	-2185	0.75	-595	0.75	-349
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.82	-1096	0.88	-4057	0.75	-2548	0.98	-2230	0.83	-3269	0.84	-2384	0.75	-605	0.75	-355
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.82	-1104	0.87	-4131	0.75	-2576	0.97	-2534	0.82	-3447	0.84	-2598	0.75	-607	0.75	-356
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.82	-1102	0.88	-3947	0.75	-2577	0.97	-2538	0.82	-3457	0.84	-2595	0.75	-600	0.75	-353
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.82	-1101	0.88	-3944	0.75	-2576	0.97	-2525	0.82	-3452	0.84	-2587	0.75	-600	0.75	-353
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV + RAS	0.82	-1078	0.88	-3882	0.75	-2562	0.98	-2130	0.86	-2912	0.83	-2219	0.74	-613	0.75	-372
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.83	-1094	0.88	-4085	0.75	-2531	0.98	-2265	0.82	-3279	0.81	-2210	0.75	-606	0.75	-356
BF 4432 OSTRANDER-TROUTDALE & SPLIT OSTRANDER 500 KV	0.82	-1097	0.88	-4074	0.75	-2551	0.98	-2187	0.83	-3312	0.84	-2394	0.75	-606	0.75	-356
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.82	-1104	0.87	-4190	0.75	-2572	0.98	-2339	0.82	-3385	0.84	-2499	0.74	-609	0.75	-357
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.82	-1102	0.87	-4205	0.75	-2568	0.98	-2340	0.82	-3378	0.84	-2508	0.74	-607	0.75	-357
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.82	-1098	0.88	-4103	0.75	-2556	0.98	-2281	0.82	-3330	0.85	-2417	0.75	-606	0.75	-356
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.82	-1097	0.88	-4123	0.75	-2552	0.98	-2211	0.83	-3333	0.84	-2443	0.75	-605	0.75	-355
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV + RAS	0.81	-1146	0.91	-3476	0.75	-2817	0.98	-2638	0.82	-4039	0.85	-2533	0.73	-626	0.74	-395
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.83	-1089	0.88	-3960	0.75	-2513	0.98	-2121	0.85	-2995	0.81	-1818	0.75	-601	0.75	-352
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV + RAS	0.81	-1164	0.88	-4176	0.74	-2822	0.97	-2846	0.80	-4120	0.83	-2961	0.72	-654	0.74	-408
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV	0.83	-1074	0.89	-3596	0.75	-2508	0.98	-2092	0.83	-3223	0.86	-2361	0.76	-579	0.75	-341
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV + RAS	0.81	-1137	0.89	-3830	0.75	-2744	0.97	-2767	0.80	-3931	0.83	-2829	0.73	-625	0.74	-384
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.82	-1098	0.88	-4123	0.75	-2563	0.97	-2468	0.82	-3390	0.85	-2540	0.75	-602	0.75	-353
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.82	-1110	0.88	-3920	0.75	-2628	0.98	-2403	0.82	-3535	0.85	-2516	0.74	-604	0.75	-363
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.82	-1116	0.88	-4002	0.75	-2641	0.97	-2600	0.81	-3614	0.84	-2632	0.74	-608	0.75	-365
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.82	-1095	0.87	-4096	0.75	-2557	0.97	-2397	0.82	-3355	0.85	-2455	0.75	-600	0.75	-352
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.82	-1108	0.87	-4343	0.75	-2587	0.97	-3291	0.82	-3494	0.84	-2674	0.74	-610	0.75	-358

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.83	-964	0.88	-3627	0.77	-2494	0.98	-2990	0.82	-3405	0.85	-2434	0.76	-575	0.76	-330
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.82	-1100	0.87	-4213	0.75	-2572	0.97	-2546	0.82	-3447	0.84	-2606	0.75	-603	0.75	-353
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.81	-1184	0.87	-4294	0.74	-2762	0.97	-2976	0.80	-3954	0.82	-2928	0.77	-568	0.75	-360
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.82	-1098	0.89	-3683	0.75	-2563	0.97	-2417	0.82	-3378	0.85	-2520	0.75	-598	0.75	-353
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.82	-1090	0.87	-4029	0.75	-2559	0.97	-2488	0.81	-3412	0.85	-2562	0.75	-599	0.75	-350
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.82	-1093	0.88	-4034	0.75	-2553	0.98	-2283	0.82	-3332	0.85	-2414	0.75	-598	0.75	-351
BF 4708 HATWAI 500 KV BUS	0.82	-1107	0.88	-3817	0.76	-2564	0.97	-2579	0.82	-3505	0.84	-2619	0.80	-465	0.77	-261
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.82	-1104	0.87	-4126	0.75	-2578	0.97	-2569	0.81	-3456	0.84	-2618	0.75	-605	0.75	-356
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV + RAS	0.82	-1084	0.87	-4131	0.75	-2666	0.97	-2839	0.80	-3824	0.83	-2830	0.75	-607	0.75	-350
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.82	-1038	0.87	-3990	0.76	-2535	0.97	-2611	0.82	-3536	0.84	-2652	0.78	-525	0.76	-302
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.82	-1109	0.87	-4243	0.75	-2577	0.96	-2552	0.82	-3419	0.85	-2580	0.74	-610	0.75	-358
BF 4888 ASHE-SLATT & CGS 500 KV	0.82	-1114	0.88	-3753	0.75	-2708	0.97	-2671	0.81	-3788	0.84	-2721	0.75	-593	0.75	-359
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.82	-1061	0.87	-3408	0.76	-2520	0.98	-2106	0.84	-3211	0.86	-2313	0.76	-569	0.76	-329
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.82	-1065	0.85	-3655	0.76	-2549	0.98	-2301	0.83	-3346	0.86	-2416	0.76	-571	0.76	-330
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.83	-1047	0.88	-3452	0.76	-2446	0.98	-1832	0.85	-2941	0.86	-2022	0.76	-579	0.75	-337
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.85	-945	0.88	-3941	0.76	-1731	0.97	-2156	0.81	-2643	0.86	-2253	0.76	-562	0.76	-324
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.85	-971	0.89	-3790	0.77	-1782	0.98	-2574	0.82	-2487	0.87	-2114	0.76	-560	0.76	-323
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.82	-1089	0.87	-4277	0.75	-2526	0.97	-2559	0.75	-3226	0.84	-2611	0.75	-604	0.75	-353
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.83	-1044	0.89	-3782	0.76	-2393	0.98	-2575	0.84	-2987	0.87	-2168	0.75	-585	0.75	-341
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.83	-1080	0.87	-4093	0.75	-2451	0.97	-2356	0.82	-3371	0.85	-2506	0.74	-609	0.75	-358
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.83	-1019	0.89	-3323	0.76	-2396	0.98	-1733	0.86	-2858	0.88	-1979	0.76	-558	0.76	-323
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.83	-1059	0.87	-3565	0.76	-2480	0.98	-1895	0.84	-3194	0.86	-2295	0.76	-574	0.76	-332
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.83	-1079	0.87	-4025	0.75	-2491	0.97	-2167	0.82	-3328	0.85	-2453	0.75	-605	0.75	-354
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.84	-932	0.91	-3502	0.77	-2124	0.98	-1645	0.84	-2510	0.88	-1939	0.77	-537	0.76	-307
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.83	-1028	0.89	-3840	0.76	-2369	0.97	-2006	0.83	-2869	0.86	-2203	0.76	-576	0.75	-333
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.82	-1101	0.88	-3948	0.75	-2573	0.97	-3170	0.82	-3443	0.84	-2581	0.75	-596	0.75	-352
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.82	-1100	0.88	-3928	0.75	-2569	0.97	-2478	0.81	-3416	0.85	-2565	0.75	-600	0.75	-353
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.82	-1094	0.88	-3728	0.75	-2556	0.97	-2412	0.82	-3377	0.85	-2512	0.75	-587	0.75	-346
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.82	-1091	0.87	-3726	0.75	-2554	0.98	-2286	0.83	-3355	0.85	-2463	0.76	-581	0.75	-343
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.82	-1104	0.87	-3940	0.75	-2575	0.97	-2507	0.82	-3437	0.84	-2574	0.75	-599	0.75	-352
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.82	-1064	0.88	-4036	0.76	-2540	0.97	-2370	0.82	-3355	0.85	-2493	0.75	-595	0.75	-346
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.82	-1093	0.88	-3950	0.75	-2608	0.97	-2412	0.83	-3455	0.85	-2505	0.75	-594	0.75	-354
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.88	-1049	0.89	-3442	0.76	-2607	0.98	-2203	0.83	-3415	0.86	-2413	0.76	-576	0.75	-340
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.83	-1057	0.87	-3624	0.76	-2480	0.98	-1972	0.84	-3141	0.87	-2239	0.76	-575	0.75	-334
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.83	-1057	0.87	-3586	0.76	-2492	0.98	-2033	0.84	-3203	0.86	-2291	0.76	-570	0.76	-331
BF 5266 SLATT-BUCKLY 500 KV	0.83	-1049	0.89	-3820	0.76	-2424	0.98	-1974	0.84	-3046	0.86	-2192	0.75	-590	0.75	-344
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.82	-1103	0.86	-4040	0.75	-2577	0.97	-2532	0.82	-3444	0.84	-2591	0.75	-600	0.75	-353
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.82	-1093	0.84	-3925	0.75	-2572	0.97	-2469	0.81	-3418	0.85	-2551	0.75	-593	0.75	-350
BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.90	-638	0.91	-3436	0.75	-1833	0.98	-2294	0.86	-2376	0.89	-1913	0.80	-448	0.77	-249
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.89	-845	0.87	-4264	0.72	-1777	0.97	-3189	0.82	-3159	0.85	-2580	0.75	-586	0.75	-341
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.89	-592	0.88	-4343	0.70	-1928	0.97	-2710	0.82	-3277	0.84	-2694	0.77	-520	0.76	-301
BF IPC POPULUS-CHILL-HEMINGWAY 500 KV & HEM 500/230 XFMR	0.88	-891	0.87	-4279	0.70	-2319	0.97	-2559	0.82	-3377	0.84	-2609	0.75	-599	0.75	-348
BF LOLO 230KV	0.84	-1103	0.88	-4046	0.75	-2572	0.97	-2382	0.82	-3281	0.85	-2478	0.75	-586	0.75	-336
BF MCNARY 230 KV SECT 1	0.82	-1133	0.87	-4143	0.75	-2660	0.97	-2694	0.81	-3653	0.84	-2714	0.74	-606	0.75	-363
BF MCNARY 230 KV SECT 2	0.82	-1118	0.87	-4219	0.75	-2617	0.97	-3282	0.80	-3594	0.96	-1960	0.74	-607	0.75	-361
BF MCNARY 230 KV SECT 3	0.82	-1099	0.89	-3907	0.75	-2585	0.97	-2480	0.82	-3441	0.85	-2548	0.75	-605	0.75	-359
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.85	-750	0.93	-2889	0.81	-1693	0.98	-1882	0.88	-2025	0.90	-1457	0.80	-431	0.77	-239
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV+PTSN	0.85	-757	0.93	-2918	0.81	-1711	0.98	-1270	0.88	-2040	0.90	-1470	0.80	-445	0.77	-243
BF PGE GRASSLAND-COYOTE SP 500KV & CARTY GAS PLANT	0.82	-1077	0.88	-4075	0.75	-2535	0.97	-2364	0.82	-3303	0.85	-2463	0.75	-595	0.75	-347
BF PGE GRASSLAND-SLATT 500KV & BOARDMAN PLANT	0.82	-1103	0.88	-3992	0.75	-2598	0.97	-2488	0.81	-3538	0.85	-2585	0.75	-598	0.75	-359
BUS: ALVEY 500 KV + RAS	0.82	-1094	0.88	-4351	0.75	-2589	0.97	-3259	0.87	-2696	0.82	-2597	0.73	-623	0.75	-378
BUS: BELL BPA 500 KV	0.82	-1103	0.87	-4154	0.75	-2579	0.97	-2566	0.81	-3452	0.84	-2615	0.78	-534	0.75	-356

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BUS: BUCKLEY 500 KV	0.83	-1022	0.90	-3530	0.76	-2351	0.98	-1710	0.85	-2762	0.85	-1852	0.76	-579	0.75	-338
BUS: DIXONVILLE 500 KV	0.83	-1036	0.88	-4043	0.76	-2381	0.97	-2237	0.86	-2487	0.85	-2330	0.76	-579	0.75	-336
BUS: HOT SPRINGS 500 KV	0.82	-1103	0.87	-4232	0.75	-2573	0.97	-3232	0.81	-3454	0.84	-2620	0.75	-577	0.75	-351
BUS: KEELER 500 KV + RAS	0.81	-1147	0.92	-3320	0.75	-2810	0.98	-2393	0.84	-3773	0.86	-2271	0.73	-628	0.74	-397
BUS: ROCK CREEK 500 KV	0.83	-1056	0.88	-3585	0.76	-2488	0.98	-1973	0.84	-3176	0.86	-2265	0.76	-570	0.76	-331
BUS: SICKLER 500 KV	0.82	-1101	0.88	-3890	0.75	-2575	0.97	-2517	0.82	-3447	0.84	-2581	0.75	-599	0.75	-353
BUS: SUMMER LAKE 500 KV	0.86	-929	0.89	-3746	0.77	-1697	0.98	-1885	0.82	-2446	0.87	-2065	0.76	-554	0.76	-320
N-1: ALLSTON-KEELER 500 KV + RAS	0.81	-1150	0.91	-3549	0.74	-2824	0.98	-2689	0.82	-4085	0.85	-2585	0.73	-628	0.74	-397
N-1: ALLSTON-NAPAVINE 500 KV	0.82	-1094	0.88	-4037	0.75	-2553	0.98	-2289	0.82	-3337	0.85	-2425	0.75	-599	0.75	-351
N-1: ALLSTON-PAUL #2 500 KV	0.82	-1094	0.87	-4059	0.75	-2553	0.98	-2289	0.82	-3337	0.85	-2430	0.75	-598	0.75	-351
N-1: ALVERY-DIXONVILLE 500 KV	0.83	-1034	0.88	-4011	0.76	-2372	0.97	-2191	0.87	-2355	0.85	-2356	0.76	-580	0.75	-337
N-1: ALVEY-MARION 500 KV	0.83	-1046	0.89	-3884	0.76	-2402	0.98	-2025	0.86	-2575	0.86	-2238	0.75	-585	0.75	-341
N-1: ASHE-HANFORD 500 KV	0.82	-1102	0.85	-3921	0.75	-2576	0.97	-2518	0.82	-3427	0.85	-2559	0.75	-599	0.75	-352
N-1: ASHE-LOW MON 500 KV	0.82	-1094	0.87	-4079	0.75	-2564	0.97	-2517	0.82	-3430	0.84	-2574	0.75	-603	0.75	-352
N-1: ASHE-MARION 500 KV	0.83	-1056	0.89	-3642	0.76	-2457	0.98	-1889	0.85	-2996	0.86	-2066	0.75	-582	0.75	-341
N-1: ASHE-SLATT 500 KV	0.82	-1065	0.87	-3646	0.76	-2526	0.98	-2153	0.83	-3249	0.86	-2349	0.76	-572	0.76	-330
N-1: BELL-COULEE 500 KV	0.82	-1101	0.87	-4211	0.75	-2573	0.97	-2570	0.81	-3457	0.84	-2622	0.77	-548	0.75	-346
N-1: BELL-TAFT 500 KV	0.82	-1106	0.87	-4233	0.75	-2581	0.97	-2564	0.81	-3446	0.84	-2615	0.77	-546	0.75	-360
N-1: BIG EDDY-CELILO 500 KV	0.82	-1105	0.87	-4287	0.75	-2579	0.97	-2575	0.81	-3459	0.84	-2627	0.74	-608	0.75	-357
N-1: BIG EDDY-JOHN DAY 500 KV	0.82	-1107	0.87	-4264	0.75	-2577	0.96	-2582	0.82	-3441	0.84	-2604	0.74	-609	0.75	-358
N-1: BIG EDDY-KNIGHT 500 KV	0.82	-1090	0.87	-4079	0.75	-2551	0.98	-2916	0.82	-3369	0.85	-2516	0.75	-597	0.75	-349
N-1: BIG EDDY-OSTRANDER 500 KV	0.82	-1103	0.87	-4226	0.75	-2569	0.98	-2333	0.81	-3403	0.84	-2539	0.74	-608	0.75	-357
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.82	-1029	0.87	-4256	0.76	-2461	0.97	-2539	0.82	-3422	0.84	-2599	0.75	-604	0.75	-353
N-1: BRADY-ANTELOPE 230 KV	0.82	-1102	0.87	-4269	0.75	-2559	0.97	-2568	0.81	-3451	0.84	-2619	0.75	-567	0.75	-354
N-1: BROADVIEW-GARRISON #1 500 KV	0.82	-1109	0.87	-4280	0.75	-2577	0.97	-2597	0.81	-3481	0.84	-2649	0.81	-471	0.78	-280
N-1: BROWNLEE-ONTARIO 230 KV	0.83	-992	0.87	-4221	0.76	-2364	0.97	-2508	0.82	-3399	0.84	-2575	0.75	-601	0.75	-352
N-1: BUCKLEY-GRIZZLY 500 KV	0.83	-1055	0.88	-3993	0.76	-2443	0.97	-2181	0.83	-3095	0.86	-2336	0.75	-588	0.75	-342
N-1: BUCKLEY-MARION 500 KV	0.82	-1097	0.88	-4112	0.75	-2542	0.97	-2385	0.82	-3314	0.82	-2237	0.75	-607	0.75	-357
N-1: BUCKLEY-SLATT 500 KV	0.83	-1049	0.89	-3820	0.76	-2424	0.98	-1974	0.84	-3046	0.86	-2192	0.75	-590	0.75	-344
N-1: CAPTAIN JACK-OLINDA 500 KV	0.84	-1019	0.89	-3859	0.76	-2270	0.97	-2079	0.83	-2299	0.87	-2176	0.76	-573	0.76	-331
N-1: CAPTJACK-KFALLS 500 KV	0.83	-1054	0.87	-4219	0.76	-2418	0.97	-3045	0.75	-3247	0.88	-2435	0.75	-589	0.75	-342
N-1: CASCADE CROSSING 500 KV	0.83	-1084	0.89	-3878	0.75	-2486	0.98	-2074	0.84	-3088	0.85	-2084	0.75	-605	0.75	-356
N-1: CHIEF JO-COULEE 500 KV	0.82	-1106	0.87	-4198	0.75	-2580	0.97	-2579	0.81	-3461	0.84	-2635	0.74	-608	0.75	-358
N-1: CHIEF JO-MONROE 500 KV	0.82	-1103	0.88	-4055	0.75	-2573	0.97	-2527	0.82	-3445	0.84	-2594	0.75	-603	0.75	-355
N-1: CHIEF JO-SICKLER 500 KV	0.82	-1103	0.88	-4078	0.75	-2574	0.97	-2551	0.82	-3449	0.84	-2606	0.75	-600	0.75	-353
N-1: COULEE-HANFORD 500 KV	0.82	-1095	0.87	-3653	0.75	-2567	0.97	-2440	0.83	-3411	0.85	-2521	0.76	-569	0.75	-337
N-1: COULEE-SCHULTZ 500 KV	0.82	-1098	0.88	-3911	0.75	-2565	0.97	-3146	0.81	-3424	0.85	-2566	0.75	-589	0.75	-347
N-1: COVINGTON4-RAVER 500 KV	0.82	-1106	0.87	-4263	0.75	-2581	0.97	-2582	0.81	-3465	0.84	-2636	0.74	-609	0.75	-357
N-1: COVINGTON5-RAVER 500 KV	0.82	-1106	0.87	-4261	0.75	-2581	0.97	-2581	0.81	-3465	0.84	-2636	0.74	-608	0.75	-357
N-1: COYOTE-LONGHORN 500 KV	0.82	-1089	0.87	-4200	0.75	-2571	0.97	-2488	0.81	-3405	0.85	-2570	0.75	-600	0.75	-350
N-1: CUSTERW-MONROE 500 KV	0.82	-1105	0.88	-4117	0.75	-2581	0.97	-2570	0.81	-3470	0.84	-2619	0.75	-600	0.75	-354
N-1: DIXONVILLE-MERIDIAN 500 KV	0.83	-1048	0.88	-4062	0.76	-2411	0.97	-2275	0.84	-2691	0.85	-2367	0.75	-585	0.75	-340
N-1: DRYCREEK-LOLO 230 KV	0.82	-1106	0.87	-4286	0.75	-2580	0.97	-2579	0.81	-3460	0.84	-2638	0.75	-607	0.75	-357
N-1: DRYCREEK-N LEWISTON 230 KV	0.82	-1104	0.87	-4282	0.75	-2579	0.97	-2576	0.81	-3458	0.84	-2636	0.75	-607	0.75	-356
N-1: DRYCREEK-WALA AVA 230 KV	0.82	-1102	0.88	-4253	0.75	-2581	0.97	-2584	0.81	-3464	0.84	-2640	0.74	-610	0.75	-358
N-1: DWORSHAK-HATWAI 500 KV + RAS	0.82	-1140	0.88	-3840	0.76	-2580	0.97	-2560	0.82	-3499	0.84	-2609	0.76	-561	0.77	-278
N-1: DWORSHAK-HATWAI 500 KV + RAS + PTSN	0.82	-1143	0.88	-3858	0.76	-2597	0.97	-2573	0.82	-3509	0.84	-2617	0.76	-573	0.77	-282
N-1: DWORSHAK-TAFT 500 KV	0.82	-1130	0.88	-4011	0.76	-2576	0.97	-2575	0.82	-3484	0.84	-2620	0.80	-472	0.76	-289
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.82	-1106	0.87	-4164	0.75	-2580	0.97	-2550	0.82	-3451	0.84	-2606	0.74	-608	0.75	-357
N-1: ECHO LAKE-RAVER 500 KV	0.82	-1103	0.87	-4193	0.75	-2575	0.97	-2552	0.81	-3451	0.84	-2610	0.75	-604	0.75	-355
N-1: ECHO LAKE-SCHULTZ 500 KV	0.82	-1103	0.87	-4114	0.75	-2574	0.97	-2524	0.82	-3441	0.84	-2594	0.75	-606	0.75	-356
N-1: ECHO LAKE-SNOK TAP 500 KV	0.82	-1102	0.88	-3988	0.75	-2574	0.97	-2522	0.82	-3448	0.84	-2588	0.75	-596	0.75	-352

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: GARRISON-TAFT #2 500 KV	0.82	-1109	0.87	-4316	0.75	-2583	0.97	-2597	0.82	-3476	0.84	-2648	0.76	-579	0.75	-347
N-1: GOLDHILL-PLACER 115 KV	0.82	-1109	0.87	-4341	0.75	-2587	0.97	-2612	0.82	-3501	0.84	-2666	0.74	-609	0.75	-357
N-1: GRASSLAND-COYOTE 500 KV	0.82	-1077	0.88	-4075	0.75	-2535	0.97	-3025	0.82	-3303	0.85	-2463	0.75	-595	0.75	-347
N-1: GRASSLAND-SLATT 500 KV	0.82	-1103	0.87	-4262	0.75	-2542	0.97	-2536	0.82	-3441	0.84	-2613	0.75	-607	0.75	-356
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.83	-1032	0.89	-3876	0.76	-2386	0.97	-2709	0.83	-2898	0.86	-2226	0.76	-577	0.75	-334
N-1: GRIZZLY-MALIN 500 KV	0.84	-1021	0.89	-3814	0.76	-2326	0.98	-2602	0.82	-2717	0.87	-2143	0.76	-577	0.75	-335
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.84	-983	0.89	-3862	0.77	-2252	0.98	-1999	0.83	-2832	0.87	-2194	0.76	-557	0.76	-321
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.84	-1019	0.89	-3782	0.76	-2317	0.98	-1934	0.82	-2689	0.87	-2126	0.76	-577	0.75	-335
N-1: GRIZZLY-ROUND BU 500 KV	0.82	-1104	0.87	-4269	0.75	-2572	0.97	-2536	0.81	-3444	0.84	-2610	0.75	-607	0.75	-357
N-1: HANFORD-LOW MON 500 KV	0.82	-1101	0.86	-4058	0.75	-2570	0.97	-3197	0.82	-3438	0.84	-2599	0.75	-605	0.75	-355
N-1: HANFORD-VANTAGE 500 KV	0.82	-1094	0.84	-3924	0.75	-2572	0.97	-2469	0.81	-3418	0.85	-2551	0.75	-593	0.75	-350
N-1: HANFORD-WAUTOMA 500 KV	0.82	-1101	0.86	-4192	0.75	-2570	0.97	-3193	0.82	-3442	0.84	-2595	0.75	-606	0.75	-355
N-1: HATWAI 500/230 KV XFMR + RAS	0.82	-1126	0.87	-4307	0.75	-2600	0.97	-2574	0.81	-3443	0.84	-2634	0.74	-616	0.75	-355
N-1: HATWAI-LOLO 230 KV	0.82	-1113	0.87	-4295	0.75	-2588	0.97	-2578	0.81	-3454	0.84	-2637	0.74	-611	0.75	-356
N-1: HATWAI-LOW GRAN 500 KV	0.82	-1039	0.87	-4018	0.76	-2538	0.97	-2632	0.82	-3544	0.84	-2663	0.78	-525	0.76	-302
N-1: HATWAI-N LEWISTON 230 KV	0.82	-1106	0.87	-4286	0.75	-2580	0.97	-2579	0.81	-3460	0.84	-2638	0.74	-607	0.75	-357
N-1: HELLS CANYON-BROWNLEE 230 KV	0.82	-995	0.88	-3942	0.76	-2461	0.97	-2288	0.83	-3194	0.86	-2413	0.76	-576	0.75	-337
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.85	-1175	0.91	-3849	0.75	-2582	0.97	-2406	0.82	-3303	0.85	-2506	0.75	-594	0.75	-347
N-1: HEMINGWAY-GRASSLAND 500 KV	0.85	-776	0.91	-3442	0.80	-1750	0.98	-1655	0.85	-2393	0.89	-1916	0.80	-459	0.77	-251
N-1: HEMINGWAY-GRASSLAND 500 KV + FACRI	0.83	-988	0.86	-4513	0.76	-2199	0.97	-3706	0.84	-4124	0.82	-2964	0.76	-559	0.76	-321
N-1: HEMINGWAY-GRASSLAND 500 KV + PTSN SHUNT	0.84	-835	0.91	-3511	0.80	-1896	0.98	-1720	0.85	-2477	0.88	-1973	0.79	-474	0.77	-258
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.84	-996	0.87	-4256	0.76	-1836	0.97	-3175	0.82	-3150	0.85	-2573	0.75	-583	0.75	-339
N-1: HILL TOP 345/230 XFMR	0.83	-1080	0.87	-4274	0.76	-2476	0.97	-2576	0.82	-3385	0.84	-2625	0.75	-601	0.75	-352
N-1: HORSE HV-MCNARY 230 KV	0.82	-1096	0.87	-4223	0.75	-2565	0.97	-2529	0.82	-3434	0.84	-2589	0.75	-607	0.75	-356
N-1: HOT SPRINGS-TAFT 500 KV	0.82	-1103	0.87	-4232	0.75	-2573	0.97	-3232	0.81	-3454	0.84	-2620	0.75	-576	0.75	-351
N-1: HUMBOLDT-COYOTE CK 345 KV	0.82	-1163	0.87	-4193	0.75	-2608	0.97	-2444	0.82	-3165	0.85	-2510	0.74	-617	0.75	-361
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.82	-1118	0.87	-4333	0.75	-2612	0.97	-2590	0.82	-3449	0.84	-2643	0.74	-615	0.75	-361
N-1: ING500-CUSTERW 500 KV	0.82	-1105	0.87	-4223	0.75	-2578	0.97	-2573	0.81	-3458	0.84	-2620	0.75	-604	0.75	-356
N-1: JOHN DAY-MARION 500 KV	0.82	-1093	0.88	-4088	0.75	-2537	0.97	-2317	0.82	-3268	0.82	-2238	0.75	-605	0.75	-355
N-1: JOHN DAY-ROCK CK 500 KV	0.83	-1060	0.88	-3714	0.76	-2495	0.98	-2032	0.84	-3205	0.86	-2313	0.76	-574	0.76	-332
N-1: JOHN DAY-SLATT 500 KV	0.83	-1089	0.87	-4113	0.75	-2512	0.97	-2235	0.82	-3380	0.85	-2510	0.75	-606	0.75	-356
N-1: K FALLS-MERIDIAN 500 KV	0.82	-1094	0.88	-4147	0.75	-2543	0.97	-2444	0.79	-3458	0.91	-1736	0.75	-604	0.75	-354
N-1: KNIGHT-WAUTOMA 500 KV	0.83	-1060	0.88	-3680	0.76	-2485	0.98	-1999	0.84	-3157	0.87	-2256	0.76	-576	0.75	-335
N-1: LAGRANDE-NORTH POWDER 230 KV	0.83	-1054	0.87	-4249	0.75	-2566	0.97	-2524	0.82	-3400	0.84	-2587	0.75	-602	0.75	-352
N-1: LANES-MARION 500 KV	0.82	-1095	0.87	-4139	0.75	-2545	0.97	-2398	0.83	-3240	0.85	-2415	0.75	-604	0.75	-354
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.82	-1104	0.87	-4265	0.75	-2577	0.97	-2570	0.81	-3457	0.84	-2622	0.75	-606	0.75	-356
N-1: LIT GOOSE-LOW MON 500 KV	0.82	-1102	0.87	-4233	0.75	-2575	0.97	-2556	0.81	-3451	0.84	-2612	0.75	-605	0.75	-354
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.82	-1101	0.87	-4246	0.75	-2575	0.97	-2566	0.81	-3457	0.84	-2619	0.75	-603	0.75	-354
N-1: LOW MON-SAC TAP 500 KV	0.82	-1094	0.87	-3868	0.75	-2564	0.97	-2428	0.82	-3387	0.84	-2513	0.75	-582	0.75	-335
N-1: MALIN 500/230 XFMR	0.82	-1091	0.87	-4226	0.75	-2523	0.97	-3167	0.83	-3323	0.85	-2499	0.75	-605	0.75	-355
N-1: MALIN-HILLTOP 230 KV	0.82	-1106	0.87	-4300	0.75	-2580	0.97	-2583	0.81	-3464	0.84	-2641	0.74	-608	0.75	-357
N-1: MALIN-ROUND MTN #1 500 KV	0.83	-1071	0.88	-4103	0.76	-2443	0.97	-2340	0.82	-2848	0.86	-2410	0.75	-595	0.75	-347
N-1: MALIN-ROUND MTN #2 500 KV	0.83	-1069	0.88	-4097	0.76	-2436	0.97	-2321	0.82	-2821	0.86	-2400	0.75	-594	0.75	-346
N-1: MALIN-SUMMER LAKE 500 KV	0.83	-1100	0.88	-4052	0.76	-2398	0.97	-2285	0.81	-2879	0.86	-2341	0.75	-608	0.75	-358
N-1: MAPLE VLY-ROCKY RH 345 KV	0.82	-1104	0.87	-4154	0.75	-2576	0.97	-3213	0.81	-3449	0.84	-2607	0.75	-606	0.75	-356
N-1: MARION-PEARL 500 KV	0.82	-1096	0.87	-4159	0.75	-2535	0.97	-2377	0.84	-3084	0.80	-1903	0.75	-604	0.75	-354
N-1: MARION-SANTIAM 500 KV	0.82	-1112	0.87	-4375	0.75	-2597	0.97	-2681	0.81	-3549	0.83	-2728	0.74	-610	0.75	-358
N-1: MCLOUGHLIN-OSTRANDER 230 KV	0.82	-1106	0.87	-4276	0.75	-2579	0.97	-2566	0.82	-3448	0.84	-2605	0.74	-608	0.75	-357
N-1: MCNARY 500/230 KV XFMR	0.83	-1006	0.89	-4129	0.76	-2546	0.98	-2519	0.81	-3504	0.84	-2611	0.75	-607	0.75	-357
N-1: MCNARY S2-MCNARY S3 230 KV	0.82	-1104	0.87	-4274	0.75	-2577	0.97	-2577	0.81	-3459	0.84	-2639	0.74	-608	0.75	-357
N-1: MCNARY-BOARD T1 230 KV	0.82	-1099	0.87	-4291	0.75	-2560	0.97	-2549	0.82	-3415	0.84	-2606	0.75	-607	0.75	-355
N-1: MCNARY-JOHN DAY 500 KV	0.83	-1066	0.88	-3975	0.75	-2498	0.97	-2209	0.83	-3287	0.86	-2418	0.75	-600	0.75	-351

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: MCNARY-LONGHORN 500 KV	0.82	-1067	0.87	-4102	0.76	-2562	0.97	-2454	0.82	-3396	0.85	-2545	0.75	-595	0.75	-346
N-1: MCNARY-ROSS 345 KV	0.82	-1091	0.87	-4176	0.75	-2556	0.97	-3125	0.82	-3384	0.85	-2538	0.75	-607	0.75	-356
N-1: MCNARY-ROUNDUP 230 KV	0.86	-962	0.87	-4185	0.76	-2509	0.97	-2455	0.83	-3325	0.85	-2539	0.75	-595	0.75	-348
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.82	-1089	0.87	-3795	0.75	-2554	0.97	-2374	0.82	-3348	0.85	-2469	0.75	-580	0.75	-334
N-1: MIDPOINT-HEMINGWAY 500 KV	0.85	-964	0.87	-4259	0.70	-2099	0.97	-3186	0.82	-3203	0.85	-2566	0.77	-533	0.76	-306
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN SHUNT	0.85	-969	0.87	-4278	0.70	-2112	0.97	-2536	0.82	-3214	0.85	-2574	0.77	-545	0.76	-309
N-1: MIDPOINT-HUMBOLDT 345 KV	0.82	-1165	0.87	-4156	0.75	-2630	0.97	-2397	0.83	-3087	0.85	-2469	0.74	-618	0.75	-362
N-1: NAPAVINE-PAUL 500 KV	0.82	-1100	0.87	-4192	0.75	-2566	0.97	-2484	0.81	-3416	0.85	-2564	0.75	-603	0.75	-353
N-1: OLYMPIA-PAUL 500 KV	0.82	-1108	0.87	-4345	0.75	-2584	0.97	-2619	0.82	-3489	0.84	-2671	0.74	-609	0.75	-358
N-1: ONTARIO-CALDWELL 230 KV	0.84	-1062	0.87	-4259	0.75	-2465	0.97	-3206	0.82	-3425	0.84	-2603	0.75	-604	0.75	-354
N-1: OSTRANDER-KNIGHT 500 KV	0.82	-1098	0.88	-4126	0.75	-2554	0.98	-2298	0.82	-3346	0.85	-2462	0.75	-606	0.75	-355
N-1: OSTRANDER-PEARL 500 KV	0.82	-1104	0.87	-4285	0.75	-2576	0.98	-2382	0.81	-3466	0.83	-2595	0.74	-608	0.75	-357
N-1: OSTRANDER-TROUTDALE 500 KV	0.82	-1107	0.87	-4260	0.75	-2582	0.97	-2557	0.82	-3448	0.84	-2594	0.74	-609	0.75	-357
N-1: OXBOW-BROWNLEE #2 230 KV	0.82	-1092	0.87	-4282	0.75	-2571	0.97	-2573	0.81	-3455	0.84	-2623	0.75	-607	0.75	-356
N-1: OXBOW-LOLO 230 KV	0.84	-1093	0.88	-4029	0.75	-2564	0.97	-2381	0.82	-3272	0.85	-2472	0.75	-585	0.75	-336
N-1: PAUL-SATSOP 500 KV	0.82	-1105	0.87	-4238	0.75	-2577	0.97	-2550	0.82	-3445	0.84	-2597	0.75	-607	0.75	-356
N-1: PEARL-KEELER 500 KV	0.82	-1092	0.88	-4004	0.75	-2539	0.98	-2199	0.83	-3247	0.85	-2292	0.75	-596	0.75	-349
N-1: PEARL-KEELER 500 KV + RAS	0.82	-1092	0.88	-4004	0.75	-2539	0.98	-2199	0.83	-3247	0.85	-2292	0.75	-596	0.75	-349
N-1: PINTO-FOUR CORNER 345 KV	0.82	-1109	0.87	-4283	0.75	-2586	0.97	-2570	0.81	-3432	0.84	-2620	0.74	-610	0.75	-358
N-1: PONDEROSA A 500/230 KV XFMR	0.82	-1107	0.87	-4288	0.75	-2579	0.97	-2578	0.81	-3455	0.84	-2636	0.74	-608	0.75	-357
N-1: PONDEROSA B 500/230 KV XFMR	0.82	-1105	0.87	-4289	0.75	-2578	0.97	-2581	0.81	-3460	0.84	-2639	0.74	-608	0.75	-357
N-1: RAVER-PAUL 500 KV	0.82	-1076	0.89	-3627	0.75	-2512	0.98	-2126	0.83	-3266	0.86	-2399	0.76	-580	0.75	-341
N-1: RAVER-TACOMA 500 KV	0.82	-1105	0.87	-4204	0.75	-2578	0.97	-2558	0.82	-3455	0.84	-2611	0.75	-607	0.75	-356
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.82	-1116	0.87	-4260	0.75	-2610	0.97	-2539	0.82	-3378	0.84	-2595	0.74	-614	0.75	-362
N-1: ROBINSON-HARRY ALLEN 500 KV	0.83	-1082	0.87	-4300	0.76	-2468	0.97	-2588	0.81	-3480	0.84	-2643	0.75	-604	0.75	-354
N-1: ROCK CK-WAUTOMA 500 KV	0.83	-1060	0.88	-3638	0.76	-2495	0.98	-2054	0.84	-3210	0.86	-2305	0.76	-571	0.76	-331
N-1: ROUND MTN-TABLE MTN 500 KV	0.83	-1082	0.87	-4186	0.75	-2494	0.97	-2448	0.82	-3094	0.85	-2525	0.75	-599	0.75	-349
N-1: ROUNDUP-LAGRANDE 230 KV	0.85	-1040	0.87	-4211	0.75	-2558	0.97	-2477	0.81	-3358	0.85	-2557	0.75	-599	0.75	-350
N-1: SCHULTZ-SICKLER 500 KV	0.82	-1101	0.88	-4009	0.75	-2575	0.97	-2524	0.82	-3451	0.84	-2587	0.75	-600	0.75	-353
N-1: SCHULTZ-VANTAGE 500 KV	0.82	-1106	0.86	-4036	0.75	-2579	0.97	-2542	0.82	-3447	0.84	-2598	0.75	-601	0.75	-353
N-1: SCHULTZ-WAUTOMA 500 KV	0.82	-1093	0.86	-3813	0.75	-2558	0.97	-2389	0.82	-3368	0.85	-2497	0.75	-583	0.75	-344
N-1: SIGURD-GLEN CANYON 230 KV	0.82	-1105	0.87	-4300	0.75	-2575	0.97	-3244	0.81	-3461	0.84	-2640	0.75	-607	0.75	-356
N-1: SLATT 500/230 KV XFMR	0.82	-1115	0.88	-4011	0.75	-2641	0.97	-2535	0.82	-3580	0.85	-2605	0.74	-603	0.75	-362
N-1: SLATT-LONGHORN 500 KV	0.82	-1092	0.87	-4177	0.75	-2549	0.97	-2455	0.82	-3384	0.85	-2552	0.75	-606	0.75	-355
N-1: SNOK TAP-SNOKING 500 KV	0.82	-1106	0.87	-4243	0.75	-2580	0.97	-2577	0.81	-3464	0.84	-2623	0.74	-607	0.75	-357
N-1: TABLE MTN-TESLA 500 KV	0.83	-1083	0.87	-4206	0.75	-2500	0.97	-2482	0.82	-3157	0.85	-2549	0.75	-598	0.75	-349
N-1: TABLE MTN-VACA DIXON 500 KV	0.83	-1071	0.87	-4149	0.76	-2455	0.97	-2404	0.82	-2925	0.85	-2481	0.75	-593	0.75	-345
N-1: VANTAGE 500/230 KV XFMR #1	0.82	-1104	0.87	-4319	0.75	-2579	0.97	-2574	0.81	-3459	0.84	-2636	0.74	-607	0.75	-357
N-1: VANTAGE 500/230 KV XFMR #2	0.82	-1104	0.87	-4319	0.75	-2579	0.97	-2573	0.81	-3459	0.84	-2635	0.74	-607	0.75	-357
N-1: WALLA WALLA-TALBOT 230 KV	0.82	-1126	0.91	-3971	0.75	-2588	0.97	-2588	0.81	-3468	0.84	-2642	0.75	-606	0.75	-353
N-1: WALLA WALLA-WALLULA 230 KV	0.83	-1066	0.93	-3691	0.75	-2576	0.97	-2580	0.81	-3458	0.84	-2639	0.75	-606	0.75	-356
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.83	-993	0.90	-2860	0.77	-2369	0.98	-1433	0.88	-2618	0.89	-1703	0.78	-523	0.76	-303
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.83	-1042	0.90	-3405	0.76	-2407	0.98	-1648	0.86	-2745	0.84	-1663	0.76	-580	0.75	-340
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.84	-975	0.92	-2930	0.77	-2234	0.98	-1249	0.89	-2369	0.89	-1541	0.76	-552	0.76	-322
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.83	-1040	0.89	-3522	0.76	-2424	0.98	-1764	0.86	-2895	0.86	-1978	0.76	-579	0.75	-338
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.83	-1033	0.89	-3438	0.76	-2377	0.98	-1587	0.86	-2850	0.86	-1927	0.76	-579	0.75	-338
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.83	-1023	0.88	-3381	0.76	-2444	0.98	-1799	0.85	-3022	0.87	-2122	0.76	-561	0.76	-324
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.83	-1044	0.88	-3509	0.76	-2486	0.98	-1982	0.85	-3115	0.87	-2229	0.76	-566	0.76	-326
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.82	-1159	0.88	-4188	0.76	-2630	0.97	-2823	0.81	-3744	0.83	-2816	0.86	-283	0.78	-221
N-2: BETHEL-CEDAR SP 500KV & BETHEL-ROUND BUTTE 230 KV	0.82	-1094	0.88	-4059	0.75	-2520	0.98	-2242	0.83	-3259	0.85	-2170	0.74	-609	0.75	-358
N-2: BETHEL-CEDAR SP 500KV & BETHEL-SANTIAM 230KV	0.82	-1092	0.88	-4065	0.75	-2516	0.98	-2248	0.83	-3258	0.85	-2238	0.74	-607	0.75	-357
N-2: BETHEL-CEDAR SP 500KV & SANTIAM-MIKKALO 500KV	0.83	-1086	0.89	-3900	0.75	-2493	0.98	-2098	0.84	-3104	0.85	-2106	0.75	-606	0.75	-356

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.82	-1101	0.87	-4190	0.75	-2562	0.98	-2321	0.82	-3355	0.84	-2453	0.75	-607	0.75	-357
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.82	-1103	0.87	-4221	0.75	-2569	0.98	-2336	0.82	-3388	0.84	-2507	0.74	-608	0.75	-357
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.82	-823	0.87	-4129	0.78	-2103	0.97	-2388	0.82	-3260	0.85	-2494	0.75	-588	0.75	-341
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.82	-823	0.87	-4126	0.78	-2098	0.97	-2385	0.82	-3256	0.85	-2480	0.75	-587	0.75	-340
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.83	-1059	0.87	-4216	0.76	-2251	0.97	-2511	0.82	-3394	0.84	-2578	0.73	-610	0.74	-383
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.84	-1049	0.87	-4198	0.79	-2034	0.97	-2495	0.82	-3379	0.85	-2569	0.73	-586	0.74	-389
N-2: BROADVIEW-GARRISON #1 & #2 500 KV + RAS	0.82	-1125	0.88	-4383	0.74	-2717	0.97	-2968	0.80	-3961	0.82	-2928	0.70	-582	0.79	-405
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.84	-1027	0.90	-3495	0.76	-2358	0.98	-1867	0.85	-2821	0.88	-2120	0.77	-536	0.76	-304
N-2: BROWNLEE-ROCK CREEK & BROWNLEE-HELLS CANYON 230 KV	0.82	-986	0.88	-3934	0.76	-2452	0.97	-2281	0.83	-3187	0.86	-2408	0.76	-576	0.75	-336
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.83	-1083	0.89	-3855	0.75	-2493	0.98	-2672	0.84	-3055	0.80	-1735	0.75	-603	0.75	-355
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.82	-1099	0.89	-3768	0.75	-2566	0.97	-2481	0.81	-3421	0.85	-2565	0.75	-591	0.75	-349
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.82	-1101	0.88	-3930	0.75	-2570	0.97	-2495	0.82	-3432	0.84	-2573	0.75	-601	0.75	-353
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.82	-1103	0.88	-4014	0.75	-2573	0.97	-2516	0.82	-3442	0.84	-2586	0.75	-603	0.75	-354
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.82	-1102	0.88	-3979	0.75	-2573	0.97	-2529	0.82	-3447	0.84	-2593	0.75	-598	0.75	-352
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.82	-1105	0.88	-4099	0.75	-2579	0.97	-2560	0.81	-3457	0.84	-2612	0.75	-607	0.75	-357
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.82	-1070	0.85	-3115	0.76	-2354	0.98	-2217	0.83	-3344	0.86	-2363	0.78	-520	0.76	-317
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.82	-1079	0.90	-3078	0.76	-2529	0.98	-2201	0.83	-3317	0.86	-2427	0.77	-540	0.76	-322
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.82	-1103	0.88	-4044	0.75	-2579	0.97	-2553	0.82	-3461	0.84	-2607	0.75	-596	0.75	-353
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.81	-1169	0.86	-4725	0.74	-2826	0.97	-3183	0.79	-4218	0.81	-3137	0.72	-647	0.74	-401
N-2: DC-BIPOLE	0.84	-933	0.89	-3945	0.78	-2099	0.96	-2389	0.84	-2309	0.87	-2292	0.75	-577	0.75	-345
N-2: DOUBLE PALO VERDE	0.85	-563	0.96	-1815	0.80	-1993	0.99	-1335	0.92	-2200	0.92	-1658	0.80	-440	0.77	-276
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.82	-1106	0.87	-4162	0.75	-2580	0.97	-2550	0.80	-3556	0.84	-2606	0.74	-608	0.75	-357
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.82	-1104	0.88	-4027	0.75	-2577	0.97	-2518	0.82	-3445	0.84	-2586	0.75	-607	0.75	-356
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.82	-1124	0.87	-4320	0.74	-2682	0.97	-2770	0.81	-3696	0.83	-2778	0.83	-455	0.74	-456
N-2: GRASSLAND-CEDAR SP 500KV & SLATT-BUCKLEY 500KV	0.84	-1017	0.91	-3336	0.76	-2310	0.98	-1575	0.87	-2648	0.88	-1705	0.75	-584	0.75	-341
N-2: GRASSLAND-COYOTE 500KV & SLATT-LONGHORN 500KV	0.82	-984	0.91	-3326	0.77	-2415	0.98	-1692	0.86	-2866	0.89	-2010	0.76	-564	0.76	-325
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV + RAS	0.83	-1022	0.89	-4172	0.76	-2387	0.97	-2387	0.80	-2753	0.84	-2318	0.73	-628	0.74	-388
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV + RAS	0.83	-981	0.89	-4247	0.77	-2327	0.97	-3118	0.80	-3005	0.84	-2440	0.74	-609	0.75	-372
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV + RAS	0.82	-1128	0.86	-4807	0.75	-2523	0.97	-3304	0.79	-2845	0.83	-2525	0.72	-658	0.74	-413
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.82	-1101	0.82	-3248	0.75	-2571	0.97	-3137	0.82	-3386	0.85	-2532	0.75	-592	0.75	-351
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.83	-1069	0.84	-3627	0.76	-2510	0.98	-2863	0.83	-3295	0.85	-2423	0.75	-591	0.75	-342
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.82	-1122	0.91	-3798	0.75	-2576	0.91	-2434	0.82	-3268	0.88	-2324	0.74	-620	0.75	-366
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.82	-1094	0.88	-4054	0.75	-2533	0.96	-2974	0.82	-3224	0.82	-2210	0.75	-606	0.75	-356
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV + RAS	0.83	-967	0.91	-3843	0.77	-2313	0.98	-1985	0.84	-2770	0.85	-2136	0.74	-592	0.75	-358
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV + RAS	0.82	-1069	0.90	-4201	0.75	-2593	0.97	-2516	0.79	-3500	0.83	-2644	0.73	-629	0.74	-387
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.83	-1083	0.89	-3855	0.75	-2493	0.98	-2022	0.84	-3055	0.80	-1735	0.75	-603	0.75	-355
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.83	-1073	0.88	-3826	0.75	-2452	0.97	-2098	0.86	-2704	0.80	-1356	0.75	-595	0.75	-349
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.83	-1045	0.88	-3624	0.76	-2473	0.98	-1930	0.84	-3121	0.87	-2217	0.76	-573	0.76	-332
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.82	-1091	0.88	-3993	0.75	-2536	0.98	-2198	0.83	-3230	0.86	-2274	0.75	-596	0.75	-349
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.82	-1094	0.88	-4018	0.75	-2539	0.98	-2145	0.83	-3239	0.84	-2237	0.75	-606	0.75	-356
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.82	-1083	0.88	-3996	0.75	-2530	0.98	-2185	0.83	-3261	0.85	-2362	0.75	-605	0.75	-355
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.82	-1089	0.88	-4007	0.75	-2535	0.98	-2212	0.83	-3273	0.85	-2407	0.75	-601	0.75	-352
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 + RAS	0.82	-1092	0.87	-4193	0.75	-2673	0.97	-2849	0.80	-3819	0.83	-2834	0.70	-726	0.76	-363
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.83	-1102	0.87	-4786	0.76	-2458	0.97	-2935	0.79	-2324	0.85	-2749	0.73	-645	0.74	-389
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.83	-1003	0.89	-3327	0.76	-2378	0.98	-2296	0.86	-2925	0.88	-1999	0.76	-555	0.76	-321
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.83	-1050	0.88	-3857	0.76	-2467	0.97	-2127	0.84	-3212	0.86	-2340	0.75	-598	0.75	-349
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.83	-1047	0.89	-3804	0.76	-2462	0.98	-1999	0.84	-3184	0.86	-2294	0.75	-598	0.75	-350
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.83	-1080	0.87	-4088	0.75	-2538	0.97	-2404	0.82	-3352	0.85	-2480	0.75	-606	0.75	-356
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.85	-962	0.87	-4247	0.70	-2094	0.97	-2514	0.82	-3190	0.85	-2560	0.77	-523	0.76	-303
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.82	-1100	0.89	-3833	0.75	-2571	0.97	-2491	0.82	-3434	0.85	-2569	0.75	-594	0.75	-351
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.82	-1061	0.94	-2023	0.76	-2575	1.00	-1035	0.93	-2600	0.93	-1299	0.75	-566	0.75	-360
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV + RAS	0.82	-1062	0.94	-2072	0.76	-2582	1.00	-1069	0.93	-2628	0.93	-1339	0.75	-566	0.75	-360

Appendix F - 16hs2a_2250idnw_nww Base Case VQ Results

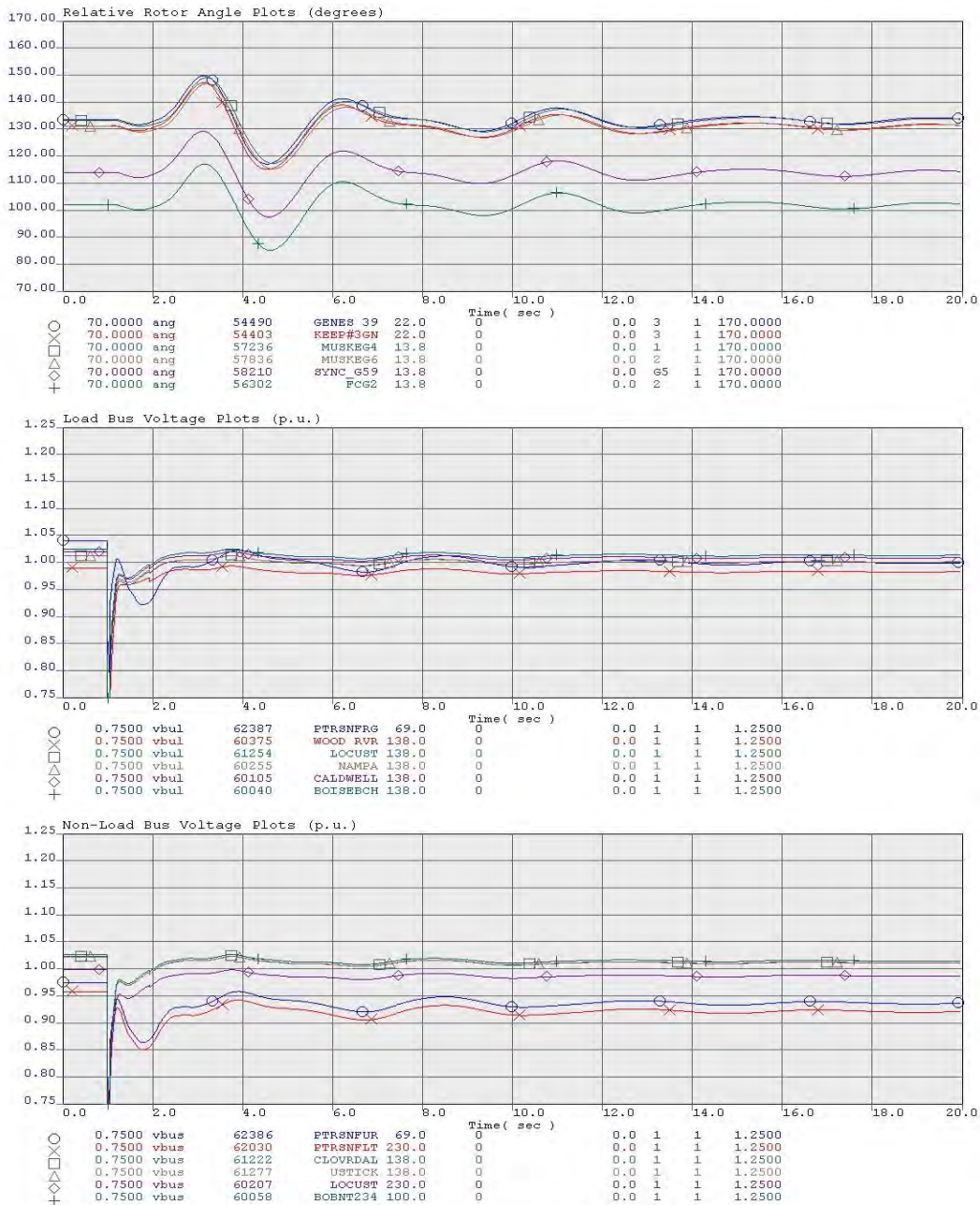
V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Brownlee		Hanford		Hemingway		John Day		Malin		Marion		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.83	-1077	0.89	-3573	0.75	-2513	0.98	-2108	0.83	-3263	0.86	-2389	0.76	-581	0.75	-341
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV + RAS	0.82	-1092	0.88	-4004	0.75	-2540	0.98	-2200	0.83	-3246	0.85	-2287	0.75	-597	0.75	-350
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.82	-1104	0.87	-4265	0.75	-2573	0.98	-2359	0.81	-3447	0.84	-2547	0.74	-608	0.75	-357
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.82	-1103	0.87	-4257	0.75	-2572	0.98	-2375	0.81	-3427	0.83	-2525	0.74	-608	0.75	-357
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.82	-1107	0.87	-4213	0.75	-2583	0.97	-2576	0.81	-3465	0.84	-2622	0.74	-610	0.75	-358
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.82	-1101	0.88	-4057	0.75	-2570	0.97	-2504	0.82	-3436	0.84	-2582	0.75	-602	0.75	-354
N-2: RAVER-PAUL & NAPA-VINE-PAUL 500 KV	0.83	-1074	0.89	-3600	0.75	-2506	0.98	-2093	0.83	-3220	0.86	-2365	0.76	-579	0.75	-340
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.82	-1133	0.90	-3598	0.75	-2736	0.97	-2689	0.80	-3908	0.84	-2793	0.74	-619	0.75	-381
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.82	-1132	0.90	-3701	0.75	-2732	0.97	-2695	0.80	-3899	0.84	-2796	0.73	-620	0.75	-381
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.82	-1096	0.88	-3789	0.75	-2557	0.97	-2399	0.82	-3369	0.85	-2517	0.75	-602	0.75	-353
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.82	-1105	0.87	-4139	0.75	-2578	0.97	-3201	0.82	-3445	0.84	-2598	0.74	-607	0.75	-357
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.82	-1104	0.87	-4178	0.75	-2576	0.97	-2545	0.82	-3447	0.84	-2603	0.75	-607	0.75	-356
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV + RAS	0.82	-1149	0.85	-5184	0.75	-2584	0.97	-3355	0.78	-2750	0.83	-3104	0.72	-659	0.74	-397
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV + RAS	0.81	-1166	0.84	-4110	0.74	-2832	0.97	-3088	0.79	-4211	0.81	-3014	0.73	-625	0.74	-390
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV + RAS	0.82	-1136	0.86	-4086	0.75	-2699	0.97	-2839	0.80	-3815	0.83	-2835	0.74	-617	0.75	-375
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.82	-1095	0.91	-3571	0.75	-2701	0.97	-2782	0.80	-3372	0.84	-2760	0.73	-630	0.74	-405
N-2: TAFT-BELL 500 KV & BELL-LANCASTER 230 KV	0.82	-1102	0.87	-4227	0.75	-2574	0.97	-2575	0.81	-3463	0.84	-2636	0.79	-492	0.75	-343
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.82	-1108	0.87	-4185	0.75	-2586	0.97	-2570	0.81	-3456	0.84	-2617	0.77	-547	0.75	-361
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV	0.82	-1102	0.87	-4227	0.75	-2574	0.97	-2575	0.81	-3463	0.84	-2636	0.79	-492	0.75	-343
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.82	-1107	0.87	-4232	0.75	-2581	0.97	-2565	0.81	-3447	0.84	-2615	0.77	-546	0.75	-360
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV	0.82	-1106	0.87	-4237	0.75	-2580	0.97	-2566	0.81	-3449	0.84	-2617	0.78	-535	0.75	-357
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.82	-1132	0.88	-4025	0.76	-2578	0.97	-2587	0.81	-3494	0.84	-2629	0.80	-469	0.77	-282
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.83	-1048	0.88	-3517	0.76	-2476	0.97	-2060	0.84	-3161	0.86	-2247	0.76	-562	0.76	-326
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.83	-1048	0.88	-3517	0.76	-2476	0.97	-2721	0.84	-3161	0.86	-2247	0.76	-562	0.76	-326
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.82	-1092	0.88	-3638	0.75	-2544	0.98	-2895	0.82	-3333	0.85	-2478	0.75	-598	0.75	-352

Appendix F – 16lhs2a_2250idnw_nww Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High Northwest Wind
N-1 Loss of Hemingway-Boardman 500 kV



Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None

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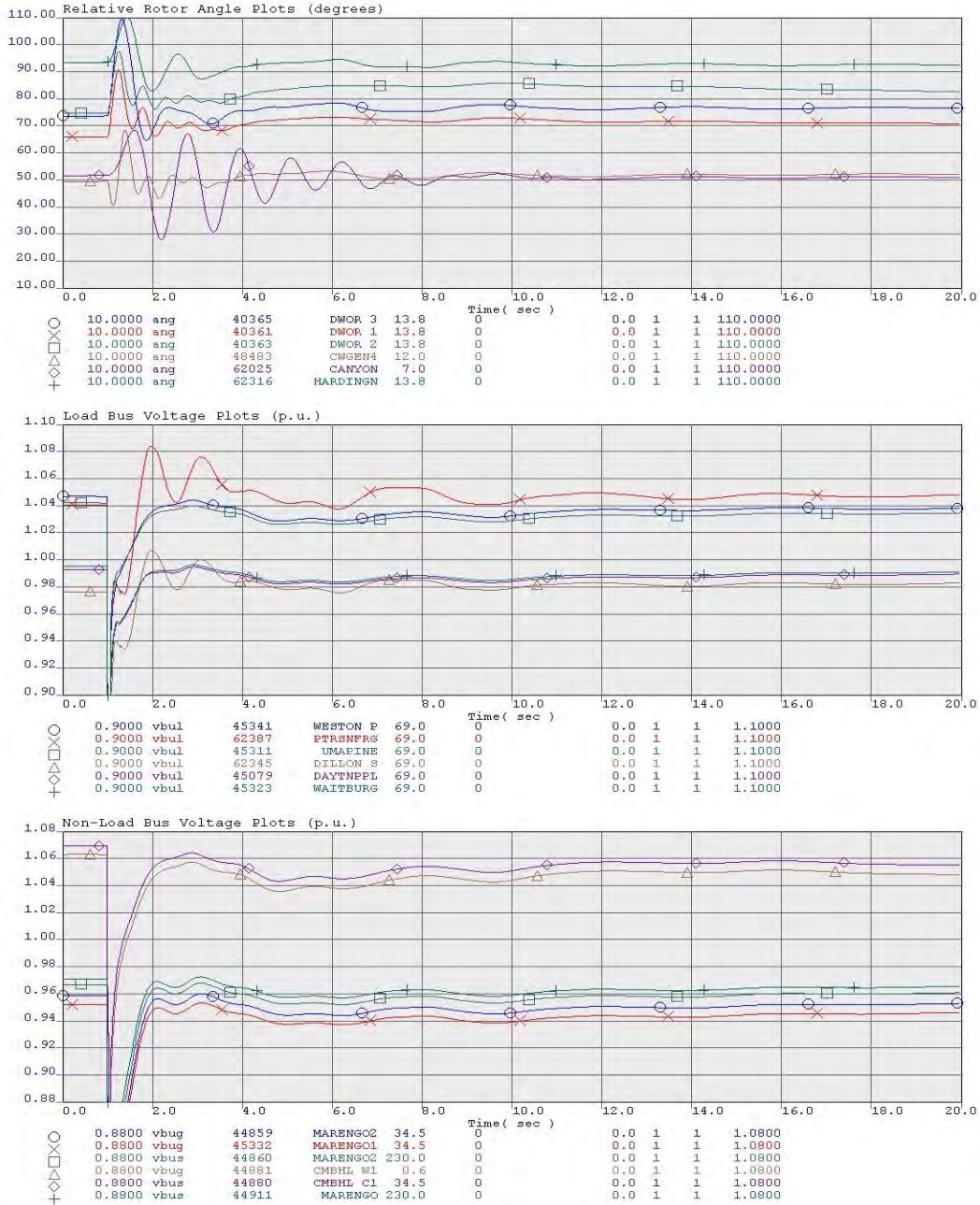
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Figure F9: N-1 Loss of Hemingway-Summer Lake 500 kV Line (Angle & Voltage Plots)

Appendix F – 16lhs2a_2250idnw_nww Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High Northwest Wind
N-1 Loss of Hatwai-Lower Granite 500 kV Line



Outage of Hatwai-Lower Granite 500 kV Line
RAS: None

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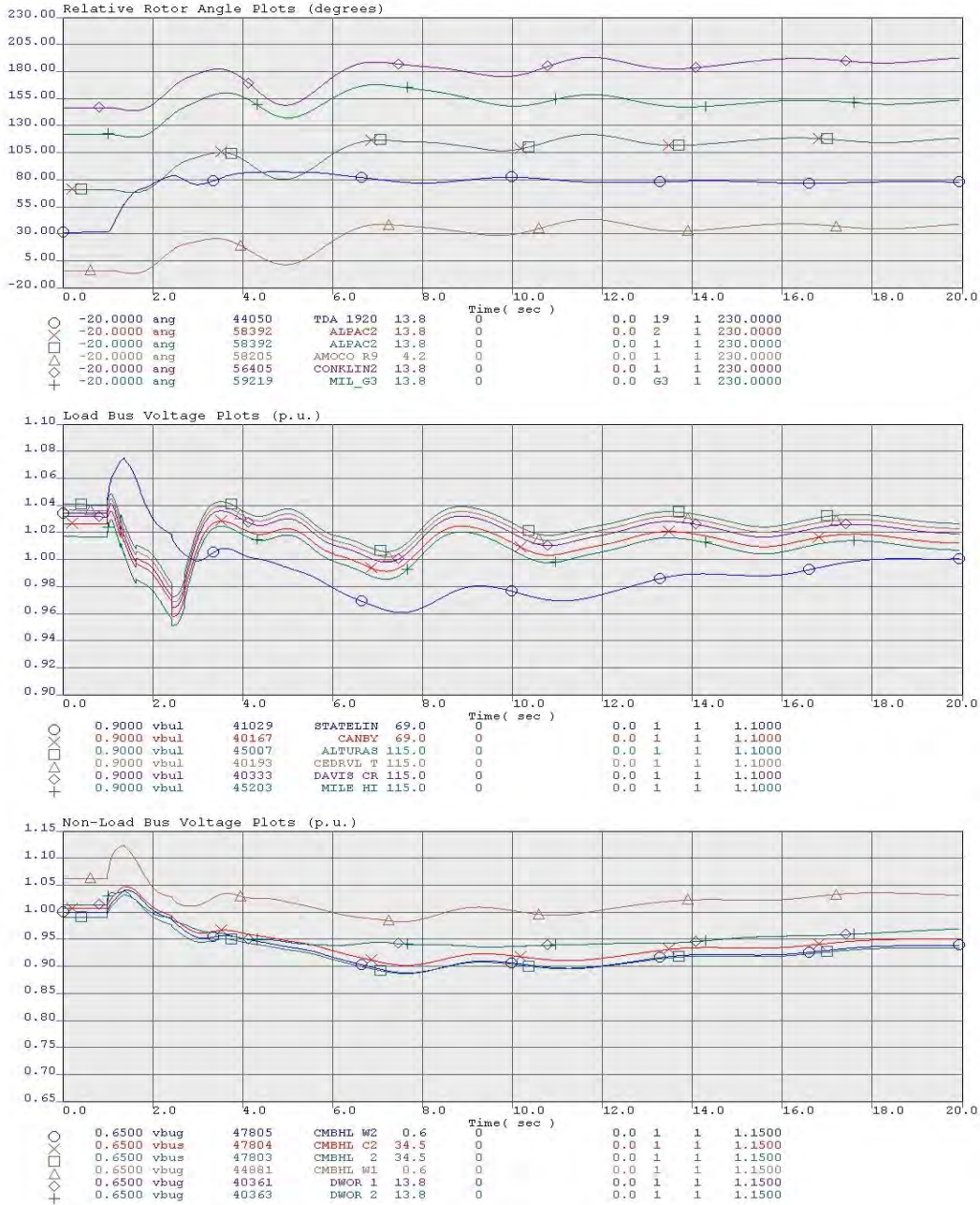
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Figure F10: N-1 Loss of Hatwai-Lower Granite 500 kV Line (Angle & Voltage Plots)

Appendix F – 16lhs2a_2250idnw_nww Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High Northwest Wind
Bi-Pole Loss of PDCI



Bipole loss of Pacific DC Intertie
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
Northwest Generation Drop (2550 MW)

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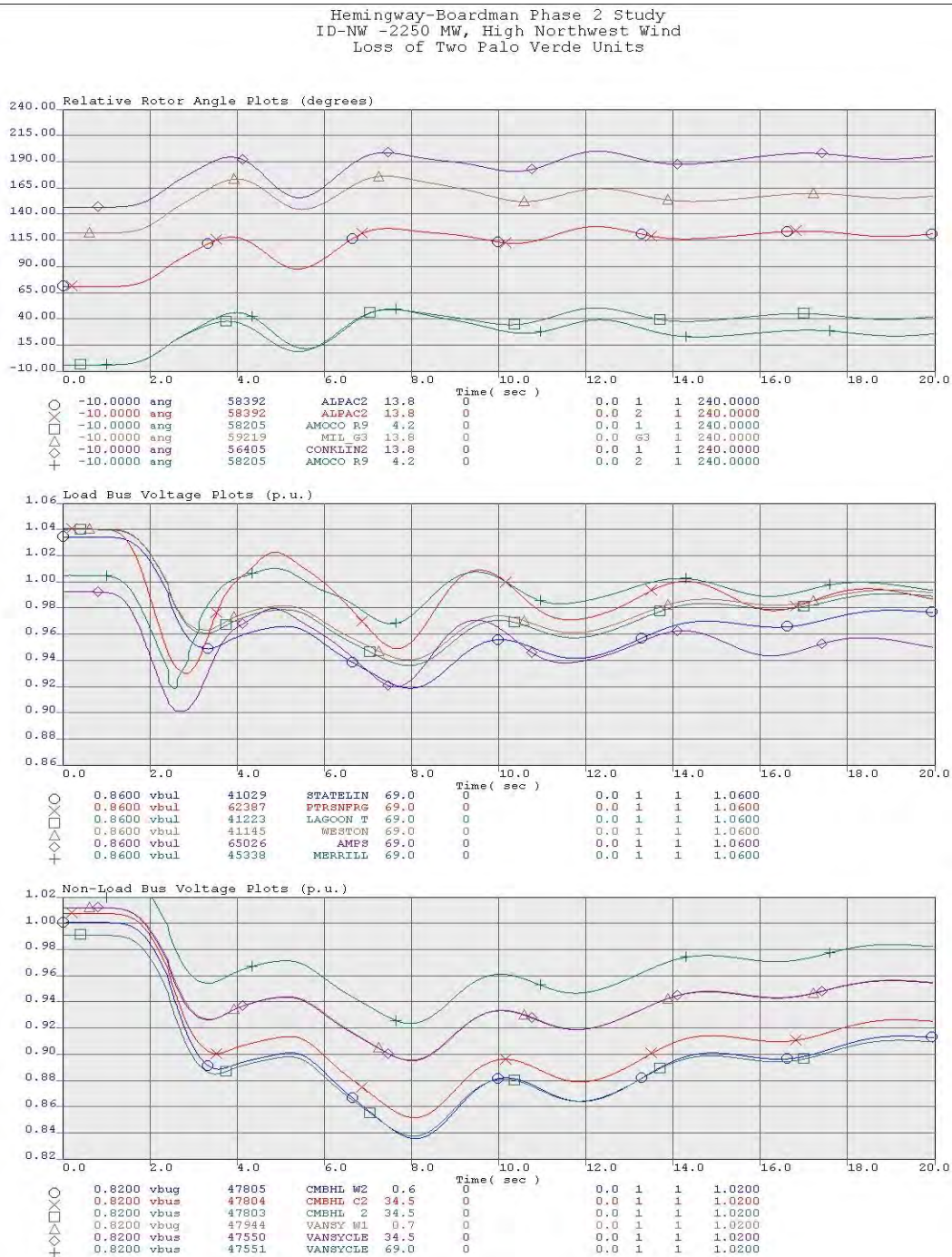
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Figure F11: Bi-Pole Loss – Pacific DC Intertie (Angle & Voltage Plots)

Appendix F – 16lhs2a_2250idnw_nww Base Case Transient Stability Plots



Loss of 2 Palo Verde Units
RAS: With Phoenix Area Load Tripping RAS
FACRI Reactive Switching

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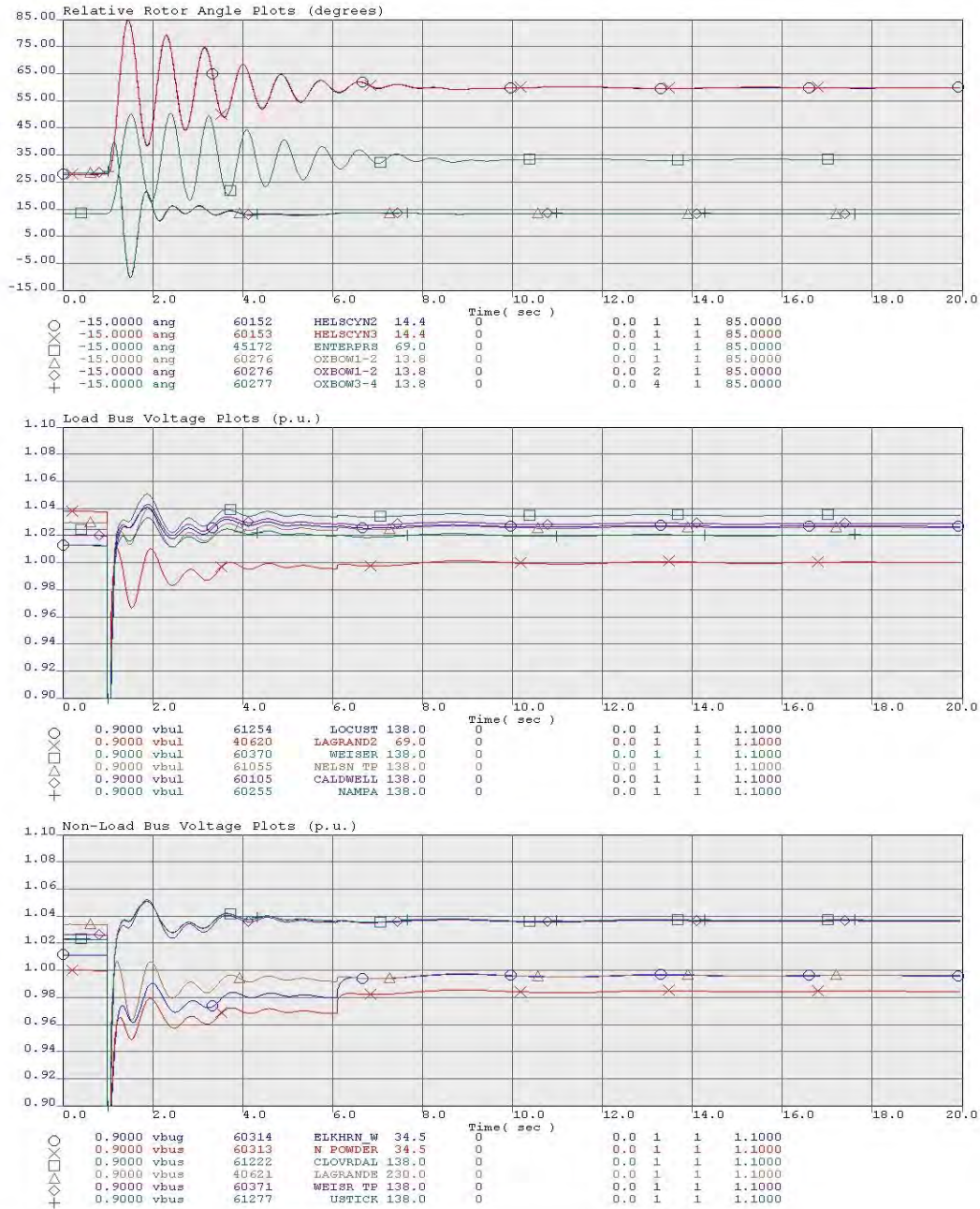
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Figure F12: Loss of Two Palo Verde Units (Angle & Voltage Plots)

Appendix F – 16lhs2a_2250idnw_nww Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High Northwest Wind
N-2 Loss of Brownlee-Hells Canyon & Oxbow-Lolo 230 kV Lines



Outage of Brownlee-Hells Canyon 230 and Oxbow-Lolo 230 Lines
LLG fault @ OBPR 230 kV clear in 4 cycles
RAS: Trip 1 HellsCyn Unit @ 5 cyc (95 MW)
Inserted PTSN 230 kV 31.7 Mvar MSC @ 5 Seconds

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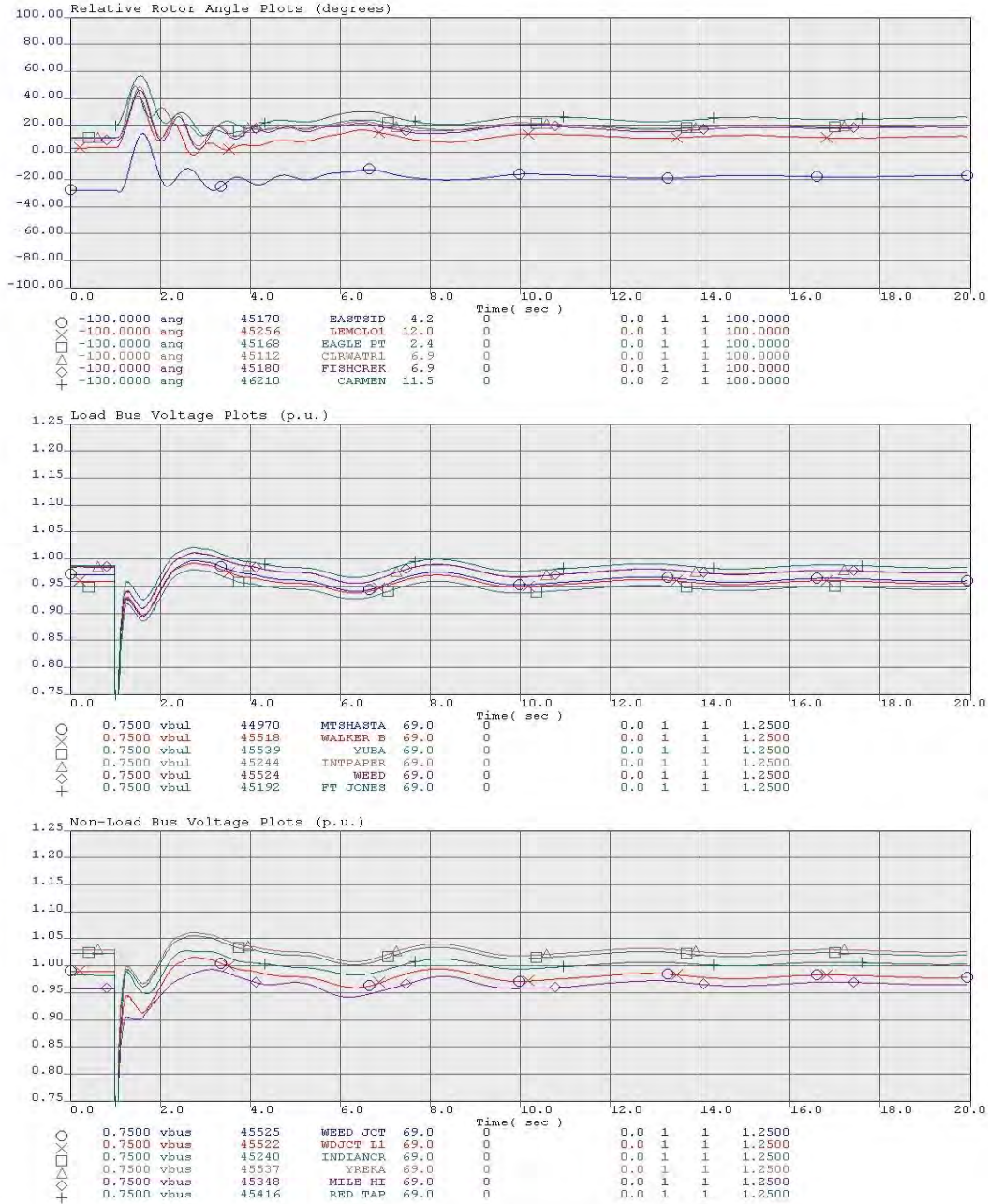
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Figure F13: N-2 Loss of Brownlee-Hells Canyon & Oxbow-Lolo 230 kV Lines (Angle & Voltage Plots)

Appendix F – 16lhs2a_2250idnw_nww Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High Northwest Wind
N-2 Loss of Malin-Round Mt #1 & #2 500 kV



3-Phase Fault @ Malin 500 kV with 4 Cycle Clearing
Loss of Malin-Round Mtn #1 & #2 500 kV Lines
Opens Round Mtn-Table Mtn #2 500 kV Line
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
NW Gen Drop 2400 MW

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Figure F14: N-2 Loss of Malin-Round Mt #1 & #2 500 kV Lines (Angle & Voltage Plots)

Appendix F - 16hs2a_2250idnw_nww Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	Various	FACRI insert of Ft Rock Series Caps	Ptrsfnrg 69 11.4%	Ptrsfnlt 230 0.851	Ptrsfnrg 69 11.4%	Bridger1 22 59.882	Stable & Damped
N-1 3 Cy 3PH Hatwai 500 kV	Hatwai-Lower Granite 500 kV	8 18	Libby 1-5 Generation Lancaster Generation	Marengo2 34.5 16.3%	Marengo1 34.5 0.796	Weston P 69 8.0%	Hardingn 13.8 59.823	Stable & Damped
Bi-pole Block	PDCI Bipole	Various	FACRI insertion of Ft Rock Series Caps, Malin Shunt CapC1 Tracy&Olinda React Switching NW 2550 MW Gen Drop	Cmbh1 w2 0.6 7.5%	Midpt ~9 230 0.885	Statelin 69 7.5%	Sync_g19 13.8 59.769	Stable & Damped
N-2	Loss of 2 Palo Verde units	Various	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1&C2, CaptJack Shunt Cap C1	Cmbh1 w2 0.6 16.5%	Cmbh1 w2 0.6 0.836	Statelin 69 7.1%	Sync_g19 13.8 59.756	Stable & Damped
N-2 4 Cy LLG Oxbow 230 kV	Brownlee-Hells Canyon 230 kV Oxbow-Lolo 230 kV	5	Tripped 1 Hells Cyn Unit (110 MW)	Elkhrn_W 34.5 10.5%	Ptrsfnlt 230 0.899	Locust 138 7.6%	Oxbow1-2 13.8 59.754	Stable & Damped
N-2 4 Cy 3PH Malin 500 kV	Malin-Round Mt #1 500 kV Malin-Round Mt #2 500 kV Round Mt-Table Mt #2 500 kV	Various	Chief Jo Braking Resistor Tracy&Olinda React Switching NW 2400 MW Gen Drop FACRI insert of Ft Rock Series Caps Flash Malin-Round Mt S-Caps	Mtshasta 69 15.8%	Yuba 69 0.802	Mtshasta 69 15.8%	Kno 13g6 13.8 59.767	Stable & Damped

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_ 18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_ 18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_ 18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_500.0 (41001)

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Contingency Studied	Actions Taken in the Contingency
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 80 MVR
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS SJUAN_G1_22.0 (10318) TO 63 MVR
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACIAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HOPKR W2_ 34.5 (47802) TO 14.5 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HOPKR W2_ 34.5 (47802) TO 14.5 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus IONE_69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_100.0 (44115)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_100.0 (44116)
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_230.0 (44125)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_100.0 (44118)
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_13.8 (44107)
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_13.8 (44108)
BF McNary 230 kV SECT 2	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 52.2 MVR
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_230.0 (44127)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_100.0 (44119)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_100.0 (44120)
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_13.8 (44112)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_345.0 (40721)
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	SET SWITCHED SHUNT AT BUS HOPKR W2_ 34.5 (47802) TO 14.5 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	CLOSE Shunt QUARTZ_138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_115.0 (40893) #2
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_115.0 (40893) #3
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_500.0 (40601)
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDN0E 1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDN0E C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDN0E W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_0.6 (47940)

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_ 0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_ 34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_ 0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_ 34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_ 0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300'
N-1: Allston-Napavine 500 kV	MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULEE R1_ 500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_ 500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_ 500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_ 500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHELS_ 500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_ 500.0 (40302) TO RAVR_ 500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVR_ 500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_ 500.0 (43123) TO LONGHORN_ 500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_ 500.0 (45095) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO LOLO_ 230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO N LEWIST_ 230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO WALA AVA_ 230.0 (48451) CKT 1
N-1: Drycreek-Wala Ava 230 kV	SET SWITCHED SHUNT AT BUS WALAWALA_ 230.0 (45327) TO 40 MVR
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Shunt GARRISON_ 500.0 (40459) #s
N-1: Dworshak-Hatwai 500 kV + RAS + PTSN	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS + PTSN	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS + PTSN	OPEN Shunt GARRISON_ 500.0 (40459) #s
N-1: Dworshak-Hatwai 500 kV + RAS + PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 63.4 MVR

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE_VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER_L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Lolo 230 kV	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-Low Gran 500 kV	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSCYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HOPKR W2_ 34.5 (47802) TO 14.5 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_ 500.0 (60155) TO BURNS_ 500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_ 500.0 (45029) TO SUMMER L_ 500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_ 230.0 (40537) TO HIL TOP_ 345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_ 500.0 (40553) TO TAFT_ 500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_ 345.0 (64032) TO HUMBOLDT_ 345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_ 120.0 (64070) TO CARLIN_ 120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_ 120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_ 69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	CLOSE Shunt HUMBOLT1_ 24.9 (64216) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_ 345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_ 345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_ 345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_ 99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_ 99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO SLATT_ 500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_ 500.0 (45262) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_ 500.0 (41450) TO WAUTOMA_ 500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_ 230.0 (40621) TO N POWDER_ 230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_ 500.0 (40629) TO MARION_ 500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO CEN FERY_ 500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_ 500.0 (40666) TO LOW GRAN_ 500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_ 500.0 (40683) TO SACJWA T_ 500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_ 230.0 (45189) TO MALIN_ 500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	SET SWITCHED SHUNT AT BUS ALTURAS_ 69.0 (45005) TO 5.4 MVR
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO ROUND MT_ 500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO SUMMER L_ 500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_ 345.0 (40691) TO ROCKY RH_ 345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_ 500.0 (40699) TO SANTIAM_ 500.0 (40941) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_ 230.0 (40939) #s
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDR_ 230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS HOPKR W2_ 34.5 (47802) TO 14.5 MVR
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS N POWDER_ 34.5 (60313) TO 9 MVR
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_ 230.0 (41352) TO MCNRY S3_ 230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_ 230.0 (40121) TO MCNRY S1_ 230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_ 500.0 (40724) TO MCNARY_ 500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_ 345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_ 345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_ 230.0 (41351) TO ROUNDUP_ 230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_ 500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_ 500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_ 13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_ 345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_ 230.0 (40537) TO 52.2 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Shunt GONDER_ 230.0 (64056) #v
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_ 69.0 (45005) TO 10.8 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_ 230.0 (40794) #s

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Talbot 230 kV	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134 MVR
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-1: Walla Walla-Wallula 230 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Ashe-Slatt 500 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 17 MVR
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap MIKKALO_500.0 (43970) TO MKLOSNT2_500.0 (43971) CKT 2
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap SANTIAM_500.0 (40941) TO SANTMKO2_500.0 (43492) CKT 2
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt PTRSNFLT_230.0 (62030) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt OREBASIN_230.0 (66145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt FRANNIE2_34.5 (67145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARLAND1_34.5 (67147) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: Coulee-Schultz #1 & #2 500 kV	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.5 MVR
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS HOPKR W2_34.5 (47802) TO 14.4 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_ 26.0 (62048) #1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRSSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line GRSSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Load MILCTYDC_230.0 (63010) #D1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Shunt MILCTYCD 230.0 (63010) #b1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
	merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_ 13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_ 13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_ 13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_ 13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_ 13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_ 13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_ 13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_ 13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_ 13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_ 13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_ 13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_ 13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_ 13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_ 13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_ 13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_ 13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_ 13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_ 13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_ 345.0 (40721) TO ROSS_ 345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_ 345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_ 345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_ 230.0 (60177) TO MIDPOINT_ 230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVALINE_ 500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_ 115.0 (40539) TO VALLEY T_ 115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_ 230.0 (48512) TO 134.2 MVR
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_ 115.0 (40539) TO VALLEY T_ 115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_ 230.0 (48512) TO 134.2 MVR
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_ 500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL_#_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_les300' MW in generator merit order by opening
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_les300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_les300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_les300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_500.0 (30005) TO RD MT 1M_500.0 (30065) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_les300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_les300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_les300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 1_12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 2_12.5 (38830)

Appendix F - 16hs2a_2250idnw_N_nww Base Case Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 3_ 12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 4_ 12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 5_ 12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_ 13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_ 13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_ 13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_ 13.8 (38715)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_ 13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_ 13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_ 13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA A_ 13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA B_ 13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA D_ 13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA E_ 13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA C_ 13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_ 13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_ 13.2 (38780)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_ 13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_ 13.2 (38805)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_ 13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_ 13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_ 13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_ 13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_ 13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_ 13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_ 13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_ 13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_ 11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_ 11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_ 18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_ 18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_ 18.0 (34604)
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_ 230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_ 115.0 (40087) TO BIGELOW_ 115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_ 230.0 (40624) TO NOXONBPA_ 230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_ 500.0 (40459) #r
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4

Appendix G

16hs2a_2250idnw_N_wom Base Case (High West of McNary & West of Slatt)

ID-NW = -2250 MW
 Grassland = -1449 MW
 Summer Lake = -209 MW
 Lolo = -317 MW
 Walla Walla = -150 MW
 LaGrande = -143 MW
 Midpoint West = -1674 MW
 Borah West = -354 MW
 Idaho-Sierra = 500 MW
 N of John Day = 8401 MW
 COI = 4649 MW
 PDCI = 3101 MW
 ID-MT = -337 MW
 W of McNary = 5299 MW
 W of Slatt = 5798 MW
 Alturas Project = 150 MW
 Path C = -1599 MW
 Montana Southeast = 600 MW
 TOT 2B1 = 70 MW
 TOT 2C = 195 MW

ID-NW = -1839 MW
 Grassland = 0 MW
 Summer Lake = -978 MW
 Lolo = -398 MW
 Walla Walla = -254 MW
 LaGrande = -221 MW
 Midpoint West = -1405 MW
 Borah West = -153 MW
 Idaho-Sierra = 437 MW
 N of John Day = 8167 MW
 COI = 4793 MW
 PDCI = 3101 MW
 ID-MT = -381 MW
 W of McNary = 4905 MW
 W of Slatt = 6457 MW
 Alturas Project = 171 MW
 Path C = -1426 MW
 Montana Southeast = 689 MW
 TOT 2B1 = 20 MW
 TOT 2C = 144 MW

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ID-NW = -1881 MW
 Grassland = 0 MW
 Summer Lake = -1006 MW
 Lolo = -403 MW
 Walla Walla = -260 MW
 LaGrande = -224 MW
 Midpoint West = -1423 MW
 Borah West = -165 MW
 Idaho-Sierra = 442 MW
 N of John Day = 8268 MW
 COI = 4854 MW
 PDCI = 3101 MW
 ID-MT = -383 MW
 W of McNary = 4921 MW
 W of Slatt = 6492 MW
 Alturas Project = 176 MW
 Path C = -1436 MW
 Montana Southeast = 702 MW
 TOT 2B1 = 26 MW
 TOT 2C = 148 MW

Figure G3: 16la1sa_3400idnw_N_wom Case after the contingency **BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr**

ID-NW = -1887 MW
 Grassland = -1194 MW
 Summer Lake = 162 MW
 Lolo = -397 MW
 Walla Walla = -249 MW
 LaGrande = -213 MW
 Midpoint West = -490 MW
 Borah West = 703 MW
 Idaho-Sierra = 378 MW
 N of John Day = 8237 MW
 COI = 4904 MW
 PDCI = 3101 MW
 ID-MT = -362 MW
 W of McNary = 5122 MW
 W of Slatt = 5845 MW
 Alturas Project = 190 MW
 Path C = -1396 MW
 Montana Southeast = 647 MW
 TOT 2B1 = 12 MW
 TOT 2C = 135 MW

Figure G4: 16la1sa_3400idnw_N_wom Case after the contingency **BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr**

ID-NW = -1843 MW
 Grassland = 0 MW
 Summer Lake = -1004 MW
 Lolo = -393 MW
 Walla Walla = -245 MW
 LaGrande = -211 MW
 Midpoint West = -1416 MW
 Borah West = -160 MW
 Idaho-Sierra = 439 MW
 N of John Day = 8211 MW
 COI = 4810 MW
 PDCI = 3101 MW
 ID-MT = -383 MW
 W of McNary = 5042 MW
 W of Slatt = 6829 MW
 Alturas Project = 173 MW
 Path C = -1429 MW
 Montana Southeast = 680 MW
 TOT 2B1 = 20 MW
 TOT 2C = 143 MW

Figure G5: 16la1sa_3400idnw_N_wom Case after the contingency **N-1: Hemingway-Grassland 500 kV + PTSN Shunt**

Diagram illustrating the Western United States power grid, showing various substations and transmission lines. The grid is color-coded by region: red for the northern and central West, orange for the southern West, and green for the southwestern West.

Key substations and their associated power flows (MW and Mvar) are labeled throughout the diagram. The grid is interconnected, showing a complex network of high-voltage transmission lines.

Legend (Right Side):

- ID-NW = -2446 MW
- Grassland = -1418 MW
- Summer Lake = -429 MW
- Lolo = -330 MW
- Walla Walla = -151 MW
- LaGrande = -139 MW
- Midpoint West = -1862 MW
- Borah West = -503 MW
- Idaho-Sierra = 548 MW
- N of John Day = 9446 MW
- COI = 5613 MW
- PDCI = 3101 MW
- ID-MT = -351 MW
- W of McNary = 5545 MW
- W of Slatt = 6294 MW
- Alturas Project = 181 MW
- Path C = -1911 MW
- Montana Southeast = 630 MW
- TOT 2B1 = 228 MW
- TOT 2C = 324 MW

Figure G6: 16la1sa 3400idnw N wom Case after the contingency **N-2: Double Palo Verde**

Appendix G– 16hs2sa_2250idnw_N_wom Case Post-Transient Contingency Results

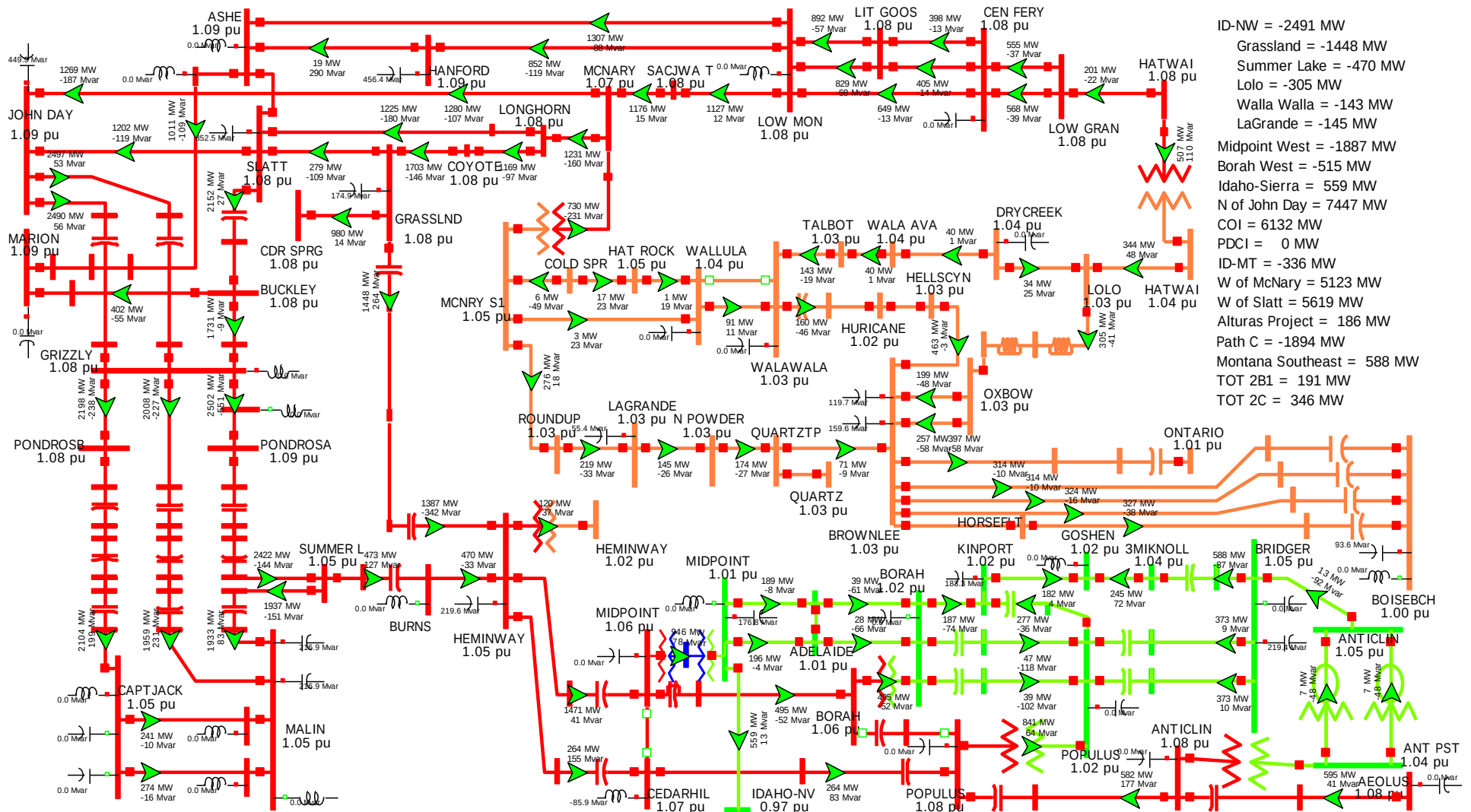


Figure G7: 16la1sa_3400idnw_N_wom Case after the contingency N-2: DC-BIPOLE

Appendix G - 16hs2a_2250idnw_wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	MERIDINP (45197) -> MERIDINP (45195) CKT 2 at MERIDINP	Branch MVA	369.3	681.4	650.0	104.8	780.0	87.4
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	633.8	1191.2	979.0	121.7	1287.7	92.5
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	299.0	767.5	722.9	106.2	1265.2	60.7
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1649.6	2849.3	2442.0	116.7	3235.5	88.1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1644.9	2849.3	2199.9	129.5	3235.5	88.1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1649.6	2847.6	2666.9	106.8	4000.0	71.2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1630.1	2827.2	2667.0	106.0	4000.0	70.7
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1605.2	2767.3	2699.7	102.5	4000.0	69.2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1587.0	2741.8	2699.7	101.6	4000.0	68.5
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1649.6	2901.6	2442.0	118.8	3235.5	89.7
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1644.9	2901.6	2199.9	131.9	3235.5	89.7
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1649.6	2899.1	2666.9	108.7	4000.0	72.5
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1630.1	2879.7	2667.0	108.0	4000.0	72.0
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	DAIRY (45140)	% Δ Volts	1.03	0.97				6.19%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	CASEBEER (45086)	% Δ Volts	1.02	0.97				5.15%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	BONANTAP (45060)	% Δ Volts	1.03	0.98				5.10%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1246.2	1237.0	100.7	1395.9	89.3
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	ATHENA (45015)	% Δ Volts	0.99	0.93				6.45%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PILOT RK (45413)	% Δ Volts	0.99	0.93				6.45%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	BUCKAROO (45027)	% Δ Volts	1.00	0.94				6.38%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	MISSIONT (47191)	% Δ Volts	1.00	0.94				6.38%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PENDLBPA (41247)	% Δ Volts	1.00	0.94				6.38%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PENDLT T (41248)	% Δ Volts	1.00	0.94				6.38%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	PENDLTON (45235)	% Δ Volts	1.00	0.94				6.38%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	JONTMB11 (90164)	% Δ Volts	1.01	0.95				6.32%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40903)	% Δ Volts	1.01	0.95				6.32%

Appendix G - 16hs2a_2250idnw_wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LJ2 1 (47808)	% Δ Volts	1.02	0.96				6.25%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40905)	% Δ Volts	1.03	0.97				6.19%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40619)	% Δ Volts	0.98	0.93				5.38%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	MCKAY (45322)	% Δ Volts	1.00	0.95				5.26%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	ROUNDUP2 (41253)	% Δ Volts	1.01	0.96				5.21%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LJ2 C1 (47807)	% Δ Volts	1.03	0.98				5.10%
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	766.2	986.3	950.0	103.8	1286.0	76.7
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	766.2	991.0	950.0	104.3	1286.0	77.1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	908.6	1022.7	1009.1	101.3	1285.2	79.6
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	SCIO (45479)	% Δ Volts	1.01	0.95				6.32%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	SANTIAM (45475)	% Δ Volts	1.03	0.97				6.19%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	SANTMSS (45476)	% Δ Volts	1.03	0.97				6.19%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	DETROIT (40344)	% Δ Volts	1.04	0.98				6.12%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	DETROIT (40345)	% Δ Volts	1.04	0.98				6.12%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	EVGRNBIO (44873)	% Δ Volts	1.02	0.97				5.15%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	EVRGNTAP (44866)	% Δ Volts	1.02	0.97				5.15%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	LYONS (45316)	% Δ Volts	1.02	0.97				5.15%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	TMBLCR T (41079)	% Δ Volts	1.02	0.97				5.15%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	SANT TAP (40937)	% Δ Volts	1.03	0.98				5.10%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	SANTIAM (40939)	% Δ Volts	1.03	0.98				5.10%
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							

Appendix G - 16hs2a_2250idnw_wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1287.6	1237.0	104.1	1395.9	92.2
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ATHENA (45015)	% Δ Volts	0.99	0.92				7.14%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PILOT RK (45413)	% Δ Volts	0.99	0.92				7.14%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	MISSIONT (47191)	% Δ Volts	1.00	0.93				7.07%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLTON (45235)	% Δ Volts	1.00	0.94				6.95%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	BUCKAROO (45027)	% Δ Volts	1.00	0.94				6.84%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLBPA (41247)	% Δ Volts	1.00	0.94				6.61%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40903)	% Δ Volts	1.01	0.95				6.54%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLT T (41248)	% Δ Volts	1.00	0.94				6.50%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ROUNDUP2 (41253)	% Δ Volts	1.01	0.95				6.32%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40619)	% Δ Volts	0.98	0.92				6.18%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRAND2 (40620)	% Δ Volts	1.04	0.98				6.12%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	MCKAY (45322)	% Δ Volts	1.00	0.94				5.93%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40621)	% Δ Volts	1.03	0.98				5.53%
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	N POWDER (60313)	% Δ Volts	1.00	0.95				5.37%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	BELL S2 (40088) -> BELL BPA (40087) CKT 1 at BELL S2	Branch MVA	232.3	252.9	249.0	101.5	312.0	81.0
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations							
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1287.6	1237.0	104.1	1395.9	92.2
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ATHENA (45015)	% Δ Volts	0.99	0.92				7.14%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PILOT RK (45413)	% Δ Volts	0.99	0.92				7.14%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	MISSIONT (47191)	% Δ Volts	1.00	0.93				7.07%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLTON (45235)	% Δ Volts	1.00	0.94				6.95%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	BUCKAROO (45027)	% Δ Volts	1.00	0.94				6.84%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLBPA (41247)	% Δ Volts	1.00	0.94				6.61%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40903)	% Δ Volts	1.01	0.95				6.54%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	PENDLT T (41248)	% Δ Volts	1.00	0.94				6.50%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40905)	% Δ Volts	1.03	0.97				6.40%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	ROUNDUP2 (41253)	% Δ Volts	1.01	0.95				6.32%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40619)	% Δ Volts	0.98	0.92				6.18%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRAND2 (40620)	% Δ Volts	1.04	0.98				6.12%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	MCKAY (45322)	% Δ Volts	1.00	0.94				5.93%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40621)	% Δ Volts	1.03	0.98				5.53%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	N POWDER (60313)	% Δ Volts	1.00	0.95				5.37%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1377.9	1237.0	111.4	1395.9	98.7
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.1	1031.0	920.0	112.1	1046.8	98.5
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	711.3	823.7	800.0	103.0	1199.9	68.7
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.97	0.89				8.99%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.98	0.90				8.89%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.97	0.91				6.59%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.1	1045.9	920.0	113.7	1046.8	99.9
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1389.9	1237.0	112.4	1395.9	99.6
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.97	0.90				7.78%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.97	0.91				6.59%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.98	0.92				6.52%
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations							
BF Lolo 230kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1272.4	1237.0	102.9	1395.9	91.2
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.08	1053.5	920.0	114.5	1046.8	100.6
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1402.9	1237.0	113.4	1395.9	100.5
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	908.59	1016.6	1009.1	100.7	1285.2	79.1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	711.27	831.62	800.0	104.0	1199.9	69.3
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1730.4	2433.5	2400.0	101.4	3800.0	64.0

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	PTRSNFLT (62030)	% Δ Volts	0.97	0.88				10.23%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	PTRSNFUR (62386)	% Δ Volts	0.98	0.90				8.89%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	AMPS (65025)	% Δ Volts	0.97	0.9				7.78%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	BELMONT (45377)	% Δ Volts	0.97	0.92				5.43%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	NORTH CST (45408)	% Δ Volts	0.97	0.92				5.43%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	DILLON S (62084)	% Δ Volts	0.98	0.93				5.38%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	LAGRANDE (40619)	% Δ Volts	0.98	0.93				5.38%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	BIGGRASS (65155)	% Δ Volts	0.99	0.94				5.32%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	BURNS (45029)	% Δ Volts	1.05	1.0				5.00%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+Caps	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.08	1046.8	920.0	113.8	1046.8	100.0
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+Caps	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1395.1	1237.0	112.8	1395.9	99.9
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+Caps	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	711.27	832.4	800.0	104.0	1199.9	69.4
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+Caps	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1730.4	2429.0	2400.0	101.2	3800.0	63.9
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	No Violations							
BF PGE Grassland-Slatt 500kV & Boardman Plant	No Violations							
Bus: Alvey 500 kV + RAS	No Violations							
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Allston-Keeler 500 kV + RAS	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	908.6	1074.5	1009.1	106.5	1285.2	83.6
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	278.3	837.4	785.7	106.6	926.3	90.4
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	278.3	837.4	785.7	106.6	926.3	90.4
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1649.6	2499.3	2442.0	102.3	3235.5	77.2
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1644.9	2499.3	2199.9	113.6	3235.5	77.2
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1800.5	2411.4	2199.9	109.6	3280.5	73.5
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1785.3	2391.1	2199.9	108.7	3280.5	72.9
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1930.7	2553.9	2477.9	103.1	4000.0	63.8
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	908.6	1025.4	1009.1	101.6	1285.2	79.8
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	633.8	1147.7	979.0	117.2	1287.7	89.1
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Hatwai-Low Gran 500 kV	No Violations							
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	800.1	1006.0	920.0	109.3	1046.8	96.1
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1380.3	1237.0	111.6	1395.9	98.9
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.1	1034.6	920.0	112.5	1046.8	98.8
N-1: Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	711.3	823.1	800.0	102.9	1199.9	68.6
N-1: Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.97	0.89				8.99%
N-1: Hemingway-Grassland 500 kV	PTRSNFUR (62386)	% Δ Volts	0.98	0.91				7.69%
N-1: Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts	0.97	0.91				6.59%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1722.2	2917.5	2400.0	121.6	3200.0	91.2
N-1: Hemingway-Grassland 500 kV + FACRI	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1256.0	1237.0	101.5	1395.9	90.0
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1730.4	2937.8	2400.0	122.4	3800.0	77.3
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1375.1	1237.0	111.2	1395.9	98.5
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.1	1030.3	920.0	112.0	1046.8	98.4
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	711.3	825.2	800.0	103.1	1199.9	68.8
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1649.6	2850.1	2442.0	116.7	3235.5	88.1
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1644.9	2850.1	2199.9	129.6	3235.5	88.1
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1649.6	2848.1	2666.9	106.8	4000.0	71.2
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1630.1	2828.2	2667.0	106.0	4000.0	70.7
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1605.2	2828.6	2699.7	104.8	4000.0	70.7
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1587.0	2805.8	2699.7	103.9	4000.0	70.1
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1243.0	1237.0	100.5	1395.9	89.0
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	PTRSNFLT (62030)	% Δ Volts	0.97	0.92				5.43%
N-1: Midpoint-Hemingway 500 kV	PTRSNFUR (62386)	% Δ Volts	0.98	0.93				5.38%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	No Violations							
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1276.9	1237.0	103.2	1395.9	91.5
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	766.2	974.5	950.0	102.6	1286.0	75.8
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	766.2	974.5	950.0	102.6	1286.0	75.8
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1800.5	3239.4	2199.9	147.2	3280.5	98.7
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUTAB21	Branch Amp	1800.5	3239.4	2667.0	121.5	4000.0	81.0
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	1778.4	3214.4	2667.0	120.5	4000.0	80.4
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABVAC11	Branch Amp	1930.7	2902.7	2667.0	108.8	4000.0	72.6
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1930.7	2902.7	2477.9	117.1	4000.0	72.6
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at VACA-DIX	Branch Amp	1919.2	2895.8	2667.0	108.6	4000.0	72.4
N-1: Table Mtn-Tesla 500 kV	VACTES11 (30044) -> TESLA (30040) CKT 1 at VACTES11	Branch Amp	1362.5	2264.1	2230.0	101.5	4000.0	56.6
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1469.8	2619.8	2230.0	117.5	3555.9	73.7
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	800.1	925.6	920.0	100.6	1046.8	88.4
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	BETHEL5 (43041) -> BETHEL (43039) CKT 1 at BETHEL5	Branch MVA	1013.0	1318.7	1309.0	100.7	1691.0	78.0
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts	0.98	0.93				5.38%
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	908.59	1046.1	1009.1	103.7	1285.2	81.4
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	908.59	1025.2	1009.1	101.6	1285.2	79.8
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	BROONT12 (61981) -> ONTARIO (60265) CKT 1 at BROONT12	Branch Amp	959.6	1590.9	1590.0	100.1	2147.0	74.1
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	BROONT12 (61981) -> ONTARIO (60265) CKT 1 at BROONT12	Branch Amp	959.6	1601.2	1590.0	100.7	2147.0	74.6
N-2: Bridger-Populus #1 & #2 345 kV	No Violations							
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	No Violations							
N-2: Broadview-Garrisont #1 & #2 500 kV + RAS	AMPS (65025)	% Δ Volts	0.97	1.03				5.83%
N-2: Broadview-Garrisont #1 & #2 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts	0.98	1.04				5.77%
N-2: Broadview-Garrisont #1 & #2 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts	0.97	1.02				4.90%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	800.1	977.4	920.0	106.2	1046.8	93.4
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1722.2	2664.1	2400.0	111.0	3200.0	83.3
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1644.9	2236.8	2199.9	101.7	2828.0	79.1

Appendix G - 16hs2a_2250idnw_wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1800.5	2352.9	2199.9	107.0	3280.5	71.7
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1785.3	2333.0	2199.9	106.0	3280.5	71.1
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1730.4	2679.0	2400.0	111.6	3800.0	70.5
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1546.1	2218.0	2134.0	103.9	3499.9	63.4
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1930.7	2521.8	2477.9	101.8	4000.0	63.0
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1525.4	2186.9	2134.0	102.5	3499.9	62.5
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	1504.6	2157.9	2134.0	101.1	3499.9	61.7
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1722.2	2429.8	2400.0	101.2	3200.0	75.9
N-2: Double Palo Verde	E EDMON9 (54089) -> NISKU A9 (54091) CKT 80 at E EDMON9	Branch Amp	379.2	411.6	410.0	100.4	552.3	74.5
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1730.4	2449.2	2400.0	102.0	3800.0	64.5
N-2: Double Palo Verde	WBK 25 (50742)	% Δ Volts	1.02	0.96				6.25%
N-2: Double Palo Verde	WRK 25 (50289)	% Δ Volts	1.02	0.96				6.25%
N-2: Double Palo Verde	HRD 25 (51210)	% Δ Volts	1.03	0.97				6.19%
N-2: Double Palo Verde	MIDPT 148 (81851)	% Δ Volts	1.08	1.02				5.88%
N-2: Double Palo Verde	NKL 60T3 (51087)	% Δ Volts	1.08	1.02				5.88%
N-2: Double Palo Verde	NKL 74P (51069)	% Δ Volts	1.08	1.02				5.88%
N-2: Double Palo Verde	WRK 73H1 (51712)	% Δ Volts	1.08	1.02				5.88%
N-2: Double Palo Verde	WRK 73H2 (51714)	% Δ Volts	1.08	1.02				5.88%
N-2: Double Palo Verde	WBK 1T1 (80261)	% Δ Volts	0.93	0.88				5.68%
N-2: Double Palo Verde	WBK 1T2 (50658)	% Δ Volts	0.93	0.88				5.68%
N-2: Double Palo Verde	WBK 1T3 (80272)	% Δ Volts	0.93	0.88				5.68%
N-2: Double Palo Verde	BDM 244P (50902)	% Δ Volts	0.96	0.91				5.49%
N-2: Double Palo Verde	YORKCANY (12091)	% Δ Volts	0.99	0.94				5.32%
N-2: Double Palo Verde	NXC 12T1 (80062)	% Δ Volts	1.01	0.96				5.21%
N-2: Double Palo Verde	NKL 25 (51092)	% Δ Volts	1.02	0.97				5.15%
N-2: Double Palo Verde	SMW 25T1 (50291)	% Δ Volts	1.02	0.97				5.15%
N-2: Double Palo Verde	DGR 12 (50152)	% Δ Volts	1.03	0.98				5.10%
N-2: Double Palo Verde	SCT 12 (50275)	% Δ Volts	1.03	0.98				5.10%
N-2: Eholake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Eholake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	PTRSNFUR (62386)	% Δ Volts	0.98	1.03				4.85%
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	No Violations							
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1128.7	1273.7	1237.0	103.0	1395.9	91.2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1730.4	3236.4	2400.0	134.8	3800.0	85.2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1480.7	3206.7	2700.0	118.8	4000.0	80.2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1663.7	3081.6	2400.0	128.4	3800.0	81.1
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON12	Branch Amp	1646.5	3065.0	2400.0	127.7	3800.0	80.7
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1663.7	3161.2	2400.0	131.7	3800.0	83.2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON12	Branch Amp	1646.5	3147.6	2400.0	131.1	3800.0	82.8
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	2054.9	3281.3	2900.0	113.1	4350.0	75.4

Appendix G - 16hs2a_2250idnw_wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or Δ Volts
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	1878.6	3444.2	3000.0	114.8	4050.0	85.0
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	766.2	974.7	950.0	102.6	1286.0	75.8
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	No Violations							
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1786.5	3601.8	2667.4	135.0	4099.2	87.9
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1754.8	3500.0	2667.4	131.2	4099.2	85.4
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1754.8	3500.0	2667.4	131.2	4099.2	85.4
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1945.1	3105.5	2993.0	103.8	4514.9	68.8
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1945.1	3105.5	2993.0	103.8	4514.9	68.8
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1914.1	3071.1	2993.0	102.6	4514.9	68.0
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1914.1	3071.1	2993.0	102.6	4514.9	68.0
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1892.6	3034.1	2993.0	101.4	4514.9	67.2
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	PTRSNFLT (62030)	% Δ Volts	0.97	0.91				6.59%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	PTRSNFUR (62386)	% Δ Volts	0.98	0.93				5.38%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	766.2	981.6	950.0	103.3	1286.0	76.3
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	683.9	899.4	830.9	108.3	953.9	94.3
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	BRDGVLL (31110) -> FRUTLDTJ (31120) CKT 1 at BRDGVLL	Branch Amp	289.4	328.6	328.1	100.2	371.4	88.5
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1786.5	3337.4	2667.4	125.1	4099.2	81.4
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1754.8	3245.6	2667.4	121.7	4099.2	79.2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1754.8	3237.3	2667.4	121.4	4099.2	79.0
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1945.1	3419.7	2993.0	114.3	4514.9	75.7

Appendix G - 16hs2a_2250idnw_wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1945.1	3419.7	2993.0	114.3	4514.9	75.7
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1914.1	3398.0	2993.0	113.5	4514.9	75.3
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at MAXWELL	Branch Amp	1914.1	3398.0	2993.0	113.5	4514.9	75.3
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1892.6	3364.8	2993.0	112.4	4514.9	74.5
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	285.7	917.1	825.9	111.1	976.5	93.9
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	232.9	858.7	825.1	104.1	975.0	88.1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	388.8	466.2	462.9	100.7	579.9	80.4
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	E EDMON9 (54089) -> NISKU A9 (54091) CKT 80 at E EDMON9	Branch Amp	379.2	412.8	410.0	100.7	552.3	74.7
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	WBK 25 (50742)	% Δ Volts	1.02	0.96				6.25%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HRD 25 (51210)	% Δ Volts	1.03	0.97				6.19%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	WBK 1T1 (80261)	% Δ Volts	0.93	0.88				5.68%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	WBK 1T2 (50658)	% Δ Volts	0.93	0.88				5.68%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	WBK 1T3 (80272)	% Δ Volts	0.93	0.88				5.68%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	ADDY (40017)	% Δ Volts	1.02	0.96				6.25%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	ARDEN (48015)	% Δ Volts	1.01	0.96				5.21%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	COLV AVA (48083)	% Δ Volts	1.01	0.96				5.21%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	METCHIP (48223)	% Δ Volts	1.01	0.96				5.21%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	ORIN (48301)	% Δ Volts	1.01	0.96				5.21%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11112 MERIDIAN-KLAM FALLS 500 KV+KFGN2+ST	0.74	-3598	0.82	-1116	0.78	-3532	0.91	-1770	0.97	-2504	0.87	-4549	0.88	-3285	0.75	-605	0.76	-345
BF 11122 CAPT JACK-KLAM FALLS 500 KV+KFGN2+ST	0.74	-2688	0.82	-1110	0.73	-3614	0.89	-2169	0.97	-2577	0.86	-4719	0.88	-3380	0.75	-602	0.76	-343
BF 111R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.74	-2664	0.82	-1129	0.81	-3534	0.93	-1673	0.97	-2611	0.87	-4710	0.88	-3370	0.74	-612	0.76	-345
BF 111R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.75	-2708	0.82	-1089	0.88	-2614	0.83	-2496	0.97	-2466	0.86	-4735	0.88	-3321	0.75	-597	0.75	-334
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.74	-2590	0.82	-1129	0.81	-3599	0.83	-2640	0.97	-2534	0.82	-4120	0.88	-3250	0.75	-604	0.76	-343
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.74	-2725	0.82	-1129	0.81	-3556	0.83	-2668	0.97	-2721	0.85	-4879	0.88	-3438	0.74	-614	0.76	-347
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.74	-2700	0.82	-1158	0.80	-3760	0.82	-2836	0.97	-2818	0.85	-4868	0.88	-3504	0.76	-572	0.76	-321
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.76	-2767	0.83	-1019	0.83	-2758	0.86	-2165	0.97	-2021	0.88	-4265	0.89	-2954	0.76	-565	0.76	-312
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.74	-2385	0.82	-1108	0.79	-3068	0.84	-2597	0.97	-2543	0.86	-4756	0.88	-3343	0.75	-605	0.76	-339
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.76	-2613	0.83	-1050	0.81	-2586	0.86	-2296	0.97	-2239	0.87	-4470	0.89	-3113	0.76	-580	0.76	-321
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.74	-2433	0.82	-1125	0.80	-3668	0.83	-2732	0.97	-2649	0.83	-4539	0.88	-3272	0.75	-608	0.76	-343
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.74	-2724	0.82	-1135	0.80	-3652	0.83	-2689	0.97	-2669	0.80	-4520	0.88	-3301	0.74	-611	0.76	-345
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.74	-2735	0.82	-1157	0.80	-3759	0.82	-2833	0.97	-2813	0.86	-4824	0.88	-3498	0.76	-563	0.76	-321
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.74	-2765	0.82	-1150	0.80	-3747	0.82	-2833	0.97	-2810	0.84	-5026	0.88	-3502	0.75	-621	0.76	-346
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500 KV	0.74	-2762	0.82	-1142	0.80	-3739	0.82	-2816	0.97	-2780	0.85	-4873	0.88	-3460	0.78	-526	0.75	-324
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.75	-2751	0.83	-1063	0.82	-3106	0.84	-2334	0.97	-1846	0.87	-4345	0.89	-2937	0.75	-588	0.75	-328
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.75	-2496	0.82	-1061	0.82	-3010	0.86	-2258	0.97	-1921	0.88	-4287	0.89	-2978	0.76	-582	0.75	-324
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.74	-2515	0.82	-1145	0.80	-3742	0.82	-2821	0.97	-2790	0.85	-4900	0.88	-3478	0.77	-554	0.75	-331
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.74	-2753	0.82	-1117	0.81	-3369	0.82	-2234	0.97	-2152	0.87	-4483	0.89	-3116	0.75	-609	0.76	-344
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.75	-2670	0.82	-1094	0.83	-2880	0.85	-2430	0.97	-2481	0.86	-4689	0.88	-3293	0.75	-601	0.75	-337
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.75	-2558	0.82	-1104	0.81	-3519	0.84	-2524	0.96	-3198	0.86	-4367	0.89	-3105	0.75	-587	0.75	-327
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.74	-2677	0.82	-1130	0.81	-3520	0.84	-2611	0.96	-2421	0.86	-4663	0.88	-3280	0.74	-613	0.76	-347
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.74	-2707	0.82	-1142	0.80	-3632	0.83	-2666	0.96	-2619	0.86	-4800	0.88	-3389	0.74	-619	0.76	-350
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.76	-2738	0.82	-1013	0.80	-3719	0.91	-2332	0.97	-2695	0.88	-4456	0.70	-2533	0.75	-605	0.76	-340
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.74	-2683	0.82	-1130	0.79	-3963	0.83	-2850	0.97	-2780	0.85	-4587	0.86	-2101	0.75	-606	0.75	-351
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.74	-2850	0.82	-1117	0.80	-3654	0.83	-2659	0.97	-2602	0.85	-4163	0.87	-2907	0.76	-574	0.76	-318
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.74	-2726	0.82	-1126	0.80	-3683	0.83	-2752	0.97	-2684	0.84	-4629	0.88	-3279	0.75	-606	0.76	-342
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.74	-2729	0.82	-1142	0.80	-3736	0.83	-2806	0.97	-2774	0.86	-4769	0.88	-3465	0.75	-608	0.76	-346
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.74	-2753	0.82	-1142	0.80	-3730	0.83	-2810	0.97	-2775	0.85	-4866	0.88	-3469	0.74	-613	0.76	-347
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV + RAS	0.74	-2752	0.82	-1134	0.84	-3263	0.79	-1933	0.97	-2488	0.85	-4689	0.89	-3224	0.74	-612	0.76	-345
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV + RAS	0.74	-2716	0.82	-1134	0.81	-3534	0.82	-2386	0.97	-2558	0.85	-4764	0.88	-3325	0.74	-610	0.76	-344
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.74	-2729	0.82	-1136	0.81	-3565	0.82	-2537	0.97	-2586	0.86	-4719	0.88	-3358	0.74	-615	0.76	-347
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.74	-2728	0.82	-1141	0.80	-3717	0.83	-2783	0.97	-2744	0.85	-4776	0.88	-3449	0.74	-616	0.76	-348
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.74	-2748	0.82	-1141	0.80	-3737	0.83	-2804	0.97	-2769	0.86	-4695	0.88	-3454	0.74	-611	0.76	-346
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.74	-2753	0.82	-1141	0.80	-3734	0.83	-2798	0.97	-2762	0.86	-4681	0.88	-3449	0.74	-611	0.76	-346
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV + RAS	0.74	-2752	0.81	-1125	0.85	-3241	0.81	-2440	0.97	-2527	0.86	-4633	0.89	-3228	0.74	-623	0.75	-370
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.74	-2788	0.82	-1133	0.81	-3545	0.80	-2331	0.97	-2555	0.86	-4682	0.91	-2991	0.74	-616	0.76	-348
BF 4432 OSTRANDER-TROUTDALE & SPLIT OSTRANDER 500 KV	0.74	-2710	0.82	-1136	0.81	-3595	0.83	-2584	0.98	-2409	0.86	-4700	0.88	-3361	0.74	-615	0.76	-347
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.74	-2729	0.82	-1142	0.80	-3677	0.82	-2654	0.97	-2635	0.86	-4825	0.88	-3419	0.74	-618	0.76	-349
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.74	-2745	0.82	-1141	0.80	-3671	0.82	-2670	0.97	-3509	0.85	-4839	0.88	-3412	0.74	-618	0.76	-349
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.74	-2742	0.82	-1136	0.81	-3620	0.83	-2589	0.97	-3458	0.86	-4746	0.88	-3358	0.74	-615	0.76	-347
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.74	-2733	0.82	-1134	0.81	-3611	0.82	-2580	0.97	-2532	0.86	-4737	0.88	-3350	0.74	-614	0.76	-347
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV + RAS	0.74	-2728	0.82	-1115	0.83	-3432	0.86	-2281	0.97	-3247	0.87	-4425	0.89	-3126	0.75	-595	0.75	-334
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.74	-2683	0.82	-1134	0.84	-3246	0.79	-1927	0.97	-2490	0.86	-4627	0.89	-3218	0.74	-614	0.76	-347
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV + RAS	0.73	-2711	0.81	-1201	0.78	-4453	0.81	-3150	0.96	-3224	0.85	-5072	0.87	-3791	0.72	-665	0.75	-403

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV	0.74	-3019	0.82	-1112	0.82	-3500	0.85	-2466	0.97	-2341	0.87	-4155	0.89	-3086	0.75	-590	0.75	-333
BF 4530 RAVER-PAUL & PAUL-SATSOP 500 KV + RAS	0.73	-2683	0.81	-1211	0.77	-4690	0.80	-3227	0.95	-4512	0.86	-4969	0.87	-3886	0.73	-657	0.74	-412
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.74	-3090	0.82	-1138	0.80	-3687	0.83	-2741	0.97	-2705	0.86	-4757	0.88	-3420	0.74	-613	0.76	-346
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.74	-2743	0.81	-1153	0.80	-3892	0.84	-2703	0.97	-2781	0.87	-4621	0.88	-3450	0.74	-617	0.75	-359
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.74	-2823	0.81	-1157	0.79	-3938	0.83	-2816	0.97	-2848	0.86	-4683	0.88	-3497	0.74	-620	0.75	-361
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.74	-2831	0.82	-1136	0.80	-3668	0.83	-2659	0.97	-2666	0.85	-4763	0.88	-3393	0.74	-611	0.76	-345
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.74	-2738	0.82	-1146	0.80	-3750	0.82	-2852	0.97	-2818	0.85	-4939	0.88	-3500	0.74	-620	0.76	-350
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.77	-2758	0.82	-964	0.81	-3705	0.88	-2435	0.98	-2517	0.87	-3956	0.79	-2937	0.76	-571	0.76	-317
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.74	-2632	0.82	-1137	0.80	-3724	0.83	-2798	0.97	-2755	0.85	-4837	0.88	-3430	0.75	-610	0.76	-345
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.73	-2747	0.81	-1215	0.78	-4279	0.80	-3175	0.97	-3250	0.84	-5284	0.87	-3862	0.76	-594	0.74	-379
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.74	-2965	0.82	-1138	0.80	-3676	0.83	-2693	0.97	-2655	0.87	-4366	0.88	-3369	0.75	-609	0.76	-345
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.74	-2742	0.82	-1115	0.80	-3689	0.83	-2724	0.97	-2655	0.85	-4580	0.88	-3245	0.75	-597	0.75	-335
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.74	-2717	0.82	-1134	0.80	-3638	0.83	-2622	0.97	-2633	0.86	-4727	0.88	-3356	0.75	-609	0.76	-344
BF 4700 HATWAI 500KV & 230 KV + RAS	0.72	-2733	0.82	-1256	0.79	-4198	0.80	-3105	0.97	-3156	0.84	-5070	0.87	-3775	0.76	-588	0.74	-379
BF 4708 HATWAI 500 KV BUS	0.74	-2979	0.82	-1193	0.80	-3730	0.83	-2804	0.97	-2773	0.86	-4592	0.88	-3462	0.78	-511	0.77	-290
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.74	-2782	0.82	-1142	0.80	-3727	0.82	-2806	0.97	-2768	0.85	-4807	0.88	-3462	0.74	-613	0.76	-347
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV + RAS	0.73	-2751	0.81	-1194	0.77	-4465	0.79	-3290	0.96	-3582	0.83	-5257	0.87	-3967	0.73	-654	0.74	-392
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.74	-3009	0.82	-1119	0.80	-3740	0.83	-2815	0.97	-2789	0.85	-4669	0.88	-3447	0.76	-570	0.75	-331
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.74	-2739	0.82	-1146	0.80	-3681	0.83	-2756	0.95	-2846	0.85	-4867	0.88	-3440	0.74	-620	0.76	-350
BF 4888 ASHE-SLATT & CGS 500 KV	0.74	-2749	0.81	-1162	0.79	-4212	0.81	-3005	0.97	-3040	0.84	-4617	0.87	-3617	0.74	-610	0.75	-359
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.75	-2927	0.82	-1093	0.81	-3553	0.84	-2545	0.97	-2446	0.84	-4001	0.88	-3033	0.76	-574	0.76	-319
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.75	-2695	0.82	-1095	0.81	-3649	0.85	-2583	0.97	-2593	0.82	-4207	0.88	-3169	0.76	-576	0.76	-319
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.75	-2711	0.82	-1077	0.83	-3269	0.84	-2185	0.97	-2108	0.86	-4015	0.90	-2772	0.76	-579	0.76	-323
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.76	-2607	0.84	-997	0.80	-2845	0.85	-2433	0.97	-3255	0.86	-4619	0.89	-3203	0.76	-575	0.76	-319
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.76	-1874	0.84	-1023	0.81	-2701	0.86	-2306	0.97	-2224	0.87	-4485	0.89	-3124	0.76	-575	0.76	-318
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.74	-1931	0.82	-1131	0.70	-3516	0.83	-2791	0.97	-2757	0.85	-4937	0.88	-3467	0.74	-614	0.76	-346
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.75	-2707	0.82	-1081	0.83	-3293	0.85	-2326	0.97	-2165	0.87	-4380	0.89	-2989	0.75	-595	0.75	-334
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.74	-2546	0.82	-1110	0.81	-3640	0.84	-2639	0.97	-2486	0.86	-4581	0.89	-2602	0.74	-621	0.75	-352
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.75	-2561	0.82	-1059	0.83	-3186	0.85	-2194	0.97	-2033	0.87	-3851	0.90	-2799	0.76	-567	0.76	-315
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.75	-2559	0.82	-1100	0.82	-3532	0.84	-2501	0.97	-2952	0.86	-4103	0.89	-2977	0.75	-583	0.75	-326
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.74	-2663	0.82	-1114	0.81	-3592	0.84	-2592	0.97	-2199	0.86	-4550	0.88	-2964	0.74	-612	0.76	-346
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.77	-2654	0.83	-979	0.82	-2813	0.85	-2160	0.97	-1942	0.88	-4236	0.89	-2952	0.77	-548	0.76	-300
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.75	-2298	0.82	-1073	0.82	-3143	0.84	-2426	0.97	-2237	0.87	-4537	0.89	-3130	0.75	-587	0.75	-327
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.74	-2553	0.82	-1140	0.80	-3728	0.83	-2786	0.97	-2751	0.85	-4657	0.88	-3443	0.75	-608	0.76	-345
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.74	-2750	0.82	-1139	0.80	-3700	0.83	-2746	0.97	-2700	0.86	-4579	0.88	-3407	0.75	-610	0.76	-346
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.74	-2748	0.82	-1134	0.80	-3679	0.83	-2711	0.97	-2655	0.86	-4400	0.88	-3360	0.75	-600	0.76	-339
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.74	-2738	0.82	-1135	0.80	-3677	0.83	-2711	0.97	-2643	0.84	-4434	0.88	-3358	0.75	-604	0.76	-341
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.74	-2742	0.82	-1141	0.80	-3711	0.83	-2781	0.97	-2728	0.85	-4575	0.88	-3426	0.74	-612	0.76	-346
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.75	-2748	0.82	-1097	0.80	-3660	0.83	-2692	0.97	-2570	0.86	-4578	0.88	-2115	0.75	-603	0.75	-338
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.74	-2718	0.81	-1137	0.79	-3894	0.83	-2825	0.97	-2758	0.85	-4718	0.87	-3111	0.75	-606	0.76	-349
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.77	-2843	0.82	-964	0.81	-3705	0.88	-2435	0.98	-2517	0.87	-3956	0.79	-2937	0.76	-571	0.76	-317
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.74	-2632	0.81	-1142	0.80	-3870	0.83	-2701	0.97	-2657	0.86	-4060	0.87	-2831	0.76	-578	0.75	-332
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.75	-2830	0.82	-1098	0.82	-3476	0.85	-2429	0.97	-2275	0.86	-4198	0.89	-3020	0.75	-584	0.75	-327
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.75	-2662	0.82	-1100	0.82	-3532	0.84	-2514	0.97	-2331	0.85	-4245	0.89	-3082	0.76	-582	0.75	-324
BF 5266 SLATT-BUCKLY 500 KV	0.75	-2676	0.82	-1084	0.83	-3311	0.84	-2356	0.97	-2216	0.87	-4398	0.89	-3057	0.75	-597	0.75	-335

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.74	-2584	0.82	-1142	0.80	-3722	0.83	-2796	0.97	-2756	0.84	-4674	0.88	-3447	0.74	-615	0.76	-347
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.74	-2751	0.82	-1138	0.80	-3703	0.83	-2769	0.97	-2720	0.82	-4375	0.88	-3409	0.74	-611	0.76	-345
BF IPC HEMINGWAY-GRASSLAND 500 KV & HEMINGWAY 500/230 XFMR	0.74	-2750	0.88	-664	0.83	-2649	0.87	-2121	0.97	-1917	0.89	-4096	0.90	-2834	0.80	-452	0.78	-238
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.72	-1994	0.87	-878	0.80	-3401	0.83	-2771	0.97	-3594	0.85	-4916	0.88	-3446	0.75	-599	0.75	-336
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.70	-1865	0.89	-615	0.81	-3361	0.83	-2767	0.97	-2756	0.85	-4913	0.88	-3454	0.77	-507	0.77	-284
BF IPC POPULUS-CHILL-HEMINGWAY 500 KV & HEM 500/230 XFMR	0.70	-2435	0.87	-919	0.80	-3646	0.83	-2800	0.97	-2767	0.85	-4934	0.88	-3466	0.75	-608	0.76	-340
BF LOLO 230KV	0.73	-2494	0.83	-1138	0.80	-3572	0.83	-2681	0.97	-2603	0.86	-4685	0.88	-3327	0.75	-596	0.75	-358
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV	0.81	-1826	0.84	-783	0.86	-2258	0.88	-1585	0.98	-2248	0.93	-3412	0.92	-2422	0.80	-433	0.75	-228
BF PGE GRASSLAND-CEDAR SP 500KV & GRASSLAND-HEM 500KV+PTSN	0.81	-1842	0.84	-790	0.86	-2273	0.88	-1595	0.98	-2259	0.93	-3429	0.92	-2431	0.80	-445	0.78	-232
BF PGE GRASSLAND-COYOTE SP 500KV & CARTY GAS PLANT	0.74	-2775	0.81	-1121	0.81	-3699	0.84	-2642	0.97	-3377	0.86	-4521	0.88	-2958	0.75	-601	0.78	-344
BF PGE GRASSLAND-SLATT 500KV & BOARDMAN PLANT	0.74	-2800	0.81	-1159	0.80	-3917	0.82	-2864	0.97	-3696	0.85	-4798	0.88	-3373	0.74	-616	0.76	-329
BUS: ALVEY 500 KV + RAS	0.74	-2752	0.82	-1140	0.88	-2932	0.80	-2828	0.97	-2896	0.85	-5148	0.87	-3639	0.73	-634	0.75	-376
BUS: BELL BPA 500 KV	0.74	-2807	0.82	-1136	0.80	-3733	0.82	-2811	0.97	-2774	0.85	-4869	0.88	-3450	0.78	-523	0.75	-328
BUS: BUCKLEY 500 KV	0.75	-2745	0.83	-1062	0.83	-3077	0.83	-1992	0.97	-1968	0.89	-4121	0.90	-2855	0.75	-589	0.75	-330
BUS: DIXONVILLE 500 KV	0.75	-2512	0.82	-1079	0.86	-2642	0.82	-2540	0.97	-2452	0.85	-4751	0.88	-3322	0.75	-592	0.75	-330
BUS: HOT SPRINGS 500 KV	0.74	-2564	0.82	-1142	0.80	-3731	0.82	-2812	0.97	-2776	0.85	-4897	0.88	-3468	0.75	-587	0.76	-343
BUS: KEELER 500 KV + RAS	0.74	-2749	0.82	-1116	0.84	-3189	0.87	-2012	0.98	-2046	0.89	-4087	0.90	-2947	0.75	-597	0.75	-335
BUS: ROCK CREEK 500 KV	0.75	-2677	0.82	-1100	0.82	-3522	0.84	-2503	0.97	-2280	0.86	-4270	0.89	-3066	0.76	-582	0.75	-325
BUS: SICKLER 500 KV	0.74	-2676	0.82	-1140	0.80	-3732	0.83	-2793	0.97	-2757	0.86	-4657	0.88	-3445	0.75	-610	0.76	-346
BUS: SUMMER LAKE 500 KV	0.76	-2752	0.85	-983	0.81	-2675	0.86	-2280	0.97	-2186	0.87	-4446	0.89	-3092	0.76	-570	0.76	-316
N-1: ALLSTON-KEELER 500 KV + RAS	0.74	-1848	0.82	-1117	0.82	-3461	0.86	-2300	0.97	-2403	0.86	-4475	0.89	-3146	0.75	-597	0.75	-335
N-1: ALLSTON-NAPAVINE 500 KV	0.74	-2691	0.82	-1134	0.80	-3649	0.83	-2635	0.97	-2644	0.86	-4740	0.88	-3377	0.75	-610	0.76	-344
N-1: ALLSTON-PAUL #2 500 KV	0.74	-2734	0.82	-1134	0.80	-3649	0.83	-2639	0.97	-2644	0.85	-4747	0.88	-3376	0.75	-610	0.76	-344
N-1: ALVERY-DIXONVILLE 500 KV	0.75	-2734	0.82	-1078	0.87	-2528	0.83	-2591	0.97	-2418	0.86	-4730	0.88	-3304	0.75	-592	0.75	-330
N-1: ALVEY-MARION 500 KV	0.75	-2559	0.82	-1090	0.86	-2799	0.83	-2470	0.97	-2361	0.86	-4600	0.89	-3159	0.75	-596	0.75	-334
N-1: ASHE-HANFORD 500 KV	0.74	-2592	0.82	-1141	0.80	-3684	0.83	-2727	0.97	-2733	0.81	-4713	0.88	-3354	0.74	-616	0.76	-347
N-1: ASHE-LOW MON 500 KV	0.74	-2745	0.82	-1119	0.80	-3692	0.82	-2736	0.97	-2669	0.85	-4648	0.88	-3283	0.75	-603	0.75	-339
N-1: ASHE-MARION 500 KV	0.75	-2723	0.82	-1097	0.83	-3329	0.84	-2242	0.97	-2205	0.87	-4265	0.89	-2962	0.75	-592	0.75	-333
N-1: ASHE-SLATT 500 KV	0.75	-2634	0.82	-1107	0.81	-3597	0.83	-2600	0.97	-3388	0.85	-4238	0.88	-3198	0.76	-581	0.76	-323
N-1: BELL-COULEE 500 KV	0.74	-2716	0.82	-1136	0.80	-3730	0.82	-2810	0.97	-2772	0.85	-4881	0.88	-3452	0.77	-544	0.75	-331
N-1: BELL-TAFT 500 KV	0.74	-2744	0.82	-1140	0.80	-3732	0.82	-2814	0.97	-2777	0.85	-4924	0.88	-3459	0.78	-538	0.75	-333
N-1: BIG EDDY-CELILO 500 KV	0.74	-2748	0.82	-1143	0.80	-3727	0.82	-2811	0.97	-2775	0.85	-4936	0.88	-3472	0.74	-618	0.76	-348
N-1: BIG EDDY-JOHN DAY 500 KV	0.74	-2751	0.82	-1144	0.80	-3692	0.82	-2786	0.96	-2772	0.85	-4900	0.88	-3448	0.74	-619	0.76	-350
N-1: BIG EDDY-KNIGHT 500 KV	0.74	-2748	0.82	-1130	0.80	-3665	0.83	-2726	0.97	-2554	0.85	-4736	0.88	-3374	0.75	-608	0.76	-342
N-1: BIG EDDY-OSTRANDER 500 KV	0.74	-2730	0.82	-1141	0.80	-3676	0.82	-2707	0.97	-3514	0.85	-4867	0.88	-3431	0.74	-618	0.76	-349
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.74	-2742	0.82	-1064	0.80	-3695	0.83	-2788	0.97	-2742	0.85	-4906	0.88	-3450	0.74	-613	0.76	-345
N-1: BRADY-ANTELOPE 230 KV	0.74	-2632	0.82	-1140	0.80	-3720	0.82	-2805	0.97	-2768	0.85	-4919	0.88	-3465	0.75	-576	0.76	-346
N-1: BROADVIEW-GARRISON #1 500 KV	0.74	-2741	0.82	-1147	0.80	-3748	0.82	-2826	0.97	-2797	0.85	-4913	0.88	-3483	0.80	-482	0.78	-279
N-1: BROWNLEE-ONTARIO 230 KV	0.76	-2755	0.82	-1029	0.80	-3682	0.83	-2776	0.97	-2721	0.85	-4881	0.88	-3430	0.74	-610	0.76	-344
N-1: BUCKLEY-GRIZZLY 500 KV	0.75	-2530	0.82	-1091	0.81	-3374	0.83	-2526	0.97	-2376	0.86	-4631	0.88	-3253	0.75	-597	0.75	-334
N-1: BUCKLEY-MARION 500 KV	0.74	-2612	0.82	-1135	0.80	-3602	0.80	-2362	0.97	-2598	0.86	-4739	0.88	-3330	0.74	-617	0.76	-349
N-1: BUCKLEY-SLATT 500 KV	0.75	-2718	0.82	-1084	0.83	-3311	0.84	-2356	0.97	-2216	0.87	-4398	0.89	-3057	0.75	-597	0.75	-335
N-1: CAPTAIN JACK-OLINDA 500 KV	0.75	-2584	0.83	-1069	0.81	-2575	0.85	-2426	0.97	-2367	0.86	-4602	0.88	-3235	0.75	-585	0.75	-326
N-1: CAPT JACK-KFALLS 500 KV	0.74	-2479	0.82	-1104	0.71	-3580	0.86	-2558	0.97	-2629	0.85	-4915	0.87	-3469	0.75	-603	0.75	-338
N-1: CASCADE CROSSING 500 KV	0.74	-2621	0.82	-1119	0.83	-3349	0.84	-2194	0.97	-2346	0.87	-4446	0.90	-3078	0.74	-613	0.76	-347

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: CHIEF JO-COULEE 500 KV	0.74	-2654	0.82	-1142	0.80	-3726	0.82	-2809	0.97	-3646	0.85	-4865	0.88	-3469	0.74	-616	0.76	-348
N-1: CHIEF JO-MONROE 500 KV	0.74	-2751	0.82	-1140	0.80	-3714	0.83	-2784	0.97	-2733	0.85	-4720	0.88	-3437	0.74	-613	0.76	-346
N-1: CHIEF JO-SICKLER 500 KV	0.74	-2747	0.82	-1141	0.80	-3726	0.83	-2802	0.97	-2762	0.86	-4759	0.88	-3457	0.75	-610	0.76	-345
N-1: COULEE-HANFORD 500 KV	0.74	-2750	0.82	-1137	0.80	-3739	0.83	-2773	0.97	-2752	0.84	-4317	0.88	-3422	0.75	-593	0.75	-335
N-1: COULEE-SCHULTZ 500 KV	0.74	-2753	0.82	-1136	0.80	-3705	0.83	-2770	0.97	-2716	0.85	-4568	0.88	-3412	0.75	-602	0.76	-340
N-1: COVINGTON4-RAVER 500 KV	0.74	-2744	0.82	-1144	0.80	-3731	0.83	-2813	0.97	-2783	0.85	-4903	0.88	-3477	0.74	-618	0.76	-349
N-1: COVINGTON5-RAVER 500 KV	0.74	-2752	0.82	-1144	0.80	-3731	0.83	-2812	0.97	-2783	0.85	-4901	0.88	-3477	0.74	-618	0.76	-349
N-1: COYOTE-LONGHORN 500 KV	0.74	-2752	0.82	-1125	0.80	-3689	0.83	-2774	0.97	-2673	0.85	-4824	0.88	-3071	0.75	-608	0.76	-342
N-1: CUSTERW-MONROE 500 KV	0.74	-2756	0.82	-1142	0.80	-3738	0.83	-2810	0.97	-2777	0.86	-4787	0.88	-3467	0.75	-609	0.76	-346
N-1: DIXONVILLE-MERIDIAN 500 KV	0.75	-2753	0.82	-1089	0.85	-2841	0.83	-2563	0.97	-2489	0.85	-4759	0.88	-3334	0.75	-596	0.75	-333
N-1: DRYCREEK-LOLO 230 KV	0.74	-2592	0.82	-1142	0.80	-3727	0.82	-2812	0.97	-2778	0.85	-4937	0.88	-3473	0.74	-617	0.76	-348
N-1: DRYCREEK-N LEWISTON 230 KV	0.74	-2750	0.82	-1143	0.80	-3725	0.82	-2810	0.97	-2775	0.85	-4929	0.88	-3470	0.74	-617	0.76	-348
N-1: DRYCREEK-WALA AVA 230 KV	0.74	-2752	0.82	-1144	0.80	-3725	0.82	-2810	0.97	-2774	0.85	-4924	0.88	-3457	0.74	-616	0.76	-347
N-1: DWORSHAK-HATWAI 500 KV + RAS	0.74	-2752	0.82	-1170	0.80	-3790	0.82	-2859	0.97	-2847	0.86	-4760	0.88	-3526	0.75	-596	0.77	-301
N-1: DWORSHAK-TAFT 500 KV	0.74	-2778	0.82	-1156	0.80	-3754	0.82	-2829	0.97	-2808	0.86	-4817	0.88	-3496	0.79	-505	0.76	-310
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.74	-2761	0.82	-1144	0.80	-3732	0.83	-2794	0.97	-2773	0.85	-4808	0.88	-3467	0.74	-619	0.76	-349
N-1: ECHO LAKE-RAVER 500 KV	0.74	-2754	0.82	-1141	0.80	-3725	0.83	-2806	0.97	-2762	0.85	-4859	0.88	-3459	0.74	-614	0.76	-347
N-1: ECHO LAKE-SCHULTZ 500 KV	0.74	-2750	0.82	-1140	0.80	-3696	0.83	-2781	0.97	-2721	0.85	-4768	0.88	-3432	0.74	-615	0.76	-348
N-1: ECHO LAKE-SNOK TAP 500 KV	0.74	-2746	0.82	-1140	0.80	-3729	0.83	-2791	0.97	-2755	0.86	-4695	0.88	-3449	0.75	-608	0.76	-345
N-1: GARRISON-TAFT #2 500 KV	0.74	-2750	0.82	-1146	0.80	-3739	0.82	-2822	0.97	-2792	0.85	-4947	0.88	-3483	0.76	-588	0.76	-340
N-1: GOLDBILL-PLACER 115 KV	0.74	-2756	0.82	-1145	0.80	-3759	0.82	-2829	0.97	-2800	0.85	-4963	0.88	-3486	0.74	-619	0.76	-348
N-1: GRASSLAND-COYOTE 500 KV	0.74	-2755	0.81	-1113	0.80	-3625	0.83	-2684	0.97	-2578	0.86	-4695	0.88	-3054	0.75	-604	0.75	-339
N-1: GRASSLAND-SLATT 500 KV	0.74	-2737	0.82	-1141	0.80	-3721	0.82	-2800	0.97	-2688	0.85	-4909	0.88	-3395	0.74	-619	0.76	-349
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.75	-2713	0.82	-1076	0.82	-3170	0.84	-2446	0.97	-2282	0.86	-4573	0.89	-3149	0.75	-588	0.75	-328
N-1: GRIZZLY-MALIN 500 KV	0.75	-2570	0.83	-1065	0.81	-2968	0.85	-2366	0.97	-2275	0.87	-4499	0.89	-3130	0.75	-589	0.75	-329
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.76	-2510	0.83	-1029	0.81	-3106	0.85	-2419	0.97	-2318	0.86	-4557	0.89	-3143	0.76	-569	0.76	-314
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.75	-2433	0.83	-1062	0.81	-2943	0.85	-2343	0.97	-2252	0.87	-4479	0.89	-3118	0.75	-588	0.75	-328
N-1: GRIZZLY-ROUND BU 500 KV	0.74	-2498	0.82	-1142	0.80	-3713	0.83	-2798	0.97	-2734	0.85	-4920	0.88	-3461	0.74	-617	0.76	-348
N-1: HANFORD-LOW MON 500 KV	0.74	-2745	0.82	-1131	0.80	-3687	0.83	-2765	0.97	-2701	0.84	-4697	0.88	-3319	0.75	-611	0.76	-345
N-1: HANFORD-VANTAGE 500 KV	0.74	-2735	0.82	-1138	0.80	-3703	0.83	-2769	0.97	-2720	0.82	-4379	0.88	-3410	0.74	-611	0.76	-345
N-1: HANFORD-WAUTOMA 500 KV	0.74	-2750	0.82	-1137	0.80	-3698	0.83	-2776	0.97	-2721	0.84	-4769	0.88	-3422	0.74	-614	0.76	-346
N-1: HATWAI 500/230 KV XFMR + RAS	0.73	-2742	0.82	-1181	0.80	-3658	0.83	-2761	0.97	-2697	0.85	-4799	0.88	-3410	0.75	-609	0.76	-341
N-1: HATWAI-LOLO 230 KV	0.74	-2775	0.82	-1146	0.80	-3711	0.83	-2798	0.97	-2756	0.85	-4898	0.88	-3455	0.74	-614	0.76	-346
N-1: HATWAI-LOW GRAN 500 KV	0.74	-2755	0.82	-1120	0.80	-3747	0.82	-2825	0.97	-2804	0.85	-4723	0.88	-3470	0.76	-570	0.75	-331
N-1: HATWAI-N LEWISTON 230 KV	0.74	-2740	0.82	-1145	0.80	-3725	0.82	-2810	0.97	-2774	0.85	-4926	0.88	-3471	0.74	-616	0.76	-348
N-1: HELLS CANYON-BROWNLEE 230 KV	0.75	-2753	0.81	-1019	0.80	-3540	0.84	-2649	0.97	-2565	0.86	-4653	0.89	-3194	0.75	-589	0.75	-332
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.73	-2651	0.83	-1170	0.80	-3620	0.83	-2739	0.97	-2673	0.85	-4792	0.89	-3284	0.75	-608	0.76	-342
N-1: HEMINGWAY-GRASSLAND 500 KV	0.80	-2761	0.84	-815	0.83	-2683	0.87	-2122	0.97	-1919	0.89	-4102	0.90	-2834	0.80	-463	0.78	-241
N-1: HEMINGWAY-GRASSLAND 500 KV + FACRI	0.76	-1897	0.82	-1008	0.81	-4194	0.82	-3008	0.97	-3934	0.85	-5034	0.88	-3545	0.76	-558	0.76	-308
N-1: HEMINGWAY-GRASSLAND 500 KV + PTSN SHUNT	0.80	-2299	0.83	-871	0.83	-2759	0.87	-2167	0.97	-1982	0.89	-4174	0.90	-2869	0.79	-479	0.77	-248
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.75	-2040	0.84	-1044	0.80	-3390	0.83	-2761	0.97	-3577	0.85	-4904	0.88	-3437	0.75	-596	0.75	-334
N-1: HILL TOP 345/230 XFMR	0.74	-1977	0.82	-1119	0.80	-3637	0.83	-2808	0.97	-2775	0.85	-4930	0.88	-3466	0.74	-610	0.76	-344
N-1: HORSE HV-MCNARY 230 KV	0.74	-2655	0.82	-1130	0.80	-3693	0.83	-2756	0.97	-2696	0.85	-4822	0.89	-3267	0.74	-616	0.76	-347
N-1: HOT SPRINGS-TAFT 500 KV	0.74	-2733	0.82	-1141	0.80	-3728	0.82	-2810	0.97	-2775	0.85	-4895	0.88	-3467	0.75	-587	0.76	-343
N-1: HUMBOLDT-COYOTE CK 345 KV	0.74	-2748	0.82	-1166	0.81	-3371	0.84	-2662	0.97	-2615	0.85	-4804	0.88	-3404	0.74	-625	0.75	-355

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.74	-2696	0.81	-1153	0.80	-3703	0.82	-2811	0.97	-2779	0.85	-4951	0.88	-3480	0.74	-625	0.75	-353
N-1: ING500-CUSTERW 500 KV	0.74	-2777	0.82	-1143	0.80	-3731	0.82	-2811	0.97	-2776	0.85	-4877	0.88	-3470	0.74	-614	0.76	-347
N-1: JOHN DAY-MARION 500 KV	0.74	-2752	0.82	-1131	0.81	-3552	0.81	-2368	0.97	-2510	0.86	-4732	0.89	-3288	0.74	-614	0.76	-347
N-1: JOHN DAY-ROCK CK 500 KV	0.75	-2716	0.82	-1103	0.82	-3539	0.84	-2540	0.97	-2332	0.86	-4408	0.89	-3121	0.75	-585	0.75	-326
N-1: JOHN DAY-SLATT 500 KV	0.74	-2680	0.82	-1124	0.81	-3628	0.83	-2646	0.97	-2259	0.86	-4657	0.88	-3215	0.74	-614	0.76	-347
N-1: KFALLS-MERIDIAN 500 KV	0.74	-2677	0.82	-1132	0.77	-3733	0.91	-1841	0.97	-2664	0.86	-4761	0.88	-3399	0.74	-614	0.76	-346
N-1: KNIGHT-WAUTOMA 500 KV	0.75	-2719	0.82	-1101	0.82	-3492	0.84	-2466	0.97	-2304	0.86	-4305	0.89	-3061	0.75	-586	0.75	-328
N-1: LAGRANDE-NORTH POWDER 230 KV	0.74	-2669	0.83	-1094	0.80	-3665	0.83	-2772	0.97	-2719	0.85	-4888	0.88	-3391	0.74	-610	0.76	-344
N-1: LANES-MARION 500 KV	0.74	-2739	0.82	-1133	0.81	-3516	0.83	-2612	0.97	-2630	0.85	-4784	0.88	-3364	0.74	-614	0.76	-346
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.74	-2722	0.82	-1141	0.80	-3727	0.82	-2810	0.97	-2773	0.85	-4911	0.88	-3465	0.74	-615	0.76	-347
N-1: LIT GOOSE-LOW MON 500 KV	0.74	-2750	0.82	-1138	0.80	-3726	0.83	-2801	0.97	-2761	0.85	-4859	0.88	-3439	0.74	-612	0.76	-345
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.74	-2748	0.82	-1139	0.80	-3730	0.82	-2810	0.97	-2775	0.85	-4888	0.88	-3459	0.75	-611	0.76	-345
N-1: LOW MON-SAC TAP 500 KV	0.74	-2749	0.82	-1132	0.80	-3698	0.82	-2732	0.97	-2693	0.85	-4302	0.87	-2994	0.76	-582	0.76	-324
N-1: MALIN 500/230 XFMR	0.74	-2748	0.82	-1131	0.82	-3561	0.83	-2679	0.97	-2728	0.85	-4884	0.88	-3442	0.74	-614	0.76	-347
N-1: MALIN-HILLTOP 230 KV	0.74	-2704	0.82	-1116	0.80	-3649	0.83	-2797	0.97	-2757	0.85	-4915	0.88	-3457	0.75	-609	0.76	-343
N-1: MALIN-ROUND MTN #1 500 KV	0.74	-2643	0.82	-1109	0.80	-3087	0.84	-2604	0.97	-2551	0.85	-4761	0.88	-3347	0.75	-605	0.76	-339
N-1: MALIN-ROUND MTN #2 500 KV	0.74	-2618	0.82	-1107	0.80	-3058	0.84	-2592	0.97	-2538	0.86	-4753	0.88	-3341	0.75	-604	0.75	-339
N-1: MALIN-SUMMER LAKE 500 KV	0.74	-2611	0.82	-1139	0.80	-3082	0.84	-2536	0.97	-2504	0.86	-4702	0.88	-3304	0.74	-618	0.76	-349
N-1: MAPLE VLY-ROCKY RH 345 KV	0.74	-2577	0.82	-1141	0.80	-3723	0.83	-2801	0.97	-2759	0.85	-4825	0.88	-3457	0.74	-616	0.76	-348
N-1: MARION-PEARL 500 KV	0.74	-2750	0.82	-1139	0.83	-3321	0.80	-1978	0.97	-2604	0.85	-4800	0.89	-3282	0.74	-617	0.76	-348
N-1: MARION-SANTIAM 500 KV	0.74	-2725	0.82	-1148	0.80	-3782	0.82	-2911	0.97	-2861	0.84	-5002	0.89	-3360	0.74	-619	0.76	-349
N-1: MCLOUGLIN-OSTRANDER 230 KV	0.74	-2766	0.82	-1143	0.80	-3725	0.83	-2775	0.97	-2782	0.85	-4922	0.88	-3467	0.74	-618	0.76	-349
N-1: MCNARY 500/230 KV XFMR	0.75	-2752	0.82	-1056	0.80	-3789	0.86	-2701	0.97	-2856	0.86	-4861	0.80	-3600	0.74	-618	0.76	-349
N-1: MCNARY S2-MCNARY S3 230 KV	0.74	-2720	0.82	-1143	0.80	-3727	0.82	-2813	0.97	-2777	0.85	-4924	0.89	-3351	0.74	-617	0.76	-348
N-1: MCNARY-BOARD T1 230 KV	0.74	-2751	0.82	-1135	0.80	-3678	0.83	-2785	0.97	-2740	0.85	-4922	0.88	-3452	0.74	-616	0.76	-346
N-1: MCNARY-JOHN DAY 500 KV	0.75	-2730	0.82	-1098	0.81	-3572	0.84	-2561	0.97	-2355	0.86	-4493	0.89	-2735	0.75	-606	0.76	-342
N-1: MCNARY-LONGHORN 500 KV	0.75	-2657	0.82	-1099	0.80	-3701	0.83	-2739	0.97	-2645	0.85	-4662	0.87	-2159	0.75	-602	0.75	-337
N-1: MCNARY-ROSS 345 KV	0.74	-2743	0.82	-1127	0.80	-3659	0.83	-2694	0.97	-2645	0.86	-4757	0.89	-3234	0.74	-617	0.76	-348
N-1: MCNARY-ROUNDUP 230 KV	0.75	-2726	0.85	-991	0.80	-3600	0.83	-2720	0.97	-2655	0.85	-4824	0.88	-3326	0.75	-605	0.76	-340
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.74	-2682	0.82	-1123	0.80	-3660	0.83	-2673	0.97	-2617	0.85	-4246	0.87	-2919	0.76	-580	0.76	-322
N-1: MIDPOINT-HEMINGWAY 500 KV	0.70	-2181	0.84	-1003	0.80	-3430	0.83	-2747	0.97	-2711	0.85	-4901	0.88	-3446	0.77	-541	0.77	-297
N-1: MIDPOINT-HEMINGWAY 500 KV + PTSN SHUNT	0.70	-2189	0.84	-1008	0.80	-3440	0.83	-2753	0.97	-2720	0.85	-4918	0.88	-3454	0.77	-553	0.76	-300
N-1: MIDPOINT-HUMBOLDT 345 KV	0.74	-2220	0.81	-1203	0.81	-3374	0.84	-2673	0.97	-2635	0.85	-4834	0.88	-3423	0.74	-629	0.75	-355
N-1: NAPA-VINE-PAUL 500 KV	0.74	-2811	0.82	-1139	0.80	-3693	0.83	-2764	0.97	-2718	0.85	-4865	0.88	-3429	0.74	-614	0.76	-346
N-1: OLYMPIA-PAUL 500 KV	0.74	-2744	0.82	-1145	0.80	-3744	0.82	-2840	0.97	-2807	0.84	-4958	0.88	-3493	0.74	-619	0.76	-349
N-1: ONTARIO-CALDWELL 230 KV	0.74	-2756	0.83	-1100	0.80	-3698	0.83	-2792	0.97	-2747	0.85	-4910	0.88	-3454	0.74	-614	0.76	-346
N-1: OSTRANDER-KNIGHT 500 KV	0.74	-2639	0.82	-1135	0.80	-3635	0.83	-2622	0.97	-2586	0.85	-4763	0.88	-3360	0.74	-614	0.76	-347
N-1: OSTRANDER-PEARL 500 KV	0.74	-2730	0.82	-1142	0.80	-3717	0.81	-2736	0.97	-2725	0.85	-4921	0.88	-3460	0.74	-618	0.76	-349
N-1: OSTRANDER-TROUTDALE 500 KV	0.74	-2748	0.82	-1145	0.80	-3730	0.83	-2767	0.97	-2780	0.85	-4913	0.88	-3473	0.74	-619	0.76	-349
N-1: OXBOW-BROWNLEE #2 230 KV	0.74	-2755	0.82	-1129	0.80	-3722	0.82	-2808	0.97	-2771	0.85	-4931	0.88	-3468	0.74	-617	0.76	-348
N-1: OXBOW-LOLO 230 KV	0.73	-2743	0.83	-1127	0.80	-3572	0.83	-2681	0.97	-2604	0.86	-4692	0.88	-3327	0.75	-596	0.75	-329
N-1: PAUL-SATSOP 500 KV	0.74	-2746	0.82	-1143	0.80	-3725	0.83	-2790	0.97	-2769	0.86	-4870	0.88	-3468	0.74	-618	0.76	-349
N-1: PEARL-KEELER 500 KV	0.74	-2751	0.82	-1138	0.81	-3580	0.83	-2558	0.97	-2606	0.85	-4802	0.88	-3380	0.74	-612	0.76	-345
N-1: PEARL-KEELER 500 KV + RAS	0.74	-2739	0.82	-1138	0.81	-3580	0.83	-2558	0.97	-2606	0.85	-4802	0.88	-3380	0.74	-612	0.76	-345
N-1: PINTO-FOUR CORNER 345 KV	0.74	-2739	0.82	-1146	0.80	-3698	0.82	-2804	0.97	-2768	0.85	-4932	0.88	-3471	0.74	-620	0.76	-350

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: PONDEROSA A 500/230 KV XFMR	0.74	-2756	0.82	-1143	0.80	-3722	0.83	-2809	0.97	-2777	0.85	-4937	0.88	-3474	0.74	-618	0.76	-349
N-1: PONDEROSA B 500/230 KV XFMR	0.74	-2751	0.82	-1142	0.80	-3727	0.83	-2812	0.97	-2779	0.85	-4939	0.88	-3474	0.74	-617	0.76	-348
N-1: RAVER-PAUL 500 KV	0.74	-2749	0.82	-1112	0.81	-3512	0.84	-2504	0.97	-2348	0.87	-4195	0.89	-3088	0.75	-590	0.75	-333
N-1: RAVER-TACOMA 500 KV	0.74	-2683	0.82	-1142	0.80	-3723	0.83	-2796	0.97	-3636	0.85	-4842	0.88	-3462	0.74	-617	0.76	-348
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.74	-2750	0.81	-1152	0.80	-3643	0.83	-2783	0.97	-2741	0.85	-4910	0.88	-3459	0.74	-624	0.75	-354
N-1: ROBINSON-HARRY ALLEN 500 KV	0.75	-2779	0.82	-1121	0.80	-3747	0.82	-2818	0.97	-2786	0.85	-4941	0.88	-3472	0.74	-613	0.76	-346
N-1: ROCK CK-WAUTOMA 500 KV	0.75	-2645	0.82	-1103	0.82	-3545	0.84	-2536	0.97	-2357	0.86	-4325	0.89	-3111	0.75	-583	0.75	-325
N-1: ROUND MTN-TABLE MTN 500 KV	0.74	-2682	0.82	-1120	0.80	-3339	0.83	-2703	0.97	-2654	0.85	-4845	0.88	-3409	0.75	-608	0.76	-342
N-1: ROUNDUP-LAGRANDE 230 KV	0.74	-2671	0.83	-1078	0.80	-3624	0.83	-2744	0.97	-2677	0.85	-4847	0.88	-3335	0.75	-607	0.76	-342
N-1: SCHULTZ-SICKLER 500 KV	0.74	-2732	0.82	-1140	0.80	-3734	0.83	-2797	0.97	-2760	0.85	-4697	0.88	-3448	0.75	-611	0.76	-346
N-1: SCHULTZ-VANTAGE 500 KV	0.74	-2752	0.82	-1143	0.80	-3723	0.83	-2801	0.97	-2763	0.84	-4698	0.88	-3453	0.74	-615	0.76	-347
N-1: SCHULTZ-WAUTOMA 500 KV	0.74	-2751	0.82	-1136	0.80	-3686	0.83	-2735	0.97	-2669	0.84	-4515	0.88	-3381	0.75	-606	0.76	-342
N-1: SIGURD-GLEN CANYON 230 KV	0.74	-2745	0.82	-1142	0.80	-3728	0.82	-2814	0.97	-2780	0.85	-4939	0.88	-3474	0.74	-617	0.76	-348
N-1: SLATT 500/230 KV XFMR	0.74	-2747	0.81	-1155	0.80	-3888	0.83	-2844	0.97	-2815	0.85	-4801	0.88	-3434	0.74	-617	0.75	-357
N-1: SLATT-LONGHORN 500 KV	0.74	-2823	0.82	-1127	0.80	-3670	0.82	-2728	0.97	-2650	0.85	-4785	0.88	-3143	0.74	-615	0.76	-347
N-1: SNOK TAP-SNOKING 500 KV	0.74	-2721	0.82	-1143	0.80	-3732	0.83	-2811	0.97	-2778	0.85	-4882	0.88	-3473	0.74	-617	0.76	-348
N-1: TABLE MTN-TESLA 500 KV	0.74	-2752	0.82	-1124	0.80	-3449	0.83	-2763	0.97	-2717	0.85	-4885	0.88	-3439	0.75	-608	0.76	-342
N-1: TABLE MTN-VACA DIXON 500 KV	0.74	-2689	0.82	-1114	0.81	-3228	0.83	-2714	0.97	-2660	0.85	-4846	0.88	-3411	0.75	-604	0.75	-339
N-1: VANTAGE 500/230 KV XFMR #1	0.74	-2648	0.82	-1142	0.80	-3727	0.82	-2809	0.97	-2775	0.84	-4953	0.88	-3470	0.74	-618	0.76	-348
N-1: VANTAGE 500/230 KV XFMR #2	0.74	-2751	0.82	-1142	0.80	-3727	0.82	-2809	0.97	-2774	0.84	-4953	0.88	-3470	0.74	-618	0.76	-348
N-1: WALLA WALLA-TALBOT 230 KV	0.74	-2751	0.82	-1150	0.80	-3723	0.82	-2805	0.97	-2765	0.85	-4882	0.88	-3460	0.74	-610	0.76	-345
N-1: WALLA WALLA-WALLULA 230 KV	0.74	-2751	0.82	-1132	0.80	-3714	0.83	-2801	0.97	-2764	0.85	-4925	0.89	-3330	0.74	-616	0.76	-348
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.76	-2752	0.82	-1042	0.85	-3067	0.87	-1959	0.98	-1733	0.88	-3418	0.90	-2539	0.77	-536	0.77	-295
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.75	-2561	0.82	-1085	0.84	-3082	0.83	-1780	0.98	-1845	0.88	-3987	0.91	-2705	0.75	-590	0.75	-333
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.76	-2584	0.83	-1017	0.87	-2702	0.88	-1694	0.98	-1395	0.91	-3457	0.91	-2390	0.76	-562	0.76	-313
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.75	-2390	0.82	-1080	0.83	-3235	0.85	-2143	0.97	-2059	0.87	-4083	0.90	-2636	0.75	-588	0.75	-331
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.75	-2592	0.83	-1072	0.84	-3163	0.85	-2053	0.97	-2635	0.88	-3926	0.90	-2652	0.75	-587	0.75	-330
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.76	-2533	0.82	-1059	0.83	-3374	0.85	-2320	0.97	-2972	0.87	-3835	0.89	-2491	0.76	-569	0.76	-316
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.75	-2606	0.82	-1083	0.82	-3474	0.85	-2443	0.97	-3192	0.86	-4040	0.89	-2804	0.76	-575	0.76	-319
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.74	-2664	0.81	-1189	0.79	-4029	0.81	-3027	0.97	-3049	0.85	-5066	0.87	-3711	0.86	-300	0.77	-237
N-2: BETHEL-CEDAR SP 500KV & BETHEL-ROUND BUTTE 230 KV	0.74	-2683	0.81	-1128	0.81	-3513	0.84	-2256	0.97	-3385	0.86	-4601	0.89	-3242	0.74	-617	0.76	-349
N-2: BETHEL-CEDAR SP 500KV & BETHEL-SANTIAM 230KV	0.74	-2682	0.81	-1126	0.81	-3521	0.84	-2348	0.97	-3388	0.86	-4636	0.89	-3260	0.74	-616	0.76	-349
N-2: BETHEL-CEDAR SP 500KV & SANTIAM-MIKKALO 500KV	0.74	-2659	0.82	-1120	0.83	-3361	0.84	-2202	0.98	-3151	0.87	-4465	0.90	-3125	0.74	-614	0.76	-347
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.74	-2836	0.82	-1139	0.80	-3647	0.82	-2616	0.97	-2613	0.85	-4818	0.88	-3391	0.74	-617	0.76	-349
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.74	-2737	0.82	-1140	0.80	-3666	0.82	-2668	0.97	-3490	0.85	-4836	0.88	-3413	0.74	-618	0.76	-349
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.77	-2740	0.80	-849	0.80	-3554	0.83	-2685	0.97	-3483	0.85	-4774	0.88	-3361	0.75	-598	0.75	-333
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.77	-2275	0.80	-848	0.80	-3550	0.83	-2682	0.97	-2608	0.85	-4771	0.88	-3358	0.75	-598	0.75	-333
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.75	-2270	0.82	-1105	0.80	-3679	0.83	-2780	0.97	-2729	0.85	-4878	0.88	-3434	0.73	-621	0.74	-374
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.79	-2436	0.83	-1076	0.80	-3633	0.83	-2761	0.97	-2698	0.85	-4844	0.88	-3412	0.73	-594	0.74	-379
N-2: BROADVIEW-GARRISONT #1 & #2 500 KV + RAS	0.73	-2132	0.81	-1172	0.78	-4376	0.80	-3215	0.96	-3463	0.84	-5459	0.87	-3915	0.70	-599	0.82	-413
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.74	-2927	0.82	-1045	0.83	-3205	0.85	-2393	0.97	-2254	0.87	-4240	0.90	-2880	0.76	-550	0.76	-299
N-2: BROWNLEE-OSBOW & BROWNLEE-HELLS CANYON 230 KV	0.75	-2562	0.81	-1010	0.80	-3533	0.84	-2644	0.97	-2558	0.86	-4646	0.89	-3189	0.75	-588	0.75	-331
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.74	-2640	0.82	-1123	0.82	-3350	0.80	-1831	0.97	-2322	0.87	-4448	0.90	-3088	0.74	-613	0.76	-347
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.74	-2674	0.82	-1137	0.80	-3697	0.83	-2761	0.97	-2704	0.87	-4455	0.88	-3405	0.75	-603	0.76	-342
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.74	-2744	0.82	-1138	0.80	-3697	0.83	-2765	0.97	-2710	0.86	-4586	0.88	-3418	0.75	-610	0.76	-345

Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.74	-2745	0.82	-1140	0.80	-3715	0.83	-2778	0.97	-2732	0.85	-4671	0.88	-3435	0.74	-612	0.76	-346
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.74	-2748	0.82	-1140	0.80	-3720	0.83	-2788	0.97	-2744	0.86	-4650	0.88	-3442	0.75	-608	0.76	-344
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.74	-2748	0.82	-1142	0.80	-3723	0.83	-2801	0.97	-2760	0.86	-4775	0.88	-3458	0.74	-615	0.76	-348
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.74	-2750	0.82	-1127	0.80	-3731	0.84	-2700	0.97	-2708	0.82	-3623	0.88	-3342	0.76	-574	0.75	-324
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.74	-2751	0.82	-1121	0.80	-3665	0.83	-2633	0.97	-2564	0.88	-3797	0.88	-3215	0.76	-559	0.76	-317
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.74	-2719	0.82	-1141	0.80	-3739	0.83	-2802	0.97	-2773	0.86	-4725	0.88	-3462	0.75	-605	0.76	-345
N-2: CUSTERW-MONROE #1 & #2 500 KV + RAS	0.73	-2753	0.81	-1204	0.77	-4472	0.79	-3277	0.96	-3523	0.84	-5495	0.87	-3911	0.73	-656	0.75	-396
N-2: DC-BIPOLE	0.77	-3010	0.84	-986	0.82	-2749	0.84	-2669	0.93	-3067	0.86	-4915	0.88	-3522	0.75	-584	0.75	-351
N-2: DOUBLE PALO VERDE	0.79	-2387	0.84	-666	0.86	-3126	0.87	-2345	0.97	-2283	0.90	-3503	0.89	-2947	0.78	-490	0.76	-300
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.74	-2357	0.82	-1144	0.80	-3732	0.83	-2794	0.97	-3646	0.85	-4806	0.88	-3466	0.74	-619	0.76	-349
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.74	-2754	0.82	-1142	0.80	-3722	0.83	-2772	0.97	-2740	0.86	-4667	0.88	-3439	0.74	-617	0.76	-348
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.73	-2752	0.81	-1165	0.79	-4012	0.81	-3005	0.97	-3015	0.84	-5126	0.87	-3688	0.83	-466	0.74	-451
N-2: GRASSLAND-CEDAR SP 500KV & SLATT-BUCKLEY 500KV	0.75	-2438	0.83	-1047	0.86	-2881	0.88	-1755	0.98	-2428	0.91	-3760	0.91	-2648	0.76	-589	0.75	-332
N-2: GRASSLAND-COYOTE 500KV & SLATT-LONGHORN 500KV	0.77	-2619	0.82	-1000	0.84	-3255	0.88	-2187	0.98	-2642	0.89	-3584	0.91	-1451	0.76	-564	0.76	-314
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV + RAS	0.75	-2860	0.82	-1077	0.80	-3097	0.84	-2628	0.97	-2732	0.86	-5027	0.88	-3562	0.73	-632	0.74	-390
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV + RAS	0.76	-2646	0.82	-1040	0.79	-3404	0.82	-2746	0.97	-2811	0.86	-5102	0.88	-3608	0.74	-616	0.75	-375
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV + RAS	0.74	-2581	0.82	-1171	0.78	-3141	0.83	-2791	0.97	-2954	0.83	-5527	0.88	-3710	0.73	-659	0.74	-413
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.74	-2757	0.82	-1124	0.81	-3572	0.83	-2584	0.97	-2593	0.80	-3960	0.89	-2923	0.74	-611	0.76	-346
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.75	-2700	0.82	-1101	0.81	-3574	0.84	-2547	0.97	-2453	0.82	-3991	0.89	-3085	0.75	-593	0.75	-331
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.74	-2674	0.82	-1157	0.80	-3515	0.86	-2495	0.89	-2651	0.89	-4408	0.89	-3296	0.74	-630	0.75	-360
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.74	-2741	0.82	-1132	0.81	-3512	0.81	-2344	0.96	-3370	0.86	-4670	0.89	-3259	0.74	-615	0.76	-348
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV + RAS	0.76	-2711	0.82	-1038	0.82	-3233	0.82	-2495	0.97	-2404	0.87	-4800	0.89	-3308	0.74	-608	0.75	-365
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV + RAS	0.75	-2601	0.82	-1061	0.81	-3337	0.83	-2525	0.97	-2340	0.86	-4776	0.88	-3317	0.74	-603	0.74	-390
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.74	-2612	0.82	-1123	0.82	-3350	0.80	-1831	0.97	-2322	0.87	-4448	0.90	-3088	0.74	-613	0.76	-347
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.74	-2674	0.82	-1120	0.86	-2942	0.79	-1416	0.97	-2330	0.86	-4500	0.90	-3019	0.75	-609	0.76	-344
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.75	-2659	0.82	-1085	0.83	-3443	0.85	-2410	0.97	-2195	0.87	-4220	0.90	-2879	0.75	-584	0.75	-325
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.74	-2647	0.82	-1137	0.81	-3570	0.83	-2538	0.97	-2602	0.85	-4786	0.88	-3375	0.74	-612	0.76	-345
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.74	-2736	0.82	-1131	0.82	-3513	0.85	-2361	0.98	-2256	0.87	-4600	0.89	-3234	0.74	-615	0.76	-348
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.74	-2711	0.82	-1117	0.81	-3521	0.84	-2489	0.97	-2427	0.87	-4558	0.90	-3063	0.74	-613	0.76	-346
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.74	-2695	0.82	-1127	0.81	-3570	0.84	-2568	0.97	-3362	0.86	-4631	0.89	-3238	0.75	-610	0.76	-344
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.73	-2713	0.81	-1194	0.77	-4465	0.79	-3290	0.96	-4460	0.83	-5257	0.87	-3967	0.73	-654	0.74	-392
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.74	-3009	0.82	-1145	0.79	-2501	0.83	-2941	0.96	-3293	0.85	-5469	0.87	-3905	0.73	-651	0.74	-389
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.76	-2679	0.82	-1040	0.84	-3256	0.86	-2178	0.98	-2637	0.88	-3816	0.90	-2364	0.76	-567	0.76	-313
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.75	-2534	0.82	-1078	0.82	-3493	0.84	-2467	0.97	-2255	0.87	-4287	0.90	-2509	0.75	-604	0.76	-340
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.75	-2617	0.82	-1076	0.82	-3445	0.85	-2409	0.97	-2208	0.87	-4253	0.90	-2497	0.75	-605	0.76	-341
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.74	-2609	0.82	-1110	0.81	-3596	0.83	-2622	0.97	-2542	0.86	-4620	0.90	-2997	0.74	-614	0.76	-347
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.70	-2177	0.84	-999	0.81	-3410	0.83	-2741	0.97	-2703	0.85	-4891	0.88	-3442	0.77	-532	0.77	-294
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.74	-2203	0.82	-1138	0.80	-3710	0.83	-2767	0.97	-2725	0.87	-4512	0.88	-3421	0.75	-604	0.76	-344
N-2: NAPAVALINE-ALLSTON & PAUL-ALLSTON #2 500 KV + RAS	0.74	-2748	0.81	-1133	0.88	-3455	0.90	-1688	0.99	-1787	0.91	-3476	0.91	-2644	0.74	-602	0.75	-374
N-2: PAUL-NAPAVALINE & PAUL-ALLSTON #2 500 KV + RAS	0.74	-2897	0.81	-1133	0.88	-3504	0.90	-1732	0.99	-1828	0.91	-3513	0.91	-2686	0.74	-602	0.75	-374
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.74	-2899	0.82	-1112	0.81	-3507	0.85	-2476	0.97	-2339	0.87	-4127	0.89	-3081	0.75	-590	0.75	-332
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV + RAS	0.74	-2681	0.82	-1139	0.81	-3577	0.83	-2550	0.97	-3479	0.85	-4799	0.88	-3382	0.74	-613	0.76	-345
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.74	-2740	0.82	-1141	0.80	-3693	0.81	-2683	0.97	-2703	0.85	-4902	0.88	-3446	0.74	-618	0.76	-349
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.74	-2745	0.82	-1142	0.80	-3694	0.83	-2632	0.97	-2732	0.85	-4892	0.88	-3444	0.74	-618	0.76	-349
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.74	-2745	0.82	-1145	0.80	-3739	0.83	-2803	0.97	-2789	0.85	-4838	0.88	-3479	0.74	-620	0.76	-349

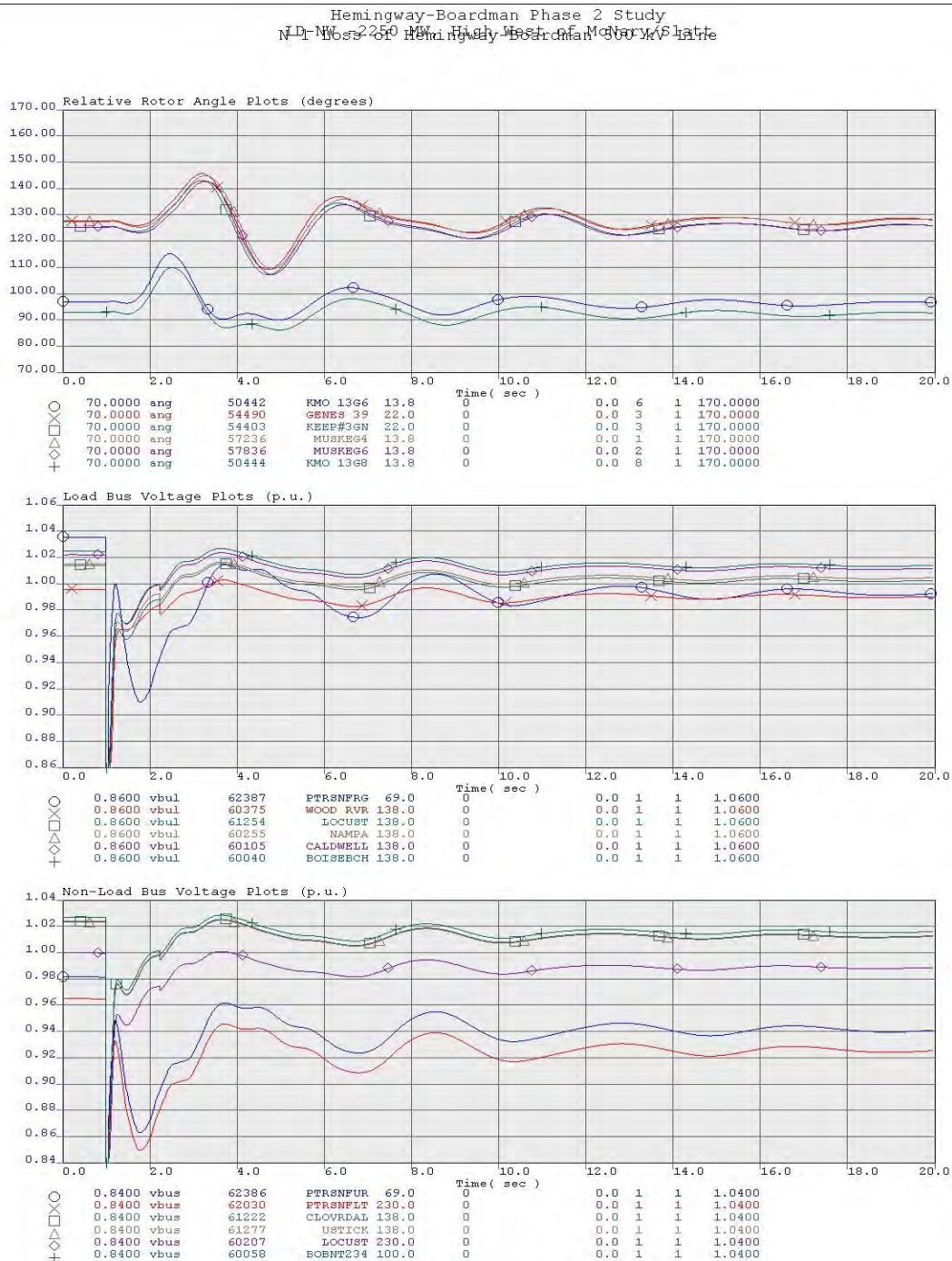
Appendix G - 16hs2a_2250idnw_N_wom Case VQ Results

V is the voltage at Qm. Qm is the Reactive Margin

Yellow highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Hemingway		Brownlee		Malin		Marion		John Day		Hanford		McNary		Mill Creek		Yellowtail	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.74	-2755	0.82	-1139	0.80	-3700	0.83	-2776	0.97	-2720	0.85	-4726	0.88	-3428	0.74	-611	0.76	-346
N-2: RAVER-PAUL & NAPAIVINE-PAUL 500 KV	0.74	-2745	0.82	-1111	0.81	-3499	0.85	-2468	0.97	-2330	0.87	-4182	0.89	-3076	0.75	-589	0.75	-332
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.73	-2679	0.81	-1205	0.78	-4651	0.80	-3191	0.97	-4156	0.87	-4821	0.87	-3812	0.73	-653	0.74	-408
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.73	-3080	0.81	-1205	0.78	-4634	0.80	-3170	0.97	-3257	0.87	-4884	0.87	-3795	0.73	-653	0.74	-408
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.74	-3076	0.82	-1132	0.80	-3641	0.83	-2682	0.97	-2583	0.86	-4406	0.88	-3308	0.75	-610	0.76	-345
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.74	-2730	0.82	-1143	0.80	-3726	0.83	-2784	0.97	-2761	0.86	-4766	0.88	-3458	0.74	-618	0.76	-349
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.74	-2752	0.82	-1142	0.80	-3723	0.83	-2791	0.97	-2758	0.85	-4820	0.88	-3459	0.74	-617	0.76	-348
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV + RAS	0.74	-2750	0.81	-1187	0.77	-2896	0.81	-3247	0.96	-3654	0.84	-5787	0.86	-4137	0.72	-663	0.74	-394
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV + RAS	0.74	-2784	0.82	-1137	0.80	-3685	0.84	-2698	0.97	-3523	0.84	-3996	0.88	-3332	0.75	-595	0.75	-336
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV + RAS	0.74	-2747	0.82	-1140	0.80	-3725	0.83	-2785	0.97	-2738	0.85	-4494	0.88	-3419	0.75	-609	0.76	-345
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.74	-2751	0.82	-1132	0.78	-3924	0.80	-3139	0.96	-3388	0.88	-4824	0.87	-3861	0.73	-636	0.74	-410
N-2: TAFT-BELL 500 KV & BELL-LANCASTER 230 KV	0.74	-2964	0.82	-1134	0.80	-3747	0.82	-2817	0.97	-2778	0.85	-4857	0.88	-3438	0.80	-475	0.76	-312
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.74	-2742	0.82	-1141	0.80	-3742	0.82	-2818	0.97	-2785	0.85	-4885	0.88	-3464	0.78	-537	0.75	-334
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV	0.74	-2752	0.82	-1134	0.80	-3747	0.82	-2817	0.97	-2778	0.85	-4857	0.88	-3438	0.80	-475	0.76	-312
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.74	-2742	0.82	-1140	0.80	-3733	0.82	-2814	0.97	-2778	0.85	-4923	0.88	-3459	0.78	-538	0.75	-333
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV	0.74	-2748	0.82	-1139	0.80	-3736	0.82	-2815	0.97	-2778	0.85	-4917	0.88	-3454	0.78	-521	0.75	-327
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.74	-2746	0.82	-1158	0.80	-3763	0.82	-2837	0.97	-2818	0.85	-4828	0.88	-3503	0.79	-500	0.76	-303
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.75	-2764	0.82	-1092	0.82	-3500	0.84	-2465	0.97	-2285	0.86	-4206	0.89	-3033	0.76	-577	0.76	-320
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.75	-2663	0.82	-1092	0.82	-3500	0.84	-2465	0.97	-2285	0.86	-4205	0.89	-3033	0.76	-577	0.76	-320
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.74	-2663	0.82	-1129	0.80	-3602	0.83	-2632	0.97	-2515	0.86	-4225	0.88	-3236	0.75	-607	0.76	-343

Appendix G – 16lhs2a_2250idnw_wom Base Case Transient Stability Plots



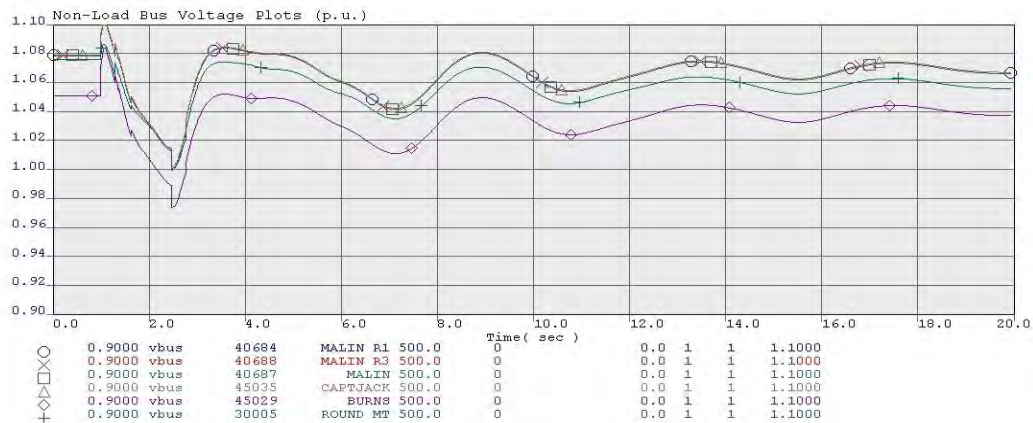
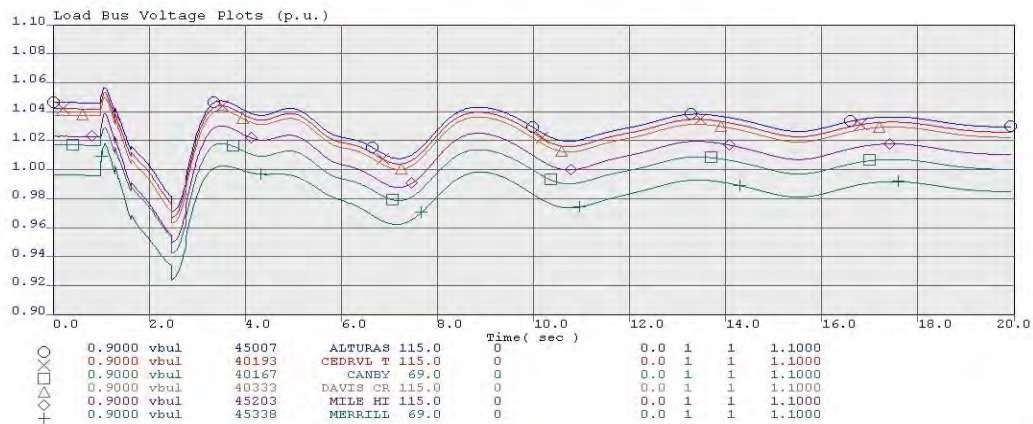
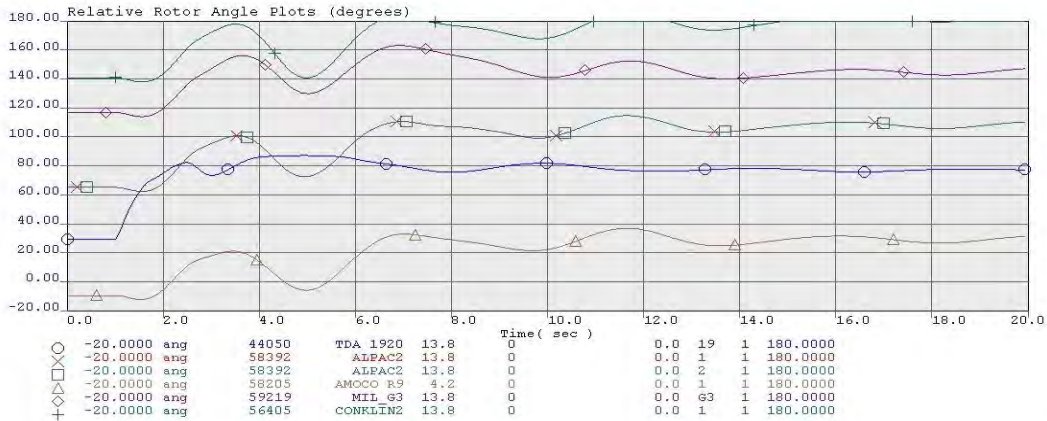
Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None



Figure G8: N-1 Loss of Hemingway-Boardman 500 kV Line (Angle & Voltage Plots)

Appendix G – 16lhs2a_2250idnw_wom Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High West of McNary/Slatt
Bi-Pole Block Loss of PDCI

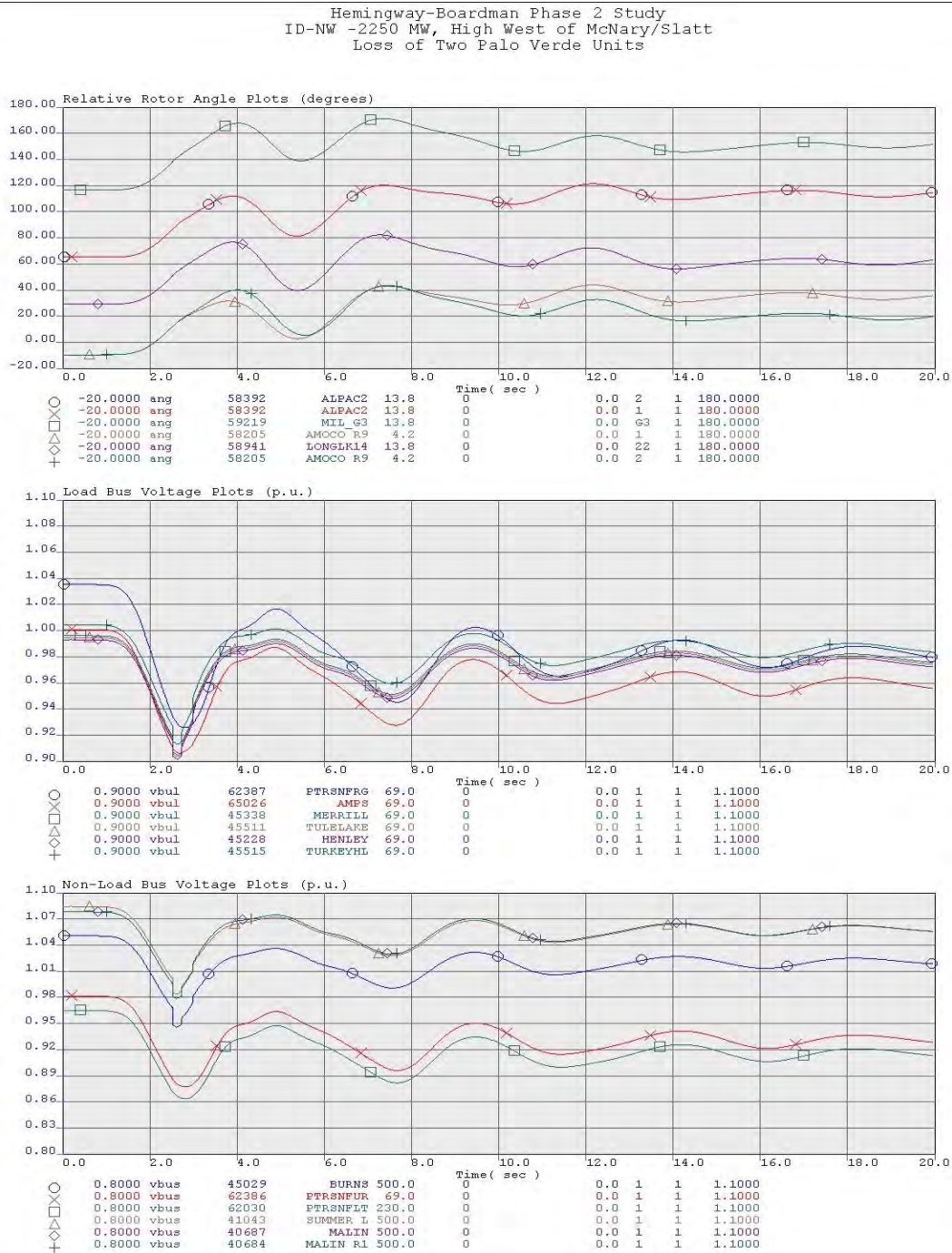


Bipole loss of Pacific DC Intertie
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
Northwest Generation Drop (2550 MW)



Figure G9: Bi-Pole Block – Pacific DC Intertie (Angle & Voltage Plots)

Appendix G – 16lhs2a_2250idnw_wom Base Case Transient Stability Plots



Loss of 2 Palo Verde Units
RAS: With Phoenix Area Load Tripping RAS
FACRI Reactive Switching

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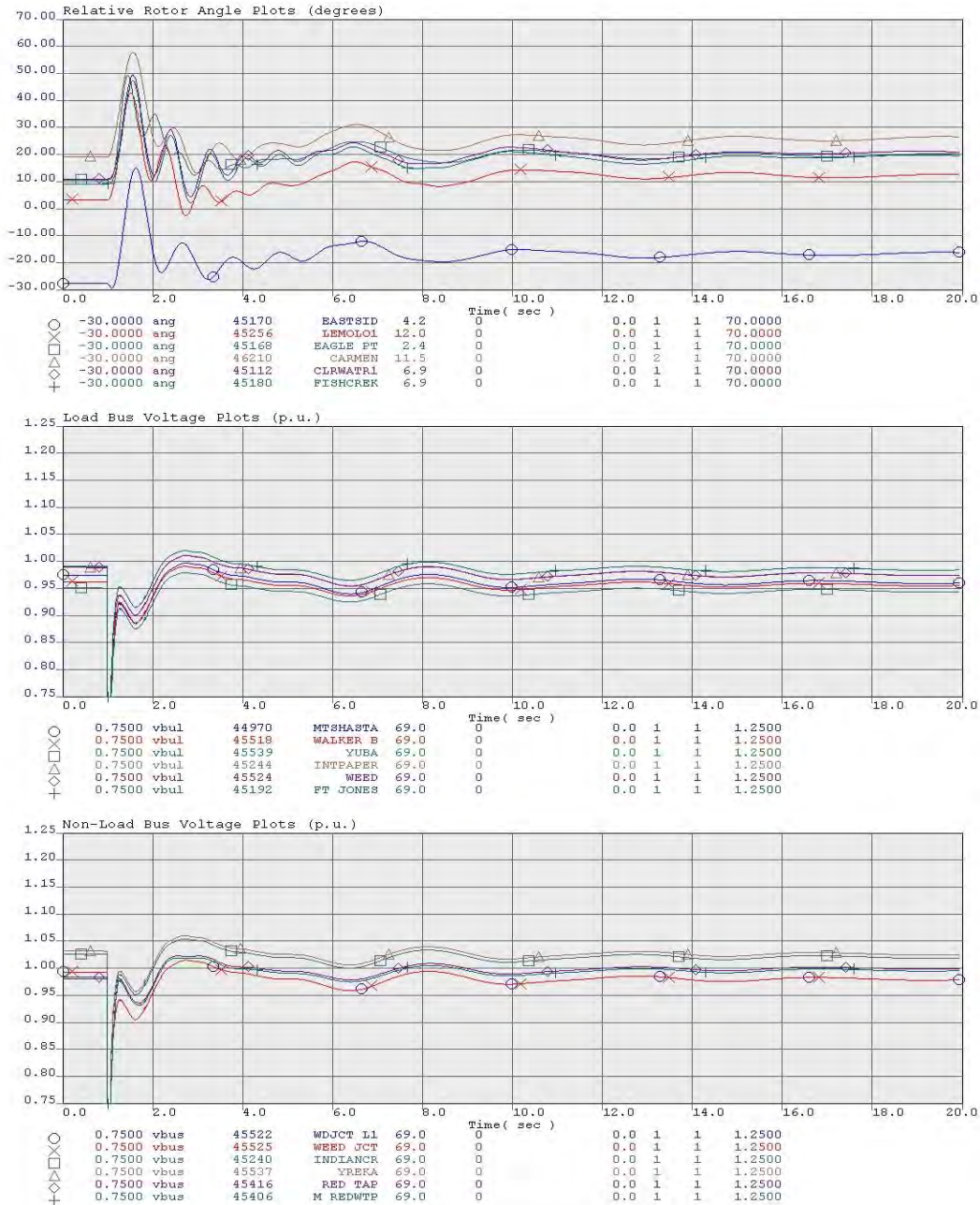
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Figure G10: Loss of Two Palo Verde Units (Angle & Voltage Plots)

Appendix G – 16hs2a_2250idnw_wom Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High West of McNary/Slatt
N-2 Loss of Malin-Round Mt #1 & #2 500 kV Lines



3-Phase Fault @ Malin 500 kV with 4 Cycle Clearing
Loss of Malin-Round Mtn #1 & #2 500 kV Lines
Opens Round Mtn-Table Mtn #2 500 kV Line
RAS: FACRI and Tracy/Olinda 500 kV Reactive Switching
NW Gen Drop 2400 MW

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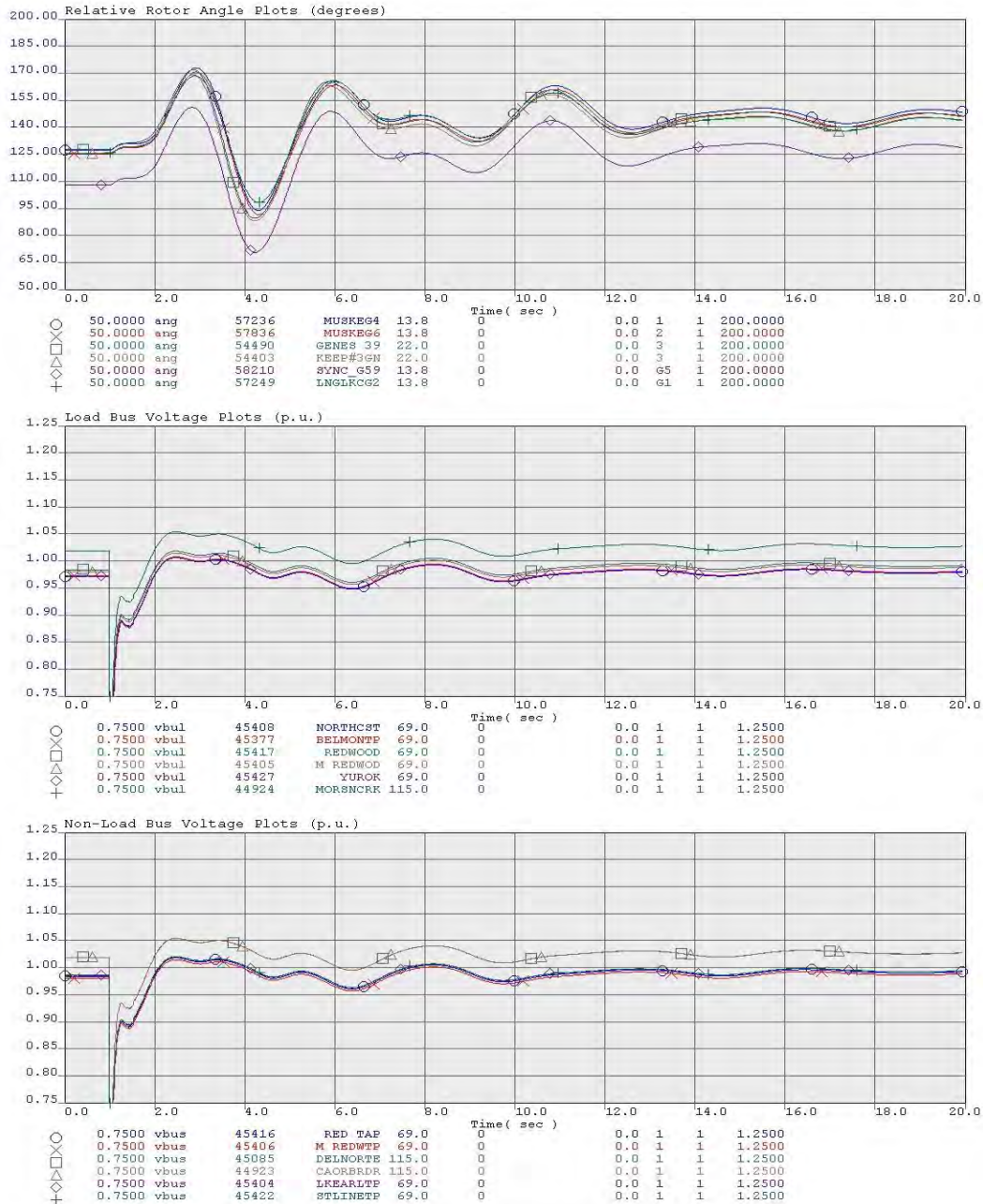
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Figure G11: N-2 Loss of Malin-Round Mtn #1 & #2 500 kV Lines (Angle & Voltage Plots)

Appendix G – 16lhs2a_2250idnw_wom Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High West of McNary/Slatt
N-2 Loss of John Day-Grizzly #2 Buckley-Grizzly 500 kV Lines



3-Phase Fault @ Grizzly 500 kV with 4 Cycle Clearing
Loss of John Day-Grizzly #2 and
Buckley-Grizzly 500 kV
RAS: NW Gen Drop 2400 MW

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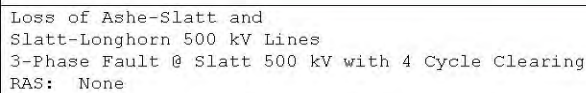
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Figure G12: N-2 Loss of John Day-Grizzly #2 & Buckley-Grizzly 500 kV Lines (Angle & Voltage Plots)

Hemingway-Boardman Phase 2 Study
ID-NW -2250 MW, High West of McNary/Slatt
N-2 Loss of Slatt-Ashe & Slatt-Longhorn 500 kV Lines



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Appendix F - 16hs2a_2250idnw_wom Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	Var	FACRI insert of Ft Rock Series Caps	Ptrsfnrg 69 12.2%	Ptrsfnlt 230 0.850	Ptrsfnrg 69 12.2%	Bridger1 22 59.878	Stable & Damped
Bi-pole Block	PDCI Bipole	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt CapC1 Tracy&Olinda React Switching NW 2550 MW Gen Drop	Malin R1 500 7.2%	Wbk 1t3 138 0.888	Alturas 115 7.2%	Lnglkc2 13.8 59.764	Stable & Damped
N-2	Loss of 2 Palo Verde units	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1&C2, CaptJack Shunt Cap C1	Ptrsfnrg 69 10.6%	Ptrsfnlt 230 0.864	Ptrsfnrg 69 10.6%	Muskeg4 13.8 59.754	Stable & Damped
N-2 4 Cy 3PH Malin 500 kV	Malin-Round Mt #1 500 kV Malin-Round Mt #2 500 kV Round Mt-Table Mt #2 500 kV	Var	Chief Jo Braking Resistor Tracy&Olinda React Switching NW 2400 MW Gen Drop FACRI insert Ft Rock Series Caps Flash Malin-Round Mt S-Caps	Mtshasta 16.6%	Yuba 69 0.796	Mtshasta 16.6%	Kmo 13g6 13.8 59.761	Stable & Damped
N-2 4 Cy 3PH Grizzly 500 kV	John Day-Grizzly #2 500 kV Buckley-Grizzly 500 kV	Var	FACRI insert Ft Rock Series Caps, Malin C1, CaptJack C1 NW 2400 MW Gen Drop	Northcst 69 20.6%	Northcst 69 0.772	Northcst 69 20.6%	Kmo 13g6 13.8 59.645	Stable & Damped
N-2 4 Cy 3PH Slatt 500 kV	Slatt-Ashe 500 kV Slatt-Longhorn 500 kV	Var	FACRI insertion of Ft Rock Series Caps, Malin Shunt Cap C1 & CaptJack Sh Cap C1	Northcst 69 19.4%	Northcst 69 0.783	Northcst 69 19.4%	Kmo 13g6 13.8 59.766	Stable & Damped

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_ 18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_ 18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_ 18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDR_500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	CLOSE MultiSectionLine PEARL_500.0 (40827) TO KNIGHT_500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPAIVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 52.2 MVR
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_500.0 (40521)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_230.0 (40519)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line NPULLMAN_115.0 (48291) TO SHAWNEE_115.0 (48383) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48245) TO SPULLMAN_115.0 (48413) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS HOT SPR_500.0 (40553) TO -148.3 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	CLOSE Line LEON_115.0 (48183) TO MOSCITYT_115.0 (48243) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48243) TO MOSCITYT_115.0 (48245) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS N LEWIST_115.0 (48253) TO 44.4 MVR
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 52.2 MVR
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus IONE_69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_100.0 (44115)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_100.0 (44116)
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_230.0 (44125)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_100.0 (44118)
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_13.8 (44107)
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_13.8 (44108)
BF McNary 230 kV SECT 2	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 52.2 MVR
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_230.0 (44127)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_100.0 (44119)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_100.0 (44120)

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_ 13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_ 13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_ 13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_ 13.8 (44112)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_ 345.0 (40721)
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN Line CDR SPRG_ 500.0 (43950) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	OPEN MultiSectionLine HEMINWAY_ 500.0 (60155) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	CLOSE Shunt QUARTZ_ 138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN Line CDR SPRG_ 500.0 (43950) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	OPEN MultiSectionLine HEMINWAY_ 500.0 (60155) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 63.4 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	CLOSE Shunt QUARTZ_ 138.0 (60305) #c1
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS N POWDER_ 34.5 (60313) TO 18 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS HEMINWAY_ 500 (60155) TO 400 MVR
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD CT_ 18.5 (43044) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD ST_ 16.0 (43045) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Transformer BOARD CT_ 18.5 (43044) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Gen BOARD ST_ 16.0 (43045) #1
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	OPEN Line GRASSLND_ 500.0 (43049) TO COYOTE_ 500.0 (43123) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Transformer BOARD F_ 24.0 (43047) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Slatt 500kV & Boardman Plant	OPEN Line GRASSLND_ 500.0 (43049) TO SLATT_ 500.0 (40989) CKT 1
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_ 500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_ 500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_ 500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_ 500.0 (45095)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_ 230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #2
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #3
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_ 500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_ 500.0 (40601)
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_ 500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_ 230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_ 230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_ 230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_ 230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_ 230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_ 34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_ 34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_ 0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_ 230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_ 34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_ 34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_ 34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_ 0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_ 34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_ 0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_ 34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_ 34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_ 230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_ 34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_ 34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_ 34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_ 34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_ 34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_ 230.0 (47857)

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_ 34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_ 34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_ 230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_ 34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_ 0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_ 34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_ 34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_ 0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_ 0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_ 0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_ 0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_ 0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_ 34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_ 0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_ 34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_ 0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPAVINE_500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO DIXONVLE_500.0 (45095) CKT 1
N-1: Alvery-Dixonville 500 kV	SET SWITCHED SHUNT AT BUS DELNORTE_115.0 (45085) TO 7.5 MVR
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO CELILO1_500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO KNIGHT_500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_230.0 (60073) TO ANTLOPE_230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_230.0 (60095) TO ONTARIO_230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO OLINDA_500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Dixonville-Meridian 500 kv	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kv	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kv	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kv	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kv + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kv + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kv + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Dworshak-Taft 500 kv	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kv	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kv	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kv	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kv	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kv	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kv	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Goldhill-Placer 115 kv	OPEN Bus HORSHE1_115.0 (32229)
N-1: Goldhill-Placer 115 kv	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kv	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kv	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kv	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kv	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kv	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kv	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kv	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kv	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kv	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kv	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kv	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kv	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kv	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kv	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kv	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kv	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kv Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kv Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kv Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Lolo 230 kv	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kv	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kv	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kv	OPEN Line HELLSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kv	OPEN Gen HELSCYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kv	OPEN Line HELLSCYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kv	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kv	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kv	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kv	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kv	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kv + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Grassland 500 kv + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Grassland 500 kv + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Grassland 500 kv + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Grassland 500 kv + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt MIDPOINT_345.0 (60235) #2
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACIWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_230.0 (40939) #s
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 26.1 MVR
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS N POWDER_34.5 (60313) TO 27 MVR
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_230.0 (41352) TO MCNRY S3_230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_230.0 (40537) TO 52.2 MVR
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	CLOSE Shunt BETHEL5_500.0 (43041) #1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap MIKKALO_500.0 (43970) TO MKLOSNT2_500.0 (43971) CKT 2
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	OPEN Series Cap SANTIAM_500.0 (40941) TO SANTMKO2_500.0 (43492) CKT 2
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt PTRSNFLT_230.0 (62030) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt OREBASIN_230.0 (66145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt FRANNIE2_34.5 (67145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARLAND1_34.5 (67147) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN InjectionGroup RAS Lower Granite Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN InjectionGroup Libby Gen
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #3

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_ 13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_ 13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_ 13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_ 13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_ 13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_ 13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_ 13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_ 13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_ 13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_ 13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_ 13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO NAPA VINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_500.0 (30005) TO RD MT 1M_500.0 (30065) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 1_12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 2_12.5 (38830)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 3_12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 4_12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 5_12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_13.8 (38715)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA A_13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA B_13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA D_13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA E_13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA C_13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_13.2 (38780)

Appendix G - 16hs2a_2250idnw_N_wom Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_ 13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_ 13.2 (38805)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_ 13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_ 13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_ 13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_ 13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_ 13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_ 13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_ 13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_ 13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_ 11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_ 11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_ 18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_ 18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_ 18.0 (34604)
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_ 230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_ 115.0 (40087) TO BIGELOW_ 115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_ 230.0 (40624) TO NOXONBPA_ 230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_ 500.0 (40459) #r
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVR_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4

Appendix H

16la1sa_3400idnw_Path76 Base Case (Alturas Project, Path 76)

Appendix H – 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

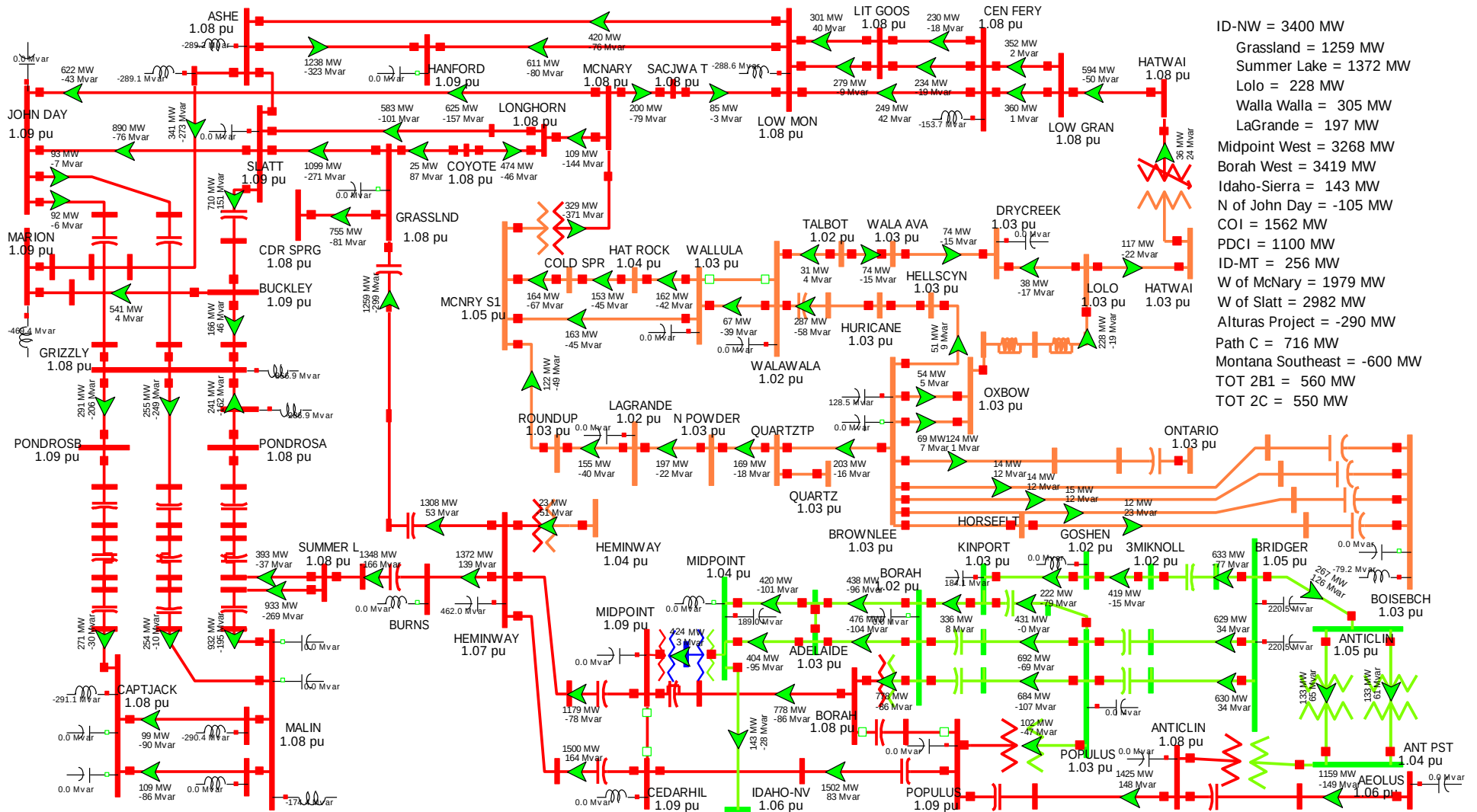


Figure H1: 16la1sa_3400idnw_Path76 Base Case **Pre-Contingency**

Appendix H – 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

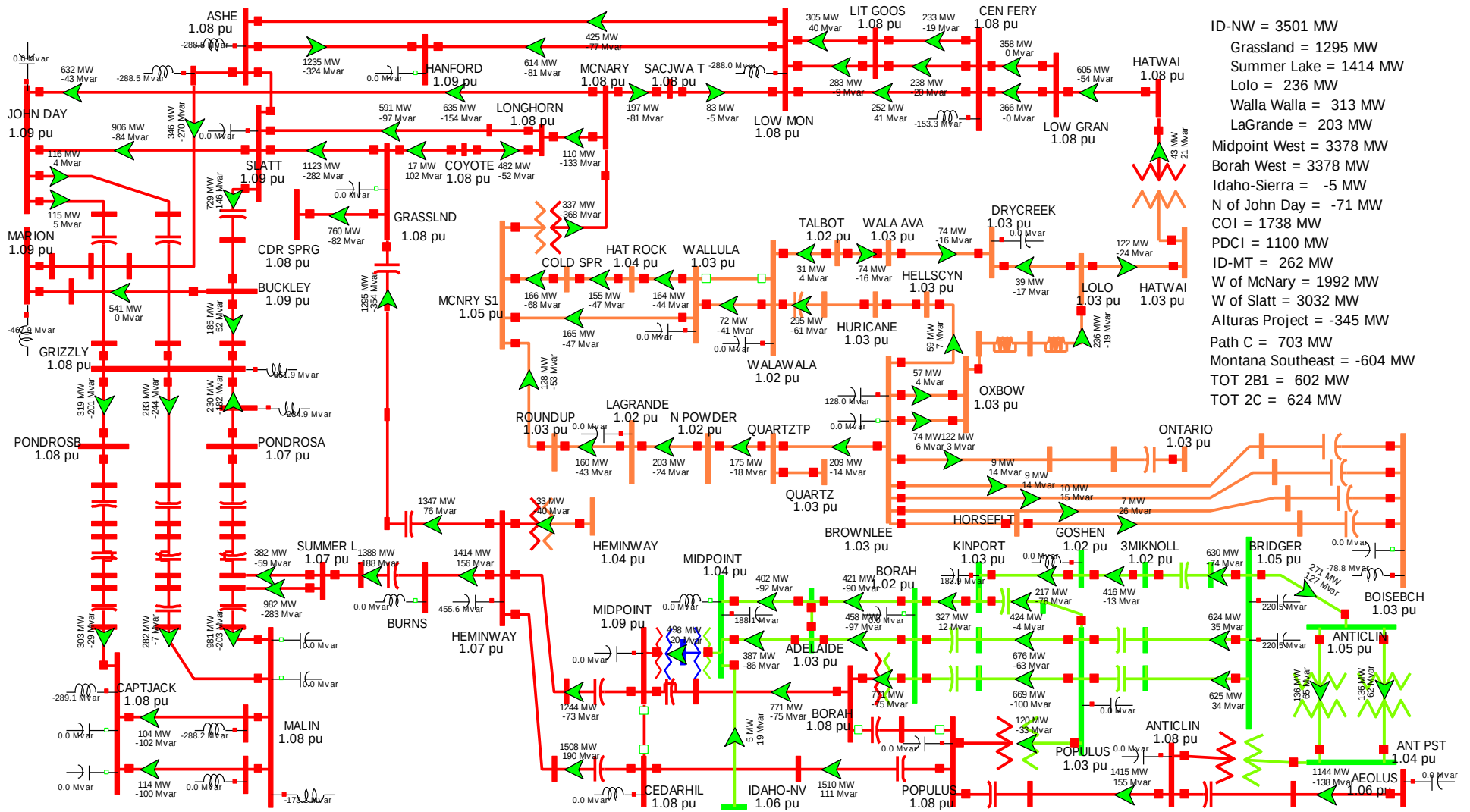


Figure H2: 16la1sa_3400idnw_Path76 Base Case after the contingency N-1: Robinson-Harry Allen 500 kV

Appendix H – 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

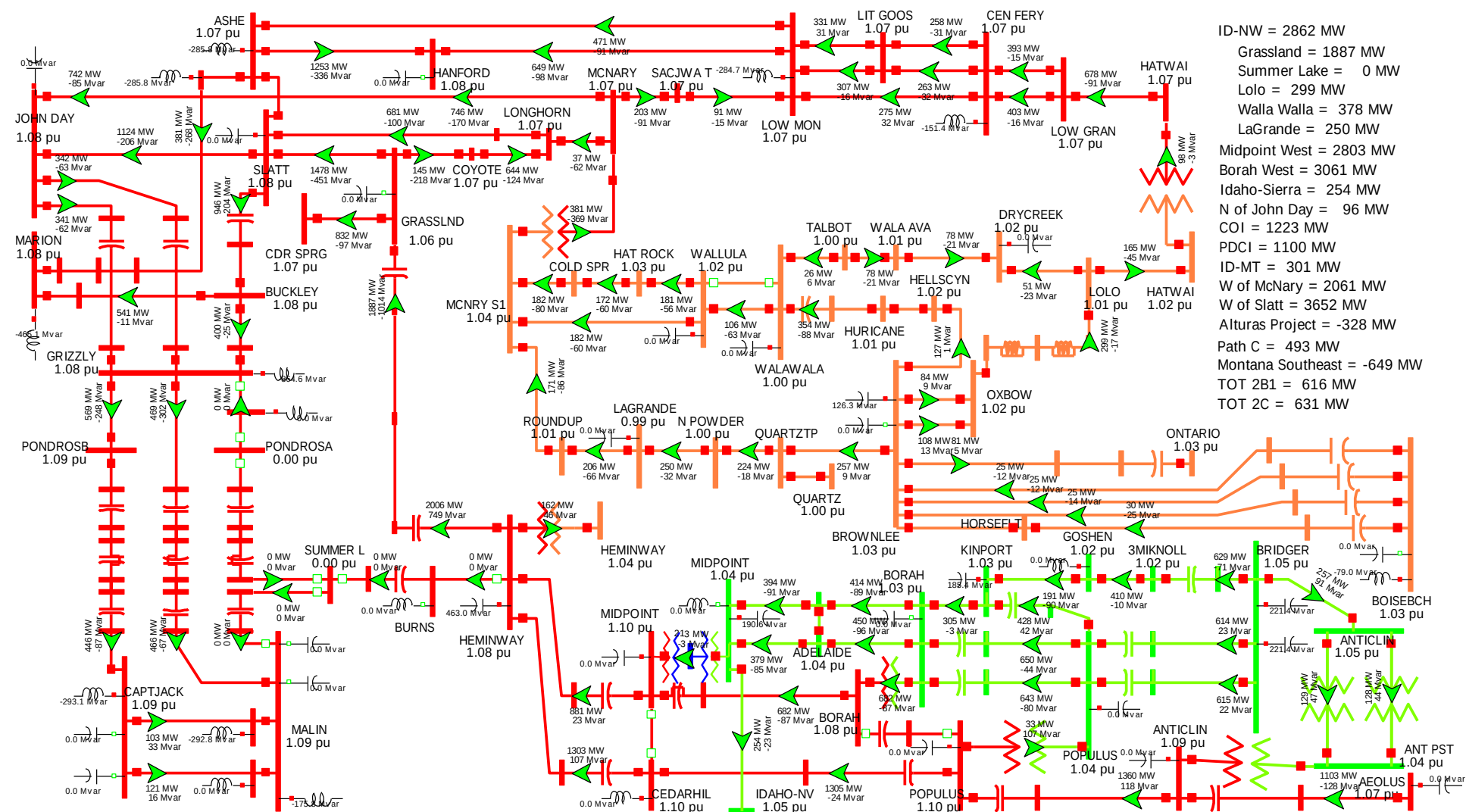


Figure H3: 16la1sa_3400idnw_Path76 Base Case after the contingency **Bus: Summer Lake 500 kV**

Appendix H – 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

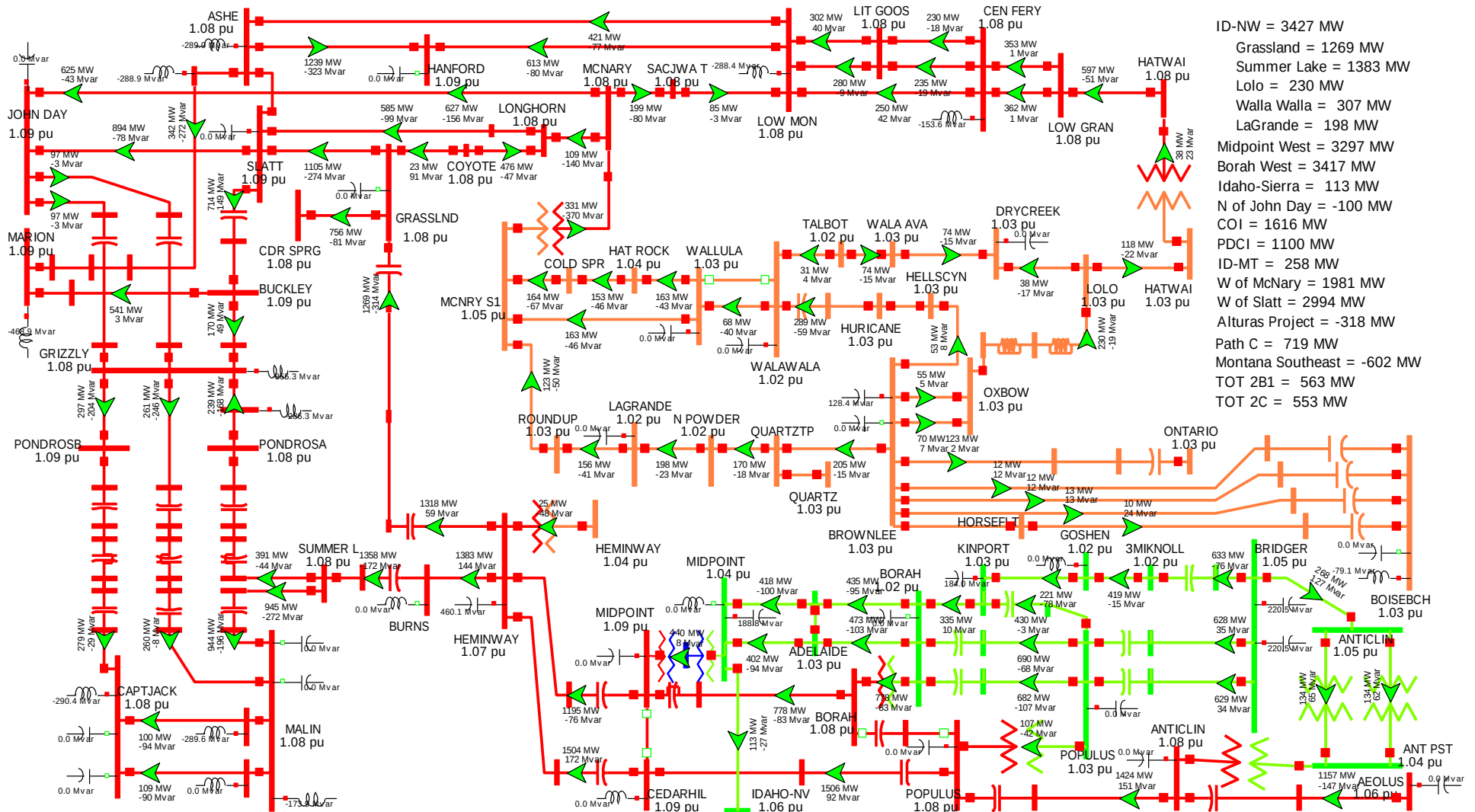


Figure H4: 16la1sa_3400idnw_Path76 Base Case after the contingency N-1: Cal Sub 120 kV Phase Shifter

Appendix H – 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

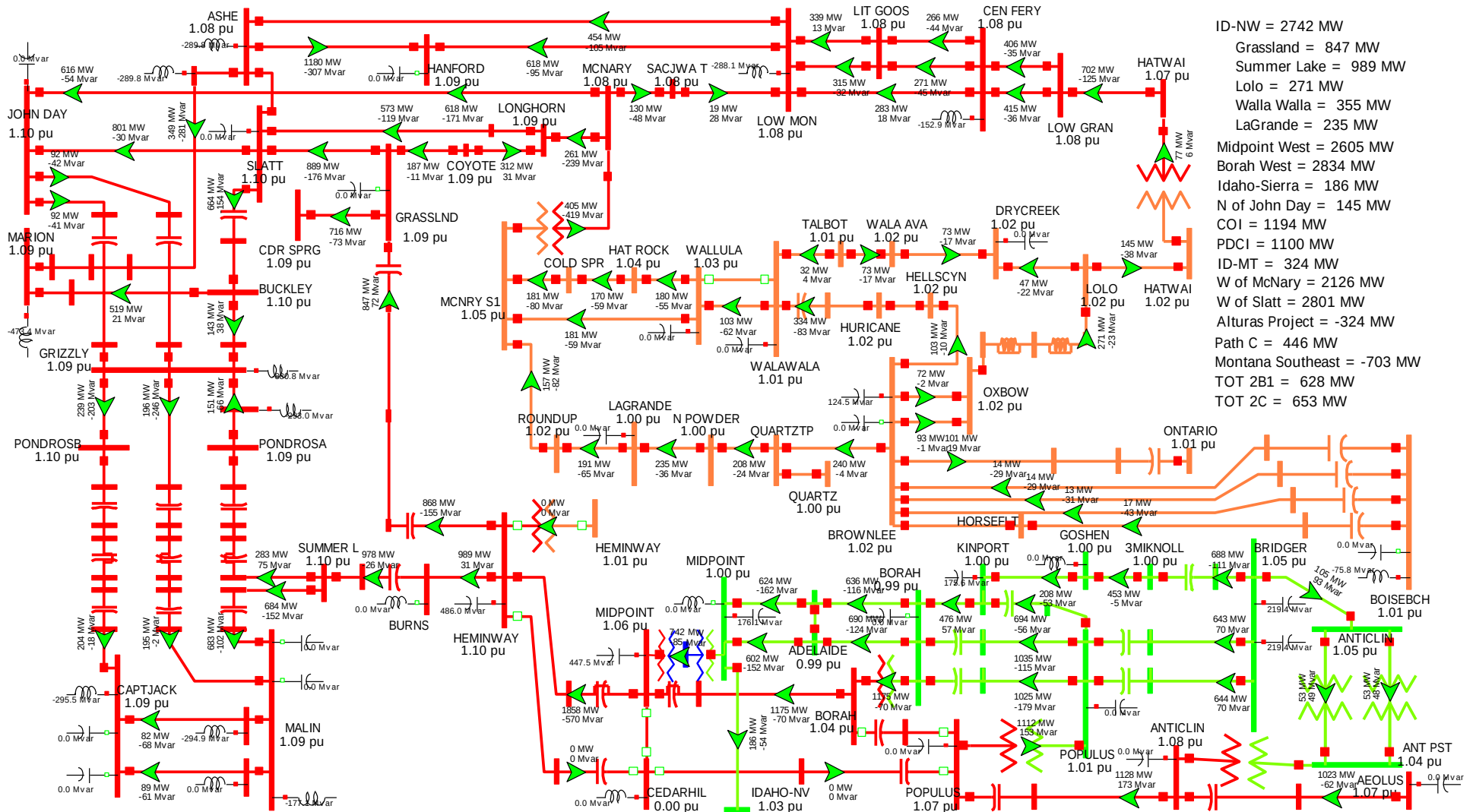


Figure H5: 16la1sa_3400idnw_Path76 Base Case after the contingency BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS

Appendix H - 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.5	300.0	101.5%	370.0	82.3%
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.2	300.0	101.4%	370.0	82.2%
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	No Violations							
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	No Violations							
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.7	300.0	100.2%	370.0	81.3%
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	306.9	300.0	102.3%	370.0	82.9%
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	300.6	300.0	100.2%	370.0	81.3%
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.4	300.0	100.1%	370.0	81.2%
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	305.9	300.0	102.0%	370.0	82.7%
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	No Violations							
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	No Violations							
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							

Appendix H - 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	308.3	300.0	102.8%	370.0	83.3%
BF 4542 Paul-Allston 500 kV & Center G2	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	302.0	300.0	100.7%	370.0	81.6%
BF 4542 Paul-Napavine 500 kV & Center G1	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	307.6	300.0	102.5%	370.0	83.1%
BF 4542 Paul-Napavine 500 kV & Center G1	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	301.4	300.0	100.5%	370.0	81.5%
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	193.1	266.5	254.0	104.9%	307.0	86.8%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	302.9	300.0	101.0%	370.0	81.9%
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4708 Hatwai 500 kV Bus	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.7	300.0	100.2%	370.0	81.3%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	301.4	300.0	100.5%	370.0	81.5%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.8	300.0	100.3%	370.0	81.3%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	312.9	300.0	104.3%	370.0	84.6%
BF 4888 Ashe-Slatt & CGS 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	306.3	300.0	102.1%	370.0	82.8%
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	52.2	50.0	104.3%	55.0	94.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	338.7	300.0	112.9%	370.0	91.5%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	330.4	300.0	110.1%	370.0	89.3%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	311.0	300.0	103.7%	370.0	84.0%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	311.0	300.0	103.7%	370.0	84.0%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	321.2	315.0	102.0%	394.0	81.5%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	320.6	315.0	101.8%	394.0	81.4%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1401.9	2206.3	2000.1	110.3%	3000.0	73.5%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1420.6	2181.0	2000.1	109.0%	3000.0	72.7%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	52.7	50.0	105.4%	55.0	95.8%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	338.0	300.0	112.7%	370.0	91.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	329.8	300.0	109.9%	370.0	89.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	309.0	300.0	103.0%	370.0	83.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	309.0	300.0	103.0%	370.0	83.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	319.8	315.0	101.5%	394.0	81.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	319.2	315.0	101.3%	394.0	81.0%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1401.9	2202.4	2000.1	110.1%	3000.0	73.4%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1420.6	2171.5	2000.1	108.6%	3000.0	72.4%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	302.2	300.0	100.7%	370.0	81.7%

Appendix H - 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	305.6	300.0	101.9%	370.0	82.6%
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.7	300.0	101.6%	370.0	82.4%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	193.1	266.2	254.0	104.8%	307.0	86.7%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	306.0	300.0	102.0%	370.0	82.7%
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	331.3	300.0	110.4%	370.0	89.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	322.6	300.0	107.5%	370.0	87.2%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	306.3	300.0	102.1%	370.0	82.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	306.3	300.0	102.1%	370.0	82.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	89.7	118.6	112.0	105.9%	146.7	80.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	317.9	315.0	100.9%	394.0	80.7%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	317.4	315.0	100.7%	394.0	80.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1503.2	2312.2	1732.1	133.5%	2338.3	98.9%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.993	0.929				6.45%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.991	0.931				6.05%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.992	0.942				5.04%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	51.1	50.0	102.2%	55.0	92.9%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	336.8	300.0	112.3%	370.0	91.0%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	328.7	300.0	109.6%	370.0	88.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	308.9	300.0	103.0%	370.0	83.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	308.9	300.0	103.0%	370.0	83.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	319.7	315.0	101.5%	394.0	81.1%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	319.1	315.0	101.3%	394.0	81.0%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1401.9	2260.2	2000.1	113.0%	3000.0	75.3%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1420.6	2232.1	2000.1	111.6%	3000.0	74.4%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	50.4	50.0	100.9%	55.0	91.7%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	334.2	300.0	111.4%	370.0	90.3%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	326.1	300.0	108.7%	370.0	88.1%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	CEDARHIL (60159) -> CEDHEM21 (61992) CKT 2 at CEDARHIL	Branch Amp	1599.8	2376.2	2309.4	102.9%	3464.1	68.6%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	POPULUS (67794) -> POPCED21 (61963) CKT 2 at POPULUS	Branch Amp	1607.7	2352.0	2309.4	101.8%	3464.1	67.9%

Appendix H - 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or Δ Volts
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	316.8	300.0	105.6%	370.0	85.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	310.2	300.0	103.4%	370.0	83.8%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	304.7	300.0	101.6%	370.0	82.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	304.7	300.0	101.6%	370.0	82.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	315.6	315.0	100.2%	394.0	80.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	315.2	315.0	100.1%	394.0	80.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1283.7	2361.9	1732.1	136.4%	2338.3	101.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1146.4	1838.2	1701.6	108.0%	2108.6	87.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1130.8	1819.8	1650.1	110.3%	2227.4	81.7%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1136.5	1831.9	1492.7	122.7%	2264.2	80.9%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	333.7	300.0	111.2%	370.0	90.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	326.3	300.0	108.8%	370.0	88.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	321.6	300.0	107.2%	370.0	86.9%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	321.6	300.0	107.2%	370.0	86.9%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	328.5	315.0	104.3%	394.0	83.4%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	327.7	315.0	104.0%	394.0	83.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	89.7	120.0	112.0	107.2%	146.7	81.8%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1146.4	1755.4	1701.6	103.2%	2108.6	83.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1130.8	1739.9	1650.1	105.4%	2227.4	78.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1136.5	1751.8	1492.7	117.4%	2264.2	77.4%
BF Lolo 230kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	301.3	300.0	100.4%	370.0	81.4%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	50.6	50.0	101.2%	55.0	92.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	332.0	300.0	110.7%	370.0	89.7%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	323.2	300.0	107.7%	370.0	87.4%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	306.2	300.0	102.1%	370.0	82.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	306.2	300.0	102.1%	370.0	82.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	317.7	315.0	100.9%	394.0	80.6%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	317.2	315.0	100.7%	394.0	80.5%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	89.7	117.3	112.0	104.8%	146.7	80.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1503.2	2262.6	1732.1	130.6%	2338.3	96.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFUR (62386)	% Δ Volts	0.993	0.931				6.24%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.991	0.934				5.75%
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	307.6	300.0	102.5%	370.0	83.1%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	301.4	300.0	100.5%	370.0	81.5%
Bus: Alvey 500 kV	No Violations							
Bus: Bell BPA 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.2	300.0	101.4%	370.0	82.2%
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	52.6	50.0	105.3%	55.0	95.7%
Bus: Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	339.1	300.0	113.0%	370.0	91.7%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
Bus: Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	330.8	300.0	110.3%	370.0	89.4%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	311.0	300.0	103.7%	370.0	84.1%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	311.0	300.0	103.7%	370.0	84.1%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	321.2	315.0	102.0%	394.0	81.5%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	320.7	315.0	101.8%	394.0	81.4%
Bus: Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1401.9	2205.2	2000.1	110.3%	3000.0	73.5%
Bus: Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1420.6	2180.1	2000.1	109.0%	3000.0	72.7%
N-1: Allston-Keeler 500 kV	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.3	300.0	100.1%	370.0	81.2%
N-1: Bell-Taft 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.0	300.0	101.3%	370.0	82.2%
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	301.0	300.0	100.3%	370.0	81.4%
N-1: Broadview-Garrison #1 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.5	300.0	100.2%	370.0	81.2%
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Cal Sub 120 kV Phase Shifter	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	327.6	300.0	109.2%	370.0	88.5%
N-1: Cal Sub 120 kV Phase Shifter	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	319.8	300.0	106.6%	370.0	86.4%
N-1: Captain Jack-Olinda 500 kV	No Violations							
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	No Violations							
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	No Violations							
N-1: Drycreek-Lolo 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.7	300.0	100.2%	370.0	81.3%
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.7	300.0	100.2%	370.0	81.3%
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	344.5	315.0	109.4%	394.0	87.4%
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	343.5	315.0	109.0%	394.0	87.2%
N-1: Hatwai 500/230 kV Xfmr	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.8	300.0	100.3%	370.0	81.3%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	No Violations							
N-1: Hells Canyon-Walla Walla 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	302.7	300.0	100.9%	370.0	81.8%
N-1: Hemingway-Grassland 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	50.0	50.0	100.0%	55.0	90.9%
N-1: Hemingway-Grassland 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	330.9	300.0	110.3%	370.0	89.4%
N-1: Hemingway-Grassland 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	322.3	300.0	107.4%	370.0	87.1%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	304.9	300.0	101.6%	370.0	82.4%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	304.9	300.0	101.6%	370.0	82.4%
N-1: Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	89.7	119.7	112.0	106.9%	146.7	81.6%
N-1: Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	316.8	315.0	100.6%	394.0	80.4%
N-1: Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	316.3	315.0	100.4%	394.0	80.3%
N-1: Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1503.2	2252.3	1732.1	130.0%	2338.3	96.3%
N-1: Hemingway-Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	52.8	50.0	105.7%	55.0	96.1%
N-1: Hemingway-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	337.2	300.0	112.4%	370.0	91.1%
N-1: Hemingway-Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	329.0	300.0	109.7%	370.0	88.9%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	308.8	300.0	102.9%	370.0	83.5%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	308.8	300.0	102.9%	370.0	83.5%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	319.6	315.0	101.5%	394.0	81.1%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	319.1	315.0	101.3%	394.0	81.0%
N-1: Hemingway-Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1401.9	2211.1	2000.1	110.6%	3000.0	73.7%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Hemingway-Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1420.6	2186.1	2000.1	109.3%	3000.0	72.9%
N-1: Hill Top 345/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.4	177.5	150.0	118.3%	180.0	98.6%
N-1: Hill Top 345/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	315.0	435.5	415.7	104.8%	483.5	90.1%
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	335.1	300.0	111.7%	370.0	90.6%
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	335.1	300.0	111.7%	370.0	90.6%
N-1: Huntington-Pinto-Four Corners 345 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.3	300.0	100.1%	370.0	81.2%
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	52.3	50.0	104.7%	55.0	95.2%
N-1: LaGrande-North Powder 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.8	300.0	100.3%	370.0	81.3%
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.4	152.8	150.0	101.9%	180.0	84.9%
N-1: Malin-Round Mtn #1 500 kV	No Violations							
N-1: Malin-Round Mtn #2 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	305.3	300.0	101.8%	370.0	82.5%
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	326.7	300.0	108.9%	370.0	88.3%
N-1: Midpoint-Hemingway 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	319.1	300.0	106.4%	370.0	86.3%
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	301.4	300.0	100.5%	370.0	81.4%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	No Violations							
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	332.2	300.0	110.7%	370.0	89.8%
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	332.2	300.0	110.7%	370.0	89.8%
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Populus-Cedar Hill-Hemingway 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	315.1	300.0	105.0%	370.0	85.2%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	308.6	300.0	102.9%	370.0	83.4%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	303.4	300.0	101.1%	370.0	82.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	303.4	300.0	101.1%	370.0	82.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1283.7	2191.5	1732.1	126.5%	2338.3	93.7%
N-1: Populus-Cedar Hill-Hemingway 500 kV	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1146.4	1840.3	1701.6	108.2%	2108.6	87.3%
N-1: Populus-Cedar Hill-Hemingway 500 kV	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1130.8	1821.8	1650.1	110.4%	2227.4	81.8%
N-1: Populus-Cedar Hill-Hemingway 500 kV	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1136.5	1834.0	1492.7	122.9%	2264.2	81.0%
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.4	344.4	315.0	109.3%	394.0	87.4%
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.4	343.3	315.0	109.0%	394.0	87.1%
N-1: Robinson-Harry Allen 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	358.5	300.0	119.5%	370.0	96.9%
N-1: Robinson-Harry Allen 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	347.4	300.0	115.8%	370.0	93.9%
N-1: Robinson-Harry Allen 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.4	162.9	150.0	108.6%	180.0	90.5%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	307.5	300.0	102.5%	370.0	83.1%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	307.5	300.0	102.5%	370.0	83.1%
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.9	50.4	50.0	100.8%	55.0	91.6%
N-1: Roundup-Lagrande 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.2	300.0	100.1%	370.0	81.1%
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	No Violations							
N-1: Table Mtn-Vaca Dixon 500 kV	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.8	300.0	100.3%	370.0	81.3%
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	300.1	300.0	100.0%	370.0	81.1%
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	320.4	300.0	106.8%	370.0	86.6%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	313.2	300.0	104.4%	370.0	84.7%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	BRIDGER (60085) -> BRI3MI11 (61999) CKT 1 at BRIDGER	Branch Amp	1056.3	1735.1	1600.0	108.4%	1840.0	94.3%
N-2: Bridger-Populus #1 & #2 345 kV	BRI3MI11 (61999) -> 3MIKNOLL (60084) CKT 1 at 3MIKNOLL	Branch Amp	1056.3	1709.2	1650.1	103.6%	2227.4	76.7%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> POPBRI11 (61968) CKT 1 at BRIDGER	Branch Amp	1003.7	1779.0	1492.7	119.2%	1849.2	96.2%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	POPBRI11 (61968) -> POPULUS (67790) CKT 1 at POPULUS	Branch Amp	991.9	1762.1	1650.1	106.8%	2227.6	79.1%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	319.5	300.0	106.5%	370.0	86.4%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	89.7	125.3	112.0	111.9%	146.7	85.4%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	312.5	300.0	104.2%	370.0	84.5%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	ABSAROKA (62201)	% Δ Volts	0.955	0.877				8.17%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLBUSAT (62224)	% Δ Volts	0.975	0.900				7.69%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLUMBUS (62015)	% Δ Volts	0.978	0.903				7.67%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	BGTMBERA (62250)	% Δ Volts	1.009	0.936				7.23%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLRPLJE (62220)	% Δ Volts	1.000	0.929				7.10%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	DUCKCR-R (62325)	% Δ Volts	1.015	0.944				7.00%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	WILLSALL (62019)	% Δ Volts	1.036	0.965				6.85%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLRPLJE (62205)	% Δ Volts	1.000	0.937				6.30%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	WILLSALL (62016)	% Δ Volts	1.033	0.968				6.29%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	CLYDE P (62108)	% Δ Volts	1.026	0.966				5.85%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	THRRIVER (62331)	% Δ Volts	1.032	0.979				5.14%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	STANFRDM (62231)	% Δ Volts	1.033	0.980				5.13%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	KINGHILL (62170)	% Δ Volts	1.045	0.992				5.07%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	UTICA (62238)	% Δ Volts	1.029	0.977				5.05%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.9	300.0	101.6%	370.0	82.4%
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	297.8	300.0	300.0	100.0%	370.0	81.1%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							

Appendix H - 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	302.2	300.0	100.7%	370.0	81.7%
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	302.2	300.0	100.7%	370.0	81.7%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	270.7	345.6	300.0	115.2%	370.0	93.4%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	270.7	345.6	300.0	115.2%	370.0	93.4%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO	Branch MVA	290.4	364.7	315.0	115.8%	394.0	92.6%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO	Branch MVA	290.4	363.3	315.0	115.3%	394.0	92.2%
N-2: Double Palo Verde	CR_NEST1 (54458) -> CBK 500 (50791) CKT 1 at CR_NEST1	Branch Amp	430.1	1104.4	1085.4	101.8%	1199.7	92.1%
N-2: Double Palo Verde	CHOLLA (14000) -> CHOSAG11 (14014) CKT 1 at CHOSAG11	Branch Amp	970.5	1065.0	1026.0	103.8%	1538.1	69.2%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	319.6	300.0	106.5%	370.0	86.4%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	312.5	300.0	104.2%	370.0	84.5%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	PLACIDLK (62344)	% Δ Volts	1.026	0.962				6.24%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	DIXON MV (40348)	% Δ Volts	1.026	0.969				5.56%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	RATTLE S (40867)	% Δ Volts	1.025	0.970				5.37%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	DIAMNDMT (62295)	% Δ Volts	1.022	0.968				5.28%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	SUPERRMT (62296)	% Δ Volts	1.022	0.968				5.28%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	TARKIO-R (62294)	% Δ Volts	1.025	0.971				5.27%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	ST REGIS (62297)	% Δ Volts	1.020	0.967				5.20%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	ALBERTON (62293)	% Δ Volts	1.029	0.976				5.15%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HUSON-R (62300)	% Δ Volts	1.032	0.980				5.04%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HAMLTNMT (62074)	% Δ Volts	1.014	0.963				5.03%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HAUGEN (62298)	% Δ Volts	1.018	0.967				5.01%
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	303.1	300.0	101.0%	370.0	81.9%
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	No Violations							
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	309.0	300.0	103.0%	370.0	83.5%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	302.5	300.0	100.8%	370.0	81.7%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	226.0	267.0	252.0	105.9%	271.1	98.5%
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	303.2	300.0	101.1%	370.0	82.0%
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV	No Violations							
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	No Violations							
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	No Violations							
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							

Appendix H - 16la1sa_3400idnw_Path76 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	301.4	300.0	100.5%	370.0	81.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	No Violations							
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	327.6	300.0	109.2%	370.0	88.6%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	320.0	300.0	106.7%	370.0	86.5%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	No Violations							
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	226.0	255.1	252.0	101.2%	271.1	94.1%
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.0	300.0	101.3%	370.0	82.2%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	307.8	300.0	102.6%	370.0	83.2%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	292.0	301.5	300.0	100.5%	370.0	81.5%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	226.0	254.4	252.0	100.9%	271.1	93.8%
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	304.0	300.0	101.3%	370.0	82.2%
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	305.5	300.0	101.8%	370.0	82.6%
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	297.8	302.2	300.0	100.7%	370.0	81.7%
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.70	-803	0.70	-1972	0.70	-344	0.70	-737	0.71	-4676	0.72	-1789	0.80	-1582	0.70	-918
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.70	-804	0.70	-1982	0.70	-345	0.70	-737	0.71	-4610	0.72	-1797	0.79	-1588	0.70	-919
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.70	-809	0.70	-2024	0.70	-347	0.70	-741	0.71	-4795	0.71	-1837	0.79	-1632	0.70	-924
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.70	-809	0.70	-2040	0.70	-348	0.70	-740	0.70	-4750	0.71	-1850	0.79	-1644	0.70	-924
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.70	-810	0.70	-2050	0.70	-351	0.70	-741	0.73	-4813	0.71	-1859	0.79	-1651	0.70	-925
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.70	-788	0.70	-2050	0.70	-249	0.70	-742	0.70	-4881	0.71	-1858	0.79	-1649	0.70	-904
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.70	-809	0.70	-2006	0.70	-350	0.70	-737	0.73	-4835	0.72	-1819	0.79	-1614	0.70	-923
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.70	-804	0.70	-2015	0.70	-340	0.70	-737	0.70	-4423	0.71	-1839	0.79	-1639	0.70	-919
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.70	-813	0.70	-2071	0.70	-355	0.70	-741	0.71	-4555	0.71	-1877	0.79	-1669	0.70	-928
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.70	-805	0.70	-2028	0.70	-340	0.70	-737	0.71	-4089	0.71	-1853	0.79	-1653	0.70	-919
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.70	-809	0.70	-2042	0.70	-350	0.70	-739	0.76	-4635	0.71	-1853	0.79	-1646	0.70	-924
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.70	-809	0.70	-2039	0.70	-350	0.70	-740	0.77	-4503	0.71	-1854	0.79	-1649	0.70	-924
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.70	-809	0.70	-2009	0.70	-350	0.70	-738	0.73	-4845	0.72	-1822	0.79	-1616	0.70	-924
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.70	-807	0.70	-1962	0.70	-349	0.70	-734	0.75	-4611	0.72	-1781	0.79	-1575	0.70	-921
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500KV + RAS	0.70	-800	0.70	-1813	0.70	-343	0.70	-725	0.80	-4234	0.74	-1661	0.79	-1466	0.70	-914
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.70	-806	0.70	-2031	0.70	-346	0.70	-738	0.71	-4708	0.71	-1854	0.79	-1651	0.70	-921
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.70	-808	0.70	-2039	0.70	-348	0.70	-739	0.70	-4774	0.71	-1852	0.79	-1646	0.70	-923
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.70	-807	0.70	-1990	0.70	-350	0.70	-736	0.72	-4927	0.72	-1800	0.79	-1590	0.70	-922
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.70	-809	0.70	-2040	0.70	-349	0.70	-740	0.76	-4581	0.71	-1853	0.79	-1647	0.70	-924
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.70	-789	0.70	-2047	0.70	-249	0.70	-741	0.71	-4472	0.71	-1862	0.79	-1657	0.70	-904
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.70	-810	0.70	-2048	0.70	-350	0.70	-740	0.73	-4811	0.71	-1858	0.79	-1650	0.70	-925
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-741	0.75	-4702	0.71	-1861	0.79	-1652	0.70	-925
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.70	-810	0.70	-2044	0.70	-350	0.70	-740	0.74	-4777	0.71	-1855	0.79	-1648	0.70	-925
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.70	-810	0.70	-2019	0.70	-352	0.70	-740	0.78	-4639	0.71	-1849	0.79	-1647	0.70	-925
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.70	-804	0.70	-1933	0.70	-347	0.70	-737	0.77	-4518	0.73	-1757	0.80	-1548	0.70	-919
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.70	-810	0.70	-2045	0.70	-351	0.70	-740	0.74	-4794	0.71	-1856	0.79	-1649	0.70	-925
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.70	-809	0.70	-2040	0.70	-350	0.70	-739	0.75	-4626	0.71	-1852	0.79	-1645	0.70	-924
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.73	-4887	0.71	-1860	0.79	-1651	0.70	-925
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.72	-4915	0.71	-1861	0.79	-1652	0.70	-925
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV	0.70	-812	0.70	-2049	0.70	-353	0.70	-741	0.74	-4740	0.71	-1858	0.79	-1650	0.70	-927
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV	0.70	-810	0.70	-2056	0.70	-352	0.70	-741	0.73	-4820	0.71	-1862	0.79	-1653	0.70	-925
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.70	-810	0.70	-2057	0.70	-351	0.70	-741	0.75	-4722	0.71	-1862	0.79	-1652	0.70	-925
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTON5 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4851	0.71	-1859	0.79	-1650	0.70	-925
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.72	-4912	0.71	-1860	0.79	-1651	0.70	-925
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.75	-4723	0.71	-1860	0.79	-1651	0.70	-925
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV	0.70	-807	0.70	-2034	0.70	-346	0.70	-738	0.76	-4386	0.71	-1851	0.79	-1645	0.70	-921
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.70	-809	0.70	-2038	0.70	-349	0.70	-740	0.76	-4533	0.71	-1853	0.79	-1647	0.70	-923
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.70	-810	0.70	-2044	0.70	-350	0.70	-740	0.74	-4778	0.71	-1855	0.79	-1648	0.70	-924
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.70	-810	0.70	-2046	0.70	-350	0.70	-740	0.73	-4820	0.71	-1856	0.79	-1649	0.70	-925
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.70	-809	0.70	-2041	0.70	-350	0.70	-740	0.74	-4731	0.71	-1853	0.79	-1647	0.70	-924
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.70	-809	0.70	-2045	0.70	-350	0.70	-740	0.74	-4770	0.71	-1855	0.79	-1648	0.70	-924
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.74	-4745	0.71	-1859	0.79	-1650	0.70	-925
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.70	-812	0.70	-2049	0.70	-353	0.70	-741	0.76	-4591	0.71	-1857	0.79	-1649	0.70	-927
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.76	-4659	0.71	-1858	0.79	-1650	0.70	-925
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-741	0.76	-4620	0.71	-1860	0.79	-1651	0.70	-925
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.73	-4869	0.71	-1860	0.79	-1651	0.70	-925
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.70	-801	0.70	-1918	0.70	-344	0.70	-734	0.78	-4429	0.73	-1733	0.80	-1523	0.70	-916
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.70	-802	0.70	-1930	0.70	-345	0.70	-735	0.77	-4528	0.73	-1742	0.80	-1532	0.70	-917
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4877	0.71	-1858	0.79	-1649	0.70	-925
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.70	-810	0.70	-2056	0.70	-352	0.70	-741	0.72	-4951	0.71	-1861	0.79	-1651	0.70	-925
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.70	-810	0.70	-2035	0.70	-352	0.70	-740	0.77	-4648	0.71	-1852	0.79	-1648	0.70	-925
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.75	-4719	0.71	-1858	0.79	-1650	0.70	-925

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.70	-806	0.70	-1981	0.70	-349	0.70	-737	0.72	-4949	0.72	-1785	0.79	-1574	0.70	-921
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4859	0.71	-1857	0.79	-1649	0.70	-925
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.70	-810	0.70	-2058	0.70	-351	0.70	-740	0.72	-4965	0.71	-1862	0.79	-1652	0.70	-925
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4843	0.71	-1859	0.79	-1651	0.70	-925
BF 4708 HATWAI 500 KV BUS	0.70	-807	0.70	-1990	0.70	-349	0.70	-735	0.73	-4859	0.72	-1807	0.79	-1600	0.70	-922
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4893	0.71	-1857	0.79	-1648	0.70	-925
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV	0.70	-806	0.70	-1990	0.70	-348	0.70	-735	0.74	-4785	0.72	-1813	0.79	-1607	0.70	-921
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.70	-807	0.70	-1997	0.70	-349	0.70	-736	0.73	-4833	0.72	-1818	0.79	-1613	0.70	-921
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-741	0.75	-4690	0.71	-1861	0.79	-1652	0.70	-925
BF 4888 ASHE-SLATT & CGS 500 KV	0.70	-798	0.71	-1849	0.70	-342	0.70	-733	0.77	-4485	0.74	-1673	0.80	-1465	0.70	-912
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.70	-809	0.70	-2034	0.70	-350	0.70	-740	0.74	-4760	0.71	-1851	0.79	-1646	0.70	-924
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.70	-809	0.70	-2026	0.70	-349	0.70	-740	0.76	-4484	0.71	-1850	0.79	-1648	0.70	-924
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.70	-808	0.70	-2031	0.70	-348	0.70	-738	0.76	-4471	0.71	-1847	0.79	-1642	0.70	-923
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.70	-768	0.70	-1608	0.70	-327	0.70	-707	0.76	-4300	0.71	-1703	0.80	-1705	0.70	-879
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.70	-770	0.70	-1681	0.70	-329	0.70	-714	0.75	-4374	0.71	-1773	0.80	-1771	0.70	-882
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.70	-813	0.70	-2067	0.70	-355	0.70	-742	0.70	-4189	0.71	-1869	0.79	-1659	0.70	-928
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.70	-805	0.70	-2020	0.70	-347	0.70	-737	0.73	-4709	0.71	-1862	0.79	-1663	0.70	-920
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.70	-802	0.70	-2013	0.70	-346	0.70	-735	0.76	-4479	0.71	-1869	0.79	-1679	0.70	-916
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.70	-807	0.70	-2036	0.70	-348	0.70	-738	0.76	-4484	0.71	-1859	0.79	-1655	0.70	-922
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.70	-807	0.70	-2033	0.70	-349	0.70	-739	0.74	-4730	0.71	-1862	0.79	-1659	0.70	-922
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.70	-808	0.70	-2042	0.70	-349	0.70	-739	0.73	-4814	0.71	-1862	0.79	-1656	0.70	-922
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.70	-808	0.70	-2019	0.70	-348	0.70	-740	0.71	-4656	0.71	-1848	0.79	-1650	0.70	-923
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.70	-808	0.70	-2036	0.70	-347	0.70	-739	0.73	-4619	0.71	-1850	0.79	-1645	0.70	-923
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.75	-4725	0.71	-1861	0.79	-1652	0.70	-925
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.70	-810	0.70	-2050	0.70	-351	0.70	-740	0.73	-4858	0.71	-1858	0.79	-1649	0.70	-925
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.70	-809	0.70	-2038	0.70	-350	0.70	-740	0.74	-4751	0.71	-1850	0.79	-1644	0.70	-924
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.70	-810	0.70	-2048	0.70	-351	0.70	-741	0.74	-4751	0.71	-1857	0.79	-1650	0.70	-925
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.70	-810	0.70	-2050	0.70	-351	0.70	-740	0.76	-4619	0.71	-1858	0.79	-1650	0.70	-925
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.70	-810	0.70	-2034	0.70	-351	0.70	-740	0.73	-4855	0.71	-1858	0.79	-1653	0.70	-925
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.70	-805	0.70	-1916	0.70	-347	0.70	-736	0.74	-4788	0.73	-1758	0.80	-1553	0.70	-919
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.70	-810	0.70	-2037	0.70	-352	0.70	-740	0.78	-4610	0.71	-1854	0.79	-1649	0.70	-925
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.70	-804	0.70	-1920	0.70	-346	0.70	-736	0.78	-4388	0.73	-1748	0.80	-1540	0.70	-918
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.70	-809	0.70	-2044	0.70	-350	0.70	-740	0.74	-4803	0.71	-1855	0.79	-1648	0.70	-924
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.70	-810	0.70	-2046	0.70	-351	0.70	-740	0.73	-4798	0.71	-1857	0.79	-1649	0.70	-925
BF 5266 SLATT-BUCKLY 500 KV	0.70	-807	0.70	-2051	0.70	-349	0.70	-739	0.72	-4773	0.71	-1864	0.79	-1657	0.70	-922
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.73	-4869	0.71	-1860	0.79	-1651	0.70	-925
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.70	-810	0.70	-2050	0.70	-351	0.70	-741	0.73	-4817	0.71	-1859	0.79	-1651	0.70	-925
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.70	-768	0.70	-1177	0.70	-320	0.70	-696	0.76	-4370	0.72	-1447	0.82	-1474	0.70	-880
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.70	-770	0.70	-1416	0.70	-329	0.70	-709	0.78	-4357	0.71	-1659	0.81	-1651	0.70	-882
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.70	-772	0.70	-1234	0.70	-329	0.70	-703	0.77	-4538	0.70	-1415	0.77	-1372	0.70	-884
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR	0.70	-793	0.70	-1531	0.70	-344	0.70	-708	0.76	-4783	0.71	-1413	0.80	-1264	0.70	-906
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.70	-774	0.70	-1431	0.70	-335	0.70	-678	0.76	-4789	0.71	-1180	0.81	-1226	0.70	-882
BF LOLO 230KV	0.70	-806	0.70	-1998	0.70	-348	0.70	-736	0.73	-4865	0.71	-1839	0.79	-1642	0.70	-921
BF PGE GRASSLAND-CEDAR SPRING & HEMINGWAY-GRASSLAND 500 KV	0.70	-767	0.70	-1364	0.70	-319	0.70	-698	0.78	-4223	0.72	-1502	0.81	-1544	0.70	-879
BF PGE GRASSLAND-COYOTE 500 KV & CARTY GAS PROJECT	0.70	-810	0.70	-2014	0.70	-351	0.70	-740	0.72	-4909	0.71	-1846	0.79	-1643	0.70	-925
BF PGE SLATT-GRASSLAND 500 KV & BOARDMAN COAL GEN	0.70	-803	0.70	-1891	0.70	-346	0.70	-735	0.74	-4820	0.73	-1739	0.80	-1544	0.70	-917
BUS: ALVEY 500 KV	0.70	-808	0.70	-2040	0.70	-346	0.70	-739	0.71	-4630	0.71	-1853	0.79	-1647	0.70	-923
BUS: BELL BPA 500 KV	0.70	-802	0.70	-1874	0.70	-345	0.70	-728	0.77	-4522	0.73	-1719	0.79	-1524	0.70	-916
BUS: BUCKLEY 500 KV	0.70	-805	0.70	-2024	0.70	-345	0.70	-737	0.73	-4570	0.71	-1847	0.79	-1645	0.70	-920
BUS: DIXONVILLE 500 KV	0.70	-809	0.70	-2044	0.70	-348	0.70	-740	0.72	-4621	0.71	-1853	0.79	-1646	0.70	-924
BUS: HOT SPRINGS 500 KV	0.70	-810	0.70	-2059	0.70	-352	0.70	-741	0.72	-4944	0.71	-1864	0.79	-1655	0.70	-925
BUS: KEELER 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.76	-4512	0.71	-1859	0.79	-1650	0.70	-925

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BUS: ROCK CREEK 500 KV	0.70	-809	0.70	-2029	0.70	-349	0.70	-739	0.74	-4757	0.71	-1841	0.79	-1634	0.70	-923
BUS: SICKLER 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.73	-4880	0.71	-1859	0.79	-1650	0.70	-925
BUS: SUMMER LAKE 500 KV	0.70	-768	0.70	-1610	0.70	-328	0.70	-707	0.75	-4324	0.71	-1705	0.80	-1706	0.70	-879
N-1: ALLSTON-KEELER 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.74	-4756	0.71	-1859	0.79	-1650	0.70	-925
N-1: ALLSTON-NAPAVINE 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4843	0.71	-1859	0.79	-1650	0.70	-925
N-1: ALLSTON-PAUL #2 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4857	0.71	-1859	0.79	-1651	0.70	-925
N-1: ALVERY-DIXONVILLE 500 KV	0.70	-809	0.70	-2048	0.70	-348	0.70	-740	0.73	-4623	0.71	-1857	0.79	-1649	0.70	-924
N-1: ALVEY-MARION 500 KV	0.70	-808	0.70	-2052	0.70	-349	0.70	-740	0.74	-4600	0.71	-1860	0.79	-1652	0.70	-923
N-1: ASHE-HANFORD 500 KV	0.70	-809	0.70	-2041	0.70	-350	0.70	-740	0.76	-4527	0.71	-1855	0.79	-1650	0.70	-924
N-1: ASHE-LOW MON 500 KV	0.70	-810	0.70	-2047	0.70	-351	0.70	-740	0.73	-4876	0.71	-1856	0.79	-1648	0.70	-925
N-1: ASHE-MARION 500 KV	0.70	-808	0.70	-2039	0.70	-348	0.70	-739	0.74	-4727	0.71	-1852	0.79	-1646	0.70	-923
N-1: ASHE-SLATT 500 KV	0.70	-810	0.70	-2042	0.70	-351	0.70	-740	0.73	-4820	0.71	-1856	0.79	-1650	0.70	-925
N-1: BELL-COULEE 500 KV	0.70	-807	0.70	-2000	0.70	-349	0.70	-736	0.73	-4862	0.72	-1819	0.79	-1613	0.70	-922
N-1: BELL-TAFT 500 KV	0.70	-802	0.70	-1875	0.70	-345	0.70	-729	0.79	-4225	0.73	-1721	0.79	-1526	0.70	-916
N-1: BIG EDDY-CELILO 500 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4933	0.71	-1862	0.79	-1652	0.70	-925
N-1: BIG EDDY-JOHN DAY 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-741	0.72	-4905	0.71	-1861	0.79	-1652	0.70	-925
N-1: BIG EDDY-KNIGHT 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4891	0.71	-1859	0.79	-1651	0.70	-925
N-1: BIG EDDY-OSTRANDER 500 KV	0.70	-810	0.70	-2047	0.70	-350	0.70	-740	0.73	-4822	0.71	-1857	0.79	-1649	0.70	-925
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.70	-810	0.70	-2032	0.70	-351	0.70	-739	0.72	-4929	0.71	-1833	0.79	-1638	0.70	-925
N-1: BRADY-ANTELOPE 230 KV + RAS	0.70	-806	0.70	-1976	0.70	-349	0.70	-734	0.72	-4915	0.71	-1809	0.79	-1623	0.70	-921
N-1: BROADVIEW-GARRISON #1 500 KV	0.70	-807	0.72	-1920	0.70	-349	0.70	-735	0.76	-4662	0.73	-1762	0.80	-1547	0.70	-922
N-1: BROWNLEE-ONTARIO 230 KV	0.70	-810	0.70	-2016	0.70	-351	0.70	-739	0.72	-4921	0.71	-1824	0.79	-1632	0.70	-925
N-1: BUCKLEY-GRIZZLY 500 KV	0.70	-809	0.70	-2049	0.70	-348	0.70	-740	0.70	-4841	0.71	-1857	0.79	-1650	0.70	-923
N-1: BUCKLEY-MARION 500 KV	0.70	-809	0.70	-2040	0.70	-349	0.70	-740	0.74	-4752	0.71	-1854	0.79	-1648	0.70	-923
N-1: BUCKLEY-SLATT 500 KV	0.70	-807	0.70	-2051	0.70	-349	0.70	-739	0.72	-4774	0.71	-1864	0.79	-1657	0.70	-922
N-1: CAL SUB 120 KV PHASE SHIFTER	0.70	-771	0.70	-2027	0.70	-332	0.70	-742	0.72	-4868	0.71	-1844	0.79	-1640	0.70	-871
N-1: CAPTAIN JACK-OLINDA 500 KV	0.70	-811	0.70	-2060	0.70	-349	0.70	-739	0.72	-4219	0.71	-1877	0.79	-1673	0.70	-926
N-1: CAPTJACK-KFALLS 500 KV	0.70	-809	0.70	-2046	0.70	-349	0.70	-740	0.70	-4756	0.71	-1856	0.79	-1649	0.70	-924
N-1: CASCADE CROSSING 500 KV	0.70	-806	0.70	-2039	0.70	-347	0.70	-738	0.78	-4381	0.71	-1860	0.79	-1656	0.70	-921
N-1: CHIEF JO-COULEE 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4889	0.71	-1857	0.79	-1648	0.70	-925
N-1: CHIEF JO-MONROE 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4911	0.71	-1857	0.79	-1649	0.70	-925
N-1: CHIEF JO-SICKLER 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.75	-4721	0.71	-1860	0.79	-1651	0.70	-925
N-1: COULEE-HANFORD 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4637	0.71	-1858	0.79	-1651	0.70	-925
N-1: COULEE-SCHULTZ 500 KV	0.70	-810	0.70	-2046	0.70	-351	0.70	-740	0.73	-4843	0.71	-1855	0.79	-1648	0.70	-925
N-1: COVINGTON4-RAVER 500 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4913	0.71	-1862	0.79	-1652	0.70	-925
N-1: COVINGTON5-RAVER 500 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4912	0.71	-1861	0.79	-1652	0.70	-925
N-1: COYOTE-LONGHORN 500 KV	0.70	-810	0.70	-2048	0.70	-351	0.70	-741	0.72	-4918	0.71	-1864	0.79	-1657	0.70	-925
N-1: CUSTERW-MONROE 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.75	-4720	0.71	-1860	0.79	-1651	0.70	-925
N-1: DIXONVILLE-MERIDIAN 500 KV	0.70	-809	0.70	-2041	0.70	-348	0.70	-740	0.70	-4762	0.71	-1851	0.79	-1645	0.70	-924
N-1: DRYCREEK-LOLO 230 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4932	0.71	-1861	0.79	-1652	0.70	-925
N-1: DRYCREEK-N LEWISTON 230 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-740	0.72	-4949	0.71	-1861	0.79	-1652	0.70	-925
N-1: DRYCREEK-WALA AVA 230 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.75	-4735	0.71	-1861	0.79	-1652	0.70	-925
N-1: DWORSHAK-HATWAI 500 KV	0.70	-809	0.70	-2009	0.70	-350	0.70	-737	0.75	-4726	0.72	-1817	0.79	-1608	0.70	-923
N-1: DWORSHAK-TAFT 500 KV	0.70	-809	0.70	-2006	0.70	-350	0.70	-737	0.73	-4835	0.72	-1819	0.79	-1614	0.70	-923
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.73	-4884	0.71	-1858	0.79	-1650	0.70	-925
N-1: ECHO LAKE-RAVER 500 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-741	0.72	-4911	0.71	-1861	0.79	-1652	0.70	-925
N-1: ECHO LAKE-SCHULTZ 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4832	0.71	-1857	0.79	-1649	0.70	-925
N-1: ECHO LAKE-SNOK TAP 500 KV	0.70	-810	0.70	-2056	0.70	-352	0.70	-741	0.75	-4733	0.71	-1862	0.79	-1653	0.70	-925
N-1: GARRISON-TAFT #2 500 KV	0.70	-807	0.70	-1962	0.70	-349	0.70	-734	0.74	-4804	0.72	-1781	0.79	-1575	0.70	-921
N-1: GOLDHILL-PLACER 115 KV	0.70	-810	0.70	-2057	0.70	-351	0.70	-741	0.72	-4935	0.71	-1863	0.79	-1654	0.70	-925
N-1: GRASSLAND-COYOTE 500 KV	0.70	-810	0.70	-2014	0.70	-351	0.70	-740	0.72	-4927	0.71	-1846	0.79	-1643	0.70	-925
N-1: GRASSLAND-SLATT 500 KV	0.70	-807	0.70	-2027	0.70	-349	0.70	-739	0.73	-4865	0.71	-1863	0.79	-1662	0.70	-922

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.70	-808	0.70	-2039	0.70	-348	0.70	-739	0.70	-4778	0.71	-1852	0.79	-1646	0.70	-923
N-1: GRIZZLY-MALIN 500 KV	0.70	-806	0.70	-2034	0.70	-344	0.70	-738	0.72	-4546	0.71	-1851	0.79	-1647	0.70	-921
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.70	-810	0.70	-2025	0.70	-351	0.70	-741	0.72	-4733	0.71	-1850	0.79	-1651	0.70	-925
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.70	-806	0.70	-2033	0.70	-344	0.70	-738	0.72	-4560	0.71	-1851	0.79	-1647	0.70	-921
N-1: GRIZZLY-ROUND BU 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.72	-4918	0.71	-1860	0.79	-1651	0.70	-925
N-1: HANFORD-LOW MON 500 KV	0.70	-809	0.70	-2044	0.70	-351	0.70	-740	0.73	-4869	0.71	-1855	0.79	-1647	0.70	-924
N-1: HANFORD-VANTAGE 500 KV	0.70	-810	0.70	-2050	0.70	-351	0.70	-741	0.73	-4813	0.71	-1859	0.79	-1651	0.70	-925
N-1: HANFORD-WAUTOMA 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.72	-4911	0.71	-1860	0.79	-1651	0.70	-925
N-1: HARRY ALLEN 345 KV PHASE SHIFTER	0.70	-800	0.71	-1734	0.70	-347	0.70	-699	0.74	-4648	0.75	-1572	0.81	-1408	0.70	-912
N-1: HATWAI 500/230 KV XFMR	0.70	-810	0.70	-2056	0.70	-351	0.70	-740	0.72	-4926	0.71	-1862	0.79	-1653	0.70	-925
N-1: HATWAI-LOLO 230 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.72	-4947	0.71	-1861	0.79	-1652	0.70	-925
N-1: HATWAI-LOW GRAN 500 KV	0.70	-807	0.70	-1999	0.70	-349	0.70	-736	0.73	-4865	0.72	-1819	0.79	-1613	0.70	-921
N-1: HATWAI-N LEWISTON 230 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4951	0.71	-1862	0.79	-1652	0.70	-925
N-1: HELLS CANYON-BROWNEE 230 KV	0.70	-808	0.70	-1971	0.70	-350	0.70	-739	0.72	-4970	0.72	-1813	0.79	-1627	0.70	-923
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.70	-804	0.70	-1941	0.70	-347	0.70	-733	0.73	-4857	0.71	-1806	0.79	-1626	0.70	-919
N-1: HEMINGWAY-GRASSLAND 500 KV	0.70	-769	0.70	-1383	0.70	-321	0.70	-701	0.76	-4432	0.72	-1519	0.81	-1563	0.70	-881
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.70	-770	0.70	-1622	0.70	-329	0.70	-709	0.76	-4545	0.71	-1713	0.80	-1703	0.70	-882
N-1: HILL TOP 345/230 XFMR	0.70	-796	0.70	-1963	0.70	-232	0.70	-749	0.73	-4809	0.72	-1795	0.79	-1598	0.70	-913
N-1: HORSE HV-MCNARY 230 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.75	-4730	0.71	-1861	0.79	-1652	0.70	-925
N-1: HOT SPRINGS-TAFT 500 KV	0.70	-810	0.70	-2050	0.70	-351	0.70	-740	0.75	-4731	0.71	-1857	0.79	-1648	0.70	-925
N-1: HUMBOLDT-COYOTE CK 345 KV	0.70	-810	0.70	-1967	0.70	-356	0.70	-236	0.72	-4886	0.72	-1736	0.80	-1632	0.70	-912
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.70	-800	0.71	-1750	0.70	-346	0.70	-706	0.74	-4674	0.74	-1592	0.81	-1435	0.70	-914
N-1: ING500-CUSTERW 500 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.72	-4917	0.71	-1861	0.79	-1652	0.70	-925
N-1: JOHN DAY-MARION 500 KV	0.70	-809	0.70	-2040	0.70	-349	0.70	-740	0.74	-4759	0.71	-1853	0.79	-1647	0.70	-924
N-1: JOHN DAY-ROCK CK 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.73	-4844	0.71	-1859	0.79	-1651	0.70	-925
N-1: JOHN DAY-SLATT 500 KV	0.70	-808	0.70	-2051	0.70	-350	0.70	-739	0.73	-4865	0.71	-1865	0.79	-1659	0.70	-923
N-1: K FALLS-MERIDIAN 500 KV	0.70	-809	0.70	-2023	0.70	-348	0.70	-741	0.71	-4806	0.72	-1836	0.79	-1632	0.70	-924
N-1: KNIGHT-WAUTOMA 500 KV	0.70	-809	0.70	-2046	0.70	-350	0.70	-740	0.74	-4817	0.71	-1856	0.79	-1648	0.70	-924
N-1: LAGRANDE-NORTH POWDER 230 KV	0.70	-807	0.70	-2007	0.70	-349	0.70	-737	0.75	-4699	0.71	-1841	0.79	-1642	0.70	-921
N-1: LANES-MARION 500 KV	0.70	-809	0.70	-2048	0.70	-350	0.70	-740	0.73	-4829	0.71	-1857	0.79	-1650	0.70	-924
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.72	-4923	0.71	-1860	0.79	-1651	0.70	-925
N-1: LIT GOOSE-LOW MON 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.72	-4922	0.71	-1859	0.79	-1651	0.70	-925
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.72	-4922	0.71	-1859	0.79	-1650	0.70	-925
N-1: LOW MON-SAC TAP 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-741	0.75	-4715	0.71	-1861	0.79	-1652	0.70	-925
N-1: MALIN 500/230 XFMR	0.70	-789	0.70	-2052	0.70	-249	0.70	-742	0.71	-4931	0.71	-1859	0.79	-1650	0.70	-905
N-1: MALIN-HILLTOP 230 KV	0.70	-786	0.70	-1997	0.70	-181	0.70	-750	0.72	-4844	0.72	-1820	0.79	-1618	0.70	-904
N-1: MALIN-ROUND MTN #1 500 KV	0.70	-810	0.70	-2052	0.70	-348	0.70	-739	0.72	-4479	0.71	-1866	0.79	-1660	0.70	-924
N-1: MALIN-ROUND MTN #2 500 KV	0.70	-810	0.70	-2051	0.70	-348	0.70	-739	0.72	-4458	0.71	-1866	0.79	-1660	0.70	-924
N-1: MALIN-SUMMER LAKE 500 KV	0.70	-803	0.70	-2020	0.70	-347	0.70	-737	0.71	-4645	0.71	-1872	0.79	-1684	0.70	-917
N-1: MAPLE VLY-ROCKY RH 345 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.75	-4723	0.71	-1861	0.79	-1652	0.70	-925
N-1: MARION-PEARL 500 KV	0.70	-812	0.70	-2050	0.70	-353	0.70	-741	0.73	-4802	0.71	-1858	0.79	-1650	0.70	-927
N-1: MARION-SANTIAM 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-741	0.75	-4747	0.71	-1860	0.79	-1651	0.70	-925
N-1: MCLOUGHLIN-OSTRANDER 230 KV	0.70	-810	0.70	-2056	0.70	-352	0.70	-741	0.72	-4977	0.71	-1861	0.79	-1652	0.70	-925
N-1: MCNARY 500/230 KV XFMR	0.70	-810	0.70	-2041	0.70	-352	0.70	-740	0.78	-4681	0.71	-1855	0.79	-1649	0.70	-925
N-1: MCNARY-BOARD T1 230 KV	0.70	-811	0.70	-2067	0.70	-352	0.70	-741	0.72	-4942	0.71	-1872	0.79	-1663	0.70	-926
N-1: MCNARY-JOHN DAY 500 KV	0.70	-808	0.70	-2043	0.70	-350	0.70	-739	0.73	-4798	0.71	-1857	0.79	-1650	0.70	-923
N-1: MCNARY-LONGHORN 500 KV	0.70	-811	0.70	-2039	0.70	-352	0.70	-741	0.72	-4905	0.71	-1858	0.79	-1651	0.70	-925
N-1: MCNARY-ROSS 345 KV	0.70	-809	0.70	-2047	0.70	-350	0.70	-740	0.73	-4827	0.71	-1857	0.79	-1649	0.70	-924
N-1: MCNARY-ROUNDUP 230 KV	0.70	-808	0.70	-2017	0.70	-350	0.70	-738	0.72	-4938	0.71	-1844	0.79	-1645	0.70	-923
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.76	-4627	0.71	-1859	0.79	-1651	0.70	-925
N-1: MIDPOINT-HEMINGWAY 500 KV	0.70	-780	0.70	-1560	0.70	-334	0.70	-706	0.76	-4625	0.70	-1384	0.78	-1449	0.70	-892
N-1: MIDPOINT-HUMBOLDT 345 KV	0.70	-820	0.70	-1921	0.70	-361	0.70	-476	0.73	-4854	0.72	-1710	0.80	-1603	0.70	-926

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: NAPAIVINE-PAUL 500 KV	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4925	0.71	-1862	0.79	-1652	0.70	-925
N-1: OLYMPIA-PAUL 500 KV	0.70	-810	0.70	-2057	0.70	-352	0.70	-741	0.72	-4973	0.71	-1861	0.79	-1652	0.70	-925
N-1: ONTARIO-CALDWELL 230 KV	0.70	-810	0.70	-2046	0.70	-351	0.70	-740	0.72	-4932	0.71	-1851	0.79	-1647	0.70	-925
N-1: OSTRANDER-KNIGHT 500 KV	0.70	-809	0.70	-2044	0.70	-350	0.70	-740	0.74	-4798	0.71	-1855	0.79	-1648	0.70	-924
N-1: OSTRANDER-PEARL 500 KV	0.70	-810	0.70	-2058	0.70	-351	0.70	-741	0.75	-4732	0.71	-1862	0.79	-1653	0.70	-925
N-1: OSTRANDER-TROUTDALE 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.73	-4888	0.71	-1860	0.79	-1651	0.70	-925
N-1: OXBOW-BROWNLEE #2 230 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.72	-4932	0.71	-1859	0.79	-1652	0.70	-925
N-1: OXBOW-LOLO 230 KV	0.70	-806	0.70	-1993	0.70	-348	0.70	-736	0.73	-4877	0.71	-1836	0.79	-1640	0.70	-921
N-1: PAUL-SATSOP 500 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.73	-4883	0.71	-1860	0.79	-1652	0.70	-925
N-1: PEARL-KEELER 500 KV	0.70	-811	0.70	-2058	0.70	-352	0.70	-741	0.73	-4855	0.71	-1863	0.79	-1654	0.70	-926
N-1: PINTO-FOUR CORNER 345 KV	0.70	-801	0.70	-1774	0.70	-347	0.70	-709	0.76	-4533	0.74	-1614	0.81	-1453	0.70	-915
N-1: PONDEROSA A 500/230 KV XFMR	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4928	0.71	-1862	0.79	-1653	0.70	-925
N-1: PONDEROSA B 500/230 KV XFMR	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.72	-4951	0.71	-1860	0.79	-1651	0.70	-925
N-1: POPULUS-CEDAR HILL-HEMINGWAY 500 KV	0.70	-794	0.70	-1715	0.70	-344	0.70	-709	0.72	-5037	0.72	-1429	0.80	-1270	0.70	-907
N-1: RAVER-PAUL 500 KV	0.70	-811	0.70	-2056	0.70	-352	0.70	-741	0.73	-4894	0.71	-1861	0.79	-1652	0.70	-926
N-1: RAVER-TACOMA 500 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.73	-4893	0.71	-1861	0.79	-1652	0.70	-925
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.70	-801	0.71	-1735	0.70	-347	0.70	-702	0.74	-4648	0.75	-1573	0.81	-1409	0.70	-914
N-1: ROBINSON-HARRY ALLEN 500 KV	0.70	-741	0.70	-1970	0.70	-307	0.70	-725	0.73	-4715	0.71	-1818	0.79	-1634	0.70	-850
N-1: ROCK CK-WAUTOMA 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4831	0.71	-1858	0.79	-1650	0.70	-925
N-1: ROUND MTN-TABLE MTN 500 KV	0.70	-811	0.70	-2060	0.70	-351	0.70	-740	0.72	-4715	0.71	-1868	0.79	-1660	0.70	-925
N-1: ROUNDUP-LAGRANDE 230 KV	0.70	-807	0.70	-2012	0.70	-349	0.70	-737	0.72	-4906	0.71	-1842	0.79	-1643	0.70	-922
N-1: SCHULTZ-SICKLER 500 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.72	-4906	0.71	-1861	0.79	-1652	0.70	-925
N-1: SCHULTZ-VANTAGE 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.73	-4876	0.71	-1860	0.79	-1651	0.70	-925
N-1: SCHULTZ-WAUTOMA 500 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-741	0.76	-4616	0.71	-1860	0.79	-1652	0.70	-925
N-1: SIGURD-GLEN CANYON 230 KV	0.70	-807	0.70	-1993	0.70	-350	0.70	-732	0.75	-4704	0.72	-1807	0.79	-1607	0.70	-922
N-1: SLATT 500/230 KV XFMR	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.72	-4904	0.71	-1859	0.79	-1651	0.70	-925
N-1: SLATT-LONGHORN 500 KV	0.70	-810	0.70	-2050	0.70	-351	0.70	-740	0.75	-4701	0.71	-1860	0.79	-1651	0.70	-924
N-1: SNOK TAP-SNOKING 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.72	-4899	0.71	-1859	0.79	-1650	0.70	-925
N-1: TABLE MTN-TESLA 500 KV	0.70	-812	0.70	-2069	0.70	-353	0.70	-740	0.72	-4797	0.71	-1875	0.79	-1666	0.70	-927
N-1: TABLE MTN-VACA DIXON 500 KV	0.70	-813	0.70	-2077	0.70	-353	0.70	-740	0.72	-4681	0.71	-1884	0.79	-1675	0.70	-928
N-1: VANTAGE 500/230 KV XFMR #1	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4932	0.71	-1862	0.79	-1652	0.70	-925
N-1: VANTAGE 500/230 KV XFMR #2	0.70	-810	0.70	-2056	0.70	-351	0.70	-741	0.72	-4949	0.71	-1862	0.79	-1652	0.70	-925
N-1: WALLA WALLA-TALBOT 230 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.72	-4931	0.71	-1861	0.79	-1651	0.70	-925
N-1: WALLA WALLA-WALLULA 230 KV	0.70	-810	0.70	-2045	0.70	-351	0.70	-740	0.72	-4942	0.71	-1856	0.79	-1650	0.70	-925
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.70	-808	0.70	-2021	0.70	-348	0.70	-739	0.75	-4599	0.71	-1845	0.79	-1641	0.70	-923
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.70	-806	0.70	-2023	0.70	-345	0.70	-738	0.78	-4268	0.71	-1845	0.79	-1642	0.70	-921
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.70	-805	0.70	-2034	0.70	-345	0.70	-737	0.74	-4530	0.71	-1855	0.79	-1651	0.70	-919
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.70	-807	0.70	-2033	0.70	-348	0.70	-738	0.76	-4469	0.71	-1850	0.79	-1645	0.70	-922
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.70	-806	0.70	-2033	0.70	-346	0.70	-738	0.75	-4637	0.71	-1857	0.79	-1653	0.70	-921
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.70	-808	0.70	-2027	0.70	-349	0.70	-739	0.75	-4667	0.71	-1850	0.79	-1646	0.70	-923
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.70	-809	0.70	-2034	0.70	-350	0.70	-740	0.74	-4759	0.71	-1853	0.79	-1648	0.70	-924
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.70	-790	0.72	-1653	0.70	-336	0.70	-722	0.79	-4284	0.76	-1515	0.80	-1335	0.70	-903
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-ROUND BUTTE 230 KV	0.70	-807	0.70	-2041	0.70	-347	0.70	-739	0.78	-4359	0.71	-1860	0.79	-1657	0.70	-921
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-SANTIAM 230 KV	0.70	-806	0.70	-2042	0.70	-347	0.70	-739	0.78	-4385	0.71	-1861	0.79	-1657	0.70	-921
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.70	-810	0.70	-2044	0.70	-350	0.70	-740	0.74	-4790	0.71	-1855	0.79	-1648	0.70	-924
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.70	-810	0.70	-2045	0.70	-350	0.70	-740	0.74	-4789	0.71	-1856	0.79	-1648	0.70	-924
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.70	-810	0.70	-1964	0.70	-351	0.70	-736	0.72	-4918	0.72	-1759	0.80	-1604	0.70	-925
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.70	-810	0.70	-1963	0.70	-351	0.70	-736	0.72	-4937	0.72	-1756	0.80	-1604	0.70	-925
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.70	-811	0.73	-1714	0.70	-352	0.70	-733	0.72	-4916	0.77	-1483	0.83	-1062	0.70	-926
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.70	-810	0.73	-1645	0.70	-351	0.70	-728	0.75	-4714	0.78	-1435	0.83	-1012	0.70	-925
N-2: BROADVIEW-GARRISON #1 & #2 500 KV + RAS	0.70	-793	0.86	-1283	0.70	-338	0.70	-726	0.78	-4561	0.85	-1265	0.86	-1173	0.70	-906
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.70	-802	0.70	-1870	0.70	-346	0.70	-732	0.72	-4882	0.72	-1766	0.79	-1609	0.70	-917

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: BROWNLEE-OXBOW & BROWNLEE-HELLS CANYON 230 KV	0.70	-808	0.70	-1967	0.70	-350	0.70	-739	0.72	-4971	0.72	-1810	0.79	-1626	0.70	-923
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.70	-807	0.70	-2023	0.70	-346	0.70	-739	0.78	-4289	0.71	-1845	0.79	-1643	0.70	-922
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.70	-810	0.70	-2043	0.70	-351	0.70	-740	0.74	-4792	0.71	-1853	0.79	-1646	0.70	-925
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.70	-810	0.70	-2045	0.70	-351	0.70	-740	0.74	-4798	0.71	-1855	0.79	-1647	0.70	-925
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.70	-810	0.70	-2048	0.70	-351	0.70	-740	0.76	-4644	0.71	-1856	0.79	-1648	0.70	-925
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.70	-810	0.70	-2050	0.70	-351	0.70	-740	0.73	-4867	0.71	-1858	0.79	-1650	0.70	-925
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.70	-810	0.70	-2047	0.70	-351	0.70	-740	0.73	-4851	0.71	-1855	0.79	-1647	0.70	-925
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.70	-810	0.70	-2042	0.70	-351	0.70	-741	0.75	-4656	0.71	-1855	0.79	-1650	0.70	-925
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.70	-809	0.70	-2029	0.70	-350	0.70	-739	0.75	-4718	0.71	-1843	0.79	-1638	0.70	-924
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.73	-4877	0.71	-1860	0.79	-1651	0.70	-925
N-2: CUSTERW-MONROE #1 & #2 500 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.74	-4822	0.71	-1858	0.79	-1649	0.70	-925
N-2: DC-BIPOLE	0.70	-828	0.70	-2294	0.70	-367	0.70	-735	0.70	-5048	0.70	-2049	0.77	-1842	0.70	-943
N-2: DOUBLE PALO VERDE	0.70	-835	0.70	-2270	0.70	-367	0.70	-734	0.73	-4615	0.70	-2039	0.78	-1787	0.70	-950
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.70	-810	0.70	-2051	0.70	-351	0.70	-740	0.73	-4882	0.71	-1858	0.79	-1650	0.70	-925
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4839	0.71	-1857	0.79	-1649	0.70	-925
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.70	-791	0.73	-1649	0.70	-337	0.70	-721	0.77	-4491	0.76	-1506	0.81	-1318	0.70	-904
N-2: GRASSLAND-CEDAR SPRING & SLATT - BUCKLEY 500 KV	0.70	-803	0.70	-2044	0.70	-345	0.70	-736	0.75	-4524	0.71	-1869	0.79	-1666	0.70	-918
N-2: GRASSLAND-COYOTE & SLATT - LONGHORN 500 KV	0.70	-809	0.70	-1971	0.70	-350	0.70	-738	0.73	-4804	0.71	-1825	0.79	-1628	0.70	-924
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV	0.70	-800	0.70	-2015	0.70	-336	0.70	-735	0.70	-4241	0.71	-1845	0.79	-1647	0.70	-915
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV	0.70	-806	0.70	-2000	0.70	-343	0.70	-739	0.70	-4415	0.71	-1836	0.79	-1642	0.70	-921
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV	0.70	-794	0.70	-2010	0.70	-337	0.70	-732	0.70	-4232	0.70	-1879	0.79	-1702	0.70	-908
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.70	-806	0.70	-2000	0.70	-347	0.70	-737	0.80	-4121	0.71	-1835	0.79	-1635	0.70	-921
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.70	-809	0.70	-2045	0.70	-351	0.70	-739	0.73	-4862	0.71	-1855	0.79	-1648	0.70	-924
N-2: HELLS CANYON-BROWNLEE & OXBOW-LOLO 230 KV	0.70	-804	0.70	-1890	0.70	-347	0.70	-733	0.73	-4861	0.72	-1783	0.79	-1628	0.70	-918
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.70	-810	0.70	-2041	0.70	-350	0.70	-741	0.78	-4363	0.71	-1853	0.79	-1648	0.70	-925
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.70	-809	0.70	-2036	0.70	-349	0.70	-739	0.77	-4490	0.71	-1851	0.79	-1646	0.70	-924
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV	0.70	-805	0.70	-2015	0.70	-342	0.70	-737	0.70	-4331	0.71	-1838	0.79	-1638	0.70	-920
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV	0.70	-806	0.70	-2031	0.70	-343	0.70	-738	0.70	-4505	0.71	-1847	0.79	-1643	0.70	-921
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.70	-807	0.70	-2023	0.70	-346	0.70	-739	0.78	-4289	0.71	-1845	0.79	-1643	0.70	-922
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.70	-810	0.70	-2033	0.70	-350	0.70	-740	0.75	-4616	0.71	-1848	0.79	-1644	0.70	-925
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.70	-809	0.70	-2041	0.70	-349	0.70	-739	0.74	-4731	0.71	-1855	0.79	-1648	0.70	-924
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.70	-811	0.70	-2059	0.70	-352	0.70	-741	0.73	-4835	0.71	-1865	0.79	-1656	0.70	-926
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.70	-808	0.70	-2031	0.70	-348	0.70	-739	0.77	-4409	0.71	-1847	0.79	-1643	0.70	-923
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.70	-808	0.70	-2034	0.70	-349	0.70	-739	0.77	-4431	0.71	-1850	0.79	-1645	0.70	-923
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.70	-809	0.70	-2045	0.70	-350	0.70	-740	0.74	-4769	0.71	-1856	0.79	-1649	0.70	-924
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.70	-806	0.70	-1990	0.70	-348	0.70	-735	0.74	-4789	0.72	-1813	0.79	-1607	0.70	-921
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.70	-815	0.70	-2096	0.70	-350	0.70	-734	0.71	-3165	0.70	-1929	0.79	-1735	0.70	-929
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.70	-808	0.70	-2036	0.70	-349	0.70	-738	0.74	-4690	0.71	-1854	0.79	-1648	0.70	-923
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.70	-808	0.70	-2040	0.70	-349	0.70	-738	0.74	-4779	0.71	-1856	0.79	-1649	0.70	-923
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.70	-807	0.70	-2032	0.70	-348	0.70	-738	0.75	-4659	0.71	-1852	0.79	-1647	0.70	-922
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.70	-809	0.70	-2044	0.70	-350	0.70	-739	0.74	-4799	0.71	-1857	0.79	-1649	0.70	-924
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.70	-779	0.70	-1553	0.70	-333	0.70	-704	0.76	-4620	0.70	-1362	0.78	-1427	0.70	-891
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.70	-810	0.70	-2046	0.70	-351	0.70	-740	0.74	-4768	0.71	-1855	0.79	-1647	0.70	-925
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV	0.70	-808	0.70	-2030	0.70	-349	0.70	-738	0.81	-4228	0.71	-1845	0.79	-1639	0.70	-923
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV	0.70	-809	0.70	-2047	0.70	-350	0.70	-740	0.74	-4802	0.71	-1857	0.79	-1648	0.70	-924
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.70	-811	0.70	-2055	0.70	-352	0.70	-741	0.73	-4864	0.71	-1861	0.79	-1652	0.70	-926
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV	0.70	-811	0.70	-2059	0.70	-352	0.70	-741	0.73	-4855	0.71	-1864	0.79	-1654	0.70	-926
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-740	0.75	-4696	0.71	-1861	0.79	-1652	0.70	-925
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.70	-810	0.70	-2058	0.70	-351	0.70	-741	0.75	-4701	0.71	-1862	0.79	-1652	0.70	-925
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.70	-810	0.70	-2055	0.70	-351	0.70	-741	0.73	-4887	0.71	-1861	0.79	-1651	0.70	-925
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4869	0.71	-1859	0.79	-1651	0.70	-925
N-2: RAVER-PAUL & NAPAVINE-PAUL 500 KV	0.70	-811	0.70	-2055	0.70	-352	0.70	-741	0.73	-4878	0.71	-1861	0.79	-1652	0.70	-926

Appendix H - 16la1sa_3400idnw_Path76 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hill top		Humboldt		Malin		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-741	0.76	-4659	0.71	-1859	0.79	-1651	0.70	-925
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.70	-811	0.70	-2059	0.70	-352	0.70	-741	0.73	-4894	0.71	-1864	0.79	-1655	0.70	-926
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.70	-809	0.70	-2038	0.70	-350	0.70	-740	0.75	-4683	0.71	-1851	0.79	-1644	0.70	-924
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.70	-810	0.70	-2053	0.70	-351	0.70	-740	0.73	-4870	0.71	-1859	0.79	-1650	0.70	-925
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.70	-810	0.70	-2054	0.70	-351	0.70	-740	0.73	-4887	0.71	-1860	0.79	-1651	0.70	-925
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV	0.70	-820	0.70	-2142	0.70	-361	0.70	-736	0.71	-3798	0.70	-1953	0.78	-1750	0.70	-933
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV	0.70	-810	0.70	-2048	0.70	-351	0.70	-741	0.75	-4662	0.71	-1859	0.79	-1651	0.70	-925
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV	0.70	-810	0.70	-2052	0.70	-351	0.70	-740	0.73	-4865	0.71	-1860	0.79	-1651	0.70	-925
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.70	-822	0.70	-2154	0.70	-361	0.70	-738	0.71	-4251	0.70	-1956	0.78	-1749	0.70	-937
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.70	-802	0.70	-1873	0.70	-345	0.70	-729	0.80	-4217	0.73	-1720	0.79	-1525	0.70	-916
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV + RAS	0.70	-799	0.70	-1804	0.70	-342	0.70	-726	0.81	-4070	0.74	-1664	0.80	-1472	0.70	-913
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.70	-802	0.70	-1874	0.70	-345	0.70	-729	0.80	-4222	0.73	-1721	0.79	-1525	0.70	-916
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV + RAS	0.70	-801	0.70	-1839	0.70	-344	0.70	-728	0.80	-4147	0.73	-1695	0.79	-1502	0.70	-915
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.70	-805	0.70	-1903	0.70	-347	0.70	-731	0.75	-4718	0.73	-1730	0.79	-1527	0.70	-919
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4807	0.71	-1858	0.79	-1651	0.70	-925
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.70	-810	0.70	-2049	0.70	-351	0.70	-740	0.73	-4810	0.71	-1858	0.79	-1651	0.70	-925
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.70	-809	0.70	-2037	0.70	-350	0.70	-740	0.77	-4444	0.71	-1850	0.79	-1643	0.70	-924

Appendix H - 16la1sa_3400idnw_Path76 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt HOT SPR_500.0 (40553) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt DWORSHAK_500.0 (40369) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt HOT SPR_500.0 (40553) #s
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt DWORSHAK_500.0 (40369) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1

Appendix H - 16la1sa_3400idnw_Path76 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOKING_500.0 (41007)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 109.8 MVR
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)

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Contingency	Actions Taken in the Contingency
BF 4728 Coulee-Chief Jo 500 kV & Chief Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Chief Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1

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Contingency	Actions Taken in the Contingency
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BYPASS SeriesCap MIDPOINT_500.0 (60240) TO MIDHEM11_500.0 (61988) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_24.0 (43047) #1
Bus: Alvey 500 kV	OPEN Bus ALVEY_500.0 (40051)
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV	OPEN Bus KEELER_500.0 (40601)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_34.5 (47966)

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Contingency	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-1: Allston-Keeler 500 kV	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPAIVINE_500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO DIXONVLE_500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO CELILO1_500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO KNIGHT_500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV + RAS	OPEN Line BRADY_230.0 (60073) TO ANTLOPE_230.0 (65075) CKT 1
N-1: Brady-Antelope 230 kV + RAS	OPEN Bus MLCK PHA_230.0 (62355)
N-1: Brady-Antelope 230 kV + RAS	OPEN Shunt AMPS_69.0 (65026) #1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_500.0 (62013)
N-1: Broadview-Garrison #1 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_230.0 (60095) TO ONTARIO_230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-1: Cal Sub 120 kV Phase Shifter	OPEN Transformer CAL SUB_120.0 (64025) TO CAL S PS_120.0 (64023) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO OLINDA_500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32229)

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Contingency	Actions Taken in the Contingency
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCASTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCASTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCASTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 2
N-1: Harry Allen 345 kV Phase Shifter	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Hatwai 500/230 kV Xfmr	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSCTYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSCTYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSCTYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO & 1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACJWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Hilltop 230 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 0 MVR
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDER_230.0 (40810)

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Contingency	Actions Taken in the Contingency
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Pinto-Four Corner 345 kV	OPEN Shunt PINTO_138.0 (66230) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO 2_13.8 (66228) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO 3_13.8 (66229) #1
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine POPULUS_500.0 (67794) TO CEDARHIL_500.0 (60159) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine CEDARHIL_500.0 (60159) TO HEMINWAY_500.0 (60155) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt GONDER1_230.0 (64205) #v
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2

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Contingency	Actions Taken in the Contingency
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	CLOSE Shunt GARRISON_500.0 (40459) #r
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR1EAST_500.0 (40451)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN1_500.0 (62013)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR2EAST_500.0 (40453)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN2_500.0 (62012)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT2_13.8 (62333) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT1_13.8 (62332) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS TAFT_500.0 (41057) TO -186 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS BZ EGALL_50.0 (62348) TO 20.4 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS JACKRABB_50.0 (62349) TO 19.7 MVR
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELLSYCN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELLSYCN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)

Appendix H - 16la1sa_3400idnw_Path76 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAFS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	CLOSE Shunt ROBINSON_345.0 (64885) #b1
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PINTO_138.0 (66230) TO 64 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS YORKCANY_115.0 (12091) TO 15 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS DURANGO_115.0 (79023) TO 40 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PEIGAN 4_240.0 (54165) TO 0 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Line HELLSCYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Bus IMNAHA_230.0 (60278)
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)

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Contingency	Actions Taken in the Contingency
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPA VINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougln 230 kV	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougln 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougln 230 kV	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougln 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1

Appendix H - 16la1sa_3400idnw_Path76 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4

Appendix I

16la1sa_3400idnw_nv Base Case (Idaho-Sierra, Path 16)

Appendix I - 16la1sa_3400idnw_nv Base Case Post-Transient Contingency Results

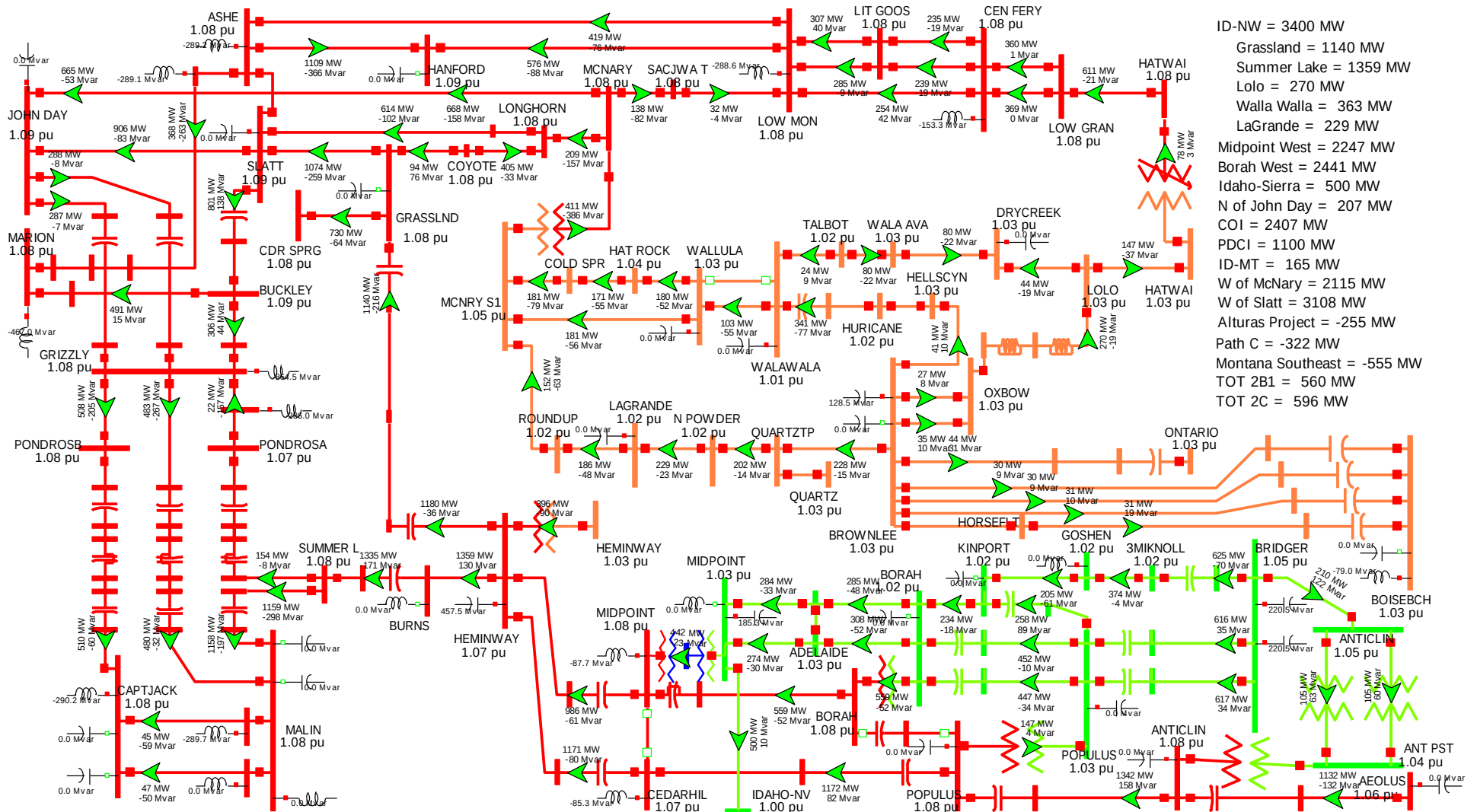


Figure I1: 16la1sa_3400idnw_nv Base Case **Pre Contingency**

Appendix I - 16la1sa_3400idnw_nv Base Case Post-Transient Contingency Results

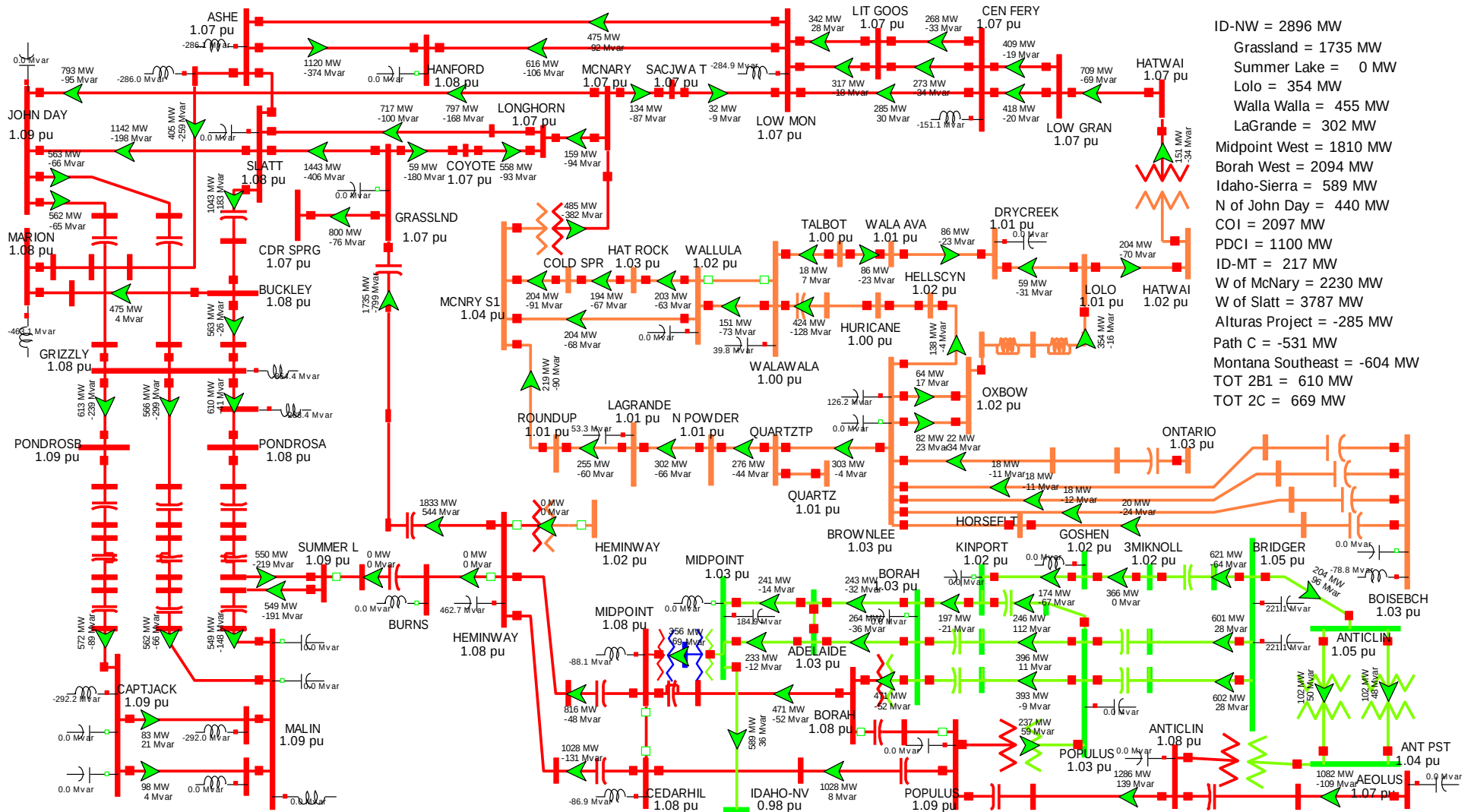


Figure I2: 16la1sa_3400idnw_nv Base Case after the contingency **BF IPC Hemingway-Summer Lake 500 kV & Hemingway 500/230 Xfmr**

ID-NW = 3129 MW
 Grassland = 971 MW
 Summer Lake = 1351 MW
 Lolo = 226 MW
 Walla Walla = 330 MW
 LaGrande = 210 MW
 Midpoint West = 1931 MW
 Borah West = 2221 MW
 Idaho-Sierra = 601 MW
 N of John Day = 1266 MW
 COI = 3548 MW
 PDCI = 1100 MW
 ID-MT = 106 MW
 W of McNary = 2337 MW
 W of Slatt = 3384 MW
 Alturas Project = -203 MW
 Path C = -673 MW
 Montana Southeast = -502 MW
 TOT 2B1 = 692 MW
 TOT 2C = 742 MW

Appendix I - 16la1sa_3400idnw_nv Base Case Post-Transient Contingency Results

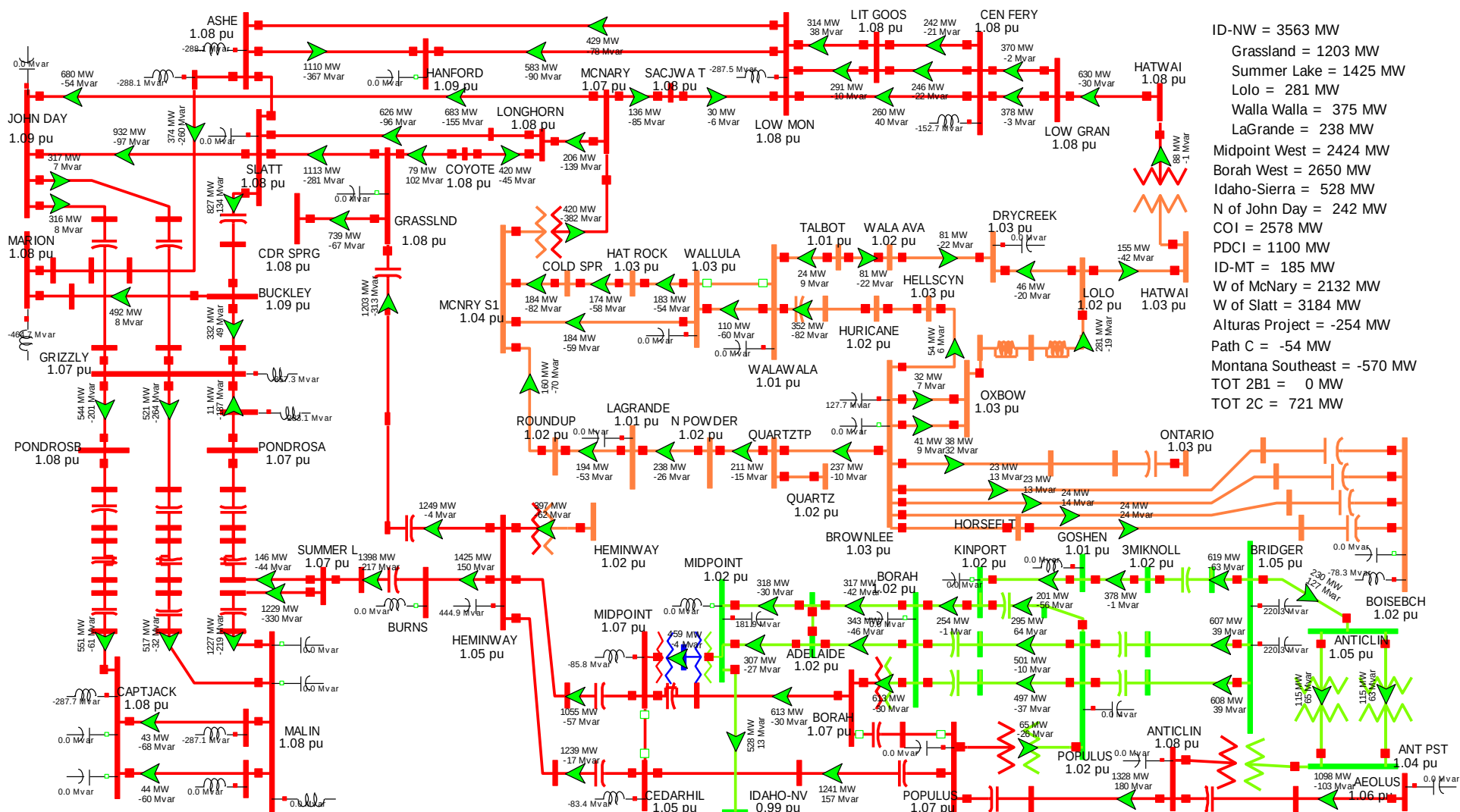


Figure I4: 16la1sa_3400idnw_nv Base Case after the contingency **N-1: Huntington-Pinto-Four Corners 345 kV**

Appendix I - 16la1sa_3400idnw_nv Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	No Violations							
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	301.9	300.0	100.6%	370.0	81.6%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	301.9	300.0	100.6%	370.0	81.6%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	300.8	300.0	100.3%	370.0	81.3%
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	300.8	300.0	100.3%	370.0	81.3%
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKLE E (40440) CKT 1 at FRANKLIN	Branch MVA	186.5	254.1	254.0	100.0%	307.0	82.8%
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	No Violations							
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	No Violations							
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							

Appendix I - 16la1sa_3400idnw_nv Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKLE (40440) CKT 1 at FRANKLIN	Branch MVA	186.5	268.1	254.0	105.5%	307.0	87.3%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4708 Hatwai 500 kV Bus	No Violations							
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	SLVR PK (64094) -> SLVR PKX (64095) CKT 1 at SLVR PKX	Branch MVA	16.6	17.0	17.0	100.2%	23.9	71.3%
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	334.6	300.0	111.5%	370.0	90.4%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	334.6	300.0	111.5%	370.0	90.4%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	321.9	315.0	102.2%	394.0	81.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	321.3	315.0	102.0%	394.0	81.5%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1077.3	999.1	107.8%	1250.1	86.2%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1057.0	1000.1	105.7%	1250.1	84.6%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1267.2	2050.7	2000.1	102.5%	3000.0	68.4%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1300.8	2031.4	2000.1	101.6%	3000.0	67.7%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	333.3	300.0	111.1%	370.0	90.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	333.3	300.0	111.1%	370.0	90.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	321.0	315.0	101.9%	394.0	81.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	320.4	315.0	101.7%	394.0	81.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1070.8	999.1	107.2%	1250.1	85.7%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1050.6	1000.1	105.1%	1250.1	84.0%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1267.2	2046.3	2000.1	102.3%	3000.0	68.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1300.8	2022.1	2000.1	101.1%	3000.0	67.4%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations							
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	301.3	300.0	100.4%	370.0	81.4%
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	301.3	300.0	100.4%	370.0	81.4%
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							

Appendix I - 16la1sa_3400idnw_nv Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	186.5	267.8	254.0	105.4%	307.0	87.2%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	52.0	50.0	104.0%	55.0	94.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	323.6	300.0	107.9%	370.0	87.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	323.6	300.0	107.9%	370.0	87.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.3	113.7	112.0	101.5%	146.7	77.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1173.1	999.1	117.4%	1250.1	93.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1151.2	1000.1	115.1%	1250.1	92.1%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1494.5	2112.0	1732.1	121.9%	2338.3	90.3%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	IMNAHA (60278) -> LOLO (48197) CKT 1 at IMNAHA	Branch Amp	667.5	936.7	920.0	101.8%	1046.8	89.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	54.8	50.0	109.6%	55.0	99.7%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	330.0	300.0	110.0%	370.0	89.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	330.0	300.0	110.0%	370.0	89.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	318.5	315.0	101.1%	394.0	80.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	317.9	315.0	100.9%	394.0	80.7%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1135.5	999.1	113.7%	1250.1	90.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1113.0	1000.1	111.3%	1250.1	89.0%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	54.4	50.0	108.8%	55.0	98.9%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	319.3	300.0	106.4%	370.0	86.3%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	319.3	300.0	106.4%	370.0	86.3%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1194.0	999.1	119.5%	1250.1	95.5%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1170.4	1000.1	117.0%	1250.1	93.6%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	IMNAHA (60278) -> LOLO (48197) CKT 1 at IMNAHA	Branch Amp	667.5	958.3	920.0	104.2%	1046.8	91.6%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> HURICANE (45103) CKT 1 at HELLSCYN	Branch Amp	902.4	1211.4	1199.9	101.0%	1396.0	86.8%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	317.5	300.0	105.8%	370.0	85.8%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	317.5	300.0	105.8%	370.0	85.8%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1093.2	2173.4	1732.1	125.5%	2338.3	93.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1028.3	999.1	102.9%	1250.1	82.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1008.1	1000.1	100.8%	1250.1	80.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	331.8	300.0	110.6%	370.0	89.7%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	331.8	300.0	110.6%	370.0	89.7%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	319.6	315.0	101.5%	394.0	81.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	319.0	315.0	101.3%	394.0	81.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.3	114.6	112.0	102.4%	146.7	78.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1110.4	999.1	111.1%	1250.1	88.8%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1089.0	1000.1	108.9%	1250.1	87.1%
BF Lolo 230kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1019.8	999.1	102.1%	1250.1	81.6%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	50.8	50.0	101.6%	55.0	92.3%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	325.0	300.0	108.3%	370.0	87.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	325.0	300.0	108.3%	370.0	87.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.3	114.3	112.0	102.0%	146.7	77.9%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	BURNS (45029) -> BURSOM11 (90132) CKT 1 at BURNS	Branch Amp	1494.5	2174.8	1732.1	125.6%	2338.3	93.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1116.3	999.1	111.7%	1250.1	89.3%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1095.1	1000.1	109.5%	1250.1	87.6%
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	No Violations							
Bus: Alvey 500 kV	No Violations							
Bus: Bell BPA 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	300.1	300.0	100.0%	370.0	81.1%
Bus: Bell BPA 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	300.1	300.0	100.0%	370.0	81.1%
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	334.6	300.0	111.5%	370.0	90.4%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	334.6	300.0	111.5%	370.0	90.4%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	321.9	315.0	102.2%	394.0	81.7%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	321.3	315.0	102.0%	394.0	81.5%
Bus: Summer Lake 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1076.7	999.1	107.8%	1250.1	86.1%
Bus: Summer Lake 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1056.5	1000.1	105.6%	1250.1	84.5%
Bus: Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1267.2	2049.6	2000.1	102.5%	3000.0	68.3%
Bus: Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1300.8	2030.5	2000.1	101.5%	3000.0	67.7%
N-1: Allston-Keeler 500 kV	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	300.0	300.0	100.0%	370.0	81.1%
N-1: Bell-Taft 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	300.0	300.0	100.0%	370.0	81.1%
N-1: Big Eddy-Celilo 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV + RAS	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Cal Sub 120 kV Phase Shifter	No Violations							
N-1: Captain Jack-Olinda 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	302.9	300.0	101.0%	370.0	81.9%
N-1: Captain Jack-Olinda 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	302.9	300.0	101.0%	370.0	81.9%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	No Violations							
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	No Violations							
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	348.7	315.0	110.7%	394.0	88.5%
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	347.5	315.0	110.3%	394.0	88.2%
N-1: Hatwai 500/230 kV Xfmr	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	No Violations							
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	No Violations							
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	324.6	300.0	108.2%	370.0	87.7%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	324.6	300.0	108.2%	370.0	87.7%
N-1: Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.3	114.7	112.0	102.4%	146.7	78.2%
N-1: Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1494.5	2174.0	1732.1	125.5%	2338.3	93.0%
N-1: Hemingway-Grassland 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1126.8	999.1	112.8%	1250.1	90.1%
N-1: Hemingway-Grassland 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1105.4	1000.1	110.5%	1250.1	88.4%
N-1: Hemingway-Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	53.2	50.0	106.5%	55.0	96.8%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	331.0	300.0	110.3%	370.0	89.5%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	331.0	300.0	110.3%	370.0	89.5%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	319.2	315.0	101.3%	394.0	81.0%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	318.7	315.0	101.2%	394.0	80.9%
N-1: Hemingway-Summer Lake 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1080.5	999.1	108.1%	1250.1	86.4%
N-1: Hemingway-Summer Lake 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	866.3	1058.7	1000.1	105.9%	1250.1	84.7%
N-1: Hemingway-Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1267.2	2062.3	2000.1	103.1%	3000.0	68.7%
N-1: Hemingway-Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1300.8	2043.2	2000.1	102.2%	3000.0	68.1%
N-1: Hill Top 345/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.5	175.5	150.0	117.0%	180.0	97.5%
N-1: Hill Top 345/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	319.9	435.3	415.7	104.7%	483.5	90.0%
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	HOT SPR (40553)	% Δ Volts	1.079	1.022				5.28%
N-1: Humboldt-Coyote Ck 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	310.2	300.0	103.4%	370.0	83.9%
N-1: Humboldt-Coyote Ck 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	310.2	300.0	103.4%	370.0	83.9%
N-1: Humboldt-Coyote Ck 345 kV	SLVR PK (64094) -> SLVR PKX (64095) CKT 1 at SLVR PKX	Branch MVA	16.6	19.4	17.0	114.0%	23.9	81.1%
N-1: Humboldt-Coyote Ck 345 kV	SLVR PS (64096) -> SLVR PK (64094) CKT 1 at SLVR PK	Branch MVA	15.9	18.4	17.0	108.5%	23.9	77.1%
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	357.0	300.0	119.0%	370.0	96.5%
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	357.0	300.0	119.0%	370.0	96.5%
N-1: Huntington-Pinto-Four Corners 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	296.3	364.2	357.0	102.0%	415.9	87.6%
N-1: Huntington-Pinto-Four Corners 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	296.3	364.2	357.0	102.0%	415.9	87.6%
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	52.0	50.0	103.9%	55.0	94.5%
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.5	150.7	150.0	100.5%	180.0	83.7%
N-1: Malin-Round Mtn #1 500 kV	No Violations							
N-1: Malin-Round Mtn #2 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	304.2	300.0	101.4%	370.0	82.2%
N-1: Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	304.2	300.0	101.4%	370.0	82.2%
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	186.5	254.6	254.0	100.3%	307.0	82.9%
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	311.0	300.0	103.7%	370.0	84.1%
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	311.0	300.0	103.7%	370.0	84.1%
N-1: Midpoint-Humboldt 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	313.1	300.0	104.4%	370.0	84.6%
N-1: Midpoint-Humboldt 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	313.1	300.0	104.4%	370.0	84.6%
N-1: Midpoint-Humboldt 345 kV	SLVR PK (64094) -> SLVR PKX (64095) CKT 1 at SLVR PKX	Branch MVA	16.6	19.8	17.0	116.4%	23.9	82.8%
N-1: Midpoint-Humboldt 345 kV	SLVR PS (64096) -> SLVR PK (64094) CKT 1 at SLVR PK	Branch MVA	15.9	18.8	17.0	110.7%	23.9	78.7%
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	884.5	1020.1	999.1	102.1%	1250.1	81.6%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	No Violations							
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	354.4	300.0	118.1%	370.0	95.8%
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	354.4	300.0	118.1%	370.0	95.8%
N-1: Pinto-Four Corner 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	296.3	361.2	357.0	101.2%	415.9	86.9%
N-1: Pinto-Four Corner 345 kV	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	296.3	361.2	357.0	101.2%	415.9	86.9%
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	314.6	300.0	104.9%	370.0	85.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	314.6	300.0	104.9%	370.0	85.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1093.2	1776.5	1732.1	102.6%	2338.3	76.0%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	348.7	315.0	110.7%	394.0	88.5%
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	347.5	315.0	110.3%	394.0	88.2%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	301.5	300.0	100.5%	370.0	81.5%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	301.5	300.0	100.5%	370.0	81.5%
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	41.1	50.0	50.0	100.1%	55.0	91.0%
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	316.7	300.0	105.6%	370.0	85.6%
N-1: Sigurd-Glen Canyon 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	316.7	300.0	105.6%	370.0	85.6%
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	No Violations							
N-1: Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	300.1	300.0	100.0%	370.0	81.1%
N-1: Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	300.1	300.0	100.0%	370.0	81.1%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	SLVR PK (64094) -> SLVR PKX (64095) CKT 1 at SLVR PKX	Branch MVA	16.6	17.0	17.0	100.3%	23.9	71.3%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	BRIDGER (60085) -> BRI3MI11 (61999) CKT 1 at BRIDGER	Branch Amp	1043.6	1703.4	1600.0	106.5%	1840.0	92.6%
N-2: Bridger-Populus #1 & #2 345 kV	BRI3MI11 (61999) -> 3MIKNOLL (60084) CKT 1 at 3MIKNOLL	Branch Amp	1043.6	1678.0	1650.1	101.7%	2227.4	75.3%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> POPBRI11 (61968) CKT 1 at BRIDGER	Branch Amp	984.0	1737.5	1492.7	116.4%	1849.2	94.0%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	POPBRI11 (61968) -> POPULUS (67790) CKT 1 at POPULUS	Branch Amp	973.2	1719.3	1650.1	104.2%	2227.6	77.2%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	90.3	126.2	112.0	112.7%	146.7	86.0%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SLVR PK (64094) -> SLVR PKX (64095) CKT 1 at SLVR PKX	Branch MVA	16.6	17.3	17.0	101.8%	23.9	72.4%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	ABSAROKE (62201)	% Δ Volts	0.963	0.911				5.40%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLBUSAT (62224)	% Δ Volts	0.983	0.933				5.09%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	326.0	300.0	108.7%	370.0	88.1%
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	326.0	300.0	108.7%	370.0	88.1%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	368.6	300.0	122.9%	370.0	99.6%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	368.6	300.0	122.9%	370.0	99.6%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO	Branch MVA	290.3	365.7	315.0	116.1%	394.0	92.8%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO	Branch MVA	290.3	364.2	315.0	115.6%	394.0	92.4%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	296.3	377.3	357.0	105.7%	415.9	90.7%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	296.3	377.3	357.0	105.7%	415.9	90.7%
N-2: Double Palo Verde	CR_NEST1 (54458) -> CBK 500 (50791) CKT 1 at CR_NEST1	Branch Amp	410.4	1151.8	1085.4	106.1%	1199.7	96.0%
N-2: Double Palo Verde	CHOLLA (14000) -> CHOSAG11 (14014) CKT 1 at CHOSAG11	Branch Amp	972.6	1069.6	1026.0	104.3%	1538.1	69.5%
N-2: Double Palo Verde	MONTROSE (79049)	% Δ Volts	1.024	0.971				5.18%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	SLVR PK (64094) -> SLVR PKX (64095) CKT 1 at SLVR PKX	Branch MVA	16.6	17.0	17.0	100.1%	23.9	71.2%
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	No Violations							
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	304.3	300.0	101.4%	370.0	82.3%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	304.3	300.0	101.4%	370.0	82.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	No Violations							
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	314.8	300.0	104.9%	370.0	85.1%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	314.8	300.0	104.9%	370.0	85.1%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	217.0	253.9	252.0	100.7%	271.1	93.7%
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV	No Violations							
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	No Violations							
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	No Violations							
N-2: Malin-Round Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	327.3	300.0	109.1%	370.0	88.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	327.3	300.0	109.1%	370.0	88.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.5	156.0	150.0	104.0%	180.0	86.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.3	316.3	315.0	100.4%	394.0	80.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.3	315.8	315.0	100.2%	394.0	80.1%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	310.6	300.0	103.5%	370.0	83.9%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	310.6	300.0	103.5%	370.0	83.9%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	323.9	300.0	108.0%	370.0	87.5%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	323.9	300.0	108.0%	370.0	87.5%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	108.5	153.1	150.0	102.1%	180.0	85.1%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	321.1	300.0	107.0%	370.0	86.8%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	321.1	300.0	107.0%	370.0	86.8%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	293.5	300.0	300.0	100.0%	370.0	81.1%
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	293.5	300.0	300.0	100.0%	370.0	81.1%
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.70	-802	0.70	-2330	0.70	-349	0.70	-505	0.71	-4430	0.70	-2101	0.70	-817	0.70	-879
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.70	-802	0.70	-2335	0.70	-350	0.70	-503	0.70	-4514	0.70	-2102	0.70	-816	0.70	-878
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.70	-807	0.70	-2376	0.70	-352	0.70	-509	0.71	-4572	0.70	-2131	0.70	-822	0.70	-884
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.70	-805	0.70	-2379	0.70	-351	0.70	-506	0.71	-4500	0.70	-2131	0.70	-819	0.70	-882
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4610	0.70	-2136	0.70	-820	0.70	-885
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.70	-791	0.70	-2385	0.70	-253	0.70	-512	0.70	-4656	0.70	-2135	0.70	-824	0.70	-869
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.70	-806	0.70	-2352	0.70	-354	0.70	-505	0.72	-4619	0.70	-2113	0.70	-817	0.70	-882
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.70	-797	0.70	-2343	0.70	-343	0.70	-498	0.70	-4265	0.70	-2112	0.70	-812	0.70	-873
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.70	-810	0.70	-2405	0.70	-359	0.70	-505	0.72	-4328	0.70	-2146	0.70	-817	0.70	-886
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.70	-798	0.70	-2361	0.70	-343	0.70	-495	0.70	-3955	0.70	-2124	0.70	-809	0.70	-874
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.70	-807	0.70	-2373	0.70	-355	0.70	-506	0.72	-4617	0.70	-2128	0.70	-819	0.70	-883
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.70	-807	0.70	-2372	0.70	-354	0.70	-507	0.73	-4526	0.70	-2131	0.70	-819	0.70	-884
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.70	-806	0.70	-2354	0.70	-355	0.70	-505	0.72	-4628	0.70	-2115	0.70	-817	0.70	-883
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.70	-803	0.70	-2320	0.70	-354	0.70	-501	0.73	-4624	0.70	-2091	0.70	-814	0.70	-880
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500KV + RAS	0.70	-796	0.70	-2211	0.70	-350	0.70	-491	0.75	-4484	0.70	-2024	0.70	-805	0.70	-871
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.70	-802	0.70	-2358	0.70	-350	0.70	-502	0.70	-4464	0.70	-2124	0.70	-815	0.70	-879
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.70	-805	0.70	-2370	0.70	-352	0.70	-505	0.72	-4527	0.70	-2126	0.70	-818	0.70	-881
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.70	-804	0.70	-2340	0.70	-354	0.70	-503	0.71	-4731	0.70	-2101	0.70	-815	0.70	-881
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.70	-806	0.70	-2372	0.70	-353	0.70	-506	0.73	-4554	0.70	-2129	0.70	-819	0.70	-883
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.70	-790	0.70	-2385	0.70	-253	0.70	-506	0.70	-4239	0.70	-2137	0.70	-819	0.70	-867
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.70	-807	0.70	-2380	0.70	-354	0.70	-507	0.72	-4574	0.70	-2132	0.70	-820	0.70	-884
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4681	0.70	-2136	0.70	-820	0.70	-885
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.70	-808	0.70	-2381	0.70	-355	0.70	-508	0.73	-4583	0.70	-2133	0.70	-820	0.70	-884
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.70	-806	0.70	-2335	0.70	-356	0.70	-505	0.79	-4488	0.70	-2113	0.70	-818	0.70	-883
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.70	-805	0.70	-2302	0.70	-353	0.70	-508	0.76	-4523	0.70	-2087	0.70	-820	0.70	-882
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.70	-807	0.70	-2377	0.70	-355	0.70	-507	0.73	-4579	0.70	-2131	0.70	-820	0.70	-884
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.70	-807	0.70	-2372	0.70	-355	0.70	-506	0.72	-4614	0.70	-2127	0.70	-819	0.70	-883
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4674	0.70	-2134	0.70	-820	0.70	-885
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.71	-4693	0.70	-2135	0.70	-820	0.70	-885
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV	0.70	-809	0.70	-2387	0.70	-357	0.70	-509	0.73	-4512	0.70	-2137	0.70	-821	0.70	-886
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-507	0.73	-4560	0.70	-2134	0.70	-820	0.70	-884
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4682	0.70	-2135	0.70	-820	0.70	-885
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTONS 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4655	0.70	-2134	0.70	-820	0.70	-885
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4689	0.70	-2135	0.70	-820	0.70	-885
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4687	0.70	-2135	0.70	-820	0.70	-885
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV	0.70	-802	0.70	-2359	0.70	-350	0.70	-502	0.73	-4311	0.70	-2121	0.70	-816	0.70	-879
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.70	-806	0.70	-2371	0.70	-353	0.70	-506	0.73	-4535	0.70	-2129	0.70	-819	0.70	-883
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.70	-807	0.70	-2379	0.70	-354	0.70	-507	0.73	-4586	0.70	-2132	0.70	-820	0.70	-884
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.70	-807	0.70	-2381	0.70	-355	0.70	-507	0.73	-4609	0.70	-2133	0.70	-820	0.70	-884
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.70	-807	0.70	-2374	0.70	-354	0.70	-507	0.73	-4544	0.70	-2130	0.70	-819	0.70	-884
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.70	-807	0.70	-2376	0.70	-354	0.70	-507	0.73	-4569	0.70	-2130	0.70	-819	0.70	-884
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV	0.70	-807	0.70	-2377	0.70	-355	0.70	-506	0.74	-4470	0.70	-2130	0.70	-819	0.70	-884
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.70	-810	0.70	-2390	0.70	-357	0.70	-510	0.72	-4583	0.70	-2138	0.70	-822	0.70	-887
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4644	0.70	-2134	0.70	-820	0.70	-885
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-509	0.73	-4619	0.70	-2137	0.70	-821	0.70	-885
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4660	0.70	-2135	0.70	-820	0.70	-885
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.70	-802	0.70	-2298	0.70	-351	0.70	-506	0.74	-4602	0.70	-2077	0.70	-818	0.70	-879
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.70	-803	0.70	-2307	0.70	-352	0.70	-507	0.73	-4666	0.70	-2082	0.70	-819	0.70	-880
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4673	0.70	-2134	0.70	-820	0.70	-884
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.70	-808	0.70	-2391	0.70	-356	0.70	-508	0.71	-4729	0.70	-2136	0.70	-820	0.70	-885
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.70	-806	0.70	-2349	0.70	-356	0.70	-505	0.78	-4516	0.70	-2116	0.70	-818	0.70	-883
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.70	-808	0.70	-2383	0.70	-355	0.70	-507	0.72	-4681	0.70	-2133	0.70	-820	0.70	-884

Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.70	-806	0.70	-2347	0.70	-354	0.70	-508	0.71	-4755	0.70	-2105	0.70	-819	0.70	-883
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.70	-808	0.70	-2382	0.70	-355	0.70	-507	0.72	-4632	0.70	-2132	0.70	-820	0.70	-884
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-507	0.71	-4735	0.70	-2134	0.70	-819	0.70	-884
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.70	-808	0.70	-2385	0.70	-355	0.70	-507	0.72	-4653	0.70	-2134	0.70	-820	0.70	-884
BF 4708 HATWAI 500 KV BUS	0.70	-803	0.70	-2320	0.70	-354	0.70	-500	0.72	-4634	0.70	-2093	0.70	-814	0.70	-879
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.70	-808	0.70	-2382	0.70	-355	0.70	-507	0.72	-4665	0.70	-2133	0.70	-820	0.70	-884
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV	0.70	-802	0.70	-2307	0.70	-353	0.70	-498	0.73	-4573	0.70	-2086	0.70	-812	0.70	-878
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.70	-803	0.70	-2319	0.70	-353	0.70	-500	0.72	-4619	0.70	-2093	0.70	-814	0.70	-879
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4677	0.70	-2136	0.70	-820	0.70	-885
BF 4888 ASHE-SLATT & CGS 500 KV	0.70	-801	0.70	-2257	0.70	-351	0.70	-507	0.73	-4667	0.70	-2052	0.70	-818	0.70	-878
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.70	-807	0.70	-2362	0.70	-354	0.70	-506	0.73	-4557	0.70	-2125	0.70	-819	0.70	-883
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.70	-807	0.70	-2361	0.70	-353	0.70	-507	0.75	-4319	0.70	-2129	0.70	-820	0.70	-884
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.70	-804	0.70	-2358	0.70	-352	0.70	-504	0.74	-4460	0.70	-2120	0.70	-817	0.70	-881
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.70	-741	0.70	-1931	0.70	-337	0.70	-420	0.75	-4172	0.70	-1971	0.70	-741	0.70	-811
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.70	-745	0.70	-2004	0.70	-337	0.70	-427	0.74	-4228	0.70	-2031	0.70	-746	0.70	-814
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.70	-811	0.70	-2400	0.70	-359	0.70	-510	0.70	-4102	0.70	-2143	0.70	-822	0.70	-888
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.70	-800	0.70	-2340	0.70	-351	0.70	-498	0.72	-4484	0.70	-2123	0.70	-811	0.70	-876
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.70	-796	0.70	-2327	0.70	-351	0.70	-492	0.74	-4484	0.70	-2122	0.70	-806	0.70	-871
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.70	-803	0.70	-2356	0.70	-352	0.70	-501	0.73	-4443	0.70	-2124	0.70	-815	0.70	-879
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.70	-804	0.70	-2358	0.70	-353	0.70	-503	0.73	-4527	0.70	-2129	0.70	-816	0.70	-880
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.70	-804	0.70	-2369	0.70	-353	0.70	-503	0.73	-4595	0.70	-2130	0.70	-816	0.70	-881
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.70	-805	0.70	-2346	0.70	-352	0.70	-505	0.70	-4558	0.70	-2121	0.70	-818	0.70	-882
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.70	-804	0.70	-2364	0.70	-351	0.70	-504	0.71	-4520	0.70	-2123	0.70	-817	0.70	-881
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.72	-4691	0.70	-2136	0.70	-820	0.70	-885
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-508	0.72	-4656	0.70	-2133	0.70	-820	0.70	-885
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.70	-807	0.70	-2371	0.70	-354	0.70	-507	0.73	-4542	0.70	-2128	0.70	-819	0.70	-884
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.70	-808	0.70	-2382	0.70	-355	0.70	-508	0.73	-4559	0.70	-2134	0.70	-820	0.70	-885
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.70	-808	0.70	-2383	0.70	-355	0.70	-508	0.73	-4614	0.70	-2134	0.70	-820	0.70	-884
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.70	-807	0.70	-2361	0.70	-355	0.70	-507	0.72	-4640	0.70	-2129	0.70	-819	0.70	-884
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.70	-805	0.70	-2278	0.70	-353	0.70	-507	0.73	-4625	0.70	-2081	0.70	-819	0.70	-881
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.70	-806	0.70	-2351	0.70	-356	0.70	-505	0.80	-4434	0.70	-2117	0.70	-818	0.70	-883
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.70	-804	0.70	-2290	0.70	-353	0.70	-507	0.77	-4377	0.70	-2081	0.70	-819	0.70	-881
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.70	-807	0.70	-2372	0.70	-354	0.70	-506	0.73	-4579	0.70	-2128	0.70	-819	0.70	-883
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.70	-807	0.70	-2376	0.70	-355	0.70	-507	0.73	-4571	0.70	-2131	0.70	-819	0.70	-884
BF 5266 SLATT-BUCKLY 500 KV	0.70	-803	0.70	-2374	0.70	-353	0.70	-502	0.72	-4538	0.70	-2129	0.70	-815	0.70	-880
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4656	0.70	-2136	0.70	-820	0.70	-885
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4611	0.70	-2136	0.70	-820	0.70	-885
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.70	-753	0.70	-1313	0.70	-335	0.70	-428	0.75	-4444	0.70	-1686	0.70	-756	0.70	-823
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.70	-748	0.70	-1567	0.70	-339	0.70	-427	0.77	-4259	0.70	-1862	0.70	-749	0.70	-817
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.70	-745	0.70	-1365	0.70	-341	0.70	-408	0.74	-4603	0.70	-1478	0.70	-751	0.70	-814
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR	0.70	-795	0.70	-1787	0.70	-354	0.70	-499	0.74	-4808	0.70	-1887	0.70	-796	0.70	-870
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.70	-768	0.70	-1627	0.70	-349	0.70	-455	0.72	-4855	0.70	-1650	0.70	-761	0.70	-840
BF LOLO 230KV	0.70	-800	0.70	-2278	0.70	-352	0.70	-495	0.72	-4641	0.70	-2076	0.70	-811	0.70	-876
BF PGE GRASSLAND-CEDAR SPRING & HEMINGWAY-GRASSLAND 500 KV	0.70	-751	0.70	-1676	0.70	-333	0.70	-430	0.76	-4308	0.70	-1810	0.70	-756	0.70	-822
BF PGE GRASSLAND-COYOTE 500 KV & CARTY GAS PROJECT	0.70	-808	0.70	-2345	0.70	-355	0.70	-507	0.71	-4687	0.70	-2123	0.70	-820	0.70	-884
BF PGE SLATT-GRASSLAND 500 KV & BOARDMAN COAL GEN	0.70	-802	0.70	-2255	0.70	-353	0.70	-504	0.73	-4650	0.70	-2067	0.70	-816	0.70	-879
BUS: ALVEY 500 KV	0.70	-803	0.70	-2372	0.70	-349	0.70	-504	0.72	-4374	0.70	-2128	0.70	-817	0.70	-880
BUS: BELL BPA 500 KV	0.70	-798	0.70	-2242	0.70	-351	0.70	-493	0.75	-4450	0.70	-2047	0.70	-808	0.70	-873
BUS: BUCKLEY 500 KV	0.70	-801	0.70	-2350	0.70	-349	0.70	-501	0.73	-4343	0.70	-2119	0.70	-814	0.70	-877
BUS: DIXONVILLE 500 KV	0.70	-805	0.70	-2382	0.70	-351	0.70	-506	0.71	-4493	0.70	-2132	0.70	-818	0.70	-882
BUS: HOT SPRINGS 500 KV	0.70	-808	0.70	-2391	0.70	-356	0.70	-508	0.71	-4710	0.70	-2137	0.70	-820	0.70	-885
BUS: KEELER 500 KV	0.70	-807	0.70	-2377	0.70	-355	0.70	-507	0.75	-4428	0.70	-2130	0.70	-819	0.70	-884

Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BUS: ROCK CREEK 500 KV	0.70	-806	0.70	-2363	0.70	-354	0.70	-506	0.73	-4543	0.70	-2123	0.70	-819	0.70	-883
BUS: SICKLER 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-508	0.72	-4666	0.70	-2134	0.70	-820	0.70	-885
BUS: SUMMER LAKE 500 KV	0.70	-741	0.70	-1934	0.70	-337	0.70	-420	0.75	-4191	0.70	-1972	0.70	-741	0.70	-810
N-1: ALLSTON-KEELER 500 KV	0.70	-807	0.70	-2377	0.70	-355	0.70	-506	0.74	-4471	0.70	-2130	0.70	-819	0.70	-883
N-1: ALLSTON-NAPAVINE 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-507	0.72	-4641	0.70	-2133	0.70	-820	0.70	-884
N-1: ALLSTON-PAUL #2 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-507	0.72	-4656	0.70	-2133	0.70	-820	0.70	-884
N-1: ALVERY-DIXONVILLE 500 KV	0.70	-805	0.70	-2383	0.70	-351	0.70	-505	0.71	-4491	0.70	-2132	0.70	-818	0.70	-881
N-1: ALVEY-MARION 500 KV	0.70	-805	0.70	-2380	0.70	-352	0.70	-505	0.73	-4494	0.70	-2131	0.70	-818	0.70	-881
N-1: ASHE-HANFORD 500 KV	0.70	-807	0.70	-2375	0.70	-354	0.70	-507	0.73	-4551	0.70	-2132	0.70	-820	0.70	-884
N-1: ASHE-LOW MON 500 KV	0.70	-807	0.70	-2378	0.70	-355	0.70	-507	0.72	-4658	0.70	-2130	0.70	-819	0.70	-884
N-1: ASHE-MARION 500 KV	0.70	-805	0.70	-2368	0.70	-353	0.70	-505	0.73	-4517	0.70	-2125	0.70	-818	0.70	-882
N-1: ASHE-SLATT 500 KV	0.70	-807	0.70	-2371	0.70	-355	0.70	-507	0.72	-4603	0.70	-2130	0.70	-820	0.70	-884
N-1: BELL-COULEE 500 KV	0.70	-804	0.70	-2339	0.70	-354	0.70	-502	0.72	-4666	0.70	-2105	0.70	-815	0.70	-880
N-1: BELL-TAFT 500 KV	0.70	-798	0.70	-2241	0.70	-351	0.70	-493	0.77	-4318	0.70	-2047	0.70	-808	0.70	-873
N-1: BIG EDDY-CEILO 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4705	0.70	-2136	0.70	-820	0.70	-885
N-1: BIG EDDY-JOHN DAY 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4681	0.70	-2136	0.70	-820	0.70	-885
N-1: BIG EDDY-KNIGHT 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-508	0.70	-4677	0.70	-2134	0.70	-820	0.70	-885
N-1: BIG EDDY-OSTRANDER 500 KV	0.70	-807	0.70	-2381	0.70	-355	0.70	-507	0.72	-4617	0.70	-2133	0.70	-820	0.70	-884
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.70	-808	0.70	-2368	0.70	-355	0.70	-507	0.71	-4703	0.70	-2116	0.70	-820	0.70	-885
N-1: BRADY-ANTELOPE 230 KV + RAS	0.70	-805	0.70	-2339	0.70	-354	0.70	-503	0.71	-4693	0.70	-2097	0.70	-816	0.70	-881
N-1: BROADVIEW-GARRISON #1 500 KV	0.70	-804	0.70	-2328	0.70	-354	0.70	-503	0.72	-4688	0.70	-2091	0.70	-816	0.70	-881
N-1: BROWNLEE-ONTARIO 230 KV	0.70	-808	0.70	-2374	0.70	-355	0.70	-507	0.71	-4703	0.70	-2129	0.70	-820	0.70	-885
N-1: BUCKLEY-GRIZZLY 500 KV	0.70	-805	0.70	-2379	0.70	-352	0.70	-505	0.70	-4589	0.70	-2130	0.70	-818	0.70	-882
N-1: BUCKLEY-MARION 500 KV	0.70	-806	0.70	-2373	0.70	-353	0.70	-506	0.73	-4553	0.70	-2130	0.70	-819	0.70	-883
N-1: BUCKLEY-SLATT 500 KV	0.70	-803	0.70	-2374	0.70	-353	0.70	-502	0.72	-4540	0.70	-2129	0.70	-815	0.70	-880
N-1: CAL SUB 120 KV PHASE SHIFTER	0.70	-782	0.70	-2378	0.70	-338	0.70	-528	0.71	-4645	0.70	-2139	0.70	-837	0.72	-846
N-1: CAPTAIN JACK-OLINDA 500 KV	0.70	-807	0.70	-2397	0.70	-353	0.70	-499	0.73	-3983	0.70	-2144	0.70	-812	0.70	-882
N-1: CAPTJACK-KFALLS 500 KV	0.70	-806	0.70	-2380	0.70	-352	0.70	-505	0.70	-4584	0.70	-2131	0.70	-818	0.70	-882
N-1: CASCADE CROSSING 500 KV	0.70	-803	0.70	-2367	0.70	-351	0.70	-503	0.75	-4404	0.70	-2129	0.70	-816	0.70	-879
N-1: CHIEF JO-COULEE 500 KV	0.70	-808	0.70	-2382	0.70	-355	0.70	-507	0.72	-4663	0.70	-2132	0.70	-820	0.70	-884
N-1: CHIEF JO-MONROE 500 KV	0.70	-808	0.70	-2382	0.70	-355	0.70	-507	0.72	-4632	0.70	-2132	0.70	-820	0.70	-884
N-1: CHIEF JO-SICKLER 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4683	0.70	-2134	0.70	-820	0.70	-885
N-1: COULEE-HANFORD 500 KV	0.70	-808	0.70	-2381	0.70	-355	0.70	-507	0.73	-4611	0.70	-2133	0.70	-820	0.70	-884
N-1: COULEE-SCHULTZ 500 KV	0.70	-807	0.70	-2378	0.70	-355	0.70	-507	0.72	-4630	0.70	-2131	0.70	-819	0.70	-884
N-1: COVINGTON4-RAVER 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4695	0.70	-2136	0.70	-820	0.70	-885
N-1: COVINGTON5-RAVER 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4694	0.70	-2136	0.70	-820	0.70	-885
N-1: COYOTE-LONGHORN 500 KV	0.70	-807	0.70	-2380	0.70	-355	0.70	-507	0.71	-4696	0.70	-2137	0.70	-819	0.70	-884
N-1: CUSTERW-MONROE 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4676	0.70	-2134	0.70	-820	0.70	-885
N-1: DIXONVILLE-MERIDIAN 500 KV	0.70	-806	0.70	-2380	0.70	-351	0.70	-506	0.71	-4510	0.70	-2131	0.70	-819	0.70	-882
N-1: DRYCREEK-LOLO 230 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.71	-4705	0.70	-2135	0.70	-820	0.70	-885
N-1: DRYCREEK-N LEWISTON 230 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.71	-4705	0.70	-2135	0.70	-820	0.70	-885
N-1: DRYCREEK-WALA AVA 230 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-507	0.72	-4692	0.70	-2134	0.70	-820	0.70	-885
N-1: DWORSHAK-HATWAI 500 KV	0.70	-806	0.70	-2355	0.70	-355	0.70	-505	0.72	-4689	0.70	-2112	0.70	-817	0.70	-882
N-1: DWORSHAK-TAFT 500 KV	0.70	-806	0.70	-2352	0.70	-354	0.70	-505	0.72	-4619	0.70	-2113	0.70	-817	0.70	-882
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4665	0.70	-2134	0.70	-820	0.70	-885
N-1: ECHO LAKE-RAVER 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.71	-4691	0.70	-2135	0.70	-820	0.70	-885
N-1: ECHO LAKE-SCHULTZ 500 KV	0.70	-808	0.70	-2382	0.70	-355	0.70	-507	0.72	-4628	0.70	-2133	0.70	-820	0.70	-884
N-1: ECHO LAKE-SNOK TAP 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4687	0.70	-2136	0.70	-820	0.70	-885
N-1: GARRISON-TAFT #2 500 KV	0.70	-803	0.70	-2320	0.70	-354	0.70	-501	0.73	-4624	0.70	-2091	0.70	-814	0.70	-880
N-1: GOLDBILL-PLACER 115 KV	0.70	-808	0.70	-2390	0.70	-355	0.70	-509	0.71	-4709	0.70	-2137	0.70	-821	0.70	-885
N-1: GRASSLAND-COYOTE 500 KV	0.70	-808	0.70	-2345	0.70	-355	0.70	-507	0.71	-4688	0.70	-2123	0.70	-820	0.70	-884
N-1: GRASSLAND-SLATT 500 KV	0.70	-804	0.70	-2355	0.70	-354	0.70	-502	0.72	-4650	0.70	-2131	0.70	-815	0.70	-880

Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.70	-805	0.70	-2370	0.70	-352	0.70	-505	0.72	-4529	0.70	-2126	0.70	-818	0.70	-881
N-1: GRIZZLY-MALIN 500 KV	0.70	-801	0.70	-2364	0.70	-347	0.70	-501	0.70	-4418	0.70	-2123	0.70	-814	0.70	-877
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.70	-808	0.70	-2352	0.70	-355	0.70	-508	0.70	-4657	0.70	-2124	0.70	-820	0.70	-885
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.70	-800	0.70	-2364	0.70	-347	0.70	-500	0.70	-4437	0.70	-2123	0.70	-814	0.70	-877
N-1: GRIZZLY-ROUND BU 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-508	0.71	-4689	0.70	-2134	0.70	-820	0.70	-884
N-1: HANFORD-LOW MON 500 KV	0.70	-807	0.70	-2375	0.70	-355	0.70	-506	0.72	-4637	0.70	-2129	0.70	-819	0.70	-883
N-1: HANFORD-VANTAGE 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4612	0.70	-2136	0.70	-820	0.70	-885
N-1: HANFORD-WAUTOMA 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-507	0.72	-4694	0.70	-2134	0.70	-820	0.70	-885
N-1: HARRY ALLEN 345 KV PHASE SHIFTER	0.70	-779	0.70	-2137	0.70	-352	0.70	-449	0.75	-4376	0.70	-1954	0.70	-733	0.70	-850
N-1: HATWAI 500/230 KV XFMR	0.70	-807	0.70	-2382	0.70	-355	0.70	-507	0.71	-4701	0.70	-2132	0.70	-819	0.70	-884
N-1: HATWAI-LOLO 230 KV	0.70	-807	0.70	-2382	0.70	-355	0.70	-507	0.71	-4703	0.70	-2132	0.70	-819	0.70	-884
N-1: HATWAI-LOW GRAN 500 KV	0.70	-803	0.70	-2321	0.70	-354	0.70	-500	0.72	-4639	0.70	-2094	0.70	-814	0.70	-879
N-1: HATWAI-N LEWISTON 230 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4707	0.70	-2135	0.70	-820	0.70	-885
N-1: HELLS CANYON-BROWNEE 230 KV	0.70	-806	0.70	-2336	0.70	-355	0.70	-506	0.71	-4756	0.70	-2109	0.70	-819	0.70	-883
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.70	-796	0.70	-2197	0.70	-351	0.70	-488	0.72	-4647	0.70	-2030	0.70	-807	0.70	-872
N-1: HEMINGWAY-GRASSLAND 500 KV	0.70	-753	0.70	-1673	0.70	-334	0.70	-431	0.74	-4458	0.70	-1806	0.70	-756	0.70	-823
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.70	-748	0.70	-1942	0.70	-339	0.70	-428	0.75	-4318	0.70	-1980	0.70	-749	0.70	-818
N-1: HILL TOP 345/230 XFMR	0.70	-797	0.70	-2353	0.70	-230	0.70	-572	0.72	-4604	0.70	-2137	0.70	-871	0.72	-895
N-1: HORSE HV-MCNARY 230 KV	0.70	-807	0.70	-2385	0.70	-355	0.70	-507	0.71	-4687	0.70	-2134	0.70	-820	0.70	-884
N-1: HOT SPRINGS-TAFT 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.71	-4689	0.70	-2133	0.70	-820	0.70	-885
N-1: HUMBOLDT-COYOTE CK 345 KV	0.70	-856	0.70	-2273	0.70	-383	0.70	-215	0.74	-4476	0.70	-2067	0.70	-738	0.72	-925
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.70	-784	0.70	-2165	0.70	-351	0.70	-463	0.75	-4421	0.70	-1979	0.70	-753	0.70	-857
N-1: ING500-CUSTERW 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.71	-4696	0.70	-2135	0.70	-820	0.70	-885
N-1: JOHN DAY-MARION 500 KV	0.70	-806	0.70	-2372	0.70	-353	0.70	-506	0.73	-4553	0.70	-2129	0.70	-819	0.70	-883
N-1: JOHN DAY-ROCK CK 500 KV	0.70	-807	0.70	-2380	0.70	-355	0.70	-507	0.72	-4611	0.70	-2131	0.70	-819	0.70	-884
N-1: JOHN DAY-SLATT 500 KV	0.70	-805	0.70	-2379	0.70	-354	0.70	-504	0.72	-4641	0.70	-2134	0.70	-817	0.70	-881
N-1: KFALLS-MERIDIAN 500 KV	0.70	-808	0.70	-2376	0.70	-353	0.70	-510	0.71	-4582	0.70	-2131	0.70	-822	0.70	-885
N-1: KNIGHT-WAUTOMA 500 KV	0.70	-807	0.70	-2375	0.70	-354	0.70	-506	0.73	-4597	0.70	-2129	0.70	-819	0.70	-883
N-1: LAGRANDE-NORTH POWDER 230 KV	0.70	-801	0.70	-2299	0.70	-353	0.70	-497	0.72	-4678	0.70	-2087	0.70	-812	0.70	-877
N-1: LANES-MARION 500 KV	0.70	-807	0.70	-2380	0.70	-354	0.70	-507	0.72	-4601	0.70	-2132	0.70	-819	0.70	-884
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.71	-4696	0.70	-2134	0.70	-820	0.70	-885
N-1: LIT GOOSE-LOW MON 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-507	0.72	-4691	0.70	-2134	0.70	-820	0.70	-885
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-507	0.72	-4691	0.70	-2133	0.70	-820	0.70	-884
N-1: LOW MON-SAC TAP 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4661	0.70	-2135	0.70	-820	0.70	-885
N-1: MALIN 500/230 XFMR	0.70	-791	0.70	-2387	0.70	-253	0.70	-512	0.71	-4704	0.70	-2136	0.70	-824	0.70	-869
N-1: MALIN-HILLTOP 230 KV	0.70	-787	0.70	-2367	0.70	-177	0.70	-550	0.71	-4630	0.70	-2137	0.70	-855	0.72	-879
N-1: MALIN-ROUND MTN #1 500 KV	0.70	-806	0.70	-2387	0.70	-353	0.70	-503	0.71	-4249	0.70	-2137	0.70	-815	0.70	-882
N-1: MALIN-ROUND MTN #2 500 KV	0.70	-806	0.70	-2387	0.70	-352	0.70	-503	0.71	-4229	0.70	-2137	0.70	-815	0.70	-882
N-1: MALIN-SUMMER LAKE 500 KV	0.70	-793	0.70	-2353	0.70	-350	0.70	-489	0.70	-4457	0.70	-2135	0.70	-803	0.70	-868
N-1: MAPLE VLY-ROCKY RH 345 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4688	0.70	-2135	0.70	-820	0.70	-885
N-1: MARION-PEARL 500 KV	0.70	-810	0.70	-2391	0.70	-357	0.70	-510	0.72	-4596	0.70	-2138	0.70	-821	0.70	-887
N-1: MARION-SANTIAM 500 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4699	0.70	-2135	0.70	-820	0.70	-885
N-1: MCLOUGHLIN-OSTRANDER 230 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4689	0.70	-2135	0.70	-820	0.70	-885
N-1: MCNARY 500/230 KV XFMR	0.70	-806	0.70	-2358	0.70	-356	0.70	-505	0.79	-4531	0.70	-2119	0.70	-818	0.70	-883
N-1: MCNARY-BOARD T1 230 KV	0.70	-808	0.70	-2396	0.70	-356	0.70	-508	0.71	-4709	0.70	-2140	0.70	-820	0.70	-885
N-1: MCNARY-JOHN DAY 500 KV	0.70	-805	0.70	-2367	0.70	-354	0.70	-504	0.73	-4579	0.70	-2126	0.70	-817	0.70	-882
N-1: MCNARY-LONGHORN 500 KV	0.70	-808	0.70	-2368	0.70	-356	0.70	-508	0.71	-4680	0.70	-2130	0.70	-820	0.70	-885
N-1: MCNARY-ROSS 345 KV	0.70	-807	0.70	-2378	0.70	-355	0.70	-507	0.73	-4617	0.70	-2131	0.70	-819	0.70	-884
N-1: MCNARY-ROUNDUP 230 KV	0.70	-803	0.70	-2325	0.70	-354	0.70	-500	0.71	-4694	0.70	-2101	0.70	-815	0.70	-880
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.70	-808	0.70	-2381	0.70	-355	0.70	-508	0.73	-4601	0.70	-2133	0.70	-820	0.70	-884
N-1: MIDPOINT-HEMINGWAY 500 KV	0.70	-770	0.70	-1785	0.70	-345	0.70	-449	0.72	-4655	0.70	-1508	0.70	-779	0.70	-842
N-1: MIDPOINT-HUMBOLDT 345 KV	0.70	-858	0.70	-2243	0.70	-387	0.70	-369	0.75	-4438	0.70	-2059	0.70	-712	0.72	-925

Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: NAPAVINE-PAUL 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4703	0.70	-2136	0.70	-820	0.70	-885
N-1: OLYMPIA-PAUL 500 KV	0.70	-808	0.70	-2391	0.70	-356	0.70	-508	0.71	-4737	0.70	-2136	0.70	-820	0.70	-885
N-1: ONTARIO-CALDWELL 230 KV	0.70	-808	0.70	-2349	0.70	-356	0.70	-508	0.71	-4704	0.70	-2110	0.70	-820	0.70	-885
N-1: OSTRANDER-KNIGHT 500 KV	0.70	-807	0.70	-2377	0.70	-354	0.70	-507	0.73	-4587	0.70	-2131	0.70	-819	0.70	-884
N-1: OSTRANDER-PEARL 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4681	0.70	-2136	0.70	-820	0.70	-885
N-1: OSTRANDER-TROUTDALE 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4674	0.70	-2134	0.70	-820	0.70	-885
N-1: OXBOW-BROWNLEE #2 230 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.71	-4706	0.70	-2134	0.70	-820	0.70	-885
N-1: OXBOW-LOLO 230 KV	0.70	-800	0.70	-2275	0.70	-352	0.70	-495	0.72	-4648	0.70	-2075	0.70	-811	0.70	-876
N-1: PAUL-SATSOP 500 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4671	0.70	-2135	0.70	-820	0.70	-885
N-1: PEARL-KEELER 500 KV	0.70	-808	0.70	-2387	0.70	-356	0.70	-508	0.73	-4596	0.70	-2136	0.70	-820	0.70	-885
N-1: PINTO-FOUR CORNER 345 KV	0.70	-786	0.70	-2181	0.70	-352	0.70	-465	0.75	-4434	0.70	-1991	0.70	-757	0.70	-859
N-1: PONDEROSA A 500/230 KV XFMR	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4702	0.70	-2136	0.70	-820	0.70	-885
N-1: PONDEROSA B 500/230 KV XFMR	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.71	-4708	0.70	-2135	0.70	-820	0.70	-885
N-1: POPULUS-CEDAR HILL-HEMINGWAY 500 KV	0.70	-801	0.70	-2191	0.70	-355	0.70	-514	0.70	-4877	0.70	-2075	0.70	-804	0.70	-878
N-1: RAVER-PAUL 500 KV	0.70	-809	0.70	-2391	0.70	-356	0.70	-509	0.72	-4680	0.70	-2137	0.70	-821	0.70	-885
N-1: RAVER-TACOMA 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4686	0.70	-2135	0.70	-820	0.70	-885
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.70	-779	0.70	-2136	0.70	-352	0.70	-449	0.75	-4376	0.70	-1953	0.70	-733	0.70	-850
N-1: ROBINSON-HARRY ALLEN 500 KV	0.70	-775	0.70	-2380	0.70	-345	0.70	-448	0.73	-4627	0.70	-2132	0.70	-421	0.71	-837
N-1: ROCK CK-WAUTOMA 500 KV	0.70	-807	0.70	-2379	0.70	-355	0.70	-507	0.73	-4584	0.70	-2132	0.70	-820	0.70	-884
N-1: ROUND MTN-TABLE MTN 500 KV	0.70	-807	0.70	-2393	0.70	-355	0.70	-504	0.71	-4479	0.70	-2139	0.70	-817	0.70	-884
N-1: ROUNDUP-LAGRANDE 230 KV	0.70	-802	0.70	-2313	0.70	-353	0.70	-499	0.71	-4685	0.70	-2095	0.70	-814	0.70	-879
N-1: SCHULTZ-SICKLER 500 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4692	0.70	-2135	0.70	-820	0.70	-885
N-1: SCHULTZ-VANTAGE 500 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4662	0.70	-2135	0.70	-820	0.70	-885
N-1: SCHULTZ-WAUTOMA 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.73	-4594	0.70	-2135	0.70	-820	0.70	-885
N-1: SIGURD-GLEN CANYON 230 KV	0.70	-802	0.70	-2343	0.70	-354	0.70	-497	0.72	-4643	0.70	-2105	0.70	-803	0.70	-878
N-1: SLATT 500/230 KV XFMR	0.70	-808	0.70	-2384	0.70	-355	0.70	-508	0.72	-4687	0.70	-2134	0.70	-820	0.70	-885
N-1: SLATT-LONGHORN 500 KV	0.70	-807	0.70	-2380	0.70	-355	0.70	-506	0.72	-4662	0.70	-2132	0.70	-819	0.70	-884
N-1: SNOK TAP-SNOKING 500 KV	0.70	-808	0.70	-2386	0.70	-355	0.70	-508	0.72	-4690	0.70	-2134	0.70	-820	0.70	-885
N-1: TABLE MTN-TESLA 500 KV	0.70	-809	0.70	-2401	0.70	-357	0.70	-506	0.71	-4553	0.70	-2143	0.70	-818	0.70	-886
N-1: TABLE MTN-VACA DIXON 500 KV	0.70	-810	0.70	-2407	0.70	-357	0.70	-504	0.71	-4431	0.70	-2147	0.70	-816	0.70	-886
N-1: VANTAGE 500/230 KV XFMR #1	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4705	0.70	-2136	0.70	-820	0.70	-885
N-1: VANTAGE 500/230 KV XFMR #2	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.71	-4706	0.70	-2136	0.70	-820	0.70	-885
N-1: WALLA WALLA-TALBOT 230 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.71	-4702	0.70	-2135	0.70	-820	0.70	-885
N-1: WALLA WALLA-WALLULA 230 KV	0.70	-807	0.70	-2369	0.70	-355	0.70	-506	0.71	-4722	0.70	-2125	0.70	-819	0.70	-884
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.70	-804	0.70	-2345	0.70	-352	0.70	-504	0.74	-4373	0.70	-2117	0.70	-817	0.70	-881
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.70	-803	0.70	-2352	0.70	-350	0.70	-503	0.75	-4295	0.70	-2119	0.70	-816	0.70	-879
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.70	-799	0.70	-2351	0.70	-349	0.70	-498	0.74	-4302	0.70	-2118	0.70	-812	0.70	-876
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.70	-804	0.70	-2358	0.70	-352	0.70	-503	0.74	-4451	0.70	-2121	0.70	-817	0.70	-881
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.70	-802	0.70	-2357	0.70	-351	0.70	-501	0.74	-4426	0.70	-2123	0.70	-814	0.70	-878
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.70	-804	0.70	-2348	0.70	-353	0.70	-503	0.74	-4462	0.70	-2119	0.70	-816	0.70	-881
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.70	-806	0.70	-2360	0.70	-354	0.70	-506	0.73	-4545	0.70	-2125	0.70	-818	0.70	-883
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.70	-795	0.70	-2149	0.70	-347	0.70	-500	0.76	-4465	0.70	-1978	0.70	-811	0.70	-871
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-ROUND BUTTE 230 KV	0.70	-803	0.70	-2370	0.70	-351	0.70	-503	0.75	-4389	0.70	-2130	0.70	-816	0.70	-880
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-SANTIAM 230 KV	0.70	-803	0.70	-2371	0.70	-351	0.70	-503	0.76	-4357	0.70	-2131	0.70	-816	0.70	-880
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.70	-807	0.70	-2379	0.70	-354	0.70	-507	0.73	-4591	0.70	-2132	0.70	-820	0.70	-884
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.70	-807	0.70	-2381	0.70	-354	0.70	-508	0.73	-4596	0.70	-2133	0.70	-820	0.70	-884
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.70	-808	0.70	-2311	0.70	-356	0.70	-506	0.71	-4696	0.70	-2064	0.70	-820	0.70	-885
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.70	-808	0.70	-2309	0.70	-356	0.70	-506	0.71	-4697	0.70	-2062	0.70	-820	0.70	-885
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.70	-810	0.70	-2220	0.70	-356	0.70	-508	0.71	-4700	0.70	-1919	0.70	-821	0.70	-887
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.70	-810	0.70	-2239	0.70	-356	0.70	-509	0.71	-4701	0.70	-1947	0.70	-822	0.70	-887
N-2: BROADVIEW-GARRISON #1 & #2 500 KV + RAS	0.70	-801	0.70	-2193	0.70	-350	0.70	-511	0.71	-4909	0.70	-1961	0.70	-820	0.70	-878
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.70	-796	0.70	-2169	0.70	-351	0.70	-488	0.71	-4686	0.70	-2017	0.70	-807	0.70	-871

Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: BROWNLEE-OXBOW & BROWNLEE-HELLS CANYON 230 KV	0.70	-806	0.70	-2335	0.70	-355	0.70	-506	0.71	-4755	0.70	-2108	0.70	-819	0.70	-883
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.70	-804	0.70	-2356	0.70	-350	0.70	-505	0.75	-4342	0.70	-2123	0.70	-818	0.70	-881
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.70	-807	0.70	-2376	0.70	-355	0.70	-507	0.73	-4597	0.70	-2130	0.70	-819	0.70	-884
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.70	-807	0.70	-2378	0.70	-355	0.70	-507	0.73	-4603	0.70	-2131	0.70	-819	0.70	-884
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.70	-807	0.70	-2381	0.70	-355	0.70	-507	0.72	-4624	0.70	-2132	0.70	-820	0.70	-884
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.70	-808	0.70	-2383	0.70	-355	0.70	-507	0.72	-4655	0.70	-2133	0.70	-820	0.70	-884
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.70	-807	0.70	-2380	0.70	-355	0.70	-507	0.72	-4632	0.70	-2131	0.70	-820	0.70	-884
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.70	-808	0.70	-2378	0.70	-354	0.70	-508	0.74	-4462	0.70	-2134	0.70	-820	0.70	-885
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.70	-806	0.70	-2360	0.70	-354	0.70	-505	0.74	-4523	0.70	-2121	0.70	-818	0.70	-883
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4665	0.70	-2134	0.70	-820	0.70	-885
N-2: CUSTERW-MONROE #1 & #2 500 KV	0.70	-808	0.70	-2382	0.70	-355	0.70	-507	0.73	-4624	0.70	-2132	0.70	-820	0.70	-884
N-2: DC-BIPOLE	0.70	-814	0.70	-2519	0.70	-365	0.70	-484	0.71	-4665	0.70	-2205	0.70	-796	0.70	-890
N-2: DOUBLE PALO VERDE	0.70	-829	0.70	-2419	0.70	-366	0.70	-461	0.74	-4063	0.70	-2125	0.70	-806	0.70	-904
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4666	0.70	-2134	0.70	-820	0.70	-885
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.70	-808	0.70	-2383	0.70	-355	0.70	-507	0.72	-4637	0.70	-2133	0.70	-820	0.70	-884
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.70	-795	0.70	-2159	0.70	-348	0.70	-499	0.73	-4758	0.70	-1972	0.70	-810	0.70	-871
N-2: GRASSLAND-CEDAR SPRING & SLATT - BUCKLEY 500 KV	0.70	-797	0.70	-2359	0.70	-349	0.70	-495	0.74	-4308	0.70	-2125	0.70	-809	0.70	-873
N-2: GRASSLAND-COYOTE & SLATT - LONGHORN 500 KV	0.70	-807	0.70	-2295	0.70	-354	0.70	-505	0.72	-4591	0.70	-2103	0.70	-819	0.70	-883
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV	0.70	-788	0.70	-2341	0.70	-337	0.70	-487	0.70	-4004	0.70	-2111	0.70	-802	0.70	-863
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV	0.70	-800	0.70	-2321	0.70	-346	0.70	-500	0.70	-4259	0.70	-2107	0.70	-813	0.70	-876
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV	0.70	-775	0.70	-2343	0.70	-338	0.70	-468	0.70	-3964	0.70	-2134	0.70	-784	0.70	-848
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.70	-804	0.70	-2335	0.70	-352	0.70	-503	0.78	-4156	0.70	-2115	0.70	-816	0.70	-880
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.70	-806	0.70	-2373	0.70	-355	0.70	-505	0.72	-4635	0.70	-2128	0.70	-818	0.70	-883
N-2: HELLS CANYON-BROWNLEE & OXBOW-LOLO 230 KV	0.70	-796	0.70	-2178	0.70	-351	0.70	-488	0.72	-4652	0.70	-2024	0.70	-807	0.70	-872
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.70	-809	0.70	-2391	0.70	-355	0.70	-510	0.76	-4393	0.70	-2141	0.70	-822	0.70	-886
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.70	-806	0.70	-2370	0.70	-353	0.70	-506	0.73	-4506	0.70	-2128	0.70	-819	0.70	-883
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV	0.70	-797	0.70	-2337	0.70	-344	0.70	-497	0.70	-4156	0.70	-2107	0.70	-811	0.70	-873
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV	0.70	-800	0.70	-2356	0.70	-346	0.70	-500	0.70	-4351	0.70	-2117	0.70	-813	0.70	-876
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.70	-804	0.70	-2356	0.70	-350	0.70	-505	0.75	-4342	0.70	-2123	0.70	-818	0.70	-881
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.70	-808	0.70	-2372	0.70	-354	0.70	-508	0.74	-4417	0.70	-2130	0.70	-820	0.70	-885
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.70	-806	0.70	-2368	0.70	-354	0.70	-505	0.73	-4513	0.70	-2126	0.70	-818	0.70	-883
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.70	-808	0.70	-2388	0.70	-356	0.70	-508	0.73	-4588	0.70	-2136	0.70	-820	0.70	-885
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.70	-806	0.70	-2369	0.70	-353	0.70	-507	0.74	-4421	0.70	-2128	0.70	-819	0.70	-883
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.70	-806	0.70	-2366	0.70	-353	0.70	-506	0.74	-4465	0.70	-2126	0.70	-818	0.70	-882
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.70	-807	0.70	-2377	0.70	-354	0.70	-507	0.73	-4572	0.70	-2131	0.70	-819	0.70	-884
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.70	-802	0.70	-2307	0.70	-353	0.70	-498	0.73	-4573	0.70	-2086	0.70	-812	0.70	-878
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.70	-799	0.70	-2440	0.70	-355	0.70	-470	0.72	-2924	0.70	-2174	0.70	-784	0.70	-871
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.70	-804	0.70	-2356	0.70	-353	0.70	-503	0.72	-4472	0.70	-2120	0.70	-816	0.70	-880
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.70	-804	0.70	-2361	0.70	-353	0.70	-503	0.73	-4563	0.70	-2123	0.70	-816	0.70	-881
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.70	-804	0.70	-2353	0.70	-353	0.70	-502	0.74	-4464	0.70	-2119	0.70	-816	0.70	-880
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.70	-806	0.70	-2372	0.70	-354	0.70	-505	0.73	-4594	0.70	-2128	0.70	-818	0.70	-883
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.70	-771	0.70	-1780	0.70	-346	0.70	-449	0.72	-4646	0.70	-1473	0.70	-780	0.70	-843
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.70	-807	0.70	-2379	0.70	-355	0.70	-507	0.73	-4590	0.70	-2131	0.70	-819	0.70	-884
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV	0.70	-805	0.70	-2359	0.70	-353	0.70	-504	0.76	-4339	0.70	-2120	0.70	-817	0.70	-882
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV	0.70	-807	0.70	-2378	0.70	-355	0.70	-507	0.73	-4605	0.70	-2130	0.70	-819	0.70	-884
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.70	-809	0.70	-2391	0.70	-356	0.70	-509	0.72	-4669	0.70	-2137	0.70	-821	0.70	-885
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV	0.70	-808	0.70	-2388	0.70	-356	0.70	-508	0.73	-4592	0.70	-2136	0.70	-820	0.70	-885
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.70	-808	0.70	-2387	0.70	-355	0.70	-508	0.72	-4656	0.70	-2135	0.70	-820	0.70	-884
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.70	-808	0.70	-2390	0.70	-355	0.70	-508	0.72	-4662	0.70	-2136	0.70	-820	0.70	-885
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.70	-808	0.70	-2389	0.70	-355	0.70	-508	0.72	-4684	0.70	-2136	0.70	-820	0.70	-885
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4662	0.70	-2134	0.70	-820	0.70	-885
N-2: RAVER-PAUL & NAPAVINE-PAUL 500 KV	0.70	-809	0.70	-2391	0.70	-356	0.70	-509	0.72	-4671	0.70	-2137	0.70	-821	0.70	-885

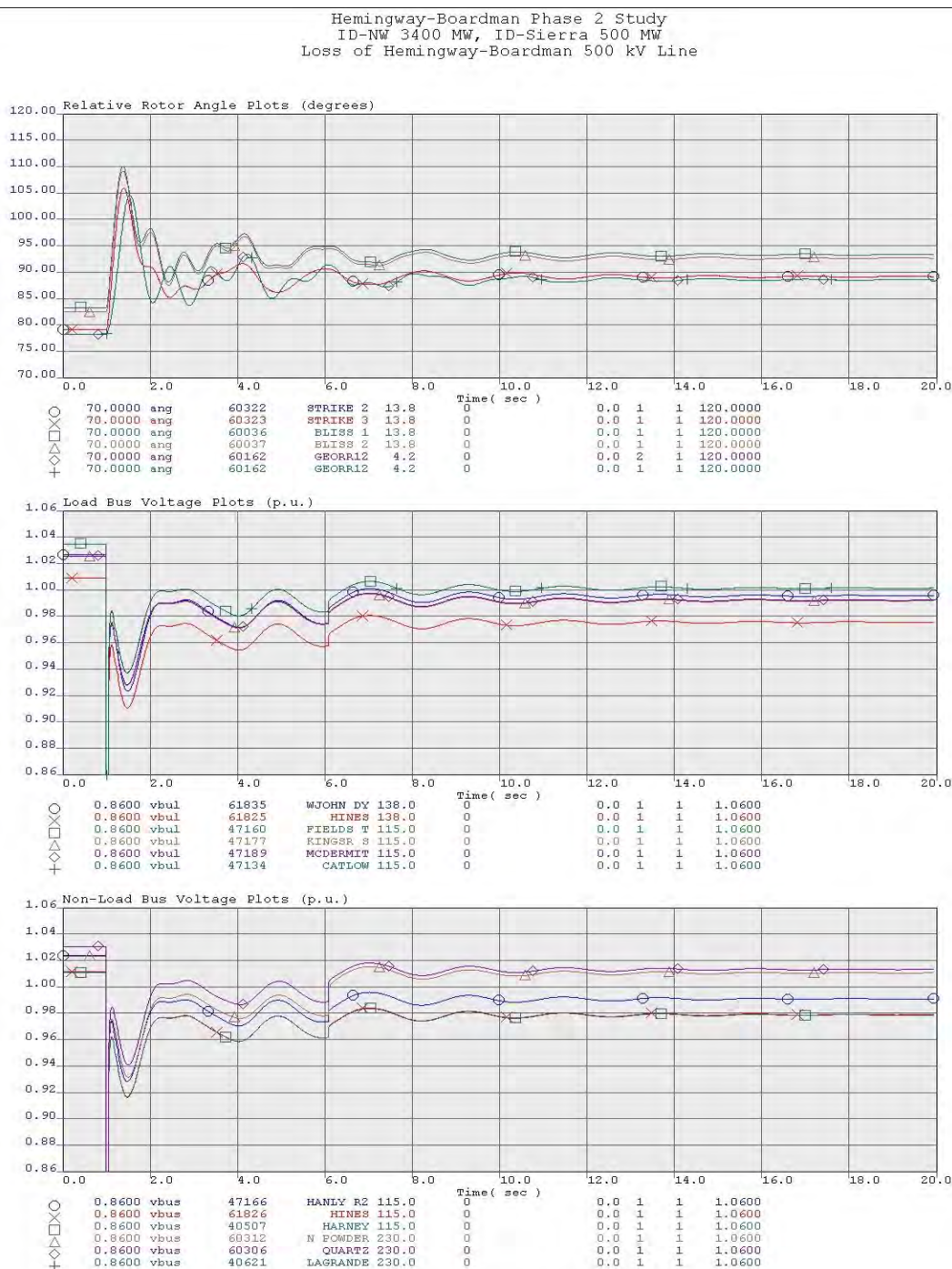
Appendix I - 16la1sa_3400idnw_nv Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Hemingway		Hilltop		Humboldt		Malin		Midpoint		Robinson		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-509	0.72	-4640	0.70	-2136	0.70	-821	0.70	-885
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.70	-809	0.70	-2394	0.70	-356	0.70	-509	0.72	-4679	0.70	-2139	0.70	-821	0.70	-886
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.70	-807	0.70	-2373	0.70	-354	0.70	-507	0.74	-4522	0.70	-2129	0.70	-819	0.70	-884
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4668	0.70	-2135	0.70	-820	0.70	-885
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.70	-808	0.70	-2388	0.70	-355	0.70	-508	0.72	-4686	0.70	-2135	0.70	-820	0.70	-885
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV	0.70	-805	0.70	-2471	0.70	-365	0.70	-475	0.73	-3547	0.70	-2185	0.70	-789	0.70	-877
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV	0.70	-808	0.70	-2384	0.70	-355	0.70	-508	0.74	-4485	0.70	-2136	0.70	-821	0.70	-885
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV	0.70	-808	0.70	-2385	0.70	-355	0.70	-508	0.72	-4637	0.70	-2135	0.70	-820	0.70	-885
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.70	-816	0.70	-2475	0.70	-366	0.70	-490	0.73	-3993	0.70	-2187	0.70	-801	0.70	-891
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.70	-798	0.70	-2241	0.70	-351	0.70	-494	0.77	-4311	0.70	-2048	0.70	-808	0.70	-874
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV + RAS	0.70	-796	0.70	-2201	0.70	-349	0.70	-493	0.78	-4221	0.70	-2022	0.70	-807	0.70	-871
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.70	-798	0.70	-2241	0.70	-351	0.70	-493	0.77	-4317	0.70	-2047	0.70	-808	0.70	-873
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV + RAS	0.70	-797	0.70	-2225	0.70	-350	0.70	-494	0.78	-4283	0.70	-2038	0.70	-808	0.70	-873
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.70	-801	0.70	-2282	0.70	-353	0.70	-498	0.74	-4543	0.70	-2066	0.70	-811	0.70	-877
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.70	-807	0.70	-2379	0.70	-355	0.70	-507	0.73	-4572	0.70	-2132	0.70	-820	0.70	-884
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.70	-807	0.70	-2379	0.70	-355	0.70	-507	0.73	-4572	0.70	-2132	0.70	-820	0.70	-884
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.70	-807	0.70	-2373	0.70	-354	0.70	-507	0.74	-4507	0.70	-2129	0.70	-819	0.70	-884

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

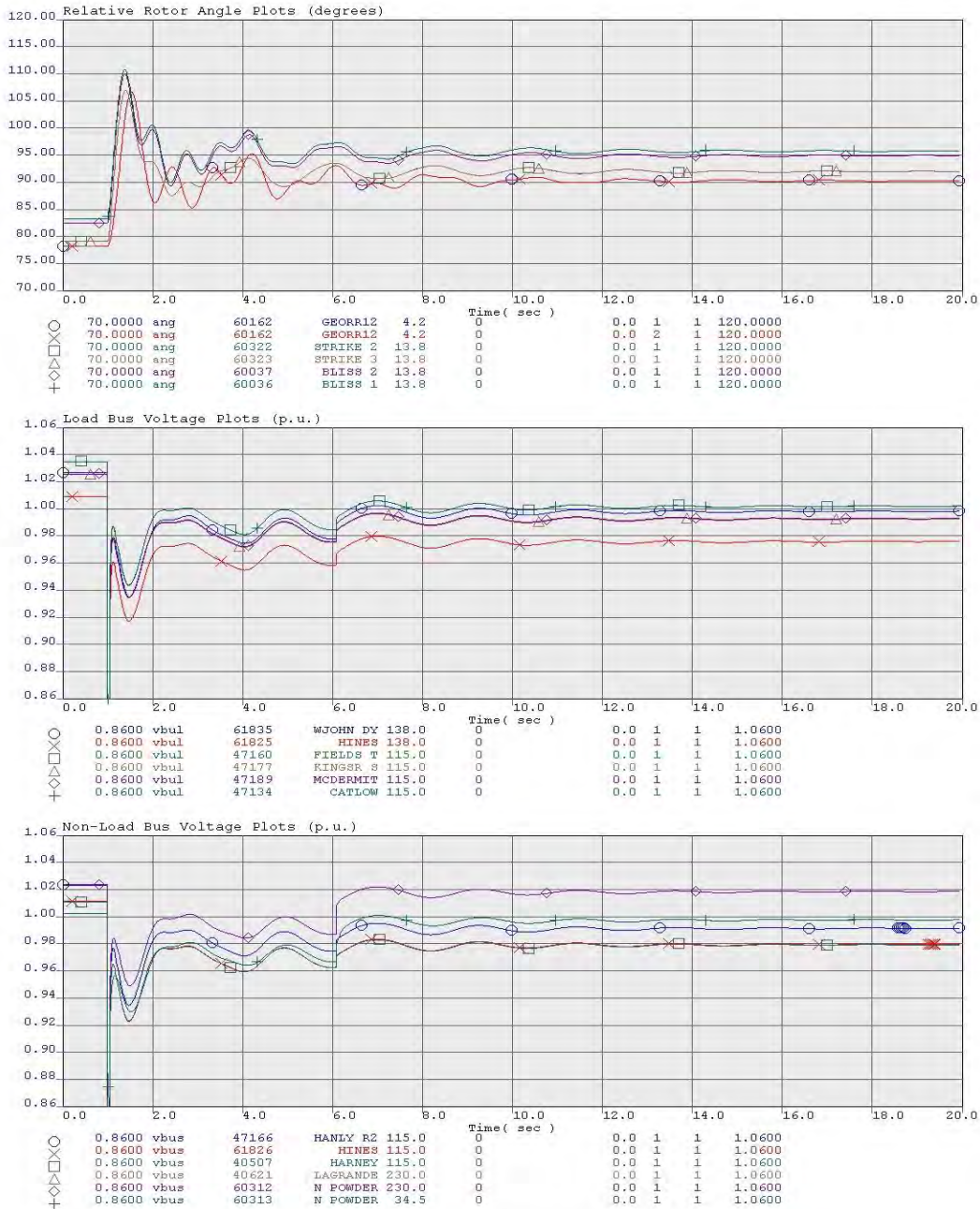


Loss of Hemingway-Boardman 500 kV line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: Inserted LGBP 230 kV 52.2 Mvar MSC @ 5 Seconds
Inserted PTSN 230 kV 31.7 Mvar MSC @ 5 Seconds
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Figure 15: N-1 Loss of Hemingway-Boardman 500 kV Line (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW, ID-Sierra 500 MW
Loss of Hemingway-Summer Lake 500 kV Line



Loss of Hemingway-Summer Lake 500 kV Line
3ph fault @ HMWY 500 kV clear in 3 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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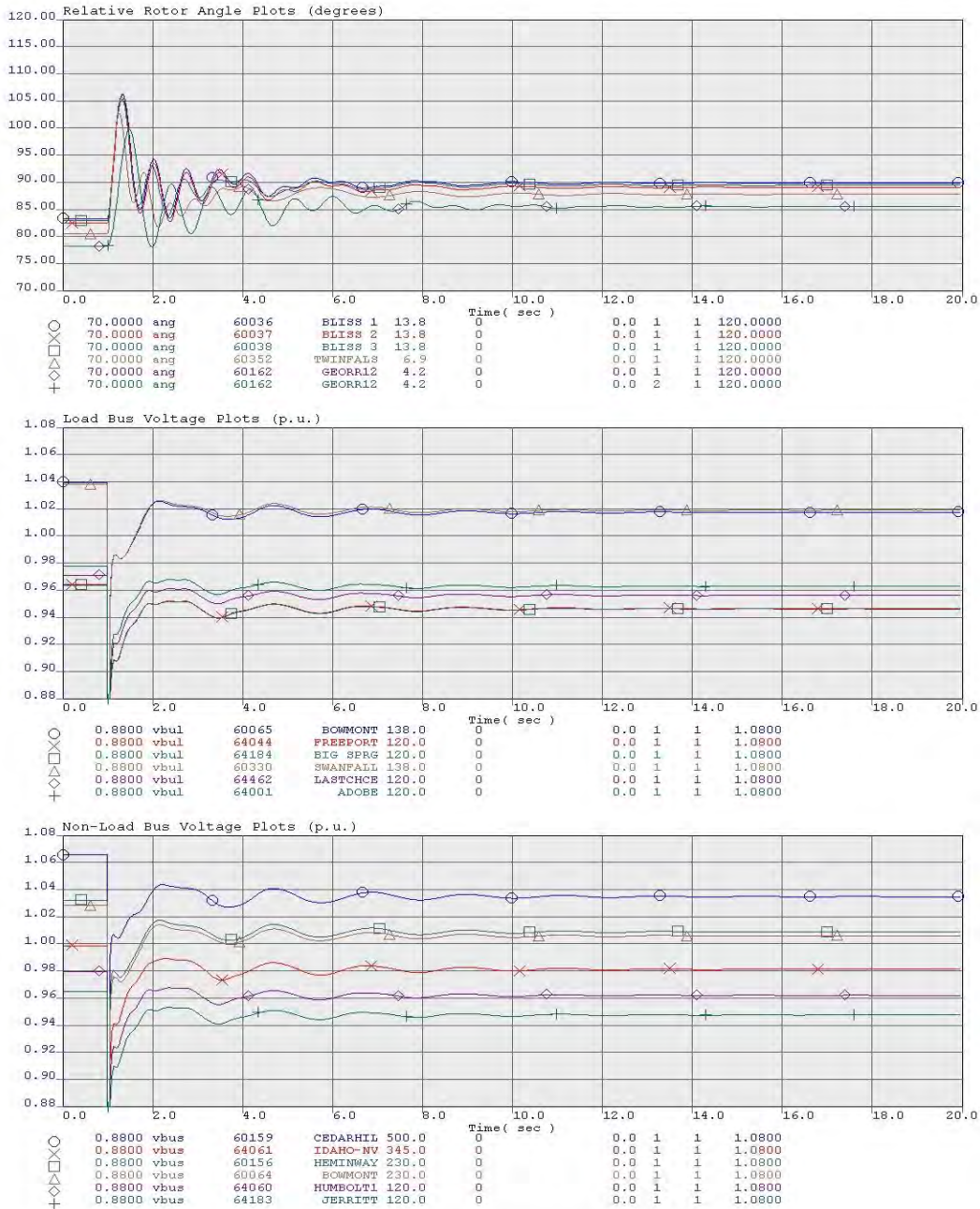
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Figure I6: N-1 Loss of Hemingway-Summer Lake 500 kV Line (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW, ID-Sierra 500 MW
Loss of Hemingway-Midpoint 500 kV Line



Loss of Hemingway-Midpoint 500 kV line
3ph fault @ MPNS 500 kV clear in 3 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Page 1



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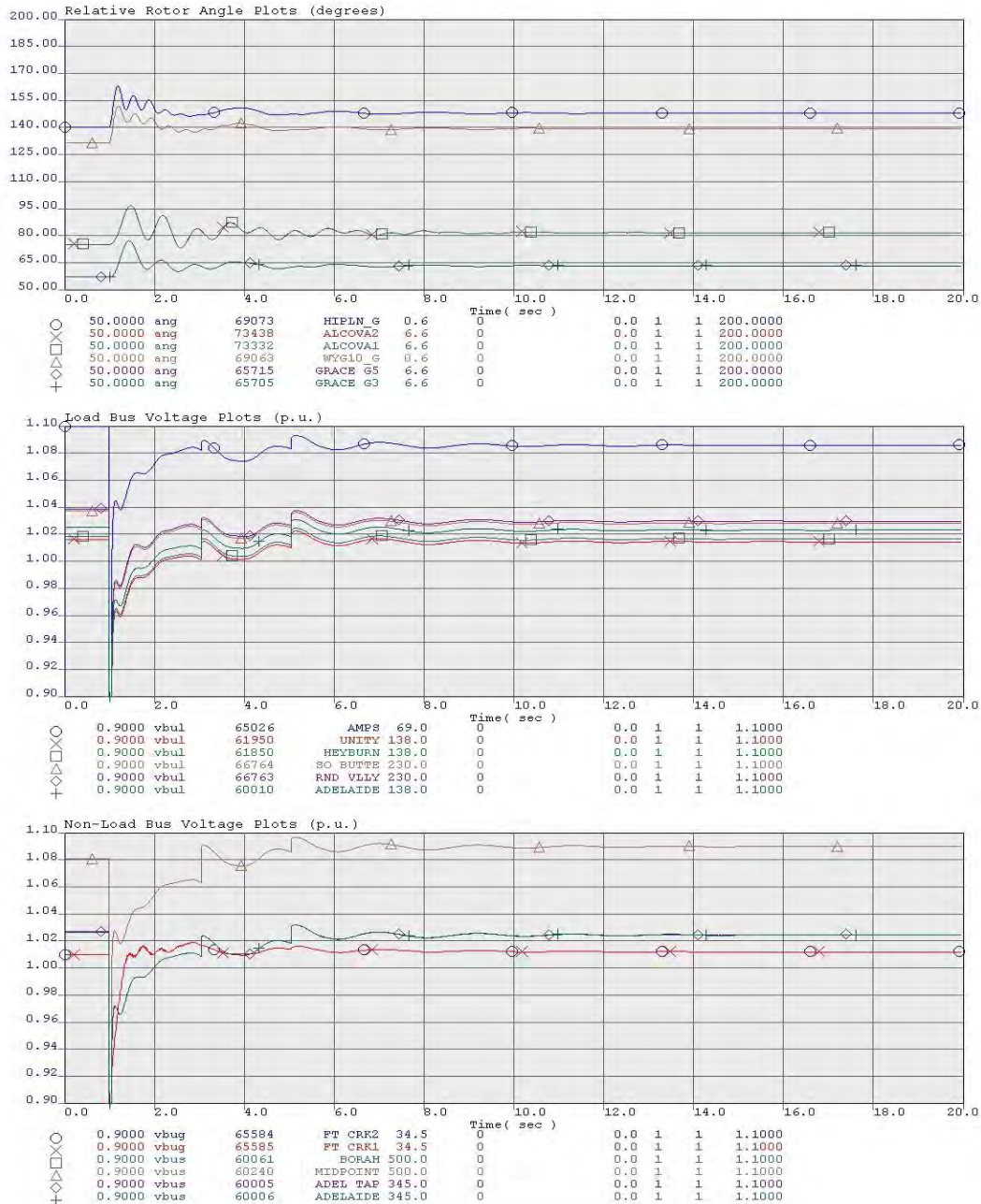
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Figure I7: N-1 Loss of Hemingway-Midpoint 500 kV Line (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW, ID-Sierra 500 MW
Loss of Hemingway-Populus 500 kV Line



Loss of Hemingway-Populus 500 kV line
3ph fault @ PPLS 500 kV clear in 3 Cycles
RAS: Insert Midpoint 500 kV 200 Mvar MSC @ 2 Seconds
Insert Borah 345 kV 175 Mvar MSC @ 4 Seconds
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

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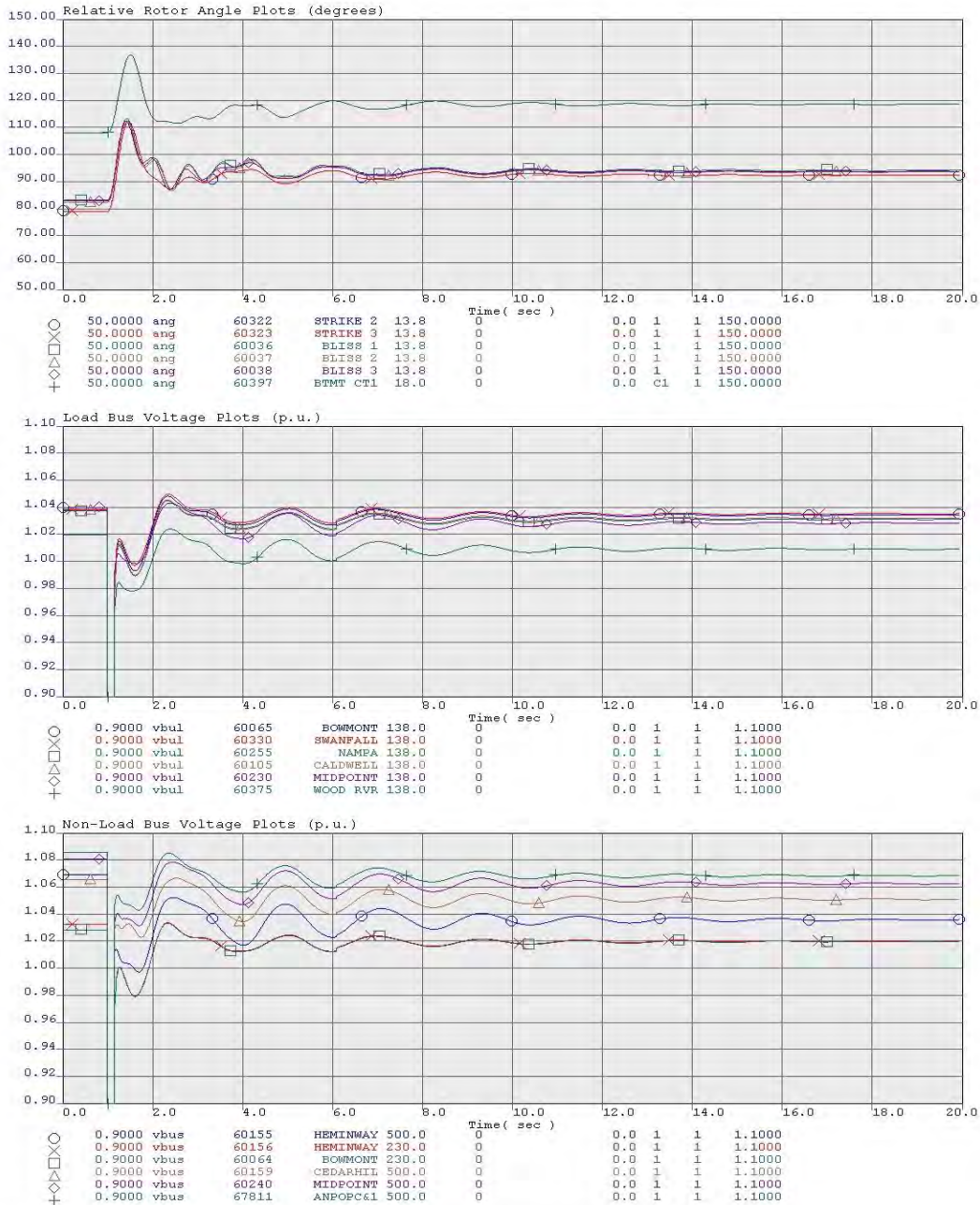
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Figure I8: N-1 Loss of Hemingway-Populus 500 kV Line (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW, ID-Sierra 500 MW
Loss of Hemingway-Boardman 500 kV & Hemingway 500/230 Xfmr



Loss of Hemingway-Boardman 500 kV Line and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: Inserted LGBP 230 kV 52.2 Mvar MSC @ 5 Seconds
Inserted PTSN 230 kV 31.7 Mvar MSC @ 5 Seconds
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

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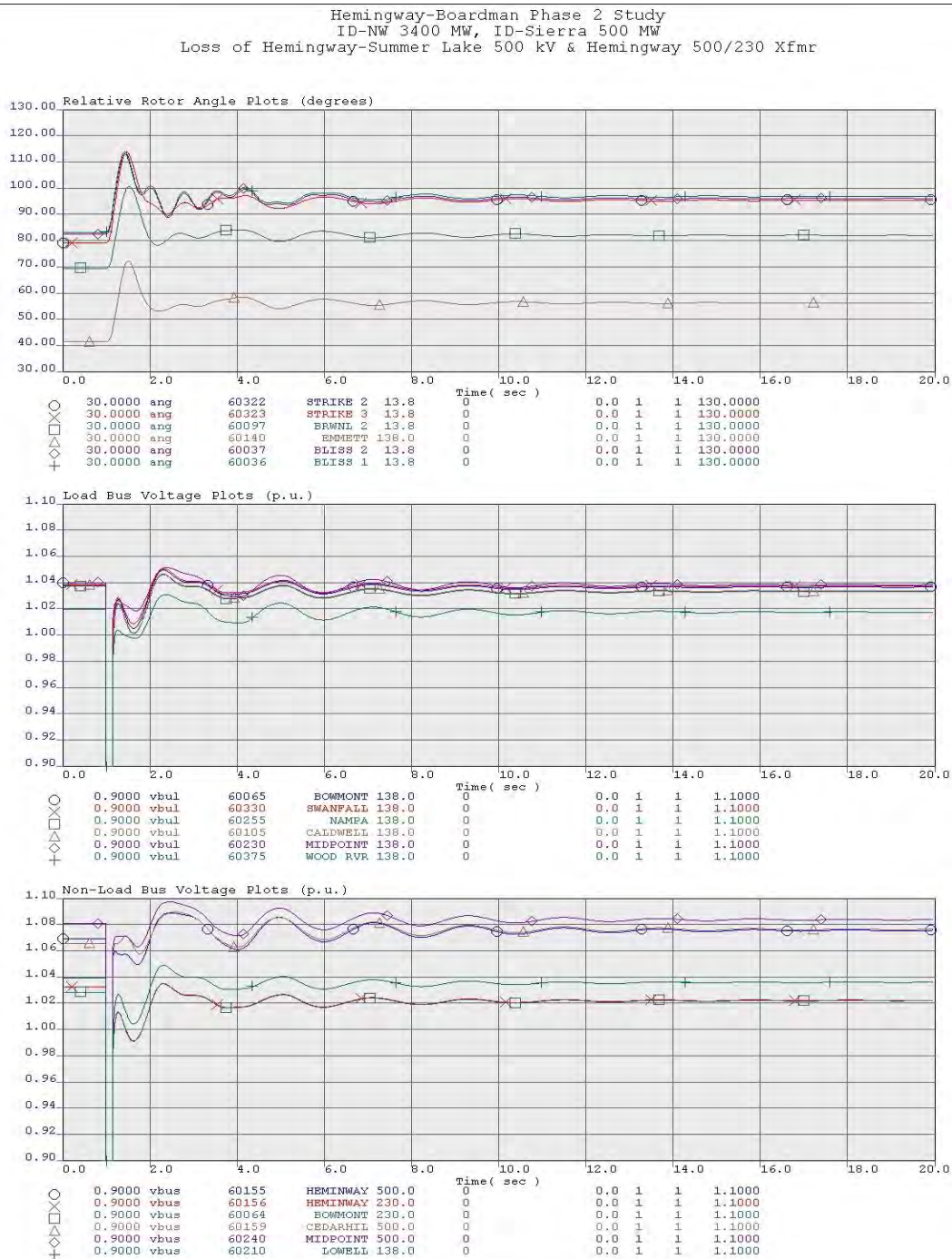
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Figure I9: Breaker Failure Loss of Hemingway-Boardman 500 kV & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots



Loss of Hemingway-Summer Lake 500 kV Line and
Hemingway 500/230 kV Transformer
SLG Fault W/ Delayed Clearing 3/10 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

Figure I10: Breaker Failure Loss of Hemingway-Summer Lake 500 kV & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

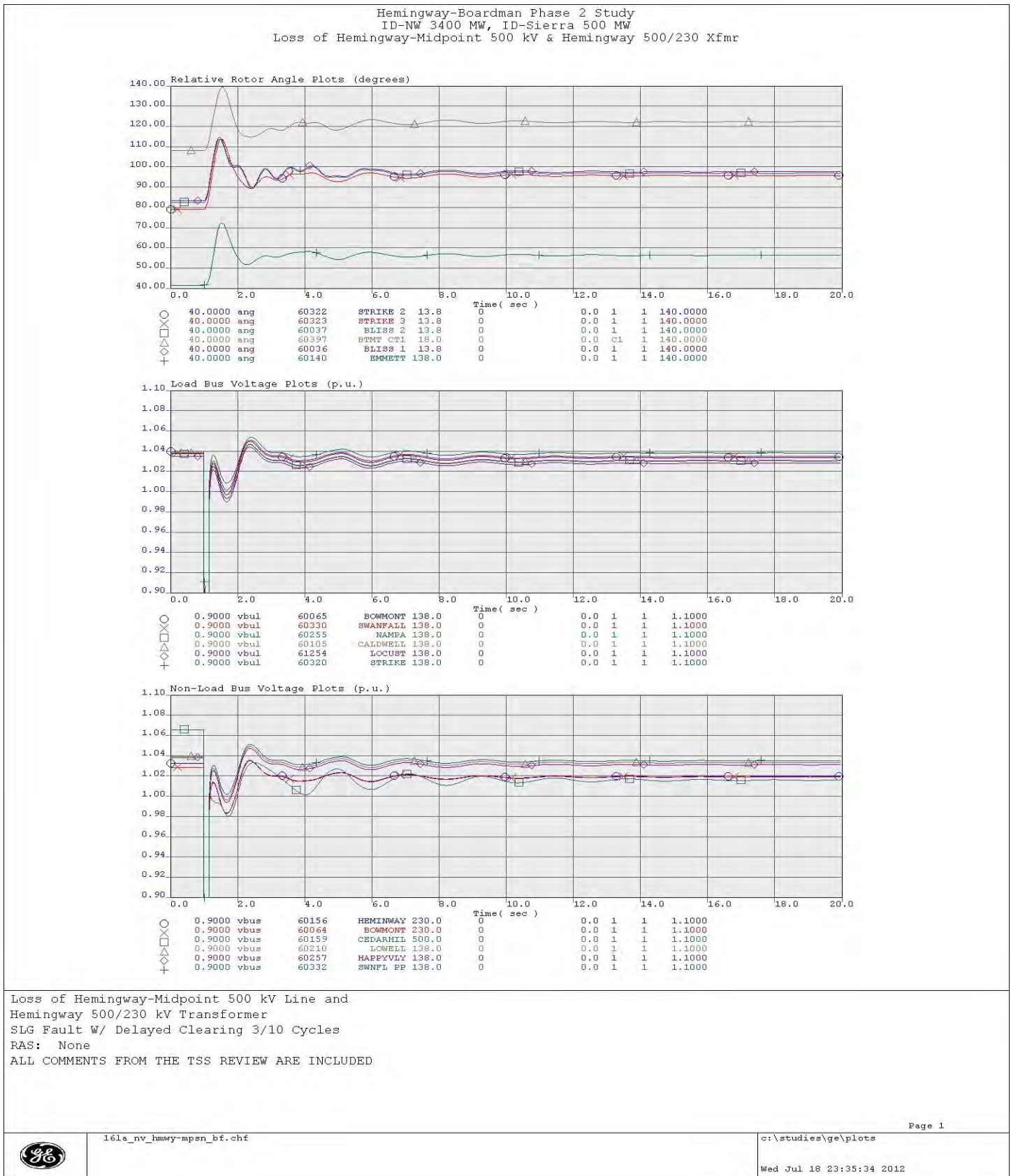


Figure I11: Breaker Failure Loss of Hemingway-Midpoint 500 kV & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

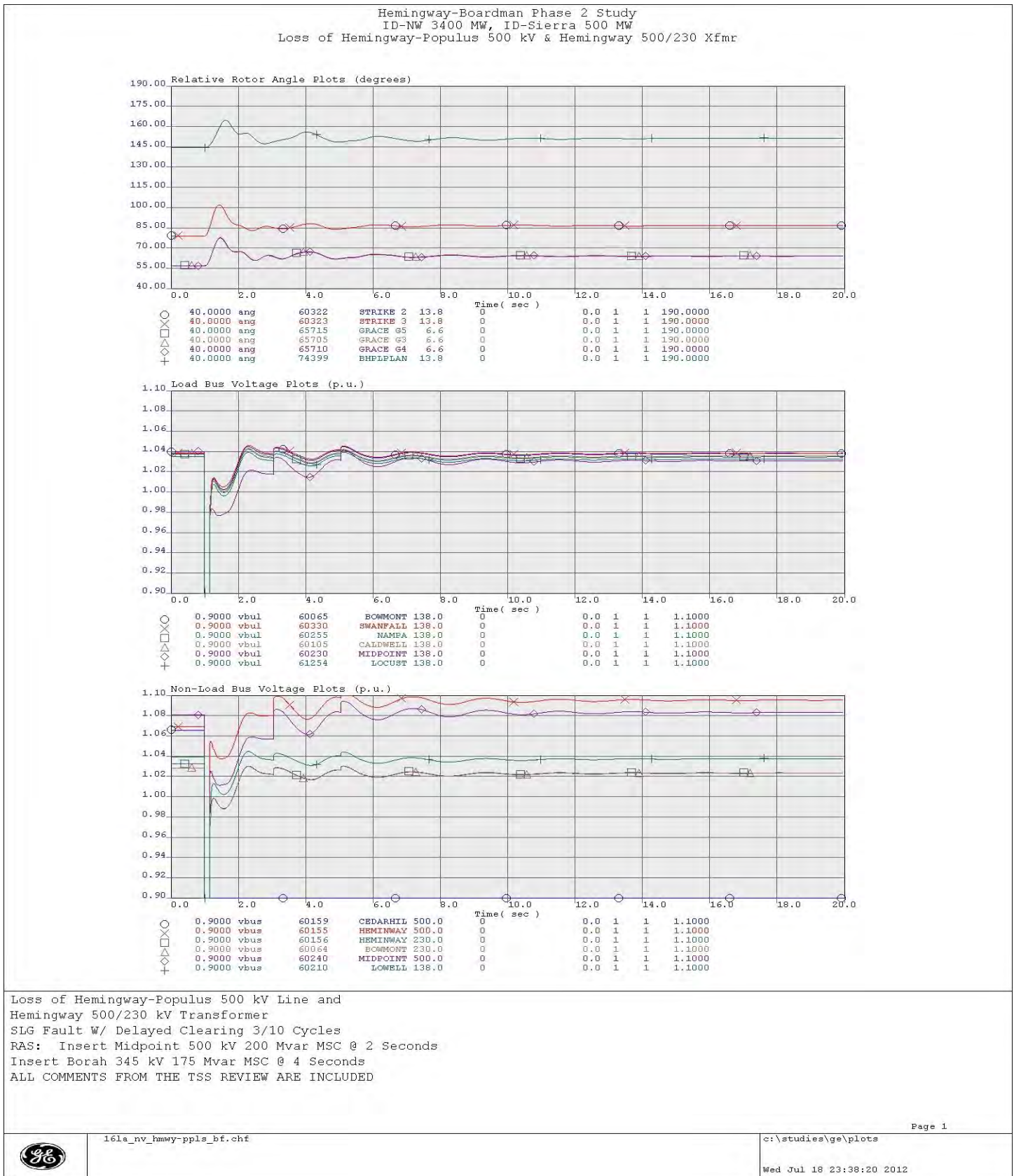
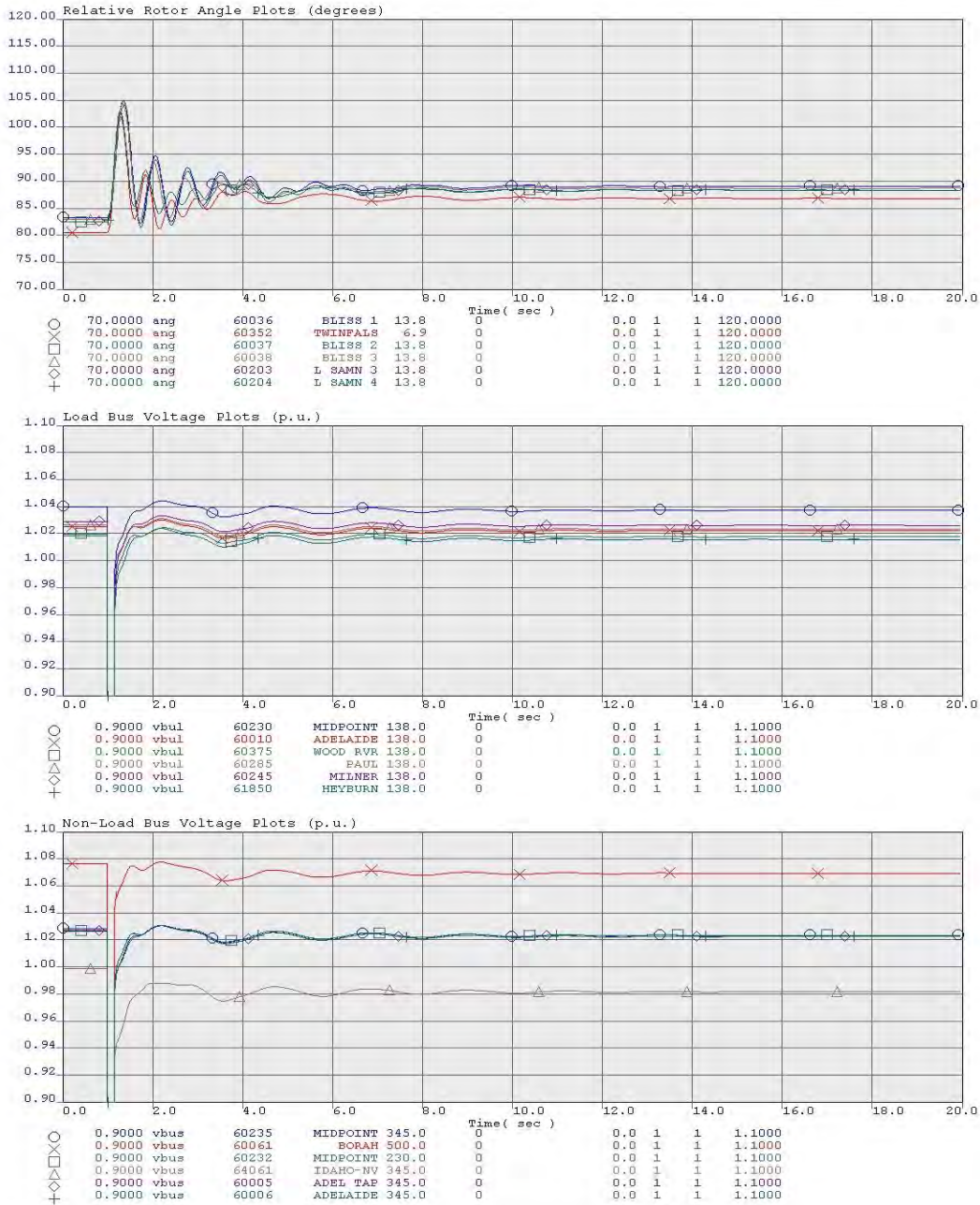


Figure I12: Breaker Failure Loss of Hemingway-Populus 500 kV & Hemingway 500/230 Xfmr (Angle & Voltage Plots)

Appendix I – 16la1sa_3400idnw_nv Base Case Transient Stability Plots

Hemingway-Boardman Phase 2 Study
ID-NW 3400 MW, ID-Sierra 500 MW
Breaker Failure Loss of Midpoint 500 kV Bus



Loss of Midpoint-Hemingway 500 kV Line and
Midpoint 500/345 kV Transformer
Open-ends Midpoint-Borah 500 kV Line (Tripped @ 12 Cycles)
SLG fault @ MPSN 500 kV w/ Delayed Clearing in 3/10 Cycles
RAS: None
ALL COMMENTS FROM THE TSS REVIEW ARE INCLUDED

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Figure I13: Breaker Failure Midpoint 500 kV Bus (Angle & Voltage Plots)

Appendix I - 16la1sa_3400idnw_nv Base Case Transient Stability Results

Fault	Disturbance/Outage	RAS Actions		Largest Swing Voltage Bus (% change)	Lowest Swing Voltage Bus (absolute value)	Largest Swing Voltage Load Bus (% change)	Lowest Load Bus Frequency (Hz)	Comments
		Cycles	Remedial Action					
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Grassland 500 kV	305 305	LaGrande 52 Mvar 230 kV MSC Peterson 31.7 Mvar 230 kV MSC	Wjohn Dy 138 -8.5%	Humboldt1 50 0.888	Wjohn Dy 138 -8.5%	Arapasub 115 59.926	Stable & Damped
N-1 3 Cy 3PH Hemingway 500 kV	Hemingway-Summer Lake 500 kV		None	Wjohn Dy 138 -9.0%	Humboldt1 50 0.893	Wjohn Dy 138 -9.0%	Arapasub 115 59.927	Stable & Damped
N-1 3 Cy 3PH Midpoint 500 kV	Hemingway-Midpoint 500 kV		None	Cedarhil 500 -5.8%	Big Sprg 120 0.908	Bowmont 138 -5.5%	Hipln_g 0.6 59.920	Stable & Damped
N-1 3 Cy 3PH Populus 500 kV	Hemingway-Populus 500 kV	123 243	Midpoint 500 kV 200 Mvar MSC Borah 345 kV 175 Mvar MSC	Ft Crk1 34.5 -6.8%	Humboldt1 50 0.901	Amps 69 -5.5%	Hipln_g 0.6 59.845	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Grassland 500 kV Hemingway 500/230 kV Xfmr	305 305	LaGrande 52 Mvar 230 kV MSC Peterson 31.7 Mvar 230 kV MSC	Wjohn Dy 138 -12.2%	Humboldt1 50 0.885	Wjohn Dy 138 -12.2%	Lgpr St1 13.8 59.893	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Summer Lake 500 kV Hemingway 500/230 kV Xfmr		None	Wjohn Dy 138 -11.4%	Humboldt1 50 0.892	Wjohn Dy 138 -11.4%	Helscyn1 14.4 59.897	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Midpoint 500 kV Hemingway 500/230 kV Xfmr		None	Wjohn Dy 138 -12.7%	Humboldt1 50 0.884	Wjohn Dy 138 -12.7%	Lgpr St1 13.8 59.892	Stable & Damped
Breaker Failure 3/10 Cy SLG Hemingway 500 kV	Hemingway-Populus 500 kV Hemingway 500/230 kV Xfmr	123 243	Midpoint 500 kV 200 Mvar MSC Borah 345 kV 175 Mvar MSC	Wjohn Dy 138 -7.3%	Humboldt1 50 0.901	Wjohn Dy 138 -7.3%	Rd_Nixon 20 59.886	Stable & Damped
Breaker Failure 3/10 Cy SLG Midpoint 500 kV	Midpoint-Hemingway 500 kV Midpoint 500/345 kV Xfmr Open Midpoint-Borah 500kV		None	Freeport 120 -5.6%	Humboldt1 50 0.888	Freeport 120 -5.6%	Bliss 3 13.8 59.913	Stable & Damped

Appendix I - 16la1sa_3400idnw_nv Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt HOT SPR_500.0 (40553) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt DWORSHAK_500.0 (40369) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt HOT SPR_500.0 (40553) #s
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt DWORSHAK_500.0 (40369) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1

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Contingency	Actions Taken in the Contingency
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_ 500.0 (40957) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_ 500.0 (40941)
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_ 230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOK TAP_ 500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOKING_ 500.0 (41007)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_ 20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_ 4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_ 13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_ 20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_ 4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_ 13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_ 115.0 (42806) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_ 500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_ 500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_ 230.0 (47814) TO 109.8 MVR
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO CEN FERY_ 500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_ 500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_ 500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_ 500.0 (40045) TO ALLSTN E_ 230.0 (40043) CKT 2

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Contingency	Actions Taken in the Contingency
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1

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Contingency	Actions Taken in the Contingency
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BYPASS SeriesCap MIDPOINT_500.0 (60240) TO MIDHEM11_500.0 (61988) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_24.0 (43047) #1
Bus: Alvey 500 kV	OPEN Bus ALVEY_500.0 (40051)
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV	OPEN Bus KEELER_500.0 (40601)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_34.5 (47902)

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Contingency	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-1: Allston-Keeler 500 kV	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPAVINE_500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO DIXONVLE_500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO CELILO1_500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO KNIGHT_500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV + RAS	OPEN Line BRADY_230.0 (60073) TO ANTLOPE_230.0 (65075) CKT 1
N-1: Brady-Antelope 230 kV + RAS	OPEN Bus MLCK PHA_230.0 (62355)
N-1: Brady-Antelope 230 kV + RAS	OPEN Shunt AMPS_69.0 (65026) #1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_500.0 (62013)
N-1: Broadview-Garrison #1 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_230.0 (60095) TO ONTARIO_230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-1: Cal Sub 120 kV Phase Shifter	OPEN Transformer CAL SUB_120.0 (64025) TO CAL S PS_120.0 (64023) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO OLINDA_500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVR_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVR_500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVR_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1

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Contingency	Actions Taken in the Contingency
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSEH1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESH1_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 2
N-1: Harry Allen 345 kV Phase Shifter	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Hatwai 500/230 kV Xfmr	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSBYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELLSBYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSBYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACJWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Hilltop 230 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 0 MVR
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1

Appendix I - 16la1sa_3400idnw_nv Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACIWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Pinto-Four Corner 345 kV	OPEN Shunt PINTO_138.0 (66230) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO_2_13.8 (66228) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO_3_13.8 (66229) #1
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine POPULUS_500.0 (67794) TO CEDARHIL_500.0 (60159) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine CEDARHIL_500.0 (60159) TO HEMINWAY_500.0 (60155) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt GONDER1_230.0 (64205) #v
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2

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Contingency	Actions Taken in the Contingency
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	CLOSE Shunt GARRISON_500.0 (40459) #r
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND B N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR1EAST_500.0 (40451)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN1_500.0 (62013)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR2EAST_500.0 (40453)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN2_500.0 (62012)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT2_13.8 (62333) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT1_13.8 (62332) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS TAFT_500.0 (41057) TO -186 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS BZ EGALL_50.0 (62348) TO 20.4 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS JACKRABB_50.0 (62349) TO 19.7 MVR
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1

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Contingency	Actions Taken in the Contingency
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PINTO_138.0 (66230) TO 64 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS YORKCANY_115.0 (12091) TO 15 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS DURANGO_115.0 (79023) TO 40 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PEIGAN 4_240.0 (54165) TO 0 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Line HELLSCTY_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Bus IMNAHA_230.0 (60278)
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)

Appendix I - 16la1sa_3400idnw_nv Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPA VINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Raver & Raver-Covington4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covington4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covington4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covington4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_500.0 (40096)

Appendix I - 16la1sa_3400idnw_nv Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine BELL_SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN Bus BELL_SC_500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4

Appendix J

16la1sa_3400idnw_N_Path24 Base Case (PG&E-Sierra, Path 24)

Appendix J – 16la1sa_3400idnw_Path24 Base Case Post-Transient Contingency Results

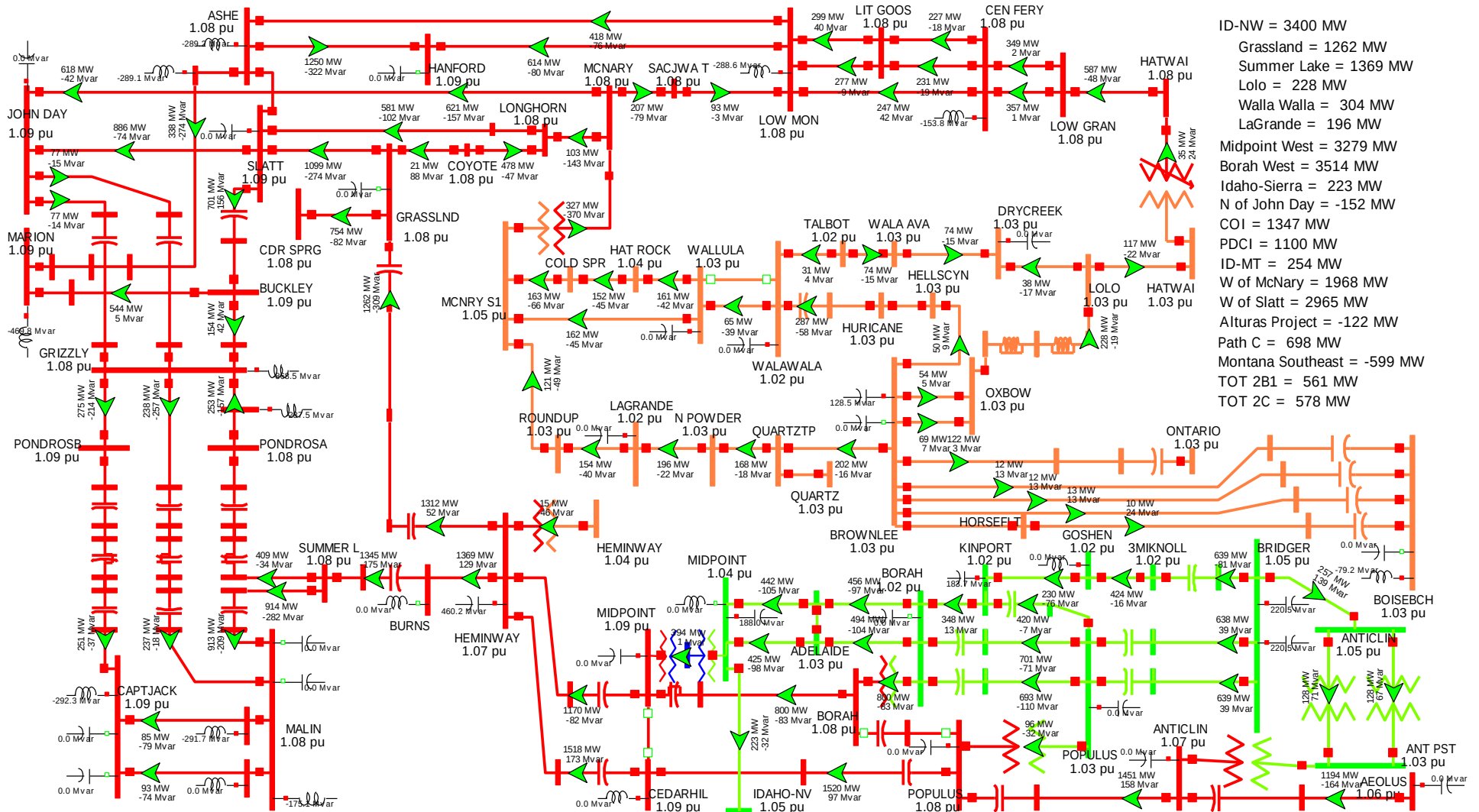


Figure J1: 16la1sa_3400idnw_Path24 Base Case **Pre-Contingency**

Appendix J – 16la1sa_3400idnw_Path24 Base Case Post-Transient Contingency Results

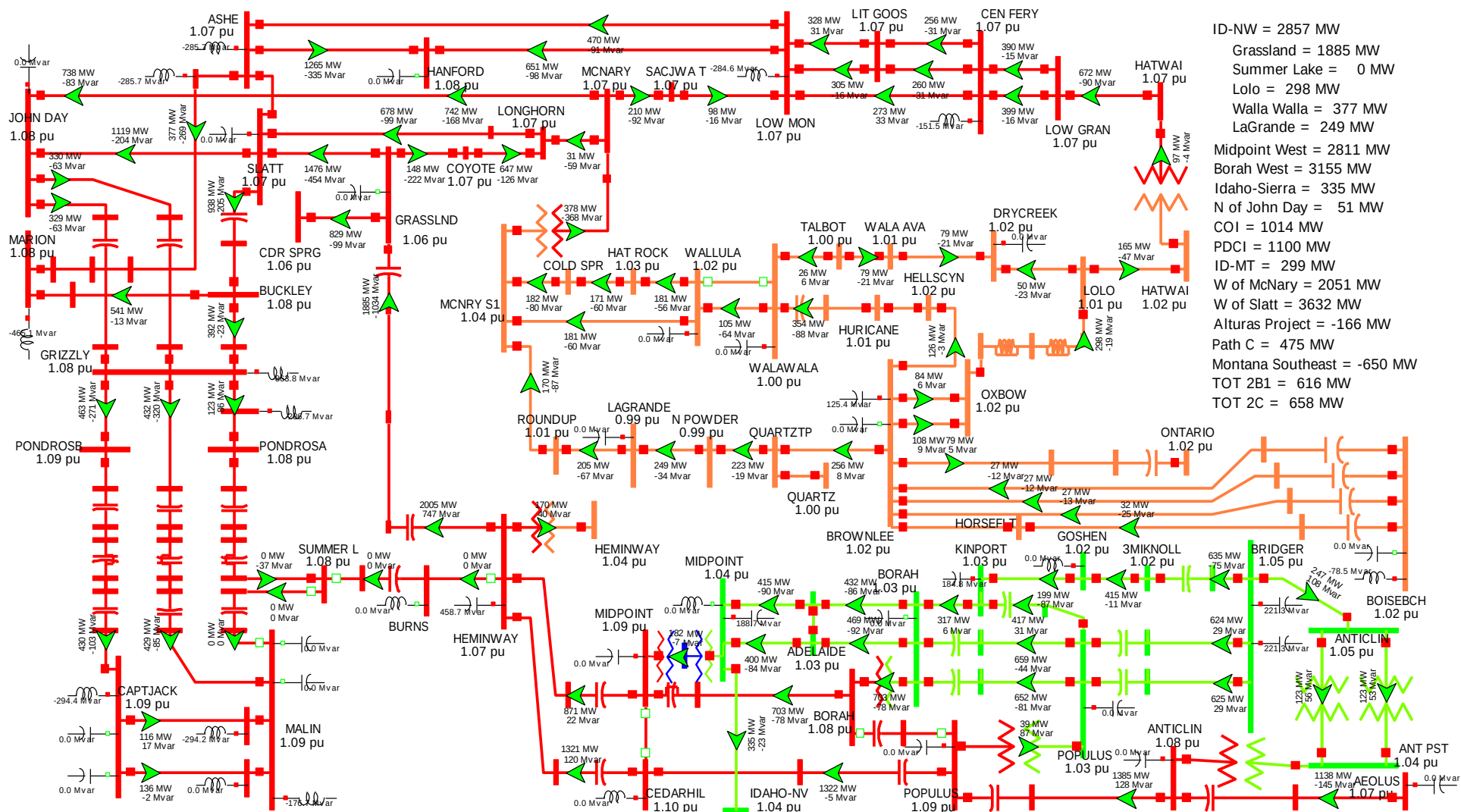


Figure J2: 16la1sa 3400idnw Path24 Base Case after the contingency **BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV**

Appendix J – 16la1sa_3400idnw_Path24 Base Case Post-Transient Contingency Results

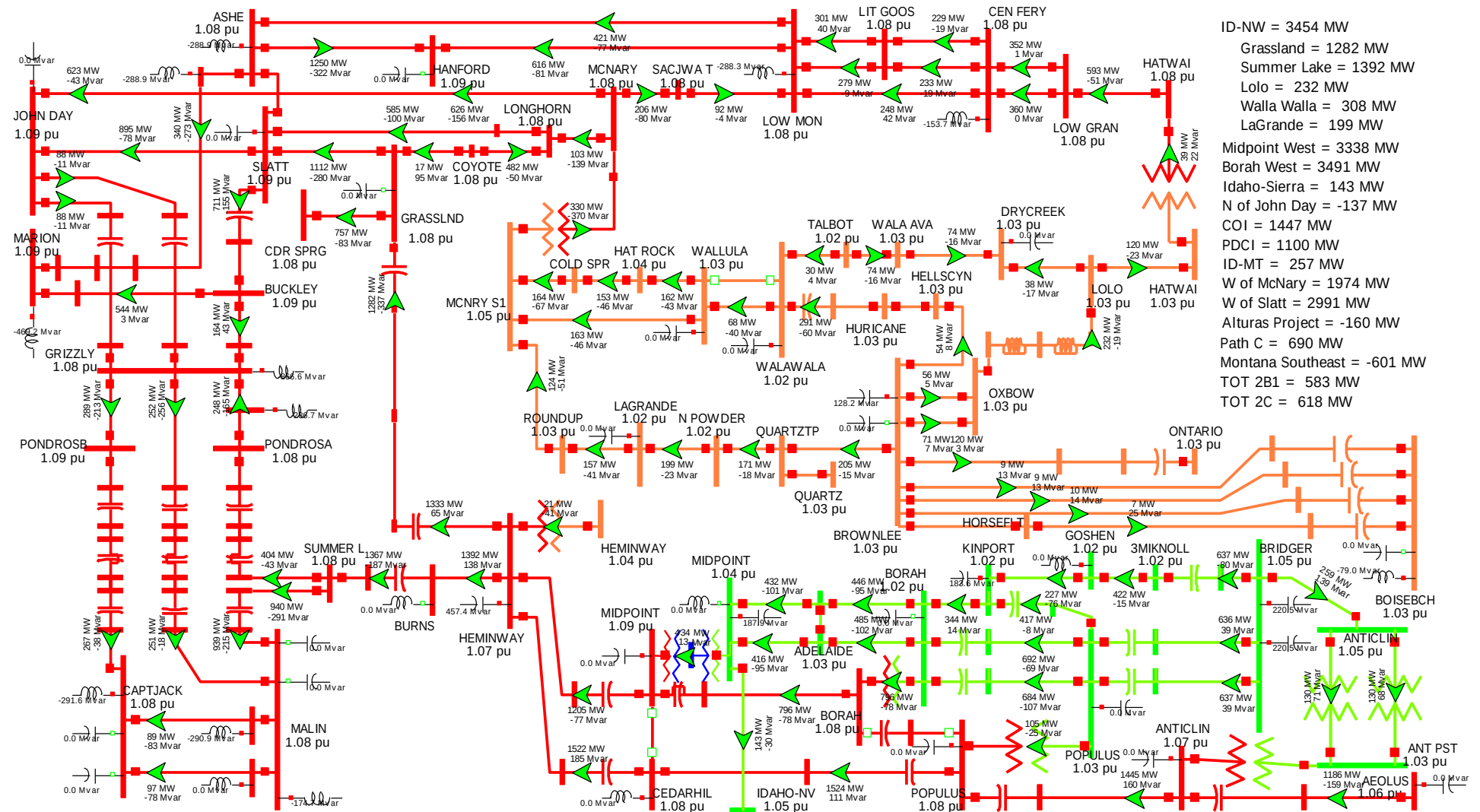
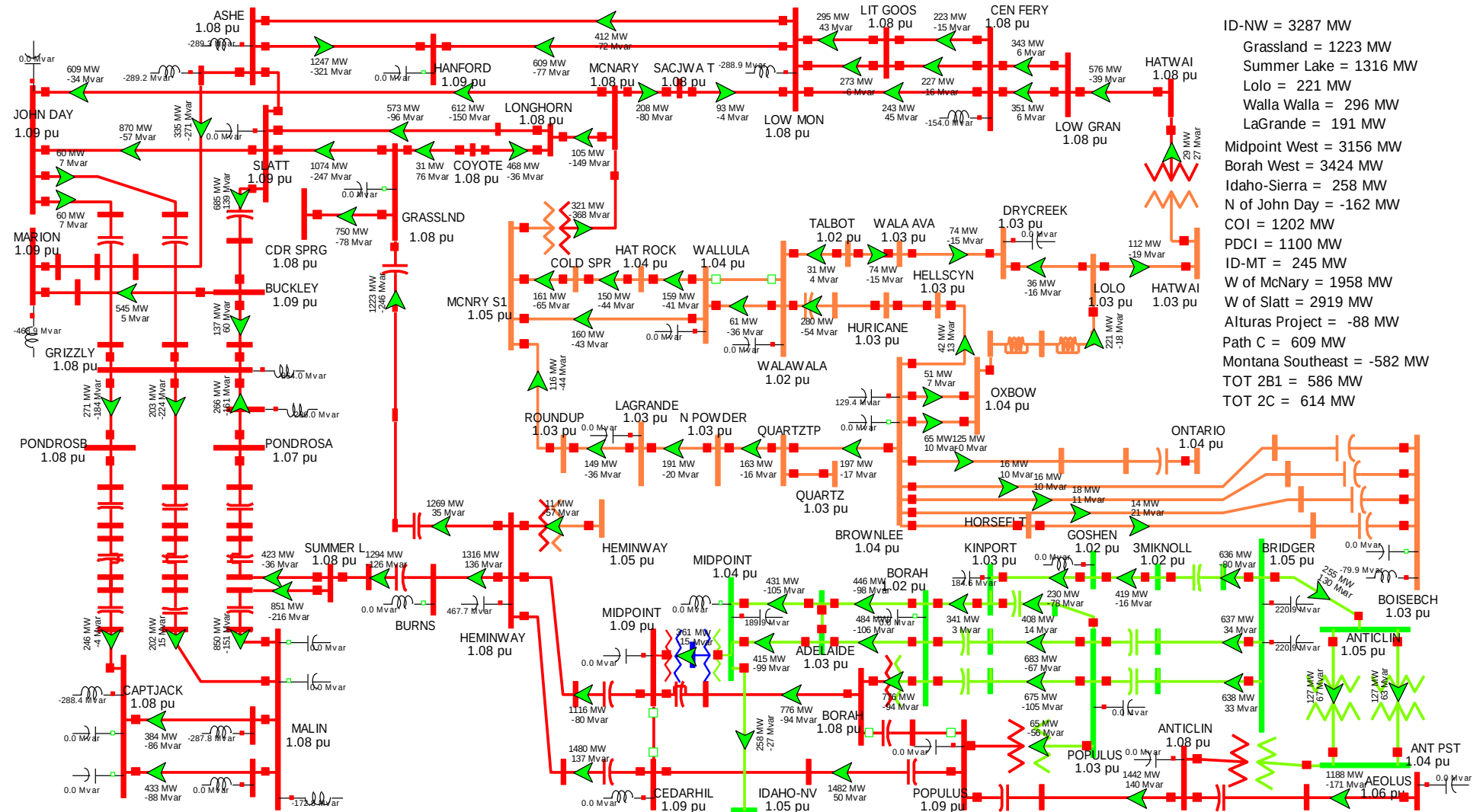


Figure J3: 16la1sa_3400idnw_Path24 Base Case after the contingency N-1: Robinson-Harry Allen 500 kv

Appendix J – 16la1sa_3400idnw_Path24 Base Case Post-Transient Contingency Results



ID-NW = 3287 MW
 Grassland = 1223 MW
 Summer Lake = 1316 MW
 Lolo = 221 MW
 Walla Walla = 296 MW
 LaGrande = 191 MW
 Midpoint West = 3156 MW
 Borah West = 3424 MW
 Idaho-Sierra = 258 MW
 N of John Day = -162 MW
 COI = 1202 MW
 PDCI = 1100 MW
 ID-MT = 245 MW
 W of McNary = 1958 MW
 W of Slatt = 2919 MW
 Alturas Project = -88 MW
 Path C = 609 MW
 Montana Southeast = -582 MW
 TOT 2B1 = 586 MW
 TOT 2C = 614 MW

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.0	150.0	100.7%	180.0	83.9%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.1	150.0	101.4%	180.0	84.5%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	154.5	150.0	103.0%	180.0	85.9%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.6	150.0	100.4%	180.0	83.6%
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.5	150.0	102.3%	180.0	85.3%
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.3%	180.0	83.6%
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.3	150.0	100.2%	180.0	83.5%
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.1	150.0	100.1%	180.0	83.4%
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	No Violations							
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	No Violations							
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.0	150.0	100.7%	180.0	83.9%
BF 4542 Paul-Napavine 500 kV & Center G1	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.8	150.0	100.5%	180.0	83.8%
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	193.9	267.0	254.0	105.1%	307.0	87.0%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4708 Hatwai 500 kV Bus	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.5	150.0	100.4%	180.0	83.6%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.1	150.0	100.7%	180.0	83.9%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.7	150.0	100.5%	180.0	83.7%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.5	150.0	101.0%	180.0	84.2%
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	174.4	150.0	116.3%	180.0	96.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	52.0	50.0	103.9%	55.0	94.5%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	324.5	300.0	108.2%	370.0	87.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	324.5	300.0	108.2%	370.0	87.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	321.4	315.0	102.0%	394.0	81.6%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	320.8	315.0	101.8%	394.0	81.4%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	428.7	415.7	103.1%	483.5	88.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1408.3	2211.8	2000.1	110.6%	3000.0	73.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1428.1	2187.8	2000.1	109.4%	3000.0	72.9%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	173.8	150.0	115.9%	180.0	96.6%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	52.5	50.0	105.1%	55.0	95.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	322.6	300.0	107.5%	370.0	87.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	322.6	300.0	107.5%	370.0	87.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	320.1	315.0	101.6%	394.0	81.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	319.5	315.0	101.4%	394.0	81.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	427.6	415.7	102.9%	483.5	88.4%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1408.3	2207.0	2000.1	110.3%	3000.0	73.6%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1428.1	2177.7	2000.1	108.9%	3000.0	72.6%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.9	150.0	101.3%	180.0	84.4%
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.8	150.0	102.6%	180.0	85.5%
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.7	150.0	100.4%	180.0	83.7%
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.2%	180.0	83.5%
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.3	150.0	100.2%	180.0	83.5%
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.2	150.0	100.1%	180.0	83.4%
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	FRANKLIN (40443) -> FRANKL E (40440) CKT 1 at FRANKLIN	Branch MVA	193.9	266.7	254.0	105.0%	307.0	86.9%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.3	150.0	100.2%	180.0	83.5%
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.5	150.0	100.3%	180.0	83.6%
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	170.6	150.0	113.7%	180.0	94.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	320.3	300.0	106.8%	370.0	86.6%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	320.3	300.0	106.8%	370.0	86.6%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	318.4	315.0	101.1%	394.0	80.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	317.8	315.0	100.9%	394.0	80.7%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	86.7	116.1	112.0	103.6%	146.7	79.1%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	BURNS (45029) -> BURNSUM11 (90132) CKT 1 at BURNS	Branch Amp	1500.7	2315.3	1732.1	133.7%	2338.3	99.0%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	422.8	415.7	101.7%	483.5	87.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.992	0.927				6.55%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.991	0.930				6.16%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.991	0.940				5.15%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	172.8	150.0	115.2%	180.0	96.0%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	50.8	50.0	101.7%	55.0	92.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	322.6	300.0	107.5%	370.0	87.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	322.6	300.0	107.5%	370.0	87.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	320.0	315.0	101.6%	394.0	81.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	319.4	315.0	101.4%	394.0	81.1%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	425.9	415.7	102.5%	483.5	88.1%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1408.3	2267.4	2000.1	113.4%	3000.0	75.6%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1428.1	2240.5	2000.1	112.0%	3000.0	74.7%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	171.9	150.0	114.6%	180.0	95.5%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	50.1	50.0	100.1%	55.0	91.0%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	311.4	300.0	103.8%	370.0	84.2%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	311.4	300.0	103.8%	370.0	84.2%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	424.7	415.7	102.2%	483.5	87.9%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	CEDARHIL (60159) -> CEDHEM21 (61992) CKT 2 at CEDHEM21	Branch Amp	1624.5	2393.0	2309.4	103.6%	3464.1	69.1%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	POPULUS (67794) -> POPCED21 (61963) CKT 2 at POPULUS	Branch Amp	1631.1	2368.4	2309.4	102.6%	3464.1	68.4%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	157.5	150.0	105.0%	180.0	87.5%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	319.5	300.0	106.5%	370.0	86.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	319.5	300.0	106.5%	370.0	86.3%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	316.7	315.0	100.6%	394.0	80.4%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	316.2	315.0	100.4%	394.0	80.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1278.3	2368.6	1732.1	136.7%	2338.3	101.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1163.5	1867.7	1701.6	109.8%	2108.6	88.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1147.8	1849.5	1650.1	112.1%	2227.4	83.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1153.7	1862.0	1492.7	124.7%	2264.2	82.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PTRSNFUR (62386)	% Δ Volts	0.992	0.940				5.24%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.991	0.941				5.05%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	167.4	150.0	111.6%	180.0	93.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	336.6	300.0	112.2%	370.0	91.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	336.6	300.0	112.2%	370.0	91.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	329.7	315.0	104.7%	394.0	83.7%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	328.9	315.0	104.4%	394.0	83.5%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	86.7	117.8	112.0	105.2%	146.7	80.3%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	416.0	415.7	100.1%	483.5	86.1%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1163.5	1784.5	1701.6	104.9%	2108.6	84.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1147.8	1769.3	1650.1	107.2%	2227.4	79.4%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1153.7	1781.6	1492.7	119.4%	2264.2	78.7%
BF Lolo 230kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.3	150.0	100.9%	180.0	84.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	171.0	150.0	114.0%	180.0	95.0%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	50.3	50.0	100.6%	55.0	91.5%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	320.1	300.0	106.7%	370.0	86.5%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	320.1	300.0	106.7%	370.0	86.5%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	318.2	315.0	101.0%	394.0	80.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	317.7	315.0	100.8%	394.0	80.6%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	86.7	114.8	112.0	102.5%	146.7	78.2%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1500.7	2263.0	1732.1	130.7%	2338.3	96.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	423.6	415.7	101.9%	483.5	87.6%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFUR (62386)	% Δ Volts	0.992	0.930				6.25%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.991	0.932				5.95%
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.3	150.0	100.9%	180.0	84.1%
Bus: Alvey 500 kV	No Violations							
Bus: Bell BPA 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.7	150.0	101.8%	180.0	84.8%
Bus: Buckley 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.6	150.0	100.4%	180.0	83.7%
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	174.4	150.0	116.2%	180.0	96.9%
Bus: Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	52.4	50.0	104.9%	55.0	95.4%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	324.6	300.0	108.2%	370.0	87.7%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	324.6	300.0	108.2%	370.0	87.7%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	321.5	315.0	102.1%	394.0	81.6%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	320.8	315.0	101.9%	394.0	81.4%
Bus: Summer Lake 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	428.6	415.7	103.1%	483.5	88.6%
Bus: Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1408.3	2210.7	2000.1	110.5%	3000.0	73.7%
Bus: Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1428.1	2186.8	2000.1	109.3%	3000.0	72.9%
N-1: Allston-Keeler 500 kV	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.3%	180.0	83.6%
N-1: Bell-Taft 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.6	150.0	101.8%	180.0	84.8%
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.1	150.0	100.7%	180.0	83.9%
N-1: Broadview-Garrison #1 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.2	150.0	100.2%	180.0	83.5%
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.5	150.0	100.3%	180.0	83.6%
N-1: Cal Sub 120 kV Phase Shifter	No Violations							
N-1: Captain Jack-Olinda 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.9	150.0	102.6%	180.0	85.5%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.3%	180.0	83.6%
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	No Violations							
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.6	150.0	100.4%	180.0	83.6%
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.8	150.0	100.5%	180.0	83.8%
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.3%	180.0	83.6%
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.5	150.0	100.3%	180.0	83.6%
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	347.8	315.0	110.4%	394.0	88.3%
N-1: Harry Allen 345 kV Phase Shifter	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	346.6	315.0	110.0%	394.0	88.0%
N-1: Harry Allen 345 kV Phase Shifter	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.4	150.0	102.3%	180.0	85.2%
N-1: Hatwai 500/230 kV Xfmr	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.7	150.0	100.5%	180.0	83.7%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	No Violations							
N-1: Hells Canyon-Walla Walla 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.2	150.0	101.5%	180.0	84.6%
N-1: Hemingway-Grassland 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	170.3	150.0	113.5%	180.0	94.6%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	318.8	300.0	106.3%	370.0	86.2%
N-1: Hemingway-Grassland 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	318.8	300.0	106.3%	370.0	86.2%
N-1: Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	317.3	315.0	100.7%	394.0	80.5%
N-1: Hemingway-Grassland 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	316.7	315.0	100.6%	394.0	80.4%
N-1: Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	86.7	117.2	112.0	104.6%	146.7	79.9%
N-1: Hemingway-Grassland 500 kV	BURNS (45029) -> BURSUM11 (90132) CKT 1 at BURNS	Branch Amp	1500.7	2252.9	1732.1	130.1%	2338.3	96.4%
N-1: Hemingway-Grassland 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	422.3	415.7	101.6%	483.5	87.4%
N-1: Hemingway-Summer Lake 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	173.1	150.0	115.4%	180.0	96.1%
N-1: Hemingway-Summer Lake 500 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	52.7	50.0	105.3%	55.0	95.7%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	322.4	300.0	107.5%	370.0	87.1%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	322.4	300.0	107.5%	370.0	87.1%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	319.9	315.0	101.5%	394.0	81.2%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	319.3	315.0	101.4%	394.0	81.0%
N-1: Hemingway-Summer Lake 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	426.4	415.7	102.6%	483.5	88.2%
N-1: Hemingway-Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1408.3	2215.7	2000.1	110.8%	3000.0	73.9%
N-1: Hemingway-Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1428.1	2191.8	2000.1	109.6%	3000.0	73.1%
N-1: Hill Top 345/230 Xfmr	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	178.7	150.0	119.2%	180.0	99.3%
N-1: Hill Top 345/230 Xfmr	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	436.9	415.7	105.1%	483.5	90.4%
N-1: Horse Hv-McNary 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	349.2	300.0	116.4%	370.0	94.4%
N-1: Huntington-Pinto-Four Corners 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	349.2	300.0	116.4%	370.0	94.4%
N-1: Huntington-Pinto-Four Corners 345 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	154.3	150.0	102.9%	180.0	85.7%
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.1	150.0	100.1%	180.0	83.4%
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	52.2	50.0	104.5%	55.0	95.0%
N-1: LaGrande-North Powder 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.9	150.0	100.6%	180.0	83.9%
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	164.2	150.0	109.5%	180.0	91.2%
N-1: Malin-Round Mtn #1 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.8	150.0	101.9%	180.0	84.9%
N-1: Malin-Round Mtn #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.0	150.0	102.0%	180.0	85.0%
N-1: Malin-Summer Lake 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	154.5	150.0	103.0%	180.0	85.9%
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.2	150.0	100.1%	180.0	83.4%
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	167.2	150.0	111.5%	180.0	92.9%
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	306.7	300.0	102.2%	370.0	82.9%
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	306.7	300.0	102.2%	370.0	82.9%
N-1: Midpoint-Hemingway 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	416.6	415.7	100.2%	483.5	86.2%
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.3	150.0	100.9%	180.0	84.1%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	No Violations							
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	346.2	300.0	115.4%	370.0	93.6%
N-1: Pinto-Four Corner 345 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	346.2	300.0	115.4%	370.0	93.6%
N-1: Pinto-Four Corner 345 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.7	150.0	102.5%	180.0	85.4%
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Populus-Cedar Hill-Hemingway 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	156.5	150.0	104.3%	180.0	86.9%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	318.1	300.0	106.0%	370.0	86.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	318.1	300.0	106.0%	370.0	86.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	315.7	315.0	100.2%	394.0	80.1%
N-1: Populus-Cedar Hill-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	315.2	315.0	100.1%	394.0	80.0%
N-1: Populus-Cedar Hill-Hemingway 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1278.3	2200.9	1732.1	127.1%	2338.3	94.1%
N-1: Populus-Cedar Hill-Hemingway 500 kV	BORPOP11 (61970) -> BORAH (60060) CKT 1 at BORAH	Branch Amp	1163.5	1869.7	1701.6	109.9%	2108.6	88.7%
N-1: Populus-Cedar Hill-Hemingway 500 kV	BORPOP21 (61969) -> BORAH (60060) CKT 2 at BORAH	Branch Amp	1147.8	1851.4	1650.1	112.2%	2227.4	83.1%
N-1: Populus-Cedar Hill-Hemingway 500 kV	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1153.7	1863.9	1492.7	124.9%	2264.2	82.3%
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.6	347.6	315.0	110.3%	394.0	88.2%
N-1: Red Butte-Harry Allen 345 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.6	346.4	315.0	110.0%	394.0	87.9%
N-1: Red Butte-Harry Allen 345 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.5	150.0	102.4%	180.0	85.3%
N-1: Robinson-Harry Allen 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	178.5	150.0	119.0%	180.0	99.2%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	304.4	300.0	101.5%	370.0	82.3%
N-1: Robinson-Harry Allen 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	304.4	300.0	101.5%	370.0	82.3%
N-1: Robinson-Harry Allen 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	438.4	415.7	105.5%	483.5	90.7%
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.1	150.0	101.4%	180.0	84.5%
N-1: Roundup-Lagrande 230 kV	HINES (61825) -> HINES (61826) CKT 1 at HINES	Branch MVA	42.8	50.3	50.0	100.5%	55.0	91.4%
N-1: Roundup-Lagrande 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.5	150.0	100.4%	180.0	83.6%
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.7	150.0	100.4%	180.0	83.7%
N-1: Sigurd-Glen Canyon 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	307.6	300.0	102.5%	370.0	83.1%
N-1: Sigurd-Glen Canyon 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	307.6	300.0	102.5%	370.0	83.1%
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	No Violations							
N-1: Table Mtn-Vaca Dixon 500 kV	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.4	150.0	100.9%	180.0	84.1%
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.9	150.0	100.6%	180.0	83.8%
N-2: Ashe-Slatt & McNary-John Day 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.0	150.0	100.0%	180.0	83.3%
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	154.6	150.0	103.1%	180.0	85.9%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.3	150.0	100.2%	180.0	83.5%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.3%	180.0	83.6%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	BRIDGER (60085) -> BRI3MI11 (61999) CKT 1 at BRIDGER	Branch Amp	1066.1	1761.0	1600.0	110.1%	1840.0	95.7%
N-2: Bridger-Populus #1 & #2 345 kV	BRI3MI11 (61999) -> 3MIKNOLL (60084) CKT 1 at 3MIKNOLL	Branch Amp	1066.1	1734.9	1650.1	105.1%	2227.4	77.9%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> POPBRI11 (61968) CKT 1 at BRIDGER	Branch Amp	1019.3	1809.4	1492.7	121.2%	1849.2	97.8%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	POPBRI11 (61968) -> POPULUS (67790) CKT 1 at POPULUS	Branch Amp	1007.9	1793.0	1650.1	108.7%	2227.6	80.5%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.2	150.0	101.5%	180.0	84.6%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	86.7	122.5	112.0	109.4%	146.7	83.5%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	ABSAROKA (62201)	% Δ Volts	0.955	0.876				8.27%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLUMBUS (62015)	% Δ Volts	0.978	0.902				7.77%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLBUSAT (62224)	% Δ Volts	0.975	0.900				7.69%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	BGTMBERA (62250)	% Δ Volts	1.009	0.935				7.33%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLRPLJE (62220)	% Δ Volts	1.000	0.929				7.10%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	DUCKCR-R (62325)	% Δ Volts	1.015	0.944				7.00%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	WILSALL (62019)	% Δ Volts	1.036	0.965				6.85%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	WILSALL (62016)	% Δ Volts	1.034	0.967				6.48%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	COLRPLJE (62205)	% Δ Volts	1.000	0.936				6.40%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	CLYDE P (62108)	% Δ Volts	1.026	0.965				5.95%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	THRRIVER (62331)	% Δ Volts	1.033	0.979				5.23%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	KINGHILL (62170)	% Δ Volts	1.045	0.991				5.17%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	STANFRDM (62231)	% Δ Volts	1.033	0.980				5.13%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	BENCHLND (62230)	% Δ Volts	1.029	0.977				5.05%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	UTICA (62238)	% Δ Volts	1.029	0.977				5.05%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	MARTNSDA (62235)	% Δ Volts	1.032	0.980				5.04%
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.8	150.0	101.8%	180.0	84.9%
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	315.6	300.0	105.2%	370.0	85.3%
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	315.6	300.0	105.2%	370.0	85.3%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	357.6	300.0	119.2%	370.0	96.7%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	357.6	300.0	119.2%	370.0	96.7%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO	Branch MVA	290.6	364.3	315.0	115.7%	394.0	92.5%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO	Branch MVA	290.6	362.8	315.0	115.2%	394.0	92.1%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	286.5	364.7	357.0	102.2%	415.9	87.7%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	286.5	364.7	357.0	102.2%	415.9	87.7%
N-2: Double Palo Verde	CR_NEST1 (54458) -> CBK 500 (50791) CKT 1 at CR_NEST1	Branch Amp	430.1	1107.8	1085.4	102.1%	1199.7	92.3%
N-2: Double Palo Verde	CHOLLA (14000) -> CHOSAG11 (14014) CKT 1 at CHOSAG11	Branch Amp	961.1	1054.8	1026.0	102.8%	1538.1	68.6%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	154.5	150.0	103.0%	180.0	85.8%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	PLACIDLK (62344)	% Δ Volts	1.026	0.962				6.24%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	DIXON MV (40348)	% Δ Volts	1.026	0.969				5.56%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	RATTLE S (40867)	% Δ Volts	1.025	0.970				5.37%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	DIAMNDMT (62295)	% Δ Volts	1.022	0.968				5.28%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	SUPERRMT (62296)	% Δ Volts	1.022	0.968				5.28%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	TARKIO-R (62294)	% Δ Volts	1.025	0.971				5.27%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	ST REGIS (62297)	% Δ Volts	1.020	0.967				5.20%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	ALBERTON (62293)	% Δ Volts	1.029	0.976				5.15%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HUSON-R (62300)	% Δ Volts	1.032	0.980				5.04%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HAMLTNMT (62074)	% Δ Volts	1.014	0.963				5.03%
N-2: Garrison-Taft #1 & #2 500 kV + RAS	HAUGEN (62298)	% Δ Volts	1.018	0.967				5.01%
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.5	150.0	101.6%	180.0	84.7%
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.3	150.0	102.2%	180.0	85.2%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	No Violations							
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	159.4	150.0	106.3%	180.0	88.5%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.5	150.0	100.3%	180.0	83.6%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	227.1	268.4	252.0	106.5%	271.1	99.0%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	TAUNTON (48425) -> SOTHELOT (48393) CKT 1 at TAUNTON	Branch Amp	225.5	266.5	266.1	100.2%	1238.4	21.5%
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.5	150.0	101.7%	180.0	84.7%
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.3	150.0	100.2%	180.0	83.5%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.3	150.0	100.2%	180.0	83.5%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	No Violations							
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.1	150.0	100.7%	180.0	83.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	176.0	150.0	117.4%	180.0	97.8%
N-2: Malin-Round Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	302.3	300.0	100.8%	370.0	81.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	302.3	300.0	100.8%	370.0	81.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	426.1	415.7	102.5%	483.5	88.1%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.1	150.0	100.1%	180.0	83.4%
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.2	150.0	100.1%	180.0	83.4%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.4	150.0	100.3%	180.0	83.5%
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	167.8	150.0	111.9%	180.0	93.2%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	307.5	300.0	102.5%	370.0	83.1%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	307.5	300.0	102.5%	370.0	83.1%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	417.6	415.7	100.5%	483.5	86.4%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	177.8	150.0	118.5%	180.0	98.8%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	302.3	300.0	100.8%	370.0	81.7%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	302.3	300.0	100.8%	370.0	81.7%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	424.6	415.7	102.1%	483.5	87.8%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	227.1	256.6	252.0	101.8%	271.1	94.7%
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	150.7	150.0	100.5%	180.0	83.7%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	284.2	302.1	300.0	100.7%	370.0	81.7%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	284.2	302.1	300.0	100.7%	370.0	81.7%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	384.8	433.6	415.7	104.3%	483.5	89.7%
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.6	150.0	101.8%	180.0	84.8%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	153.5	150.0	102.3%	180.0	85.3%
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	227.1	255.5	252.0	101.4%	271.1	94.2%

Appendix J - 16la1sa_3400idnw_Path24 Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.6	150.0	101.8%	180.0	84.8%
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	152.9	150.0	101.9%	180.0	85.0%
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	BENTNAVA (48039) -> TAUNTON (48425) CKT 1 at BENTNAVA	Branch Amp	227.1	252.3	252.0	100.1%	271.1	93.1%
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	148.9	151.4	150.0	100.9%	180.0	84.1%
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 11L12 MERIDIAN-KLAM FALLS 500 KV+KFGEN2+ST	0.7	-854	0.70	-549	0.71	-1827	0.70	-399	0.70	-656	0.74	-1659	0.80	-1502	0.70	-960
BF 11L22 CAPT JACK-KLAM FALLS 500 KV+KFGEN2+ST	0.7	-854	0.70	-549	0.71	-1839	0.70	-400	0.70	-656	0.74	-1668	0.80	-1509	0.70	-960
BF 11R1 MERIDIAN-KLAM FALLS 500 KV & MERIDIAN 500/230 KV XFMR	0.7	-857	0.70	-550	0.70	-1883	0.70	-401	0.70	-660	0.73	-1709	0.80	-1555	0.70	-964
BF 11R6 MERIDIAN-DIXONVILLE 500 KV & MERIDIAN 500/230 KV XFMR	0.7	-857	0.70	-550	0.70	-1902	0.70	-401	0.70	-659	0.73	-1724	0.80	-1567	0.70	-963
BF 4003 HANFORD-VANTAGE & HANFORD CAPS	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-660	0.73	-1733	0.80	-1574	0.70	-964
BF 4019 CAPTJACK-MALIN #2 & MALIN 500/230 XFMR	0.7	-832	0.70	-551	0.70	-1921	0.70	-297	0.70	-658	0.73	-1737	0.80	-1576	0.70	-940
BF 4028 TAFT-DWORSHAK & TAFT REACTOR 500KV	0.7	-857	0.70	-550	0.70	-1859	0.70	-404	0.70	-656	0.74	-1687	0.80	-1533	0.70	-962
BF 4046 JOHN DAY-GRIZZLY #2 & GRIZZLY-MALIN #2 500 KV	0.7	-852	0.70	-548	0.70	-1878	0.70	-394	0.70	-655	0.73	-1711	0.80	-1560	0.70	-957
BF 4064 CAPTJACK-MALIN & MALIN-ROUND MTN #1 500 KV	0.7	-859	0.70	-550	0.70	-1933	0.70	-407	0.70	-660	0.73	-1751	0.80	-1590	0.70	-965
BF 4072 GRIZZLY-MALIN #2 & MALIN-ROUND MTN #2 500 KV	0.7	-851	0.70	-547	0.70	-1889	0.70	-392	0.70	-655	0.73	-1724	0.80	-1573	0.70	-955
BF 4095 LOW MON-HANFORD & HANFORD-WAUTOMA 500 KV	0.7	-857	0.70	-550	0.70	-1906	0.70	-404	0.70	-658	0.73	-1727	0.80	-1569	0.70	-963
BF 4104 ASHE-HANFORD & HANFORD-WAUTOMA 500 KV	0.7	-857	0.70	-550	0.70	-1900	0.70	-403	0.70	-659	0.73	-1728	0.80	-1572	0.70	-963
BF 4111 HOT SPRINGS-TAFT & TAFT-DWORSHAK 500 KV	0.7	-857	0.70	-550	0.70	-1864	0.70	-404	0.70	-656	0.74	-1690	0.80	-1536	0.70	-962
BF 4114 GARRISON-TAFT #1 +TAFT REACTOR 500KV	0.7	-855	0.70	-549	0.71	-1812	0.70	-403	0.70	-653	0.74	-1647	0.80	-1493	0.70	-960
BF 4119 GARRISON-TAFT #1 & TAFT-BELL 500KV + RAS	0.7	-850	0.70	-547	0.73	-1647	0.70	-400	0.70	-642	0.76	-1518	0.80	-1375	0.71	-952
BF 4131 SLATT-JOHN DAY & JOHN DAY-GRIZZLY #2 500 KV	0.7	-855	0.70	-549	0.70	-1894	0.70	-400	0.70	-657	0.73	-1728	0.80	-1574	0.70	-960
BF 4143 (OR 4134) JOHN DAY-GRIZZLY #1 & JOHN DAY CAPS 500 KV	0.7	-856	0.70	-549	0.70	-1904	0.70	-401	0.70	-658	0.73	-1726	0.80	-1569	0.70	-962
BF 4148 HOT SPRINGS-TAFT & GARRISON-TAFT #2 500 KV	0.7	-856	0.70	-549	0.71	-1845	0.70	-404	0.70	-654	0.74	-1669	0.80	-1510	0.70	-961
BF 4170 JOHN DAY-MARION & JOHN DAY CAPS 500 KV	0.7	-857	0.70	-550	0.70	-1904	0.70	-402	0.70	-658	0.73	-1727	0.80	-1570	0.70	-963
BF 4186 (OR 4582) MALIN-ROUND MTN 500 KV & MALIN 500/230 XFMR	0.7	-831	0.70	-550	0.70	-1917	0.70	-296	0.70	-657	0.73	-1741	0.80	-1583	0.70	-938
BF 4194 ROCK CK-JOHN DAY & BIG EDDY-JOHN DAY 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1732	0.80	-1574	0.70	-964
BF 4197 JOHN DAY-BIG EDDY #1 & JOHN DAY CAPS 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-660	0.73	-1735	0.80	-1575	0.70	-965
BF 4202 JOHN DAY-BIG EDDY#2 & BIG EDDY-OSTRANDER 500 KV	0.7	-858	0.70	-550	0.70	-1907	0.70	-403	0.70	-659	0.73	-1729	0.80	-1571	0.70	-964
BF 4231 MCNARY-LONGHORN 500 KV & MCNARY 500/230 KV XFMR	0.7	-858	0.70	-550	0.71	-1869	0.70	-405	0.70	-658	0.73	-1719	0.80	-1569	0.70	-964
BF 4234 MCNARY-LONGHORN & MCNARY-HERMCALP 500 KV	0.7	-855	0.70	-549	0.72	-1783	0.70	-403	0.70	-656	0.75	-1626	0.81	-1466	0.70	-961
BF 4247 LIT GOOS-LOW MON #2 & LOW MON-MCNARY 500 KV	0.7	-858	0.70	-550	0.70	-1908	0.70	-404	0.70	-659	0.73	-1730	0.80	-1572	0.70	-964
BF 4259 LIT GOOS-LOW MON #2 & LOW MON-HANFORD 500 KV	0.7	-857	0.70	-550	0.70	-1904	0.70	-404	0.70	-658	0.73	-1726	0.80	-1568	0.70	-963
BF 4268 MONROE-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1735	0.80	-1574	0.70	-964
BF 4276 ING500-CUSTERW 500 KV & CUSTERW 500/230 XFMR	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-659	0.73	-1736	0.80	-1575	0.70	-964
BF 4280 KEELER-PEARL & PEARL-MARION 500 KV	0.7	-859	0.70	-551	0.70	-1912	0.70	-406	0.70	-661	0.73	-1732	0.80	-1573	0.70	-966
BF 4280 KEELER-PEARL & PEARL-OSTRANDER 500 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1737	0.80	-1577	0.70	-965
BF 4287 PEARL-OSTRANDER 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.7	-858	0.70	-550	0.70	-1921	0.70	-404	0.70	-660	0.73	-1736	0.80	-1576	0.70	-964
BF 4293 SCHULTZ-RAVER & RAVEN COVINGTONS 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
BF 4336 CHIEF JO-SICKLER 500 KV & SICKLER 500/230 XFMR	0.7	-858	0.70	-550	0.70	-1918	0.70	-405	0.70	-659	0.73	-1735	0.80	-1574	0.70	-964
BF 4336 SICKLER-SCHULTZ 500 KV & SICKLER 500/230 XFMR	0.7	-858	0.70	-550	0.70	-1918	0.70	-405	0.70	-659	0.73	-1735	0.80	-1574	0.70	-964
BF 4377 ASHE-MARION & MARION-ALVEY 500 KV	0.7	-855	0.70	-549	0.70	-1899	0.70	-400	0.70	-657	0.73	-1724	0.80	-1568	0.70	-960
BF 4386 BUCKLEY-MARION & MARION-SANTIAM 500 KV	0.7	-857	0.70	-550	0.70	-1901	0.70	-402	0.70	-658	0.73	-1727	0.80	-1570	0.70	-963
BF 4439 BIG EDDY-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.7	-858	0.70	-550	0.70	-1907	0.70	-403	0.70	-659	0.73	-1729	0.80	-1571	0.70	-964
BF 4442 BIG EDDY-OSTRANDER 500 KV & OSTRANDER-MCLOUGHLIN 230 KV	0.7	-858	0.70	-550	0.70	-1910	0.70	-404	0.70	-659	0.73	-1730	0.80	-1572	0.70	-964
BF 4448 KNIGHT-OSTRANDER & OSTRANDER-TROUTDALE 500 KV	0.7	-857	0.70	-550	0.70	-1905	0.70	-403	0.70	-659	0.73	-1727	0.80	-1569	0.70	-963
BF 4450 KNIGHT-OSTRANDER & OSTRANDER-PEARL 500 KV	0.7	-857	0.70	-550	0.70	-1908	0.70	-403	0.70	-659	0.73	-1729	0.80	-1571	0.70	-963
BF 4502 PAUL-ALLSTON & ALLSTON-KEELER 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1573	0.70	-964
BF 4510 PEARL-MARION 500 KV & PEARL 500/230 XFMR & PEARL CAPS	0.7	-859	0.70	-551	0.70	-1912	0.70	-406	0.70	-660	0.73	-1731	0.80	-1572	0.70	-966
BF 4526 CUSTERW-MONROE & MONROE-ECHO LAKE 500 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
BF 4530 RAVEN-PAUL & PAUL-SATSOP 500 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-660	0.73	-1734	0.80	-1575	0.70	-965
BF 4540 PAUL-NAPAVINE & PAUL-SATSOP 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
BF 4542 PAUL-ALLSTON 500 KV & CENTER G2	0.7	-853	0.70	-548	0.72	-1766	0.70	-401	0.70	-654	0.75	-1600	0.81	-1441	0.70	-958
BF 4542 PAUL-NAPAVINE 500 KV & CENTER G1	0.7	-854	0.70	-548	0.72	-1778	0.70	-402	0.70	-654	0.75	-1611	0.81	-1450	0.70	-959
BF 4550 OLYMPIA-PAUL & PAUL-ALLSTON 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
BF 4554 OLYMPIA-PAUL 500 KV & TONO 500/115 XFMR	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-660	0.73	-1735	0.80	-1574	0.70	-965
BF 4572 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.7	-858	0.70	-550	0.71	-1880	0.70	-405	0.70	-659	0.73	-1722	0.80	-1570	0.70	-964
BF 4630 CEN FERRY-LIT GOOS #1 & LIT GOOS-LOW MON #1 500 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-404	0.70	-659	0.73	-1732	0.80	-1573	0.70	-964

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BF 4652 TAFT-DWORSHAK & TAFT-HATWAI 500 KV + RAS	0.7	-856	0.70	-549	0.71	-1835	0.70	-404	0.70	-656	0.74	-1654	0.80	-1494	0.70	-962
BF 4672 MONROE-CHIEF JO 500 KV & MONROE CAPS	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1731	0.80	-1572	0.70	-964
BF 4676 LIT GOOS-LOW MON & LOW MON-ASHE 500 KV	0.7	-858	0.70	-550	0.70	-1924	0.70	-405	0.70	-659	0.73	-1737	0.80	-1575	0.70	-964
BF 4690 PAUL-ALLSTON 500 KV & ALLSTON 500/230 XFMR	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
BF 4708 HATWAI 500 KV BUS	0.7	-856	0.70	-549	0.70	-1846	0.70	-403	0.70	-654	0.74	-1677	0.80	-1520	0.70	-960
BF 4728 COULEE-CHIEF JO 500 KV & CHEIF JO 500/230 XFMR	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
BF 4775 CEN FERRY-LOW GRAN #1 & #2 500 KV	0.7	-855	0.70	-549	0.70	-1855	0.70	-403	0.70	-653	0.74	-1684	0.80	-1527	0.70	-959
BF 4776 HATWAI-LOW GRAN & LOW GRAN-CEN FERRY 500 KV	0.7	-856	0.70	-549	0.70	-1859	0.70	-403	0.70	-654	0.74	-1688	0.80	-1533	0.70	-960
BF 4870 JOHN DAY-BIG EDDY 500 KV & BIG EDDY 500/230 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-660	0.73	-1735	0.80	-1575	0.70	-965
BF 4888 ASHE-SLATT & CGS 500 KV	0.7	-852	0.70	-548	0.73	-1695	0.70	-400	0.70	-652	0.76	-1538	0.81	-1379	0.70	-956
BF 4891 LOW MON-ASHE & ASHE-SLATT 500 KV	0.7	-857	0.70	-550	0.70	-1898	0.70	-403	0.70	-658	0.73	-1725	0.80	-1569	0.70	-963
BF 4901 LOW MON-ASHE & ASHE-HANFORD 500 KV	0.7	-857	0.70	-550	0.70	-1887	0.70	-402	0.70	-659	0.73	-1723	0.80	-1571	0.70	-963
BF 4940 LOW MON-ASHE & ASHE-MARION 500 KV	0.7	-856	0.70	-549	0.70	-1895	0.70	-402	0.70	-657	0.73	-1721	0.80	-1564	0.70	-961
BF 4957 SUMMER L-MALIN & SUMMER L-HEMINGWAY 500 KV	0.7	-828	0.70	-535	0.72	-1429	0.70	-396	0.70	-615	0.73	-1530	0.81	-1607	0.72	-917
BF 4959 GRIZZLY-SUMMER L & SUMMER L-MALIN 500 KV	0.7	-830	0.70	-536	0.73	-1508	0.70	-397	0.70	-624	0.73	-1607	0.81	-1679	0.72	-921
BF 4996 CAPTJACK-MALIN #1 & #2 500 KV	0.7	-861	0.70	-551	0.70	-1932	0.70	-408	0.70	-661	0.73	-1745	0.80	-1582	0.70	-968
BF 5003 SLATT-BUCKLEY & SLATT-BOARDMAN 500 KV	0.7	-854	0.70	-548	0.70	-1883	0.70	-402	0.70	-655	0.73	-1735	0.80	-1585	0.70	-959
BF 5006 SLATT-LONGHORN & SLATT-GRASSLAND 500 KV	0.7	-852	0.70	-547	0.71	-1868	0.70	-402	0.70	-653	0.73	-1738	0.80	-1601	0.70	-956
BF 5015 ASHE-SLATT & SLATT-BUCKLEY 500 KV	0.7	-856	0.70	-549	0.70	-1900	0.70	-402	0.70	-657	0.73	-1733	0.80	-1577	0.70	-961
BF 5018 ASHE-SLATT & SLATT-JOHN DAY 500 KV	0.7	-856	0.70	-549	0.70	-1895	0.70	-403	0.70	-658	0.73	-1735	0.80	-1582	0.70	-962
BF 5021 SLATT-JOHN DAY & SLATT-LONGHORN 500 KV	0.7	-856	0.70	-549	0.70	-1907	0.70	-403	0.70	-657	0.73	-1736	0.80	-1579	0.70	-962
BF 5028 BUCKLEY-GRIZZLY & GRIZZLY-SUMMER LAKE 500 KV	0.7	-857	0.70	-550	0.70	-1883	0.70	-402	0.70	-659	0.73	-1722	0.80	-1573	0.70	-963
BF 5040 GRIZZLY-JOHN DAY & GRIZZLY-ROUND BU 500 KV	0.7	-856	0.70	-549	0.70	-1900	0.70	-401	0.70	-658	0.73	-1724	0.80	-1568	0.70	-962
BF 5114 ECHO LAKE-RAVER & ECHO LAKE- SNOK TAP 500 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
BF 5117 ECHO LAKE-MAPLE VALLEY & ECHO LAKE-RAVER 500 KV	0.7	-858	0.70	-550	0.70	-1914	0.70	-404	0.70	-659	0.73	-1732	0.80	-1573	0.70	-964
BF 5148 COULEE-SCHULTZ & ECHO LAKE-SCHULTZ 500 KV	0.7	-857	0.70	-550	0.70	-1901	0.70	-404	0.70	-658	0.73	-1724	0.80	-1567	0.70	-963
BF 5170 WAUTOMA-SCHULTZ & SCHULTZ-RAVER 500 KV	0.7	-858	0.70	-550	0.70	-1911	0.70	-404	0.70	-660	0.73	-1731	0.80	-1573	0.70	-964
BF 5179 VANTAGE-SCHULTZ & SCHULTZ-RAVER #4	0.7	-858	0.70	-550	0.70	-1914	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
BF 5187 MCNARY-LONGHORN & LONGHORN-SLATT 500 KV	0.7	-858	0.70	-550	0.70	-1899	0.70	-404	0.70	-659	0.73	-1733	0.80	-1576	0.70	-964
BF 5193 GRASSLAND-COYOTE & COYOTE-LONGHORN 500 KV	0.7	-855	0.70	-549	0.71	-1770	0.70	-403	0.70	-655	0.75	-1627	0.80	-1471	0.70	-960
BF 5211 LOW MON-MCNARY 500 KV & MCNARY 500/230 KV XFMR	0.7	-858	0.70	-550	0.71	-1886	0.70	-405	0.70	-659	0.73	-1724	0.80	-1571	0.70	-964
BF 5214 LOW MON-MCNARY & CALPINE PH 500 KV	0.7	-855	0.70	-549	0.72	-1768	0.70	-402	0.70	-655	0.75	-1617	0.81	-1458	0.70	-960
BF 5250 HANFORD-WAUTOMA#1 & WAUTOMA-KNIGHT 500 KV	0.7	-857	0.70	-550	0.70	-1908	0.70	-404	0.70	-658	0.73	-1729	0.80	-1571	0.70	-963
BF 5259 HANFORD-WAUTOMA#2 & WAUTOMA-ROCK CK 500 KV	0.7	-858	0.70	-550	0.70	-1910	0.70	-404	0.70	-659	0.73	-1731	0.80	-1572	0.70	-964
BF 5266 SLATT-BUCKLY 500 KV	0.7	-856	0.70	-549	0.70	-1916	0.70	-403	0.70	-657	0.73	-1738	0.80	-1579	0.70	-961
BF 5339 VANTAGE-SCHULTZ 500 KV & VANTAGE 500/230 XFMR #1	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-660	0.73	-1735	0.80	-1575	0.70	-964
BF 5345 VANTAGE-HANFORD 500 KV & VANTAGE 500/230 XFMR #1	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-660	0.73	-1733	0.80	-1574	0.70	-964
BF IPC HEM-GRASSLAND 500 KV & HEM 500/230 XFMR	0.7	-825	0.70	-535	0.70	-1109	0.70	-386	0.70	-604	0.74	-1299	0.82	-1384	0.72	-913
BF IPC HEMINGWAY-SUMMER L 500 KV & HEMINGWAY 500/230 XFMR	0.7	-830	0.70	-536	0.70	-1348	0.70	-397	0.70	-619	0.73	-1527	0.81	-1567	0.72	-920
BF IPC MIDPOINT-HEMINGWAY 500 KV & HEMINGWAY 500/230 XFMR	0.7	-831	0.70	-536	0.70	-1211	0.70	-396	0.70	-611	0.71	-1320	0.77	-1292	0.72	-921
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR	0.7	-846	0.70	-544	0.70	-1475	0.70	-404	0.70	-622	0.73	-1271	0.82	-1189	0.72	-939
BF IPC POPULUS-CHILL-HEM 500 KV & HEM 500/230 XFMR + RAS	0.7	-831	0.70	-538	0.70	-1378	0.70	-401	0.70	-586	0.74	-1020	0.83	-1137	0.72	-911
BF LOLO 230KV	0.7	-855	0.70	-549	0.70	-1844	0.70	-403	0.70	-654	0.73	-1705	0.80	-1565	0.70	-959
BF PGE GRASSLAND-CEDAR SPRING & HEMINGWAY-GRASSLAND 500 KV	0.7	-825	0.70	-535	0.71	-1186	0.70	-385	0.70	-605	0.74	-1316	0.82	-1438	0.72	-912
BF PGE GRASSLAND-COYOTE 500 KV & CARTY GAS PROJECT	0.7	-858	0.70	-550	0.70	-1879	0.70	-404	0.70	-659	0.73	-1720	0.80	-1566	0.70	-964
BF PGE SLATT-GRASSLAND 500 KV & BOARDMAN COAL GEN	0.7	-854	0.70	-548	0.71	-1742	0.70	-403	0.70	-654	0.75	-1607	0.81	-1461	0.70	-959
BUS: ALVEY 500 KV	0.7	-856	0.70	-549	0.70	-1904	0.70	-400	0.70	-658	0.73	-1727	0.80	-1569	0.70	-962
BUS: BELL BPA 500 KV	0.7	-852	0.70	-547	0.72	-1711	0.70	-400	0.70	-645	0.75	-1579	0.80	-1437	0.70	-954
BUS: BUCKLEY 500 KV	0.7	-854	0.70	-548	0.70	-1887	0.70	-399	0.70	-656	0.73	-1720	0.80	-1567	0.70	-959
BUS: DIXONVILLE 500 KV	0.7	-857	0.70	-550	0.70	-1907	0.70	-401	0.70	-659	0.73	-1727	0.80	-1569	0.70	-963
BUS: HOT SPRINGS 500 KV	0.7	-858	0.70	-550	0.70	-1923	0.70	-405	0.70	-660	0.73	-1739	0.80	-1578	0.70	-965
BUS: KEELER 500 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-405	0.70	-659	0.73	-1734	0.80	-1573	0.70	-964

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
BUS: ROCK CREEK 500 KV	0.7	-857	0.70	-550	0.70	-1891	0.70	-403	0.70	-658	0.73	-1714	0.80	-1557	0.70	-963
BUS: SICKLER 500 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
BUS: SUMMER LAKE 500 KV	0.7	-828	0.70	-535	0.72	-1432	0.70	-396	0.70	-615	0.73	-1532	0.81	-1608	0.72	-917
N-1: ALLSTON-KEELER 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1573	0.70	-964
N-1: ALLSTON-NAPAVINE 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: ALLSTON-PAUL #2 500 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: ALVERY-DIXONVILLE 500 KV	0.7	-857	0.70	-550	0.70	-1912	0.70	-401	0.70	-659	0.73	-1731	0.80	-1572	0.70	-963
N-1: ALVEY-MARION 500 KV	0.7	-857	0.70	-549	0.70	-1916	0.70	-402	0.70	-658	0.73	-1735	0.80	-1575	0.70	-963
N-1: ASHE-HANFORD 500 KV	0.7	-857	0.70	-550	0.70	-1902	0.70	-403	0.70	-659	0.73	-1729	0.80	-1573	0.70	-964
N-1: ASHE-LOW MON 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
N-1: ASHE-MARION 500 KV	0.7	-856	0.70	-549	0.70	-1904	0.70	-402	0.70	-658	0.73	-1726	0.80	-1568	0.70	-962
N-1: ASHE-SLATT 500 KV	0.7	-858	0.70	-550	0.70	-1906	0.70	-404	0.70	-659	0.73	-1730	0.80	-1573	0.70	-964
N-1: BELL-COULEE 500 KV	0.7	-856	0.70	-549	0.70	-1859	0.70	-403	0.70	-654	0.74	-1687	0.80	-1532	0.70	-960
N-1: BELL-TAFT 500 KV	0.7	-852	0.70	-547	0.72	-1711	0.70	-400	0.70	-646	0.75	-1581	0.80	-1438	0.70	-954
N-1: BIG EDDY-CEILO 500 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1576	0.70	-965
N-1: BIG EDDY-JOHN DAY 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-660	0.73	-1735	0.80	-1575	0.70	-965
N-1: BIG EDDY-KNIGHT 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: BIG EDDY-OSTRANDER 500 KV	0.7	-858	0.70	-550	0.70	-1911	0.70	-404	0.70	-659	0.73	-1731	0.80	-1572	0.70	-964
N-1: BOISE BENCH-BROWNLEE #3 230 KV	0.7	-858	0.70	-550	0.70	-1901	0.70	-405	0.70	-658	0.73	-1713	0.80	-1563	0.70	-964
N-1: BRADY-ANTELOPE 230 KV + RAS	0.7	-855	0.70	-549	0.70	-1832	0.70	-403	0.70	-652	0.73	-1676	0.80	-1543	0.70	-959
N-1: BROADVIEW-GARRISON #1 500 KV	0.7	-856	0.70	-549	0.73	-1767	0.70	-403	0.70	-653	0.75	-1630	0.81	-1465	0.70	-961
N-1: BROWNLEE-ONTARIO 230 KV	0.7	-858	0.70	-550	0.70	-1885	0.70	-405	0.70	-658	0.73	-1703	0.80	-1556	0.70	-964
N-1: BUCKLEY-GRIZZLY 500 KV	0.7	-857	0.70	-549	0.70	-1913	0.70	-402	0.70	-658	0.73	-1732	0.80	-1573	0.70	-962
N-1: BUCKLEY-MARION 500 KV	0.7	-857	0.70	-550	0.70	-1903	0.70	-402	0.70	-658	0.73	-1727	0.80	-1571	0.70	-963
N-1: BUCKLEY-SLATT 500 KV	0.7	-856	0.70	-549	0.70	-1916	0.70	-403	0.70	-657	0.73	-1738	0.80	-1579	0.70	-961
N-1: CAL SUB 120 KV PHASE SHIFTER	0.7	-833	0.70	-463	0.70	-1890	0.70	-396	0.70	-669	0.73	-1718	0.80	-1563	0.70	-926
N-1: CAPTAIN JACK-OLINDA 500 KV	0.7	-856	0.70	-548	0.70	-1920	0.70	-399	0.70	-658	0.73	-1748	0.80	-1591	0.70	-961
N-1: CAPTJACK-KFALLS 500 KV	0.7	-857	0.70	-550	0.70	-1909	0.70	-402	0.70	-659	0.73	-1730	0.80	-1572	0.70	-963
N-1: CASCADE CROSSING 500 KV	0.7	-855	0.70	-549	0.70	-1902	0.70	-401	0.70	-657	0.73	-1733	0.80	-1578	0.70	-960
N-1: CHIEF JO-COULEE 500 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
N-1: CHIEF JO-MONROE 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1731	0.80	-1572	0.70	-964
N-1: CHIEF JO-SICKLER 500 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: COULEE-HANFORD 500 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1732	0.80	-1574	0.70	-964
N-1: COULEE-SCHULTZ 500 KV	0.7	-858	0.70	-550	0.70	-1910	0.70	-404	0.70	-659	0.73	-1729	0.80	-1570	0.70	-964
N-1: COVINGTON4-RAVER 500 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: COVINGTON5-RAVER 500 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: COYOTE-LONGHORN 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1739	0.80	-1580	0.70	-964
N-1: CUSTERW-MONROE 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1735	0.80	-1574	0.70	-964
N-1: DIXONVILLE-MERIDIAN 500 KV	0.7	-857	0.70	-550	0.70	-1903	0.70	-401	0.70	-659	0.73	-1725	0.80	-1567	0.70	-963
N-1: DRYCREEK-LOLO 230 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-659	0.73	-1736	0.80	-1575	0.70	-964
N-1: DRYCREEK-N LEWISTON 230 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-659	0.73	-1736	0.80	-1575	0.70	-964
N-1: DRYCREEK-WALA AVA 230 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-405	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: DWORSHAK-HATWAI 500 KV	0.7	-857	0.70	-550	0.71	-1864	0.70	-404	0.70	-656	0.74	-1688	0.80	-1528	0.70	-962
N-1: DWORSHAK-TAFT 500 KV	0.7	-857	0.70	-550	0.70	-1859	0.70	-404	0.70	-656	0.74	-1687	0.80	-1533	0.70	-962
N-1: ECHO LAKE-MAPLE VALLEY 500 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
N-1: ECHO LAKE-RAVER 500 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: ECHO LAKE-SCHULTZ 500 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1731	0.80	-1572	0.70	-964
N-1: ECHO LAKE-SNOK TAP 500 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1737	0.80	-1576	0.70	-965
N-1: GARRISON-TAFT #2 500 KV	0.7	-855	0.70	-549	0.71	-1812	0.70	-403	0.70	-653	0.74	-1647	0.80	-1493	0.70	-960
N-1: GOLDBILL-PLACER 115 KV	0.7	-859	0.70	-550	0.70	-1922	0.70	-405	0.70	-660	0.73	-1738	0.80	-1577	0.70	-965
N-1: GRASSLAND-COYOTE 500 KV	0.7	-858	0.70	-550	0.70	-1879	0.70	-404	0.70	-659	0.73	-1720	0.80	-1566	0.70	-964
N-1: GRASSLAND-SLATT 500 KV	0.7	-856	0.70	-549	0.70	-1889	0.70	-404	0.70	-657	0.73	-1737	0.80	-1584	0.70	-961

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: GRIZZLY-JOHN DAY #2 500 KV	0.7	-856	0.70	-549	0.70	-1904	0.70	-401	0.70	-658	0.73	-1726	0.80	-1569	0.70	-962
N-1: GRIZZLY-MALIN 500 KV	0.7	-854	0.70	-548	0.70	-1898	0.70	-397	0.70	-657	0.73	-1724	0.80	-1569	0.70	-959
N-1: GRIZZLY-PONDEROSA A-SUMMER L 500 KV	0.7	-858	0.70	-550	0.70	-1889	0.70	-404	0.70	-660	0.73	-1725	0.80	-1575	0.70	-965
N-1: GRIZZLY-PONDEROSA B-CAPT JACK 500 KV	0.7	-854	0.70	-548	0.70	-1896	0.70	-398	0.70	-656	0.73	-1724	0.80	-1569	0.70	-959
N-1: GRIZZLY-ROUND BU 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: HANFORD-LOW MON 500 KV	0.7	-858	0.70	-550	0.70	-1908	0.70	-404	0.70	-658	0.73	-1729	0.80	-1570	0.70	-963
N-1: HANFORD-VANTAGE 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-660	0.73	-1733	0.80	-1574	0.70	-964
N-1: HANFORD-WAUTOMA 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: HARRY ALLEN 345 KV PHASE SHIFTER	0.7	-847	0.70	-545	0.73	-1541	0.70	-401	0.70	-611	0.77	-1409	0.82	-1301	0.72	-933
N-1: HATWAI 500/230 KV XFMR	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-659	0.73	-1737	0.80	-1576	0.70	-964
N-1: HATWAI-LOLO 230 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-405	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: HATWAI-LOW GRAN 500 KV	0.7	-856	0.70	-549	0.70	-1862	0.70	-403	0.70	-654	0.74	-1689	0.80	-1534	0.70	-960
N-1: HATWAI-N LEWISTON 230 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: HELLS CANYON-BROWNLEE 230 KV	0.7	-857	0.70	-550	0.71	-1784	0.70	-404	0.70	-658	0.74	-1649	0.80	-1544	0.70	-963
N-1: HELLS CANYON-WALLA WALLA 230 KV	0.7	-854	0.70	-548	0.71	-1775	0.70	-402	0.70	-650	0.73	-1662	0.80	-1544	0.70	-957
N-1: HEMINGWAY-GRASSLAND 500 KV	0.7	-827	0.70	-535	0.70	-1207	0.70	-387	0.70	-608	0.74	-1336	0.82	-1457	0.72	-915
N-1: HEMINGWAY-SUMMER LAKE 500 KV	0.7	-830	0.70	-536	0.72	-1454	0.70	-397	0.70	-619	0.73	-1550	0.81	-1609	0.72	-920
N-1: HILL TOP 345/230 XFMR	0.7	-777	0.70	-544	0.70	-1875	0.70	-234	0.70	-670	0.73	-1707	0.80	-1553	0.70	-887
N-1: HORSE HV-MCNARY 230 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-404	0.70	-659	0.73	-1736	0.80	-1575	0.70	-964
N-1: HOT SPRINGS-TAFT 500 KV	0.7	-858	0.70	-550	0.70	-1914	0.70	-405	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
N-1: HUMBOLDT-COYOTE CK 345 KV	0.7	-862	0.70	-555	0.71	-1807	0.70	-408	0.70	-233	0.74	-1615	0.80	-1564	0.74	-935
N-1: HUNTINGTON-PINTO-FOUR CORNERS 345 KV	0.7	-848	0.70	-546	0.73	-1578	0.70	-401	0.70	-620	0.76	-1442	0.82	-1340	0.72	-939
N-1: ING500-CUSTERW 500 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-659	0.73	-1736	0.80	-1575	0.70	-964
N-1: JOHN DAY-MARION 500 KV	0.7	-857	0.70	-550	0.70	-1904	0.70	-402	0.70	-658	0.73	-1727	0.80	-1570	0.70	-963
N-1: JOHN DAY-ROCK CK 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: JOHN DAY-SLATT 500 KV	0.7	-857	0.70	-549	0.70	-1915	0.70	-403	0.70	-658	0.73	-1740	0.80	-1582	0.70	-962
N-1: KFALLS-MERIDIAN 500 KV	0.7	-857	0.70	-550	0.70	-1882	0.70	-401	0.70	-660	0.73	-1708	0.80	-1554	0.70	-964
N-1: KNIGHT-WAUTOMA 500 KV	0.7	-858	0.70	-550	0.70	-1911	0.70	-404	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
N-1: LAGRANDE-NORTH POWDER 230 KV	0.7	-856	0.70	-549	0.70	-1856	0.70	-403	0.70	-655	0.73	-1708	0.80	-1564	0.70	-960
N-1: LANES-MARION 500 KV	0.7	-857	0.70	-550	0.70	-1912	0.70	-403	0.70	-659	0.73	-1732	0.80	-1573	0.70	-963
N-1: LIT GOOSE-CENTRAL FERRY 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-659	0.73	-1735	0.80	-1574	0.70	-964
N-1: LIT GOOSE-LOW MON 500 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: LOW GRAN-CENTRAL FERRY 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
N-1: LOW MON-SAC TAP 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-660	0.73	-1736	0.80	-1576	0.70	-964
N-1: MALIN 500/230 XFMR	0.7	-833	0.70	-551	0.70	-1923	0.70	-297	0.70	-658	0.73	-1738	0.80	-1577	0.70	-940
N-1: MALIN-HILLTOP 230 KV	0.7	-785	0.70	-548	0.70	-1895	0.70	-191	0.70	-666	0.73	-1720	0.80	-1564	0.70	-896
N-1: MALIN-ROUND MTN #1 500 KV	0.7	-856	0.70	-548	0.70	-1914	0.70	-400	0.70	-658	0.73	-1738	0.80	-1581	0.70	-961
N-1: MALIN-ROUND MTN #2 500 KV	0.7	-856	0.70	-548	0.70	-1914	0.70	-400	0.70	-658	0.73	-1738	0.80	-1581	0.70	-961
N-1: MALIN-SUMMER LAKE 500 KV	0.7	-853	0.70	-547	0.70	-1879	0.70	-403	0.70	-654	0.73	-1742	0.80	-1604	0.70	-957
N-1: MAPLE VLY-ROCKY RH 345 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-404	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: MARION-PEARL 500 KV	0.7	-859	0.70	-551	0.70	-1913	0.70	-406	0.70	-661	0.73	-1732	0.80	-1573	0.70	-966
N-1: MARION-SANTIAM 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-405	0.70	-659	0.73	-1735	0.80	-1574	0.70	-965
N-1: MCLOUGLIN-OSTRANDER 230 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: MCNARY 500/230 KV XFMR	0.7	-858	0.70	-550	0.71	-1891	0.70	-405	0.70	-659	0.73	-1726	0.80	-1571	0.70	-964
N-1: MCNARY-BOARD T1 230 KV	0.7	-859	0.70	-550	0.70	-1933	0.70	-405	0.70	-660	0.73	-1748	0.80	-1586	0.70	-965
N-1: MCNARY-JOHN DAY 500 KV	0.7	-857	0.70	-549	0.70	-1908	0.70	-403	0.70	-658	0.73	-1731	0.80	-1572	0.70	-962
N-1: MCNARY-LONGHORN 500 KV	0.7	-858	0.70	-550	0.70	-1905	0.70	-405	0.70	-660	0.73	-1733	0.80	-1574	0.70	-965
N-1: MCNARY-ROSS 345 KV	0.7	-857	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1732	0.80	-1572	0.70	-963
N-1: MCNARY-ROUNDUP 230 KV	0.7	-857	0.70	-549	0.71	-1858	0.70	-404	0.70	-656	0.73	-1705	0.80	-1567	0.70	-962
N-1: MCNARY-SAC TAP-LOW MON 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1733	0.80	-1574	0.70	-964
N-1: MIDPOINT-HEMINGWAY 500 KV	0.7	-836	0.70	-539	0.70	-1461	0.70	-397	0.70	-616	0.70	-1301	0.79	-1355	0.72	-929
N-1: MIDPOINT-HUMBOLDT 345 KV	0.7	-867	0.70	-558	0.71	-1754	0.70	-409	0.70	-405	0.73	-1583	0.80	-1530	0.75	-942

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-1: NAPA-VINE-PAUL 500 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: OLYMPIA-PAUL 500 KV	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: ONTARIO-CALDWELL 230 KV	0.7	-858	0.70	-550	0.70	-1914	0.70	-405	0.70	-659	0.73	-1729	0.80	-1571	0.70	-964
N-1: OSTRANDER-KNIGHT 500 KV	0.7	-857	0.70	-550	0.70	-1908	0.70	-403	0.70	-659	0.73	-1729	0.80	-1571	0.70	-963
N-1: OSTRANDER-PEARL 500 KV	0.7	-858	0.70	-550	0.70	-1922	0.70	-404	0.70	-660	0.73	-1737	0.80	-1576	0.70	-964
N-1: OSTRANDER-TROUTDALE 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1735	0.80	-1574	0.70	-964
N-1: OXBOW-BROWNLEE #2 230 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-405	0.70	-659	0.73	-1731	0.80	-1574	0.70	-964
N-1: OXBOW-LOLO 230 KV	0.7	-855	0.70	-549	0.70	-1836	0.70	-403	0.70	-654	0.73	-1699	0.80	-1562	0.70	-959
N-1: PAUL-SATSOP 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: PEARL-KEELER 500 KV	0.7	-859	0.70	-550	0.70	-1922	0.70	-405	0.70	-660	0.73	-1738	0.80	-1577	0.70	-965
N-1: PINTO-FOUR CORNER 345 KV	0.7	-849	0.70	-546	0.73	-1603	0.70	-401	0.70	-623	0.76	-1465	0.82	-1360	0.72	-941
N-1: PONDEROSA A 500/230 KV XFMR	0.7	-858	0.70	-550	0.70	-1921	0.70	-404	0.70	-659	0.73	-1737	0.80	-1576	0.70	-964
N-1: PONDEROSA B 500/230 KV XFMR	0.7	-858	0.70	-550	0.70	-1919	0.70	-404	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: POPULUS-CEDAR HILL-HEMINGWAY 500 KV	0.7	-847	0.70	-545	0.70	-1555	0.70	-403	0.70	-624	0.74	-1277	0.82	-1196	0.72	-941
N-1: RAVER-PAUL 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-660	0.73	-1735	0.80	-1575	0.70	-965
N-1: RAVER-TACOMA 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: RED BUTTE-HARRY ALLEN 345 KV	0.7	-848	0.70	-546	0.73	-1543	0.70	-401	0.70	-613	0.77	-1411	0.82	-1303	0.72	-936
N-1: ROBINSON-HARRY ALLEN 500 KV	0.7	-831	0.70	-535	0.70	-1885	0.70	-394	0.70	-624	0.73	-1724	0.80	-1573	0.71	-927
N-1: ROCK CK-WAUTOMA 500 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1732	0.80	-1573	0.70	-964
N-1: ROUND MTN-TABLE MTN 500 KV	0.7	-857	0.70	-549	0.70	-1923	0.70	-403	0.70	-659	0.73	-1742	0.80	-1582	0.70	-963
N-1: ROUNDUP-LAGRANDE 230 KV	0.7	-856	0.70	-549	0.70	-1858	0.70	-403	0.70	-656	0.73	-1706	0.80	-1565	0.70	-961
N-1: SCHULTZ-SICKLER 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-659	0.73	-1735	0.80	-1575	0.70	-964
N-1: SCHULTZ-VANTAGE 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-660	0.73	-1735	0.80	-1575	0.70	-964
N-1: SCHULTZ-WAUTOMA 500 KV	0.7	-858	0.70	-550	0.70	-1914	0.70	-404	0.70	-660	0.73	-1734	0.80	-1575	0.70	-965
N-1: SIGURD-GLEN CANYON 230 KV	0.7	-856	0.70	-549	0.70	-1849	0.70	-404	0.70	-650	0.74	-1676	0.80	-1529	0.70	-958
N-1: SLATT 500/230 KV XFMR	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-1: SLATT-LONGHORN 500 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-404	0.70	-659	0.73	-1734	0.80	-1575	0.70	-964
N-1: SNOK TAP-SNOKING 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1734	0.80	-1573	0.70	-964
N-1: TABLE MTN-TESLA 500 KV	0.7	-859	0.70	-550	0.70	-1932	0.70	-405	0.70	-659	0.73	-1749	0.80	-1587	0.70	-965
N-1: TABLE MTN-VACA DIXON 500 KV	0.7	-859	0.70	-550	0.70	-1940	0.70	-404	0.70	-659	0.73	-1757	0.79	-1596	0.70	-964
N-1: VANTAGE 500/230 KV XFMR #1	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1576	0.70	-965
N-1: VANTAGE 500/230 KV XFMR #2	0.7	-858	0.70	-550	0.70	-1921	0.70	-405	0.70	-660	0.73	-1736	0.80	-1575	0.70	-965
N-1: WALLA WALLA-TALBOT 230 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-405	0.70	-659	0.73	-1735	0.80	-1574	0.70	-965
N-1: WALLA WALLA-WALLULA 230 KV	0.7	-858	0.70	-550	0.70	-1899	0.70	-404	0.70	-659	0.73	-1729	0.80	-1572	0.70	-964
N-2: ASHE-MARION & ASHE-SLATT 500 KV	0.7	-856	0.70	-549	0.70	-1886	0.70	-401	0.70	-657	0.73	-1718	0.80	-1564	0.70	-962
N-2: ASHE-MARION & BUCKLEY-MARION 500 KV	0.7	-854	0.70	-549	0.70	-1886	0.70	-399	0.70	-656	0.73	-1718	0.80	-1564	0.70	-960
N-2: ASHE-MARION & SLATT-BUCKLEY 500 KV	0.7	-854	0.70	-548	0.70	-1900	0.70	-400	0.70	-655	0.73	-1729	0.80	-1573	0.70	-958
N-2: ASHE-MARION & SLATT-COYOTE TAP-LONGHORN 500 KV	0.7	-856	0.70	-549	0.70	-1898	0.70	-401	0.70	-657	0.73	-1724	0.80	-1567	0.70	-961
N-2: ASHE-MARION & SLATT-JOHN DAY 500 KV	0.7	-855	0.70	-549	0.70	-1897	0.70	-401	0.70	-656	0.73	-1731	0.80	-1575	0.70	-960
N-2: ASHE-SLATT & MCNARY-JOHN DAY 500 KV	0.7	-856	0.70	-549	0.70	-1891	0.70	-403	0.70	-657	0.73	-1724	0.80	-1569	0.70	-962
N-2: ASHE-SLATT & SLATT-COYOTE TAP-LONGHORN 500 KV	0.7	-857	0.70	-550	0.70	-1899	0.70	-404	0.70	-658	0.73	-1727	0.80	-1571	0.70	-963
N-2: BELL-TAFT & TAFT-DWORSKAK 500 KV + RAS	0.7	-845	0.70	-545	0.73	-1465	0.70	-397	0.70	-639	0.78	-1364	0.81	-1238	0.71	-946
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-ROUND BUTTE 230 KV	0.7	-855	0.70	-549	0.70	-1904	0.70	-401	0.70	-657	0.73	-1734	0.80	-1579	0.70	-960
N-2: BETHEL-CEDAR SPRING 500 KV & BETHEL-SANTIAM 230 KV	0.7	-855	0.70	-549	0.70	-1905	0.70	-401	0.70	-657	0.73	-1735	0.80	-1580	0.70	-960
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-CHEMAWA 230 KV	0.7	-857	0.70	-550	0.70	-1908	0.70	-403	0.70	-659	0.73	-1729	0.80	-1571	0.70	-964
N-2: BIG EDDY-OSTRANDER 500 KV & BIG EDDY-TROUTDALE 230 KV	0.7	-858	0.70	-550	0.70	-1909	0.70	-403	0.70	-659	0.73	-1730	0.80	-1571	0.70	-964
N-2: BOISE BENCH-BROWNLEE #1 & #2 230 KV	0.7	-858	0.70	-550	0.70	-1861	0.70	-404	0.70	-655	0.73	-1661	0.80	-1533	0.70	-963
N-2: BOISE BENCH-BROWNLEE #3 & BOISE BENCH-HORSEFLAT#4 230 KV	0.7	-858	0.70	-550	0.70	-1860	0.70	-404	0.70	-655	0.73	-1661	0.80	-1532	0.70	-963
N-2: BRIDGER-POPULUS #1 & #2 345 KV	0.7	-859	0.70	-551	0.73	-1439	0.70	-405	0.70	-651	0.80	-1344	0.84	-968	0.70	-964
N-2: BRIDGER-POPULUS #2 & BRIDGER-3MILEKNOLL 345 KV	0.7	-858	0.70	-550	0.79	-1509	0.70	-404	0.70	-647	0.81	-1296	0.84	-919	0.70	-961
N-2: BROADVIEW-GARRISON #1 & #2 500 KV + RAS	0.7	-848	0.70	-547	0.85	-1249	0.70	-399	0.70	-645	0.86	-1158	0.88	-1061	0.70	-950
N-2: BROWNLEE-HELLS CANYON & OXBOW-LOLO 230 KV	0.7	-853	0.70	-548	0.72	-1657	0.70	-402	0.70	-649	0.74	-1575	0.80	-1523	0.70	-956

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: BROWNLEE-OXBOW & BROWNLEE-HELLS CANYON 230 KV	0.7	-857	0.70	-550	0.71	-1780	0.70	-404	0.70	-657	0.74	-1645	0.80	-1543	0.70	-963
N-2: BUCKLEY-MARION & JOHN DAY-MARION 500 KV	0.7	-855	0.70	-549	0.70	-1884	0.70	-399	0.70	-657	0.73	-1718	0.80	-1565	0.70	-961
N-2: CHIEF JO-MONROE & CHIEF JO-SICKLER 500 KV	0.7	-858	0.70	-550	0.70	-1906	0.70	-404	0.70	-659	0.73	-1727	0.80	-1569	0.70	-964
N-2: CHIEF JO-MONROE 500 KV & CHIEF JO-SNOHOMS4 345 KV	0.7	-858	0.70	-550	0.70	-1909	0.70	-404	0.70	-659	0.73	-1728	0.80	-1570	0.70	-964
N-2: CHIEF JO-MONROE 500 KV & MONROE-SAMMAMSH 230 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
N-2: CHIEF JO-SICKLER 500 KV & CHIEF J3-SNOHOMS3 345 KV	0.7	-858	0.70	-550	0.70	-1914	0.70	-404	0.70	-659	0.73	-1732	0.80	-1573	0.70	-964
N-2: COULEE-CHIEF JO 500 KV & CHIEF J4-SNOHOMS4 345 KV	0.7	-858	0.70	-550	0.70	-1910	0.70	-404	0.70	-659	0.73	-1729	0.80	-1570	0.70	-964
N-2: COULEE-HANFORD & HANFORD-VANTAGE 500 KV	0.7	-858	0.70	-550	0.70	-1902	0.70	-404	0.70	-660	0.73	-1729	0.80	-1573	0.70	-964
N-2: COULEE-SCHULTZ #1 & #2 500 KV	0.7	-857	0.70	-550	0.70	-1892	0.70	-403	0.70	-658	0.73	-1716	0.80	-1560	0.70	-963
N-2: CUSTERW-ING500 & CUSTERW-MONROE 500 KV	0.7	-858	0.70	-550	0.70	-1917	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-2: CUSTERW-MONROE #1 & #2 500 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1732	0.80	-1572	0.70	-964
N-2: DC-BIPOLE	0.7	-867	0.70	-554	0.70	-2168	0.70	-411	0.70	-654	0.70	-1942	0.78	-1772	0.71	-970
N-2: DOUBLE PALO VERDE	0.7	-873	0.70	-558	0.70	-2145	0.70	-407	0.70	-654	0.72	-1917	0.78	-1709	0.70	-981
N-2: ECHOLAKE-MAPLE VLY 500 KV & COVINGTON-MAPLE VLY 230 KV	0.7	-858	0.70	-550	0.70	-1915	0.70	-404	0.70	-659	0.73	-1733	0.80	-1573	0.70	-964
N-2: ECHOLAKE-MAPLE VLY 500 KV & ROCKY RH-MAPLE VLY 345 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1731	0.80	-1572	0.70	-964
N-2: GARRISON-TAFT #1 & #2 500 KV + RAS	0.7	-846	0.70	-546	0.73	-1454	0.70	-398	0.70	-639	0.78	-1356	0.82	-1220	0.71	-946
N-2: GRASSLAND-CEDAR SPRING & SLATT - BUCKLEY 500 KV	0.7	-853	0.70	-548	0.70	-1908	0.70	-400	0.70	-654	0.73	-1742	0.80	-1588	0.70	-957
N-2: GRASSLAND-COYOTE & SLATT - LONGHORN 500 KV	0.7	-857	0.70	-550	0.70	-1838	0.70	-404	0.70	-657	0.73	-1700	0.80	-1551	0.70	-963
N-2: GRIZZLY-MALIN & GRIZZLY-CAPTAIN JACK 500 KV	0.7	-849	0.70	-546	0.70	-1877	0.70	-390	0.70	-652	0.73	-1716	0.80	-1567	0.70	-952
N-2: GRIZZLY-MALIN & GRIZZLY-SUMMER LAKE 500 KV	0.7	-854	0.70	-549	0.70	-1863	0.70	-397	0.70	-657	0.73	-1709	0.80	-1565	0.70	-960
N-2: GRIZZLY-MALIN & MALIN-SUMMER LAKE 500 KV	0.7	-846	0.70	-544	0.70	-1866	0.70	-395	0.70	-648	0.73	-1745	0.80	-1619	0.71	-947
N-2: HANFORD-ASHE & HANFORD-LOW MON 500 KV	0.7	-855	0.70	-549	0.70	-1855	0.70	-401	0.70	-656	0.73	-1706	0.80	-1557	0.70	-960
N-2: HANFORD-WAUTOMA #1 & #2 500 KV	0.7	-857	0.70	-550	0.70	-1910	0.70	-404	0.70	-658	0.73	-1729	0.80	-1571	0.70	-963
N-2: HELLS CANYON-BROWNLEE & OXBOW-LOLO 230 KV	0.7	-853	0.70	-548	0.72	-1677	0.70	-402	0.70	-650	0.74	-1593	0.80	-1543	0.70	-956
N-2: JOHN DAY-BIG EDDY #1 & #2 500 KV	0.7	-858	0.70	-550	0.70	-1899	0.70	-403	0.70	-660	0.73	-1726	0.80	-1571	0.70	-965
N-2: JOHN DAY-BIG EDDY & JOHN DAY-MARION 500 KV	0.7	-857	0.70	-550	0.70	-1899	0.70	-402	0.70	-658	0.73	-1725	0.80	-1569	0.70	-963
N-2: JOHN DAY-GRIZZLY #1 & #2 500 KV	0.7	-853	0.70	-548	0.70	-1880	0.70	-395	0.70	-656	0.73	-1711	0.80	-1560	0.70	-958
N-2: JOHN DAY-GRIZZLY #2 & BUCKLEY-GRIZZLY 500 KV	0.7	-854	0.70	-548	0.70	-1895	0.70	-397	0.70	-656	0.73	-1720	0.80	-1566	0.70	-959
N-2: JOHN DAY-MARION & BUCKLEY-MARION 500 KV	0.7	-855	0.70	-549	0.70	-1884	0.70	-399	0.70	-657	0.73	-1718	0.80	-1565	0.70	-961
N-2: JOHN DAY-MARION & MARION-PEARL 500 KV	0.7	-858	0.70	-550	0.70	-1894	0.70	-403	0.70	-659	0.73	-1721	0.80	-1567	0.70	-964
N-2: JOHN DAY-ROCK CREEK 500 KV & MCNARY-ROSS 345 KV	0.7	-857	0.70	-550	0.70	-1907	0.70	-403	0.70	-658	0.73	-1730	0.80	-1571	0.70	-963
N-2: KEELER-PEARL 500 & SHERWOOD-CARLTON 230 KV	0.7	-859	0.70	-550	0.70	-1924	0.70	-405	0.70	-660	0.73	-1740	0.80	-1579	0.70	-965
N-2: KNIGHT-OSTRANDER & OSTRANDER-BIG EDDY 500 KV	0.7	-857	0.70	-549	0.70	-1893	0.70	-402	0.70	-658	0.73	-1720	0.80	-1565	0.70	-962
N-2: KNIGHT-OSTRANDER 500 KV & MCNARY-ROSS 345 KV	0.7	-857	0.70	-549	0.70	-1898	0.70	-402	0.70	-658	0.73	-1724	0.80	-1568	0.70	-962
N-2: KNIGHT-OSTRANDER 500 KV & MIDWAY-BONNEVILLE 230 KV	0.7	-857	0.70	-550	0.70	-1909	0.70	-403	0.70	-659	0.73	-1731	0.80	-1572	0.70	-963
N-2: LOWER GRANITE-CENTRAL FERRY #1 & #2 500 KV	0.7	-855	0.70	-549	0.70	-1855	0.70	-403	0.70	-653	0.74	-1684	0.80	-1527	0.70	-959
N-2: MALIN-ROUND MTN #1 & #2 500 KV	0.7	-850	0.70	-541	0.70	-1944	0.70	-392	0.70	-652	0.72	-1789	0.79	-1644	0.70	-951
N-2: MCNARY-JOHN DAY & ROCK CREEK-JOHN DAY 500 KV	0.7	-856	0.70	-549	0.70	-1902	0.70	-402	0.70	-657	0.73	-1728	0.80	-1570	0.70	-962
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-HORSE HEAVEN 230 KV	0.7	-856	0.70	-549	0.70	-1904	0.70	-403	0.70	-657	0.73	-1730	0.80	-1572	0.70	-962
N-2: MCNARY-JOHN DAY 500 KV & MCNARY-ROSS 345 KV	0.7	-856	0.70	-549	0.70	-1896	0.70	-402	0.70	-656	0.73	-1726	0.80	-1569	0.70	-961
N-2: MCNARY-ROSS 345 KV & MCNARY-HORSE HEAVEN 230 KV	0.7	-857	0.70	-550	0.70	-1909	0.70	-403	0.70	-658	0.73	-1731	0.80	-1572	0.70	-963
N-2: MIDPOINT-SUMMER LAKE 500 KV & MIDPOINT-KING 230 KV	0.7	-835	0.70	-539	0.70	-1453	0.70	-397	0.70	-613	0.70	-1285	0.79	-1336	0.72	-928
N-2: MONROE-CUSTERW & CHIEF JO-MONROE 500 KV	0.7	-858	0.70	-550	0.70	-1909	0.70	-404	0.70	-659	0.73	-1729	0.80	-1570	0.70	-964
N-2: NAPAVINE-ALLSTON & PAUL-ALLSTON #2 500 KV	0.7	-856	0.70	-549	0.70	-1895	0.70	-402	0.70	-657	0.73	-1719	0.80	-1562	0.70	-962
N-2: PAUL-NAPAVINE & PAUL-ALLSTON #2 500 KV	0.7	-858	0.70	-550	0.70	-1912	0.70	-404	0.70	-659	0.73	-1731	0.80	-1571	0.70	-964
N-2: PAUL-RAVER & RAVER-COVINGT4 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-660	0.73	-1735	0.80	-1575	0.70	-965
N-2: PEARL-KEELER 500 KV & PEARL-SHERWOOD 230 KV	0.7	-859	0.70	-550	0.70	-1923	0.70	-405	0.70	-660	0.73	-1739	0.80	-1577	0.70	-965
N-2: PEARL-OSTRANDER 500 KV & BIG EDDY-MCLOUGLN 230 KV	0.7	-858	0.70	-550	0.70	-1920	0.70	-404	0.70	-659	0.73	-1736	0.80	-1575	0.70	-964
N-2: PEARL-OSTRANDER 500 KV & OSTRANDER-MCLOUGLN 230 KV	0.7	-858	0.70	-550	0.70	-1923	0.70	-405	0.70	-660	0.73	-1737	0.80	-1576	0.70	-964
N-2: RAVER-COVINGTON #1 & #2 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-660	0.73	-1735	0.80	-1574	0.70	-964
N-2: RAVER-ECHO LAKE & RAVER-SCHULTZ 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-2: RAVER-PAUL & NAPAVINE-PAUL 500 KV	0.7	-858	0.70	-550	0.70	-1919	0.70	-405	0.70	-660	0.73	-1735	0.80	-1575	0.70	-965

Appendix J - 16la1sa_3400idnw_Path24 Base Case VQ Results

V is the voltage at Qm & Qm is the Reactive Margin

Yellow Highlights indicate one of the 10 worst reactive margin contingencies

Contingency Name	Bordertown		Cal Sub		Hemingway		Hill top		Humboldt		Midpoint		Populus		Valley Road	
	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm	V	Qm
N-2: RAVER-PAUL 500 KV & COULEE-OLYMPIA 300 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-405	0.70	-660	0.73	-1734	0.80	-1574	0.70	-965
N-2: RAVER-PAUL 500 KV & TACOMA A-CHEHALIS 230 KV	0.7	-859	0.70	-550	0.70	-1923	0.70	-405	0.70	-660	0.73	-1739	0.80	-1579	0.70	-965
N-2: RAVER-SCHULTZ #1 & #2 500 KV	0.7	-857	0.70	-550	0.70	-1901	0.70	-404	0.70	-659	0.73	-1724	0.80	-1567	0.70	-963
N-2: RAVER-TACOMA & RAVER-COVINGT4 500 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-2: RAVER-TACOMA 500 KV & TACOMA-CHRISTOP-COVINGTON 230 KV	0.7	-858	0.70	-550	0.70	-1918	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-2: ROUND MTN-TABLE MTN #1 & #2 500 KV	0.7	-854	0.70	-542	0.70	-1994	0.70	-402	0.70	-654	0.72	-1818	0.79	-1663	0.70	-955
N-2: SCHULTZ-WAUTOMA & VANTAGE-SCHULTZ 500 KV	0.7	-858	0.70	-550	0.70	-1910	0.70	-404	0.70	-660	0.73	-1733	0.80	-1575	0.70	-965
N-2: SICKLER-SCHULTZ & SCHULTZ-VANTAGE 500 KV	0.7	-858	0.70	-550	0.70	-1916	0.70	-404	0.70	-659	0.73	-1734	0.80	-1574	0.70	-964
N-2: TABLE MTN-TESLA & TABLE MTN-VACA DIXON 500 KV	0.7	-862	0.70	-549	0.70	-2012	0.70	-406	0.70	-657	0.72	-1826	0.79	-1666	0.70	-965
N-2: TAFT-BELL 500KV & BELL-BOUNDARY #3 230KV	0.7	-852	0.70	-547	0.72	-1710	0.70	-400	0.70	-646	0.75	-1580	0.80	-1438	0.70	-954
N-2: TAFT-BELL 500KV & BELL-LANCASTER 230KV + RAS	0.7	-850	0.70	-547	0.73	-1635	0.70	-399	0.70	-643	0.76	-1520	0.80	-1381	0.71	-951
N-2: TAFT-BELL 500KV & BELL-TRENTWOOD #2 115KV	0.7	-852	0.70	-547	0.72	-1711	0.70	-400	0.70	-646	0.75	-1580	0.80	-1438	0.70	-954
N-2: TAFT-BELL 500KV & LANCASTER-NOXON 230KV + RAS	0.7	-851	0.70	-547	0.73	-1672	0.70	-400	0.70	-645	0.75	-1552	0.80	-1413	0.70	-953
N-2: TAFT-DWORSHAK & GARRISON-TAFT #1 500KV	0.7	-854	0.70	-548	0.72	-1743	0.70	-402	0.70	-649	0.75	-1591	0.80	-1442	0.70	-957
N-2: WAUTOMA-ROCK CK 500 KV & MIDWAY-BIG EDDY 230 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1733	0.80	-1574	0.70	-964
N-2: WAUTOMA-ROCK CK 500 KV & SPRINGCREEK-BIG EDDY 230 KV	0.7	-858	0.70	-550	0.70	-1913	0.70	-404	0.70	-659	0.73	-1733	0.80	-1574	0.70	-964
N-3: SCHULTZ-RAVER #1 & #2 & #3 500 KV	0.7	-857	0.70	-550	0.70	-1900	0.70	-403	0.70	-658	0.73	-1724	0.80	-1566	0.70	-963

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt HOT SPR_500.0 (40553) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt DWORSHAK_500.0 (40369) #s
BF 4119 Garrison-Taft #1 & Taft-Bell 500kV + RAS	OPEN Shunt HOT SPR_500.0 (40553) #s
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt DWORSHAK_500.0 (40369) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1

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Contingency	Actions Taken in the Contingency
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_ 500.0 (40957) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_ 500.0 (40941)
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_ 230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOK TAP_ 500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV	OPEN Bus SNOKING_ 500.0 (41007)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_ 500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_ 20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_ 4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_ 13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_ 20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_ 4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_ 13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_ 500.0 (40797) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_ 115.0 (42806) TO PAUL_ 500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_ 230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_ 500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_ 500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_ 500.0 (40723) TO MCNRY S1_ 230.0 (41351) CKT 1
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_ 230.0 (47814) TO 109.8 MVR
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO CEN FERY_ 500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_ 500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_ 500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_ 500.0 (40045) TO ALLSTN E_ 230.0 (40043) CKT 2

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Contingency	Actions Taken in the Contingency
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1

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Contingency	Actions Taken in the Contingency
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BYPASS SeriesCap MIDPOINT_500.0 (60240) TO MIDHEM11_500.0 (61988) CKT 1
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	SET SWITCHED SHUNT AT BUS AMPS_69.0 (65026) TO 30 MVR
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_24.0 (43047) #1
Bus: Alvey 500 kV	OPEN Bus ALVEY_500.0 (40051)
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV	OPEN Bus KEELER_500.0 (40601)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_34.5 (47902)

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-1: Allston-Keeler 500 kV	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPAVINE_500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO DIXONVLE_500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO CELILO1_500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO KNIGHT_500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV + RAS	OPEN Line BRADY_230.0 (60073) TO ANTLOPE_230.0 (65075) CKT 1
N-1: Brady-Antelope 230 kV + RAS	OPEN Bus MLCK PHA_230.0 (62355)
N-1: Brady-Antelope 230 kV + RAS	OPEN Shunt AMPS_69.0 (65026) #1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_500.0 (62013)
N-1: Broadview-Garrison #1 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_230.0 (60095) TO ONTARIO_230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-1: Cal Sub 120 kV Phase Shifter	OPEN Transformer CAL SUB_120.0 (64025) TO CAL S PS_120.0 (64023) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO OLINDA_500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVR_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVR_500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVR_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSH1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line COYOTE_500.0 (43123) TO GRASSLND_500.0 (43049) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 1
N-1: Harry Allen 345 kV Phase Shifter	OPEN Transformer HA PS_345.0 (18002) TO H ALLEN_345.0 (18001) CKT 2
N-1: Harry Allen 345 kV Phase Shifter	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Hatwai 500/230 kV Xfmr	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSBYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELLSBYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSBYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS HARNEY_115.0 (40507) TO 0 MVR
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
N-1: Hemingway-Summer Lake 500 kV	SET SWITCHED SHUNT AT BUS WALAWALA_230.0 (45327) TO 40 MVR
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line Kfalls_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACIWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Hilltop 230 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 0 MVR
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary 500/230 kV Xfmr	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 81 MVR
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Napavine-Paul 500 kV	OPEN Line NAPAVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Pinto-Four Corner 345 kV	OPEN Shunt PINTO_138.0 (66230) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO 2_13.8 (66228) #1
N-1: Pinto-Four Corner 345 kV	CLOSE Shunt PINTO 3_13.8 (66229) #1
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine POPULUS_500.0 (67794) TO CEDARHIL_500.0 (60159) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	OPEN MultiSectionLine CEDARHIL_500.0 (60159) TO HEMINWAY_500.0 (60155) CKT 2
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS MIDPOINT_500.0 (60240) TO 400 MVR
N-1: Populus-Cedar Hill-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt REDBUTTE_345.0 (66280) #1
N-1: Red Butte-Harry Allen 345 kV	OPEN Shunt GONDER1_230.0 (64205) #v
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_ 500.0 (40062) TO MARION_ 500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_ 500.0 (40062) TO MARION_ 500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_ 500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_ 500.0 (40062) TO MARION_ 500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO SLATT_ 500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_ 500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 3_ 26.0 (62048) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN Gen COLSTP 4_ 26.0 (62047) #1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	CLOSE Shunt GARRISON_ 500.0 (40459) #r
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_ 230.0 (43039) TO ROUND B N_ 230.0 (43483) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_ 500.0 (43041) TO BETHCRS1_ 500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_ 500.0 (43491) TO CDRSBET1_ 500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_ 500.0 (43950) TO CDRSBET1_ 500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN MultiSectionLine BETHEL_ 230.0 (43039) TO SANTIAM_ 230.0 (40939) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap BETHEL5_ 500.0 (43041) TO BETHCRS1_ 500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Line BETHCRS1_ 500.0 (43491) TO CDRSBET1_ 500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap CDR SPRG_ 500.0 (43950) TO CDRSBET1_ 500.0 (43951) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_ 230.0 (41342) TO CHEMAWA_ 230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_ 230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_ 230.0 (60045) TO BOIBRO31_ 230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_ 230.0 (60045) TO BOIHOR41_ 230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO HORSEFLT_ 230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_ 230.0 (60045) TO BOIBRO11_ 230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_ 230.0 (60045) TO BOIBRO21_ 230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_ 345.0 (67790) TO BRIDGER_ 345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_ 345.0 (67790) TO BRIDGER_ 345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_ 345.0 (67790) TO BRIDGER_ 345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_ 345.0 (60085) TO 3MIKNOLL_ 345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_ 345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_ 500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_ 26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_ 26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_ 22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR1EAST_ 500.0 (40451)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN1_ 500.0 (62013)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus GAR2EAST_ 500.0 (40453)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Bus TOWN2_ 500.0 (62012)
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_ 230.0 (62030) TO 31.7 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS AMPS_ 69.0 (65026) TO 30 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS DILLON S_ 69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT2_ 13.8 (62333) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt MILLCKT1_ 13.8 (62332) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS TAFT_ 500.0 (41057) TO -186 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS BZ EGALL_ 50.0 (62348) TO 20.4 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS JACKRABB_ 50.0 (62349) TO 19.7 MVR
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_ 230.0 (60150) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_ 230.0 (60275) TO IMNAHA_ 230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_ 230.0 (48197) TO IMNAHA_ 230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_ 14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_ 230.0 (60275) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_ 230.0 (60150) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_ 230.0 (60150) TO HELSCYN1_ 14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_ 14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1

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Contingency	Actions Taken in the Contingency
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_ 345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_ 345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine MONROE_ 230.0 (40747) TO NOVELTY_ 230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_ 345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_ 345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_ 345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_ 345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO VANTAGE_ 500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_ 230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_ 230.0 (26099)
N-2: DC-BIPOLE	OPEN Bus CELILO4_ 230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_ 230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_ 500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_ 500.0 (41311)
N-2: Double Palo Verde	OPEN Gen PALOVRD2_ 24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_ 24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_ 69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	CLOSE Shunt ROBINSON_ 345.0 (64885) #b1
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PINTO_ 138.0 (66230) TO 64 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS YORKCANY_ 115.0 (12091) TO 15 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS DURANGO_ 115.0 (79023) TO 40 MVR
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PEIGAN 4_ 240.0 (54165) TO 0 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_ 500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_ 230.0 (40303) TO MAPLEV12_ 230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_ 345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_ 345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_ 500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_ 26.0 (62048) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_ 26.0 (62047) #1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_ 500.0 (40459) #s
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN Line CDR SPRG_ 500.0 (43950) TO GRASSLND_ 500.0 (43049) CKT 1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTE_ 500.0 (43123) TO GRASSLND_ 500.0 (43049) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line SLATT_ 500.0 (40989) TO COYOTETP_ 500.0 (40725) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTETP_ 500.0 (40725) TO LONGHORN_ 500.0 (40724) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO MALIN_ 500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	OPEN Bus PONDROSB_ 500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO MALIN_ 500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO MALIN_ 500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_ 500.0 (40687) TO SUMMER L_ 500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO LOW MON_ 500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO WAUTOMA_ 500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO WAUTOMA_ 500.0 (41138) CKT 2
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Line HELLSCYN_ 230.0 (60150) TO BROWNLEE_ 230.0 (60095) CKT 1
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	OPEN Bus IMNAHA_ 230.0 (60278)
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO JOHN DAY_ 500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine GRIZZLY_ 500.0 (40489) TO JOHN DAY_ 500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_ 500.0 (40585) TO MARION_ 500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDR_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDR_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPA VINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV	OPEN Line PEARL_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughn 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGHN_230.0 (43313) CKT 1
N-2: Paul-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Line OSTRNDR_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Paul-Ostrander 500 kV & Ostrander-McLoughn 230 kV	OPEN Bus OSTRNDR_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL S3_230.0 (40090) TO LANCASTR_230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop

Appendix J - 16la1sa_3400idnw_Path24 Base Case Studied Contingencies & Associated Actions

Contingency	Actions Taken in the Contingency
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV + RAS	OPEN Bus BELL_SC_500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL_BPA_115.0 (40087) TO BIGELOW_115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL_SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL_SC_500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN MultiSectionLine BELL_SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV + RAS	OPEN Bus BELL_SC_500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #s
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK_CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK_CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4

Appendix K

16hs2a_2250idnw_N_lh Base Case (Longhorn Terminus Sensitivity Study)

Appendix K – 16hs2a_2250idnw_lh Case Post-Transient Contingency Results

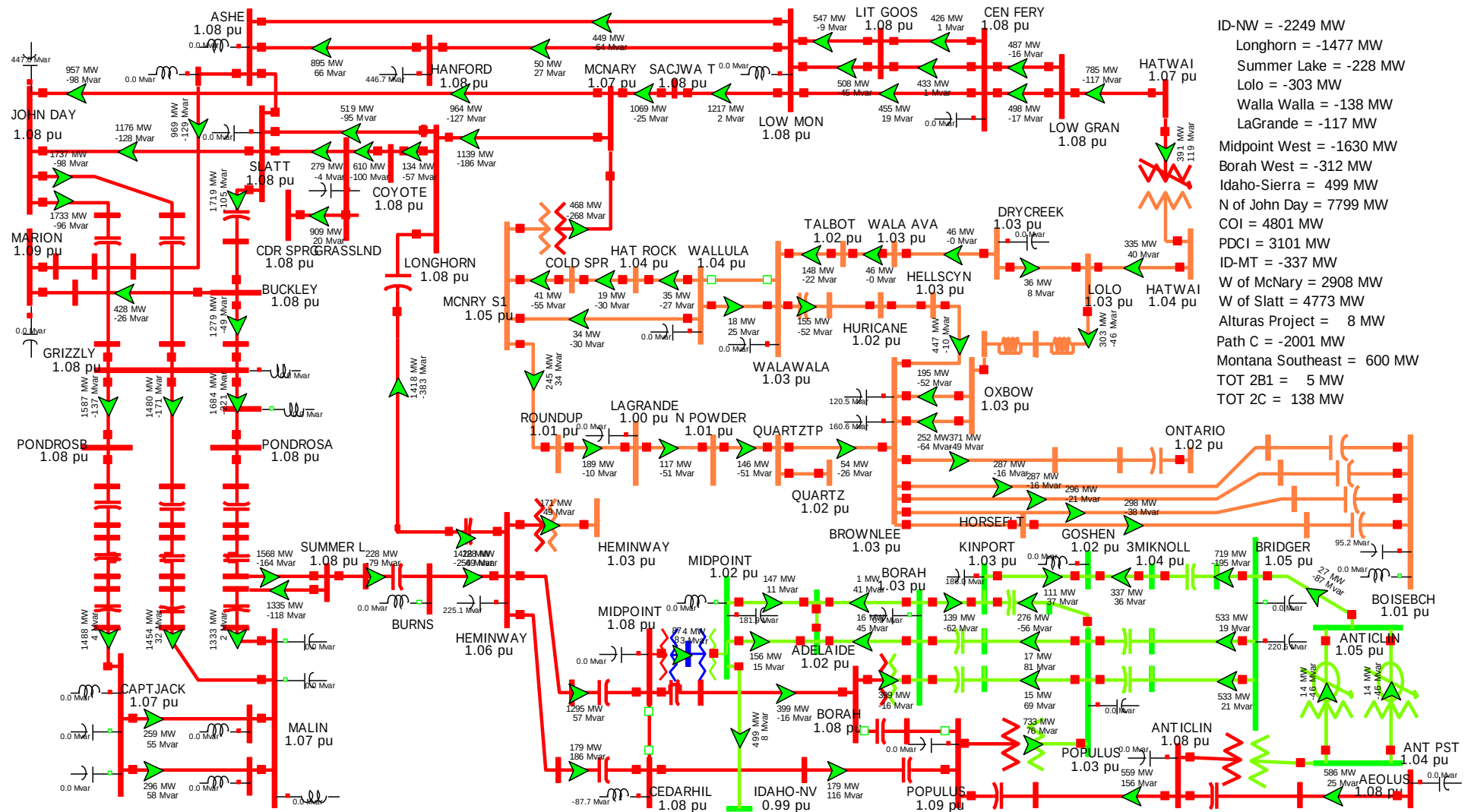


Figure K5: 16hs2a_2250idnw_lh Case **Pre-Contingency**

Appendix K – 16hs2a_2250idnw_lh Case Post-Transient Contingency Results

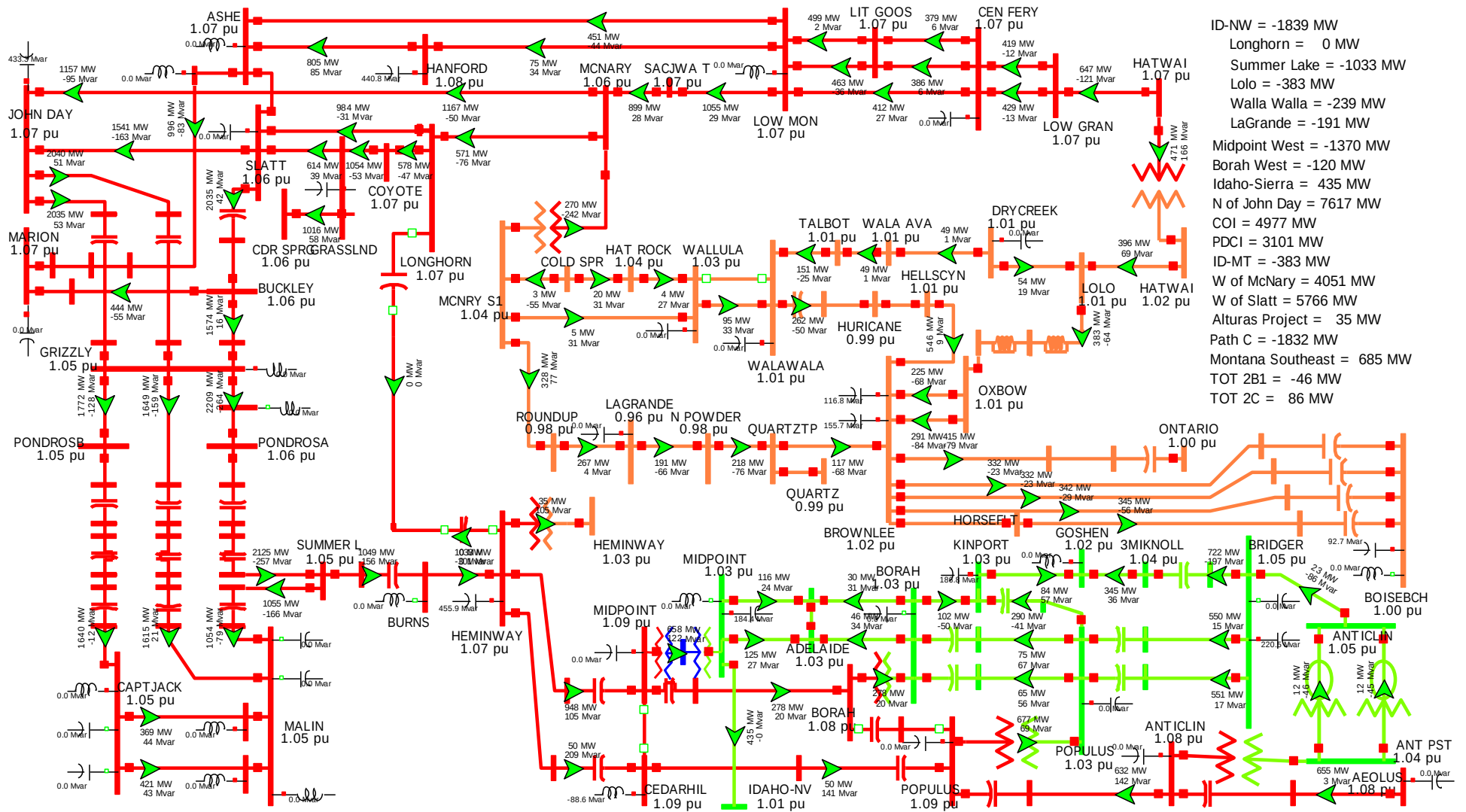


Figure K6: 16hs2a_2250idnw_lh Case N-1: Hemingway-Longhorn 500 kV+PTSN Shunt

Appendix K – 16hs2a_2250idnw_lh Case Post-Transient Contingency Results

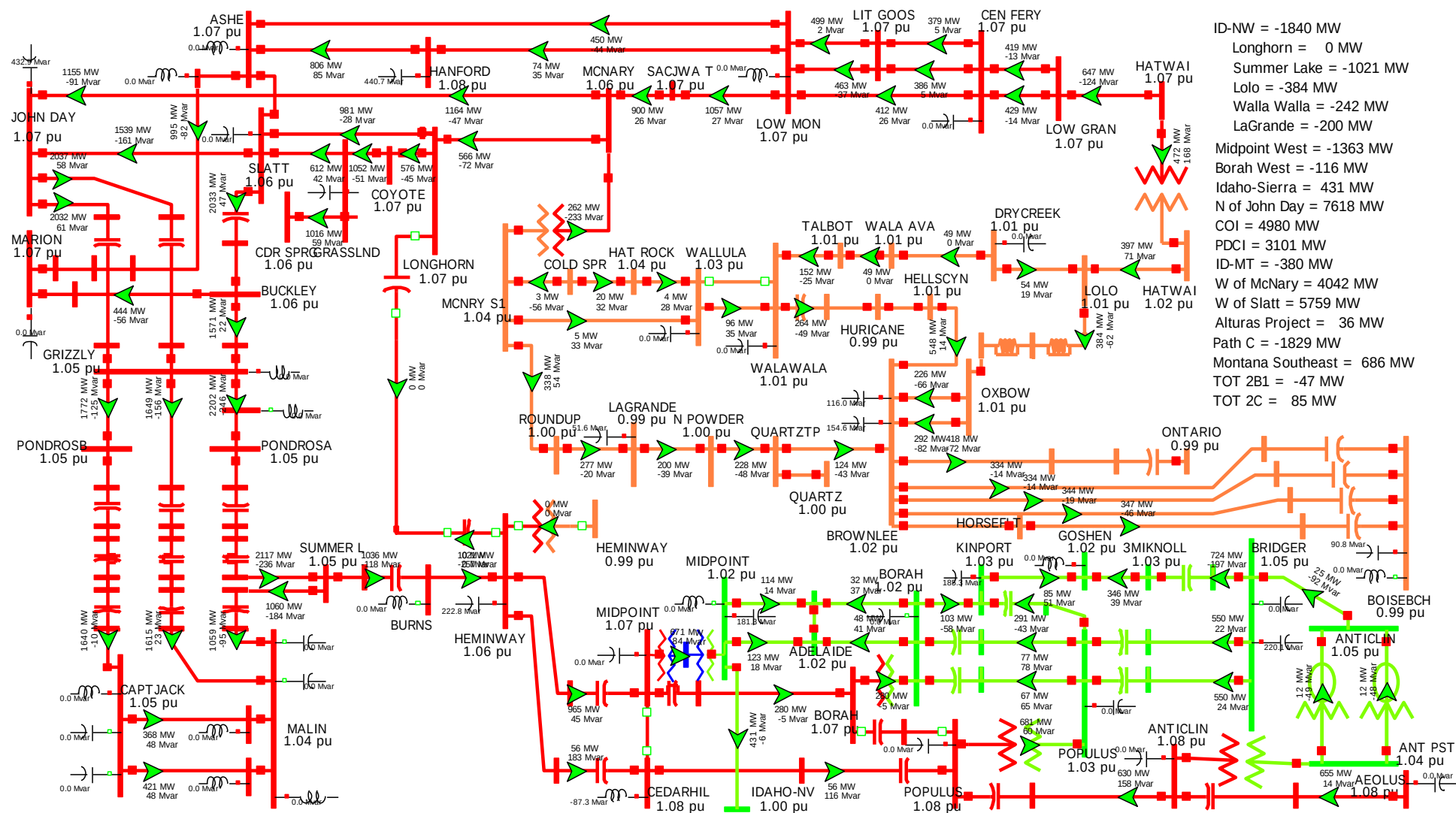


Figure K7: 16hs2a 2250idnw lh Case **BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr**

Appendix K – 16hs2a_2250idnw_lh Case Post-Transient Contingency Results

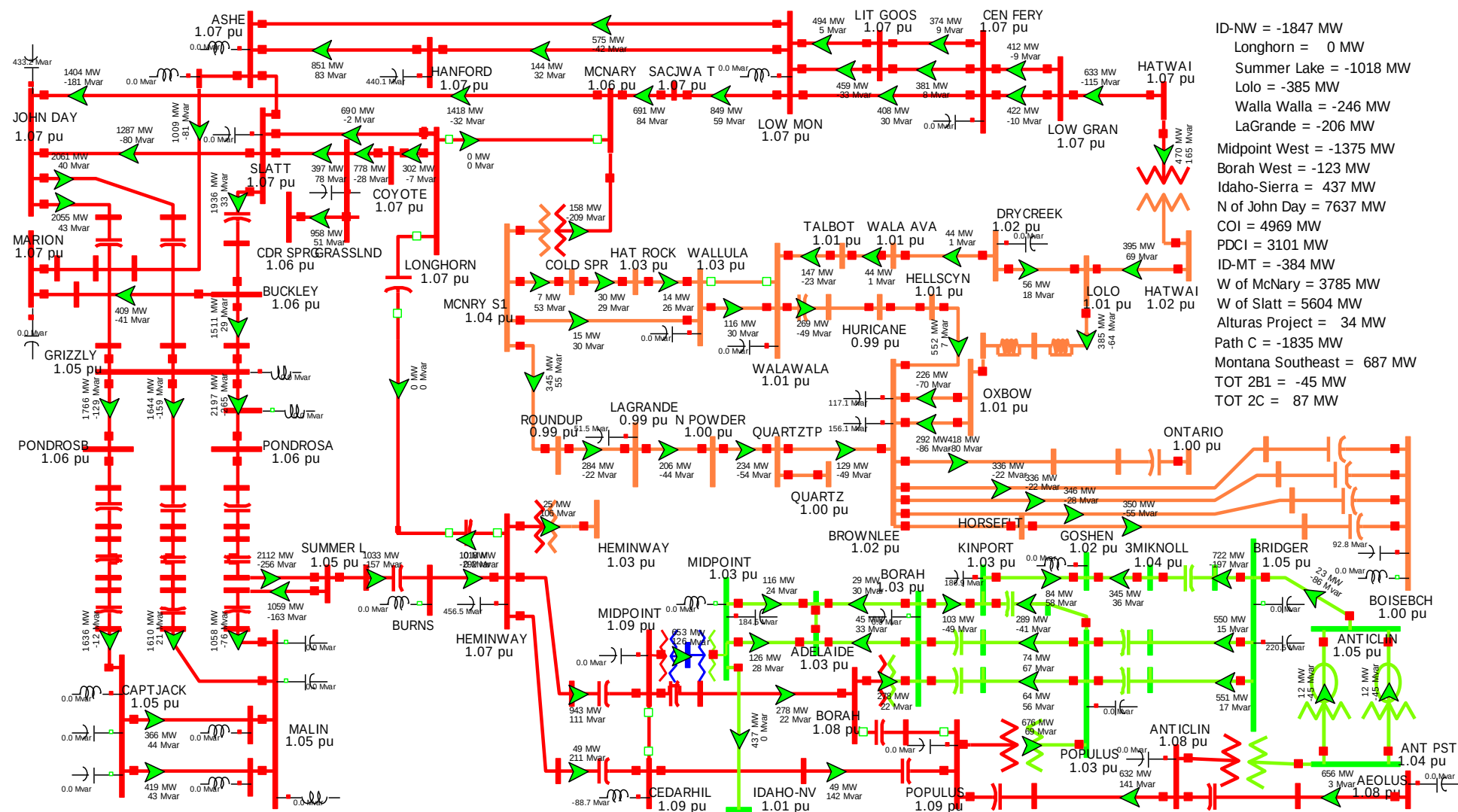


Figure K8: 16hs2a 2250idnw lh Case **BF LH Hemingway-Longhorn 500 kV & McNary-Longhorn 500 kV**

Appendix K – 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Appendix K - 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	MERIDINP (45197) -> MERIDINP (45195) CKT 2 at MERIDINP	Branch MVA	364.1	674.1	650.0	103.7%	780.0	86.4%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	637.1	1194.7	979.0	122.0%	1287.7	92.8%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	303.9	767.0	722.9	106.1%	1265.2	60.6%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1713.0	2963.3	2442.0	121.3%	3235.5	91.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1713.0	2963.3	2199.9	134.7%	3235.5	91.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALROU21	Branch Amp	1712.1	2956.2	2666.9	110.8%	3999.9	73.9%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1702.9	2945.2	2667.0	110.4%	4000.0	73.6%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALROU11	Branch Amp	1666.6	2880.5	2699.7	106.7%	3999.9	72.0%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at ROUND MT	Branch Amp	1658.9	2864.7	2699.7	106.1%	4000.0	71.6%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1713.0	3000.6	2442.0	122.9%	3235.5	92.7%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1713.0	3000.6	2199.9	136.4%	3235.5	92.7%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1712.1	2993.2	2666.9	112.2%	3999.9	74.8%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1702.9	2982.6	2667.0	111.8%	4000.0	74.6%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	269.9	327.3	320.0	102.3%	370.0	88.5%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.6	1041.4	950.0	109.6%	1286.0	81.0%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	269.9	333.8	320.0	104.3%	370.0	90.2%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.6	1053.1	950.0	110.9%	1286.0	81.9%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	897.2	1027.4	1009.1	101.8%	1285.2	79.9%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	814.9	800.0	101.9%	1199.9	67.9%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	765.9	958.7	920.0	104.2%	1046.8	91.6%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations							
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1356.6	1237.0	109.7%	1396.0	97.2%
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1012.6	920.0	110.1%	1046.8	96.7%
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	834.4	800.0	104.3%	1199.9	69.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1030.8	920.0	112.0%	1046.8	98.5%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1370.3	1237.0	110.8%	1396.0	98.2%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	810.4	800.0	101.3%	1199.9	67.5%
BF IPC Populus-CHill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations							
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1298.7	1237.0	105.0%	1396.0	93.0%
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	765.9	971.9	920.0	105.6%	1046.8	92.9%
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	819.5	800.0	102.4%	1199.9	68.3%
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1357.0	1237.0	109.7%	1396.0	97.2%
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1009.5	920.0	109.7%	1046.8	96.4%
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	835.3	800.0	104.4%	1199.9	69.6%
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1363.3	1237.0	110.2%	1396.0	97.7%
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1012.0	920.0	110.0%	1046.8	96.7%
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	836.7	800.0	104.6%	1199.9	69.7%
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1366.6	1237.0	110.5%	1396.0	97.9%
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1010.7	920.0	109.9%	1046.8	96.6%
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	836.3	800.0	104.5%	1199.9	69.7%
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	No Violations							
BF LH Longhorn-Coyote & Longhorn-Slatt 500 kV	No Violations							
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	No Violations							
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	No Violations							
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	No Violations							
BF LH McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF Lolo 230kV	No Violations							
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 2	No Violations							
BF McNary 230 kV SECT 3	No Violations							
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	No Violations							
Bus: Alvey 500 kV + RAS	No Violations							
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Allston-Keeler 500 kV + RAS	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	897.2	1071.9	1009.1	106.2%	1285.2	83.4%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1713.0	2585.0	2442.0	105.9%	3235.5	79.9%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1713.0	2585.0	2199.9	117.5%	3235.5	79.9%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1768.1	2389.5	2199.9	108.6%	3280.5	72.8%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1753.2	2369.3	2199.9	107.7%	3280.5	72.2%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2596.0	2477.9	104.8%	3999.9	64.9%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	897.2	1016.4	1009.1	100.7%	1285.2	79.1%
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	637.1	1152.1	979.0	117.7%	1287.7	89.5%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	815.7	800.0	102.0%	1199.9	68.0%
N-1: Dworshak-Hatwai 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts	0.961	0.911				-5.20%
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	818.0	800.0	102.2%	1199.9	68.2%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	765.9	958.3	920.0	104.2%	1046.8	91.6%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	765.9	965.8	920.0	105.0%	1046.8	92.3%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1355.1	1237.0	109.5%	1396.0	97.1%
N-1: Hemingway-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1011.5	920.0	109.9%	1046.8	96.6%
N-1: Hemingway-Longhorn 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	833.0	800.0	104.1%	1199.9	69.4%
N-1: Hemingway-Longhorn 500 kV	AMPS (65025)	% Δ Volts	0.967	0.902				-6.72%
N-1: Hemingway-Longhorn 500 kV	PTRSNFLT (62030)	% Δ Volts	0.961	0.885				-7.91%
N-1: Hemingway-Longhorn 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1689.8	2903.2	2400.0	121.0%	3199.9	90.7%
N-1: Hemingway-Longhorn 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1696.5	2923.3	2400.0	121.8%	3800.0	76.9%
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1088.5	1349.9	1237.0	109.1%	1396.0	96.7%
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	765.9	1007.0	920.0	109.5%	1046.8	96.2%
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	834.0	800.0	104.2%	1199.9	69.5%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							

Appendix K - 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1713.0	2965.5	2442.0	121.4%	3235.5	91.7%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1713.0	2965.5	2199.9	134.8%	3235.5	91.7%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1712.1	2958.1	2666.9	110.9%	3999.9	74.0%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1702.9	2947.7	2667.0	110.5%	4000.0	73.7%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1666.6	2937.7	2699.7	108.8%	3999.9	73.4%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1658.9	2924.5	2699.7	108.3%	4000.0	73.1%
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	No Violations							
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	No Violations							
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at HORIZN	Branch MVA	269.9	350.1	320.0	109.4%	370.0	94.6%
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.6	1180.7	950.0	124.3%	1286.0	91.8%
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	269.9	325.8	320.0	101.8%	370.0	88.1%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.6	1036.2	950.0	109.1%	1286.0	80.6%
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1768.1	3179.2	2199.9	144.5%	3280.5	96.9%

Appendix K - 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUTAB21	Branch Amp	1768.1	3179.2	2667.0	119.2%	4000.0	79.5%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at TABLE MT	Branch Amp	1758.0	3165.3	2667.0	118.7%	4000.0	79.1%
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2892.7	2477.9	116.7%	3999.9	72.3%
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	1945.6	2892.7	2667.0	108.5%	4000.0	72.3%
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at VACA-DIX	Branch Amp	1919.6	2872.2	2667.0	107.7%	4000.0	71.8%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1453.5	2598.1	2230.0	116.5%	3555.9	73.1%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.6	814.3	800.0	101.8%	1199.9	67.9%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	897.2	1035.8	1009.1	102.6%	1285.2	80.6%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	897.2	1101.3	1009.1	109.1%	1285.2	85.7%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	BRIDGER (60085) -> BRI3MI11 (61999) CKT 1 at BRIDGER	Branch Amp	1190.4	1731.0	1600.0	108.2%	1919.0	90.2%
N-2: Bridger-Populus #1 & #2 345 kV	SODA (66385) -> GRACE (65695) CKT 1 at SODA	Branch Amp	392.0	539.9	539.7	100.0%	644.3	83.8%
N-2: Bridger-Populus #1 & #2 345 kV	BRI3MI11 (61999) -> 3MIKNOLL (60084) CKT 1 at 3MIKNOLL	Branch Amp	1163.2	1686.8	1650.1	102.2%	2227.4	75.7%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> BRIDGER (65220) CKT 2 at BRIDGER	Branch MVA	114.0	206.4	200.0	103.2%	220.0	93.8%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> BRIDGER (65220) CKT 1 at BRIDGER	Branch MVA	112.1	203.0	200.0	101.5%	220.0	92.3%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> BRIDGER (65220) CKT 3 at BRIDGER	Branch MVA	112.1	203.0	200.0	101.5%	220.0	92.3%
N-2: Broadview-Garrisons #1 & #2 500 kV + RAS	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	765.9	937.8	920.0	101.9%	1046.8	89.6%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							

Appendix K - 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1689.8	2739.0	2400.0	114.1%	3199.9	85.6%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1713.0	2382.8	2199.9	108.3%	3235.5	73.6%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1768.1	2379.5	2199.9	108.2%	3280.5	72.5%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1696.5	2753.3	2400.0	114.7%	3800.0	72.5%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1753.2	2359.4	2199.9	107.2%	3280.5	71.9%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2549.0	2477.9	102.9%	3999.9	63.7%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1488.8	2181.9	2134.0	102.2%	3499.9	62.3%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1470.7	2152.3	2134.0	100.9%	3499.9	61.5%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1689.8	2524.1	2400.0	105.2%	3199.9	78.9%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1696.5	2542.8	2400.0	105.9%	3800.0	66.9%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	No Violations							
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	No Violations							
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1696.5	3292.2	2400.0	137.2%	3800.0	86.6%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1430.3	3225.4	2700.0	119.5%	4000.0	80.6%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1615.3	3125.6	2400.0	130.2%	3800.0	82.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1600.6	3112.0	2400.0	129.7%	3800.0	81.9%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1615.3	3176.2	2400.0	132.3%	3800.0	83.6%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1600.6	3165.6	2400.0	131.9%	3800.0	83.3%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1840.8	3121.7	2900.0	107.6%	4350.0	71.8%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH12	Branch Amp	1844.3	3469.8	3000.0	115.7%	4050.0	85.7%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at HORIZN	Branch MVA	269.9	346.7	320.0	108.3%	370.0	93.7%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.6	1181.0	950.0	124.3%	1286.0	91.8%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	79.2	96.3	94.0	102.5%	139.0	69.3%
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	No Violations							
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1842.0	3905.7	2667.4	146.4%	4099.2	95.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1808.4	3792.1	2667.4	142.2%	4099.2	92.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPOLI11	Branch Amp	1808.4	3792.1	2667.4	142.2%	4099.2	92.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1922.7	3239.2	2993.0	108.2%	4514.9	71.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1922.7	3239.2	2993.0	108.2%	4514.9	71.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1891.8	3204.3	2993.0	107.1%	4514.9	71.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1891.8	3204.3	2993.0	107.1%	4514.9	71.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1870.5	3165.6	2993.0	105.8%	4514.9	70.1%

Appendix K - 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020)	% Δ Volts	1.056	1.003				-5.02%
N-2: Malin-Round Mtn #1 & #2 500 kV	WDJCT L1 (45522)	% Δ Volts	1.007	0.951				-5.56%
N-2: Malin-Round Mtn #1 & #2 500 kV	WEED JCT (45525)	% Δ Volts	1.007	0.951				-5.56%
N-2: Malin-Round Mtn #1 & #2 500 kV	WEED (45524)	% Δ Volts	1.003	0.946				-5.68%
N-2: Malin-Round Mtn #1 & #2 500 kV	MTSHASTA (44970)	% Δ Volts	0.989	0.931				-5.86%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025)	% Δ Volts	1.041	0.978				-6.05%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	HORSE HV (40547)	% Δ Volts	1.032	0.980				-5.04%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	No Violations							
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Raver & Raver-Covington 4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	269.9	327.8	320.0	102.5%	370.0	88.6%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.6	1041.9	950.0	109.7%	1286.0	81.0%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLoughlin 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covington 4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	670.9	860.1	830.9	103.5%	926.3	92.9%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1842.0	3598.8	2667.4	134.9%	4099.2	87.8%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1808.4	3500.2	2667.4	131.2%	4099.2	85.4%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1808.4	3489.4	2667.4	130.8%	4099.2	85.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1922.7	3436.0	2993.0	114.8%	4514.9	76.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1922.7	3436.0	2993.0	114.8%	4514.9	76.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1891.8	3415.3	2993.0	114.1%	4514.9	75.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1891.8	3415.3	2993.0	114.1%	4514.9	75.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1870.5	3382.3	2993.0	113.0%	4514.9	74.9%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCHE (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	286.9	922.6	825.9	111.7%	976.5	94.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	233.9	864.1	825.1	104.7%	975.0	88.6%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCHEJ (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	393.2	470.8	462.9	101.7%	579.9	81.2%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1945.6	2487.0	2477.9	100.4%	3999.9	62.2%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							

Appendix K - 16hs2a_2250idnw_lh Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_ 18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_ 18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_ 18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_ 500.0 (40724) TO MCNARY_ 500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACIWA T_ 500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_ 500.0 (40665) TO LOW MON_ 500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_ 500.0 (40499) TO LOW MON_ 500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_ 500.0 (40683) #s
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_ 500.0 (50194) TO CUSTER W_ 500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_ 500.0 (40323) TO CUSTER W_ 230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_ 500.0 (40957) TO SICKLER_ 500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_ 500.0 (40973) TO DOUGLAS_ 230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_ 500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_ 500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_ 500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	CLOSE MultiSectionLine PEARL_ 500.0 (40827) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_ 230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_ 500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_ 500.0 (40809) TO KNIGHT_ 500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPAVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South of Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_ 500.0 (40699) TO PEARL_ 500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_ 500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_ 500.0 (40827) TO PEARL E_ 230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_ 13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_ 13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_ 13.8 (42042) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_ 13.8 (42043) #3

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAIVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAIVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_500.0 (40521)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_230.0 (40519)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line NPULLMAN_115.0 (48291) TO SHAWNEE_115.0 (48383) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48245) TO SPULLMAN_115.0 (48413) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS HOT SPR_500.0 (40553) TO -148.3 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	CLOSE Line LEON_115.0 (48183) TO MOSCCITY_115.0 (48243) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCCITY_115.0 (48243) TO MOSCITYT_115.0 (48245) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS N LEWIST_115.0 (48253) TO 44.4 MVR
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACIWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus LNGHRN1_230.0 (99000)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus LNGHRN1A_230.0 (99001)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 1_34.5 (99003)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 C1_34.5 (99004)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 W1_0.6 (99005)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 2_34.5 (99006)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 C2_34.5 (99007)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 W2_0.6 (99008)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 1_34.5 (99009)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 C1_34.5 (99010)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 W1_0.6 (99011)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 2_34.5 (99012)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 C2_34.5 (99013)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 W2_0.6 (99014)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 1_34.5 (99015)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 C1_34.5 (99016)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 W1_0.6 (99017)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 2_34.5 (99018)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 C2_34.5 (99019)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 W2_0.6 (99020)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 1_34.5 (99021)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 C1_34.5 (99022)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 W1_0.6 (99023)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 2_34.5 (99024)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 C2_34.5 (99025)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 W2_0.6 (99026)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 1_34.5 (99103)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 C1_34.5 (99104)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 W1_0.6 (99105)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 2_34.5 (99106)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 C2_34.5 (99107)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 W2_0.6 (99108)
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
BF LH Hemingway-Longhorn & Longhorn 500/230 Xfmr	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR

Appendix K - 16hs2a_2250idnw_N_lh Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF LH Hemingway-Longhorn & Longhorn-Coyote 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
BF LH Hemingway-Longhorn & Longhorn-Slatt 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
BF LH Hemingway-Longhorn & McNary-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus LNGHRN1_230.0 (99000)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus LNGHRN1A_230.0 (99001)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0362 1_34.5 (99003)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0362 C1_34.5 (99004)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0362 W1_0.6 (99005)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0362 2_34.5 (99006)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0362 C2_34.5 (99007)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0362 W2_0.6 (99008)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0363 1_34.5 (99009)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0363 C1_34.5 (99010)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0363 W1_0.6 (99011)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0363 2_34.5 (99012)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0363 C2_34.5 (99013)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0363 W2_0.6 (99014)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0365 1_34.5 (99015)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0365 C1_34.5 (99016)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0365 W1_0.6 (99017)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0365 2_34.5 (99018)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0365 C2_34.5 (99019)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0365 W2_0.6 (99020)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0366 1_34.5 (99021)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0366 C1_34.5 (99022)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0366 W1_0.6 (99023)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0366 2_34.5 (99024)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0366 C2_34.5 (99025)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0366 W2_0.6 (99026)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0341 1_34.5 (99103)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0341 C1_34.5 (99104)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0341 W1_0.6 (99105)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0341 2_34.5 (99106)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0341 C2_34.5 (99107)
BF LH Longhorn-Coyote & Longhorn 500/230 Xfmr	OPEN Bus G0341 W2_0.6 (99108)
BF LH Longhorn-Coyote & Longhorn-Slatt 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
BF LH Longhorn-Coyote & Longhorn-Slatt 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF LH Longhorn-Coyote & Longhorn-Slatt 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus COYOTETP_500.0 (40725)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus LNGHRN1_230.0 (99000)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus LNGHRN1A_230.0 (99001)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0362 1_34.5 (99003)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0362 C1_34.5 (99004)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0362 W1_0.6 (99005)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0362 2_34.5 (99006)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0362 C2_34.5 (99007)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0362 W2_0.6 (99008)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0363 1_34.5 (99009)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0363 C1_34.5 (99010)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0363 W1_0.6 (99011)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0363 2_34.5 (99012)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0363 C2_34.5 (99013)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0363 W2_ 0.6 (99014)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0365 1_ 34.5 (99015)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0365 C1_ 34.5 (99016)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0365 W1_ 0.6 (99017)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0365 2_ 34.5 (99018)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0365 C2_ 34.5 (99019)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0365 W2_ 0.6 (99020)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0366 1_ 34.5 (99021)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0366 C1_ 34.5 (99022)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0366 W1_ 0.6 (99023)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0366 2_ 34.5 (99024)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0366 C2_ 34.5 (99025)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0366 W2_ 0.6 (99026)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0341 1_ 34.5 (99103)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0341 C1_ 34.5 (99104)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0341 W1_ 0.6 (99105)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0341 2_ 34.5 (99106)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0341 C2_ 34.5 (99107)
BF LH Longhorn-Slatt & Longhorn 500/230 Xfmr	OPEN Bus G0341 W2_ 0.6 (99108)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus LNHRN1_230.0 (99000)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus LNHRN1A_230.0 (99001)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 1_ 34.5 (99003)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 C1_ 34.5 (99004)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 W1_ 0.6 (99005)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 2_ 34.5 (99006)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 C2_ 34.5 (99007)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0362 W2_ 0.6 (99008)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 1_ 34.5 (99009)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 C1_ 34.5 (99010)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 W1_ 0.6 (99011)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 2_ 34.5 (99012)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 C2_ 34.5 (99013)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0363 W2_ 0.6 (99014)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 1_ 34.5 (99015)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 C1_ 34.5 (99016)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 W1_ 0.6 (99017)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 2_ 34.5 (99018)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 C2_ 34.5 (99019)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0365 W2_ 0.6 (99020)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 1_ 34.5 (99021)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 C1_ 34.5 (99022)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 W1_ 0.6 (99023)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 2_ 34.5 (99024)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 C2_ 34.5 (99025)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0366 W2_ 0.6 (99026)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 1_ 34.5 (99103)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 C1_ 34.5 (99104)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 W1_ 0.6 (99105)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 2_ 34.5 (99106)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 C2_ 34.5 (99107)
BF LH McNary-Longhorn & Longhorn 500/230 Xfmr	OPEN Bus G0341 W2_ 0.6 (99108)
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
BF LH McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF LH McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
BF LH McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_ 13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_ 13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_ 13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_ 230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_ 230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_ 115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_ 115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_ 115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_ 13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_ 69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_ 69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_ 12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_ 69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus IONE_ 69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_ 115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_ 115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_ 230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_ 230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_ 230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_ 100.0 (44115)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_ 100.0 (44116)
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_ 230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_ 230.0 (44125)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_ 230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_ 230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_ 100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_ 13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_ 13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_ 100.0 (44118)
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_ 13.8 (44107)
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_ 13.8 (44108)
BF McNary 230 kV SECT 2	SET SWITCHED SHUNT AT BUS JONESCYN_ 230.0 (47814) TO 52.2 MVR
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_ 230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_ 230.0 (44127)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_ 100.0 (44119)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_ 100.0 (44120)
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_ 13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_ 13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_ 13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_ 13.8 (44112)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_ 345.0 (40721)
BF McNary 230 kV SECT 3	OPEN Bus FRANKLIN_ 230.0 (40443)
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD CT_ 18.5 (43044) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD ST_ 16.0 (43045) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD CT_ 18.5 (43044) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD ST_ 16.0 (43045) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Line GRASSLND_ 500.0 (43049) TO COYOTE_ 500.0 (43123) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_ 24.0 (43047) TO GRASSLND_ 500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_ 500.0 (43049) TO SLATT_ 500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_ 24.0 (43047) #1
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_ 500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_ 500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_ 500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_ 500.0 (45095)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_ 230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #2
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_ 115.0 (40893) #3
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_ 500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_ 500.0 (40601)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC_1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC_1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF_3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF_2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE_1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF_1_34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN_1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK_2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK_1_34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR_1_34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST_1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_500.0 (40045) TO NAPAVALINE_500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO DIXONVLE_500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_500.0 (40096)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO CELILO1_500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO KNIGHT_500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_230.0 (60073) TO ANTLOPE_230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_230.0 (60095) TO ONTARIO_230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO OLINDA_500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHEL5_500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_500.0 (43123) TO LONGHORN_500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO LOLO_230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO N LEWIST_230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_230.0 (48512) TO WALA AVA_230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELSYCN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Longhorn 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
N-1: Hemingway-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Longhorn 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Longhorn 500 kV + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
N-1: Hemingway-Longhorn 500 kV + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Longhorn 500 kV + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Longhorn 500 kV + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Longhorn 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Longhorn 500 kV + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Longhorn 500 kV + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Longhorn 500 kV + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO LONGHORN_500.0 (40724) CKT 1
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYOTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	CLOSE Shunt HUMBOLT1_24.9 (64216) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACJWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_230.0 (40939) #s
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_230.0 (41352) TO MCNRY S3_230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Roundup 230 kV	SET SWITCHED SHUNT AT BUS LAGRANDE_230.0 (40621) TO 52.2 MVR
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACIWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_230.0 (40537) TO 52.2 MVR
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPAIVINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVEN_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVEN_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Table Mtn-Vaca Dixon 500 kv	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kv Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kv Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kv	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kv	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kv	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kv	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kv	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kv	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kv	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kv	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kv	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kv	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kv	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kv	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kv	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kv	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kv	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kv	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kv	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kv	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kv	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kv	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kv	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kv + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kv + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kv + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bell-Taft & Taft-Dworskak 500 kv + RAS	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Bethel-Cedar Spring 500 kv & Bethel-Round Butte 230 kv	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Spring 500 kv & Bethel-Round Butte 230 kv	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kv & Bethel-Round Butte 230 kv	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kv & Bethel-Round Butte 230 kv	OPEN Bus BETHEL5_500.0 (43041)
N-2: Bethel-Cedar Spring 500 kv & Bethel-Santiam 230 kv	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Spring 500 kv & Bethel-Santiam 230 kv	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kv & Bethel-Santiam 230 kv	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kv & Bethel-Santiam 230 kv	OPEN Bus BETHEL5_500.0 (43041)
N-2: Big Eddy-Ostrander 500 kv & Big Eddy-Chemawa 230 kv	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kv & Big Eddy-Chemawa 230 kv	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kv & Big Eddy-Troutdale 230 kv	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kv & Big Eddy-Troutdale 230 kv	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kv	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kv	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kv	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kv	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kv	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kv	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kv	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kv	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kv	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kv	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kv	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kv	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kv	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kv	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kv	SET SWITCHED SHUNT AT BUS POPULUS_345.0 (67790) TO 200 MVR
N-2: Broadview-Garrison #1 & #2 500 kv + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garrison #1 & #2 500 kv + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garrison #1 & #2 500 kv + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kv + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt PTRSNFLT_230.0 (62030) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt OREBASIN_230.0 (66145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt FRANNIE2_34.5 (67145) #1
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	OPEN Shunt GARLAND1_34.5 (67147) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Double Palo Verde	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_345.0 (40721) TO ROSS_345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_230.0 (60177) TO MIDPOINT_230.0 (60232) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO NAPAVALINE_500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_115.0 (40539) TO VALLEY T_115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_230.0 (40207) TO LONGVW T_230.0 (40673) CKT 2
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL #_230.0 (43773) TO SHERWOOD_230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougln 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougln 230 kV	OPEN MultiSectionLine BIGEDDY3_230.0 (41343) TO MCLOUGLN_230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougln 230 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougln 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_230.0 (47748)
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVER_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_ 13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_ 13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_ 13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_ 13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_ 13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_ 500.0 (30005) TO RD MT 1M_ 500.0 (30065) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_ 500.0 (40957) TO VANTAGE_ 500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_ 500.0 (40957) TO WAUTOMA_ 500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_ 500.0 (40957) TO SICKLER_ 500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_ 500.0 (40957) TO VANTAGE_ 500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_ 500.0 (30015) TO TESLA_ 500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 1_ 12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 2_ 12.5 (38830)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 3_ 12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 4_ 12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 5_ 12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_ 13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_ 13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_ 13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_ 13.8 (38715)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_ 13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_ 13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_ 13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA A_ 13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA B_ 13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA D_ 13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA E_ 13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA C_ 13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_ 13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_ 13.2 (38780)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_ 13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_ 13.2 (38805)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_ 13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_ 13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_ 13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_ 13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_ 13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_ 13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_ 13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_ 13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_ 11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_ 11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_ 18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_ 18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_ 18.0 (34604)
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_ 230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_ 115.0 (40087) TO BIGELOW_ 115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_ 500.0 (40096)

Appendix K - 16hs2a_2250idnw_N_Ih Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_230.0 (40624) TO NOXONBPA_230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL_SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL_SC_500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK_CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK_CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4

Appendix L

16hs2a_2250idnw_N_nvmod Base Case (NV Energy Updates Sensitivity Study

Appendix L – 16hs2a_2250idnw_nvmod Case Post-Transient Contingency Results

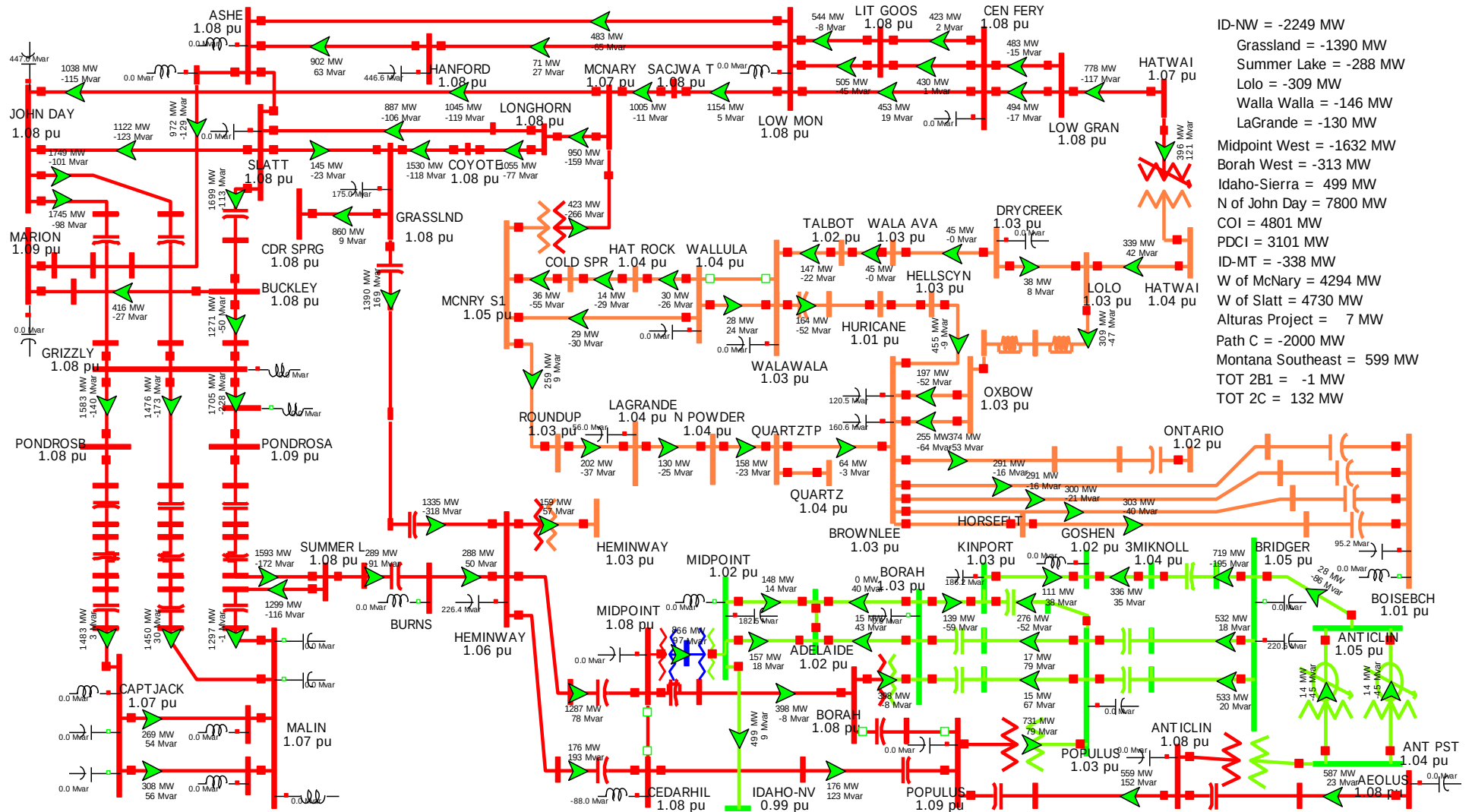


Figure L9: 16hs2a_2250idnw_nvmod Case Pre-Contingency

Western United States Power Grid

Legend:

- ID-NW = -1861 MW
- Grassland = 0 MW
- Summer Lake = -1050 MW
- Lolo = -382 MW
- Walla Walla = -238 MW
- LaGrande = -198 MW
- Midpoint West = -1385 MW
- Borah West = -132 MW
- Idaho-Sierra = 438 MW
- N of John Day = 7627 MW
- COI = 4972 MW
- PDCI = 3101 MW
- ID-MT = -382 MW
- W of McNary = 4051 MW
- W of Slatt = 5727 MW
- Alturas Project = 33 MW
- Path C = -1840 MW
- Montana Southeast = 677 MW
- TOT 2B1 = -49 MW
- TOT 2C = 83 MW

Figure L10: 16hs2a_2250idnw_nvmod Case N-1: Hemingway-Grassland 500 kV + PTSN Shunt

ASHE 1.08 pu
JOHN DAY 1.09 pu
MARION 1.09 pu
GRIZZLY 1.08 pu
PONDROSA 1.08 pu
CAPT JACK 1.07 pu
MALIN 1.07 pu
HANFORD 1.08 pu
LONGHORN 1.08 pu
SLATT 1.08 pu
CDR SPRG 1.08 pu
BUCKLEY 1.08 pu
PONDROSA 1.09 pu
SUMMER L 1.08 pu
HEMINWAY 1.08 pu
CEDARHIL 1.07 pu
IDAHO-NV 1.00 pu
POPULUS 1.07 pu
MCNARY 1.07 pu
SACJWA T 1.08 pu
LOW MON 1.08 pu
WALLULA 1.03 pu
TALBOT 1.01 pu
WALA AWA 1.01 pu
HELLSCYN 1.01 pu
HURICANE 0.99 pu
WALAWALA 1.01 pu
QUARTZ 1.00 pu
QUARTZTP 1.00 pu
QUARTZ 1.00 pu
BROWNLEE 1.01 pu
BORAH 1.01 pu
ADELAIDE 1.00 pu
BORAH 1.06 pu
POPULUS 1.02 pu
ANTICLIN 1.04 pu
ANT PST 1.03 pu
AEOLUS 1.07 pu
CEN FERY 1.08 pu
LOW GRAN 1.08 pu
HATWAI 1.07 pu
LOLO 1.01 pu
HATWAI 1.03 pu
ONTARIO 0.99 pu
BRIDGER 1.05 pu
BOISEBCH 0.98 pu
ANTICLIN 1.04 pu
ANT PST 1.03 pu
AEOLUS 1.07 pu

Power Sources and Capacities:

- Grassland = -1125 MW
- Summer Lake = 92 MW
- Lolo = -393 MW
- Walla Walla = -252 MW
- LaGrande = -206 MW
- Midpoint West = -430 MW
- Borah West = 752 MW
- Idaho-Sierra = 367 MW
- N of John Day = 7636 MW
- COI = 5072 MW
- PDCI = 3101 MW
- ID-MT = -362 MW
- W of McNary = 4107 MW
- W of Slatt = 4779 MW
- Alturas Project = 49 MW
- Path C = -1795 MW
- Montana Southeast = 647 MW
- TOT 2B1 = -60 MW
- TOT 2C = 71 MW

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	No Violations							
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	614.0	1156.6	979.0	118.1%	1287.7	89.8%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	297.6	748.0	722.9	103.5%	1265.2	59.1%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1711.7	2960.5	2442.0	121.2%	3235.5	91.5%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1711.7	2960.5	2199.9	134.6%	3235.5	91.5%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1710.6	2953.3	2666.9	110.7%	3999.9	73.8%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1701.8	2942.6	2667.0	110.3%	4000.0	73.6%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1665.2	2877.8	2699.7	106.6%	3999.9	71.9%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1657.8	2862.3	2699.7	106.0%	4000.0	71.6%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	No Violations							
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1711.7	2995.4	2442.0	122.7%	3235.5	92.6%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1711.7	2995.4	2199.9	136.2%	3235.5	92.6%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1710.6	2987.8	2666.9	112.0%	3999.9	74.7%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1701.8	2977.5	2667.0	111.6%	4000.0	74.4%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.3	328.1	320.0	102.5%	370.0	88.7%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.5	1043.8	950.0	109.9%	1286.0	81.2%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.3	334.6	320.0	104.6%	370.0	90.4%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.5	1055.5	950.0	111.1%	1286.0	82.1%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	898.4	1024.6	1009.1	101.5%	1285.2	79.7%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	811.6	800.0	101.4%	1199.9	67.6%
BF 4708 Hatwai 500 kV Bus	AMPS (65025)	% Δ Volts	0.967	0.916				-5.27%
BF 4708 Hatwai 500 kV Bus	PTRSNFLT (62030)	% Δ Volts	0.961	0.901				-6.24%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	782.0	972.5	920.0	105.7%	1046.8	92.9%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations							
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 5214 Low Mon-McNary & Calpine PH 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1358.1	1237.0	109.8%	1396.0	97.3%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	782.0	1014.6	920.0	110.3%	1046.8	96.9%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	824.1	800.0	103.0%	1199.9	68.7%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.967	0.907				-6.20%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.961	0.889				-7.49%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	782.0	1041.1	920.0	113.2%	1046.8	99.5%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1382.6	1237.0	111.8%	1396.0	99.0%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	806.0	800.0	100.7%	1199.9	67.2%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	AMPS (65025)	% Δ Volts	0.967	0.909				-6.00%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	PTRSNFLT (62030)	% Δ Volts	0.961	0.897				-6.66%
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	No Violations							
BF Lolo 230kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1248.0	1237.0	100.9%	1396.0	89.4%
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 3	FRANKLIN (40443)	% Δ Volts	1.005	0.943				-6.17%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1369.8	1237.0	110.7%	1396.0	98.1%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	782.0	1023.6	920.0	111.3%	1046.8	97.8%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	831.8	800.0	104.0%	1199.9	69.3%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	DILLON S (62084)	% Δ Volts	0.980	0.929				-5.20%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts	0.967	0.901				-6.83%
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.961	0.883				-8.12%
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	No Violations							
Bus: Alvey 500 kV + RAS	No Violations							
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	No Violations							
Bus: Rock Creek 500 kV	No Violations							
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Allston-Keeler 500 kV + RAS	No Violations							
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	898.4	1069.8	1009.1	106.0%	1285.2	83.2%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1711.7	2603.3	2442.0	106.6%	3235.5	80.5%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1711.7	2603.3	2199.9	118.3%	3235.5	80.5%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1767.5	2402.3	2199.9	109.2%	3280.5	73.2%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1752.6	2382.0	2199.9	108.3%	3280.5	72.6%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1944.2	2606.5	2477.9	105.2%	3999.9	65.2%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	898.4	1014.1	1009.1	100.5%	1285.2	78.9%
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	614.0	1117.8	979.0	114.2%	1287.7	86.8%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	815.3	800.0	101.9%	1199.9	67.9%
N-1: Dworshak-Hatwai 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts	0.961	0.911				-5.20%
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	817.6	800.0	102.2%	1199.9	68.1%
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	782.0	972.1	920.0	105.7%	1046.8	92.9%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	782.0	985.4	920.0	107.1%	1046.8	94.1%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1350.5	1237.0	109.2%	1396.0	96.7%
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	782.0	1008.2	920.0	109.6%	1046.8	96.3%
N-1: Hemingway-Grassland 500 kV	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	824.3	800.0	103.0%	1199.9	68.7%
N-1: Hemingway-Grassland 500 kV	AMPS (65025)	% Δ Volts	0.967	0.908				-6.10%
N-1: Hemingway-Grassland 500 kV	PTRSNFLT (62030)	% Δ Volts	0.961	0.891				-7.28%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1717.4	2896.0	2400.0	120.7%	3199.9	90.5%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1724.3	2915.8	2400.0	121.5%	3800.0	76.7%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1345.4	1237.0	108.8%	1396.0	96.4%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	782.0	1003.8	920.0	109.1%	1046.8	95.9%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	825.5	800.0	103.2%	1199.9	68.8%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	No Violations							
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1711.7	2963.1	2442.0	121.3%	3235.5	91.6%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1711.7	2963.1	2199.9	134.7%	3235.5	91.6%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1710.6	2955.7	2666.9	110.8%	3999.9	73.9%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1701.8	2945.5	2667.0	110.4%	4000.0	73.6%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1665.2	2935.2	2699.7	108.7%	3999.9	73.4%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1657.8	2922.3	2699.7	108.2%	4000.0	73.1%

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	No Violations							
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1108.1	1252.2	1237.0	101.2%	1396.0	89.7%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.3	350.9	320.0	109.7%	370.0	94.8%
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.5	1183.3	950.0	124.6%	1286.0	92.0%
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.3	326.6	320.0	102.1%	370.0	88.3%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.5	1038.6	950.0	109.3%	1286.0	80.8%
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1767.5	3178.1	2199.9	144.5%	3280.5	96.9%
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUND MT	Branch Amp	1767.5	3178.1	2667.0	119.2%	4000.0	79.5%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	1757.6	3164.4	2667.0	118.6%	4000.0	79.1%
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1944.2	2891.7	2477.9	116.7%	3999.9	72.3%
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABLE MT	Branch Amp	1944.2	2891.7	2667.0	108.4%	4000.0	72.3%
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at TABVAC12	Branch Amp	1918.3	2871.4	2667.0	107.7%	4000.0	71.8%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1454.0	2597.8	2230.0	116.5%	3555.9	73.1%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	MLCK PHA (62355) -> PTRSNFLT (62030) CKT 1 at PTRSNFLT	Branch Amp	715.7	812.8	800.0	101.6%	1199.9	67.7%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	AMPS (65025)	% Δ Volts	0.967	0.916				-5.27%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	PTRSNFLT (62030)	% Δ Volts	0.961	0.900				-6.35%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	898.4	1033.4	1009.1	102.4%	1285.2	80.4%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	BETHEL5 (43041)	% Δ Volts	1.054	0.996				-5.50%
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	898.4	1099.2	1009.1	108.9%	1285.2	85.5%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	BRIDGER (60085) -> BRI3MI11 (61999) CKT 1 at BRIDGER	Branch Amp	1189.6	1729.0	1600.0	108.1%	1919.0	90.1%
N-2: Bridger-Populus #1 & #2 345 kV	SODA (66385) -> GRACE (65695) CKT 1 at SODA	Branch Amp	393.0	540.1	539.7	100.1%	644.3	83.8%
N-2: Bridger-Populus #1 & #2 345 kV	BRI3MI11 (61999) -> 3MIKNOLL (60084) CKT 1 at BRI3MI11	Branch Amp	1162.5	1684.5	1650.1	102.1%	2227.4	75.6%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> BRIDGER (65220) CKT 2 at BRIDGER	Branch MVA	114.7	208.6	200.0	104.3%	220.0	94.8%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> BRIDGER (65220) CKT 1 at BRIDGER	Branch MVA	112.8	205.3	200.0	102.6%	220.0	93.3%
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	BRIDGER (60085) -> BRIDGER (65220) CKT 3 at BRIDGER	Branch MVA	112.8	205.3	200.0	102.6%	220.0	93.3%
N-2: Broadview-Garrison #1 & #2 500 kV + RAS	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	782.0	957.1	920.0	104.0%	1046.8	91.4%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1717.4	2792.7	2400.0	116.4%	3199.9	87.3%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1724.3	2807.4	2400.0	117.0%	3800.0	73.9%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1711.7	2380.0	2199.9	108.2%	3235.5	73.6%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1767.5	2377.6	2199.9	108.1%	3280.5	72.5%

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1752.6	2357.5	2199.9	107.2%	3280.5	71.9%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1944.2	2546.6	2477.9	102.8%	3999.9	63.7%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at VINCENT	Branch Amp	1499.6	2192.3	2134.0	102.7%	3499.9	62.6%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1481.2	2162.4	2134.0	101.3%	3499.9	61.8%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1717.4	2587.2	2400.0	107.8%	3199.9	80.9%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1724.3	2606.3	2400.0	108.6%	3800.0	68.6%
N-2: Double Palo Verde	AMPS (65025)	% Δ Volts	0.967	0.913				-5.58%
N-2: Double Palo Verde	PTRSNFLT (62030)	% Δ Volts	0.961	0.900				-6.35%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	No Violations							
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	No Violations							
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	No Violations							
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1724.3	3310.0	2400.0	137.9%	3800.0	87.1%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM12	Branch Amp	1391.0	3176.7	2700.0	117.7%	4000.0	79.4%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1609.0	3130.5	2400.0	130.4%	3800.0	82.4%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1594.2	3116.7	2400.0	129.9%	3800.0	82.0%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1609.0	3140.0	2400.0	130.8%	3800.0	82.6%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1594.2	3129.4	2400.0	130.4%	3800.0	82.4%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1819.8	3113.6	2900.0	107.4%	4350.0	71.6%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	1857.1	3483.3	3000.0	116.1%	4050.0	86.0%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at HORIZN	Branch MVA	270.3	347.5	320.0	108.6%	370.0	93.9%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.5	1183.6	950.0	124.6%	1286.0	92.0%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CLATSOP (40243) -> LWSCCLARK (45314) CKT 1 at CLATSOP	Branch MVA	79.4	96.5	94.0	102.7%	139.0	69.4%
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	782.0	1023.4	920.0	111.2%	1046.8	97.8%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1841.9	3902.0	2667.4	146.3%	4099.2	95.2%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1808.1	3788.4	2667.4	142.0%	4099.2	92.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1808.1	3788.4	2667.4	142.0%	4099.2	92.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1923.8	3238.0	2993.0	108.2%	4514.9	71.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1923.8	3238.0	2993.0	108.2%	4514.9	71.7%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1893.1	3203.3	2993.0	107.0%	4514.9	71.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1893.1	3203.3	2993.0	107.0%	4514.9	71.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1871.9	3164.8	2993.0	105.7%	4514.9	70.1%
N-2: Malin-Round Mtn #1 & #2 500 kV	WDJCT L1 (45522)	% Δ Volts	1.006	0.950				-5.57%
N-2: Malin-Round Mtn #1 & #2 500 kV	WEED JCT (45525)	% Δ Volts	1.006	0.950				-5.57%
N-2: Malin-Round Mtn #1 & #2 500 kV	WEED (45524)	% Δ Volts	1.002	0.945				-5.69%
N-2: Malin-Round Mtn #1 & #2 500 kV	MTSHASTA (44970)	% Δ Volts	0.988	0.930				-5.87%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025)	% Δ Volts	1.042	0.979				-6.05%

Appendix L - 16hs2a_2250idnw_N_nvmod Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	HORSE HV (40547)	% Δ Volts	1.032	0.980				-5.04%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	PTRSNFLT (62030)	% Δ Volts	0.961	0.911				-5.20%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	No Violations							
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.3	328.6	320.0	102.7%	370.0	88.8%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	647.5	1044.2	950.0	109.9%	1286.0	81.2%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	670.2	859.3	830.9	103.4%	926.3	92.8%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1841.9	3595.3	2667.4	134.8%	4099.2	87.7%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1808.1	3497.0	2667.4	131.1%	4099.2	85.3%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPOLI11	Branch Amp	1808.1	3485.9	2667.4	130.7%	4099.2	85.0%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	1923.8	3434.9	2993.0	114.8%	4514.9	76.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	1923.8	3434.9	2993.0	114.8%	4514.9	76.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	1893.1	3414.4	2993.0	114.1%	4514.9	75.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at OLIMAX12	Branch Amp	1893.1	3414.4	2993.0	114.1%	4514.9	75.6%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	1871.9	3381.5	2993.0	113.0%	4514.9	74.9%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (30790) -> MCMULLN1 (30825) CKT 1 at MCMULLN1	Branch Amp	286.9	922.5	825.9	111.7%	976.5	94.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MCMULLN1 (30825) -> KEARNEY (30830) CKT 1 at MCMULLN1	Branch Amp	233.8	864.0	825.1	104.7%	975.0	88.6%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PANOCH (34159) -> HAMMONDS (34160) CKT 1 at HAMMONDS	Branch Amp	392.7	470.2	462.9	101.6%	579.9	81.1%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1944.2	2485.0	2477.9	100.3%	3999.9	62.1%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Line CAPTJACK_500.0 (45035) TO KFALLS_500.0 (45262) CKT 1
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-CT2M_18.0 (45451)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALLCT2_18.0 (45449)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFC-STMD_18.0 (45452)
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	OPEN Bus KFALL ST_18.0 (45447)
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN MultiSectionLine DIXONVLE_500.0 (45095) TO MERIDINP_500.0 (45197) CKT 1
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	OPEN Transformer MERIDINP_230.0 (45195) TO MERIDINP_500.0 (45197) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 4003 Hanford-Vantage & Hanford Caps	OPEN Shunt HANFORD_500.0 (40499) #s
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Bus MALIN R3_500.0 (40688)
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4028 Taft-Dworshak & Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt MALIN_500.0 (40687) #c1
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	OPEN Shunt GARRISON_500.0 (40459) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt TAFT_500.0 (41057) #s
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Bus HOT SPR_500.0 (40553)
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
BF 4170 John Day-Marion & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1

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Contingency Studied	Actions Taken in the Contingency
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP S1_18.0 (47641)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G2_18.0 (47640)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Bus HPP G1_18.0 (47639)
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 2
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	OPEN Bus SACJWA T_500.0 (40917)
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	OPEN Transformer CUSTER W_500.0 (40323) TO CUSTER W_230.0 (40321) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line COVINGT5_500.0 (40306) TO RAVER_500.0 (40869) CKT 2
BF 4293 Schultz-Raver & Raver Covington5 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	OPEN Transformer SICKLER_500.0 (40973) TO DOUGLAS_230.0 (47031) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN Bus ASHE R1_500.0 (40062)
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	OPEN MultiSectionLine ALVEY_500.0 (40051) TO MARION_500.0 (40699) CKT 1
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	OPEN Bus SANTIAM_500.0 (40941)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Shunt OSTRNDER_500.0 (40809) #s
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	CLOSE MultiSectionLine PEARL_500.0 (40827) TO KNIGHT_500.0 (41450) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN Bus TROUTDAL_500.0 (41095)
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_500.0 (40045) TO KEELER_500.0 (40601) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Shunt PEARL_500.0 (40827) #s
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	OPEN Transformer PEARL_500.0 (40827) TO PEARL E_230.0 (40824) CKT 1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2

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Contingency Studied	Actions Taken in the Contingency
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOK TAP_500.0 (41001)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Bus SNOKING_500.0 (41007)
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt JOHN DAY_500.0 (40585) #s
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	OPEN Shunt MONROE_500.0 (40749) #s
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Bus SATSOP_500.0 (40949)
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Bus SATSOP_500.0 (40949)
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR G2_20.0 (47744)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2AX_4.2 (47746)
BF 4542 Paul-Allston 500 kV & Center G2	OPEN Bus CENTR2FG_13.8 (47747)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Line NAPAVALINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR G1_20.0 (47740)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1AX_4.2 (47742)
BF 4542 Paul-Napavine 500 kV & Center G1	OPEN Bus CENTR1FG_13.8 (47743)
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4550 Olympia-Paul & Paul-Allston 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Transformer TONO_115.0 (42806) TO PAUL_500.0 (40821) CKT 1
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	OPEN Shunt OLY E_230.0 (40794) #s
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJWA T_500.0 (40917)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	OPEN Shunt MONROE_500.0 (40749) #s
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	OPEN Shunt LOW MON_500.0 (40683) #s
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Line ALLSTON_500.0 (40045) TO PAUL_500.0 (40821) CKT 2
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	OPEN Transformer ALLSTON_500.0 (40045) TO ALLSTN E_230.0 (40043) CKT 2
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_500.0 (40521)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Bus HATWAI_230.0 (40519)
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Lancaster Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN InjectionGroup RAS Dworshak Gen Drop
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line NPULLMAN_115.0 (48291) TO SHAWNEE_115.0 (48383) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCITYT_115.0 (48245) TO SPULLMAN_115.0 (48413) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS HOT SPR_500.0 (40553) TO -148.3 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4700 Hatwai 500kV & 230 kV + RAS	CLOSE Line LEON_115.0 (48183) TO MOSCCITY_115.0 (48243) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	OPEN Line MOSCCITY_115.0 (48243) TO MOSCITYT_115.0 (48245) CKT 1
BF 4700 Hatwai 500kV & 230 kV + RAS	SET SWITCHED SHUNT AT BUS N LEWIST_115.0 (48253) TO 44.4 MVR
BF 4708 Hatwai 500 kV Bus	OPEN Bus HATWAI_500.0 (40521)
BF 4708 Hatwai 500 kV Bus	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
BF 4708 Hatwai 500 kV Bus	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 134.2 MVR
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	OPEN Transformer CHIEF JO_500.0 (40233) TO CHIEF J2_230.0 (40232) CKT 3

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Contingency Studied	Actions Taken in the Contingency
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Lower Granite Gen Drop
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	OPEN Transformer BIG EDDY_500.0 (40111) TO BIGEDDY1_230.0 (41341) CKT 2
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4888 Ashe-Slatt & CGS 500 kV	OPEN Bus CGS_25.0 (40063)
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Line ASHE_500.0 (40061) TO LOW MON_500.0 (40683) CKT 1
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN Bus BURNS_500.0 (45029)
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R1_500.0 (40684)
BF 4996 CaptJack-Malin #1 & #2 500 kV	OPEN Bus MALIN R3_500.0 (40688)
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus PONDROSA_500.0 (40837)
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	OPEN Bus GRIZZ R3_500.0 (40488)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN Bus ROUND BU_500.0 (43485)
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Bus MAPLE VL_500.0 (40693)
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 3
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line RAVER_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 4
BF 5179 Vantage-Schultz & Schultz-Raver #4	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	OPEN Bus COYOTETP_500.0 (40725)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M1_500.0 (43115)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G1_18.0 (43111)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S1_13.8 (43119)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYOTE_500.0 (43123)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO M2_1.0 (48519)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO G2_18.0 (48516)
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	OPEN Bus COYO S2_13.8 (48518)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACIWA T_500.0 (40917)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Bus SACJAWEA_500.0 (40913)
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACIWA T_500.0 (40917)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus SACJAWEA_500.0 (40913)

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Bus HERMCALP_500.0 (47638)
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G1_18.0 (47639) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP G2_18.0 (47640) CKT 1
BF 5214 Low Mon-McNary & Calpine PH 500 kV	OPEN Transformer HERMCALP_500.0 (47638) TO HPP S1_18.0 (47641) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
BF 5266 Slatt-Buckly 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Bus BURNS_500.0 (45029)
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Bus CEDARHIL_500.0 (60159)
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	OPEN Transformer HEMINWAY_500.0 (60155) TO HEMINWAY_230.0 (60156) CKT 1
BF Lolo 230kV	OPEN Bus LOLO_230.0 (48197)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1G_18.0 (45454)
BF McNary 230 kV SECT 1	OPEN Bus HERM 1S_13.8 (45455)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2G_18.0 (45456)
BF McNary 230 kV SECT 1	OPEN Bus HERM 2S_13.8 (45457)
BF McNary 230 kV SECT 1	OPEN Bus MCN 01_13.8 (44101)
BF McNary 230 kV SECT 1	OPEN Bus MCN 02_13.8 (44102)
BF McNary 230 kV SECT 1	OPEN Bus MCN 03_13.8 (44103)
BF McNary 230 kV SECT 1	OPEN Bus MCN 04_13.8 (44104)
BF McNary 230 kV SECT 1	OPEN Bus BOARD T1_230.0 (40121)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_230.0 (40129)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_115.0 (40127)
BF McNary 230 kV SECT 1	OPEN Bus MORROW 1_115.0 (47334)
BF McNary 230 kV SECT 1	OPEN Bus PORT MOR_115.0 (47335)
BF McNary 230 kV SECT 1	OPEN Bus MORRO G1_13.8 (47658)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN T_69.0 (40608)
BF McNary 230 kV SECT 1	OPEN Bus KINGEN_69.0 (47332)
BF McNary 230 kV SECT 1	OPEN Bus KINZ WW_12.5 (47331)
BF McNary 230 kV SECT 1	OPEN Bus BOARDMAN_69.0 (40125)
BF McNary 230 kV SECT 1	OPEN Bus IONE_69.0 (40575)
BF McNary 230 kV SECT 1	OPEN Bus TOWER RD_115.0 (41324)
BF McNary 230 kV SECT 1	OPEN Bus ALKALI C_115.0 (41319)
BF McNary 230 kV SECT 1	OPEN Bus HERMISTN_230.0 (45137)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH1_230.0 (44122)
BF McNary 230 kV SECT 1	OPEN Bus MCN PH2_230.0 (44123)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX1_100.0 (44115)
BF McNary 230 kV SECT 1	OPEN Bus MCN TX2_100.0 (44116)
BF McNary 230 kV SECT 2	OPEN Bus MCNRY S2_230.0 (41352)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH34_230.0 (44125)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH3_230.0 (44124)
BF McNary 230 kV SECT 2	OPEN Bus MCN PH4_230.0 (44126)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX3_100.0 (44117)
BF McNary 230 kV SECT 2	OPEN Bus MCN 05_13.8 (44105)
BF McNary 230 kV SECT 2	OPEN Bus MCN 06_13.8 (44106)
BF McNary 230 kV SECT 2	OPEN Bus MCN TX4_100.0 (44118)
BF McNary 230 kV SECT 2	OPEN Bus MCN 07_13.8 (44107)
BF McNary 230 kV SECT 2	OPEN Bus MCN 08_13.8 (44108)
BF McNary 230 kV SECT 2	SET SWITCHED SHUNT AT BUS JONESCYN_230.0 (47814) TO 52.2 MVR
BF McNary 230 kV SECT 3	OPEN Bus MCNRY S3_230.0 (41353)
BF McNary 230 kV SECT 3	OPEN Bus MCN PH5_230.0 (44127)
BF McNary 230 kV SECT 3	OPEN Bus MCN TX5_100.0 (44119)

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
BF McNary 230 kV SECT 3	OPEN Bus MCN TX6_100.0 (44120)
BF McNary 230 kV SECT 3	OPEN Bus MCN 09_13.8 (44109)
BF McNary 230 kV SECT 3	OPEN Bus MCN 10_13.8 (44110)
BF McNary 230 kV SECT 3	OPEN Bus MCN 11_13.8 (44111)
BF McNary 230 kV SECT 3	OPEN Bus MCN 12_13.8 (44112)
BF McNary 230 kV SECT 3	OPEN Bus MCNARY_345.0 (40721)
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Cedar Spring & Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD CT_18.5 (43044) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD ST_16.0 (43045) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Transformer BOARD CT_18.5 (43044) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Gen BOARD ST_16.0 (43045) #1
BF PGE Grassland-Coyote 500 kV & Carty Gas Project	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Transformer BOARD F_24.0 (43047) TO GRASSLND_500.0 (43049) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	OPEN Gen BOARD F_24.0 (43047) #1
Bus: Alvey 500 kV + RAS	OPEN Bus ALVEY_500.0 (40051)
Bus: Alvey 500 kV + RAS	CHANGE INJECTION GROUP RAS Low Gen Drop Units BY 'Low_gen_drop_value_less300' MW in generator merit order by opening
Bus: Bell BPA 500 kV	OPEN Bus BELL BPA_500.0 (40091)
Bus: Bell BPA 500 kV	OPEN Bus COULE R1_500.0 (40288)
Bus: Bell BPA 500 kV	OPEN Bus BELL SC_500.0 (40096)
Bus: Buckley 500 kV	OPEN Bus BUCKLEY_500.0 (40155)
Bus: Dixonville 500 kV	OPEN Bus DIXONVLE_500.0 (45095)
Bus: Dixonville 500 kV	SET SWITCHED SHUNT AT BUS GRANT PS_230.0 (45123) TO 147.4 MVR
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_115.0 (40893) #2
Bus: Dixonville 500 kV	CLOSE Shunt ROGUE_115.0 (40893) #3
Bus: Hot Springs 500 kV	OPEN Bus HOT SPR_500.0 (40553)
Bus: Keeler 500 kV + RAS	OPEN Bus KEELER_500.0 (40601)
Bus: Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_13.2 (45351) TO 70 MW
Bus: Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_500.0 (41401)
Bus: Rock Creek 500 kV	OPEN Bus ROCK CK_230.0 (41402)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_230.0 (47386)
Bus: Rock Creek 500 kV	OPEN Bus ENRGZR T_230.0 (47823)
Bus: Rock Creek 500 kV	OPEN Bus WHITE CK_230.0 (47827)
Bus: Rock Creek 500 kV	OPEN Bus IMRIE_230.0 (47822)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC 1_34.5 (47387)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC C1_34.5 (47388)
Bus: Rock Creek 500 kV	OPEN Bus JNPRC W1_0.7 (47389)
Bus: Rock Creek 500 kV	OPEN Bus DOOLEY T_230.0 (47465)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 3_34.5 (47496)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 2_34.5 (47493)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C2_34.5 (47494)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W2_0.7 (47495)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C3_34.5 (47497)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W3_0.7 (47498)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE 1_34.5 (47829)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF 1_34.5 (47825)
Bus: Rock Creek 500 kV	OPEN Bus WILLIS T_230.0 (47824)
Bus: Rock Creek 500 kV	OPEN Bus TULMN 1_34.5 (47826)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF C1_34.5 (47936)
Bus: Rock Creek 500 kV	OPEN Bus TULMN C1_34.5 (47938)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 2_34.5 (47903)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK 1_34.5 (47902)
Bus: Rock Creek 500 kV	OPEN Bus MILLRA S_230.0 (47857)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE C1_34.5 (47865)
Bus: Rock Creek 500 kV	OPEN Bus MILLR 1_34.5 (47966)
Bus: Rock Creek 500 kV	OPEN Bus HARVST W_230.0 (47858)
Bus: Rock Creek 500 kV	OPEN Bus HRVST 1_34.5 (47979)
Bus: Rock Creek 500 kV	OPEN Bus GDNOE W1_0.6 (47866)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C1_34.5 (47904)

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
Bus: Rock Creek 500 kV	OPEN Bus WHTCK C2_ 34.5 (47905)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W1_ 0.7 (47906)
Bus: Rock Creek 500 kV	OPEN Bus WHTCK W2_ 0.7 (47907)
Bus: Rock Creek 500 kV	OPEN Bus WNDYF W1_ 0.7 (47937)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W2_ 0.6 (47940)
Bus: Rock Creek 500 kV	OPEN Bus TULMN W1_ 0.7 (47939)
Bus: Rock Creek 500 kV	OPEN Bus MILLR C1_ 34.5 (47967)
Bus: Rock Creek 500 kV	OPEN Bus MILLR W1_ 0.6 (47968)
Bus: Rock Creek 500 kV	OPEN Bus HRVST C1_ 34.5 (47980)
Bus: Rock Creek 500 kV	OPEN Bus HRVST W1_ 0.7 (47981)
Bus: Sickler 500 kV	OPEN Bus SICKLER_ 500.0 (40973)
Bus: Summer Lake 500 kV	OPEN Bus PONDROSA_ 500.0 (40837)
Bus: Summer Lake 500 kV	OPEN Bus SUMMER L_ 500.0 (41043)
Bus: Summer Lake 500 kV	OPEN Bus BURNS_ 500.0 (45029)
Bus: Summer Lake 500 kV	OPEN Bus GRIZZ R3_ 500.0 (40488)
N-1: Allston-Keeler 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO KEELER_ 500.0 (40601) CKT 1
N-1: Allston-Keeler 500 kV + RAS	SET GENERATION AT BUS YALE GEN_ 13.2 (45351) TO 70 MW
N-1: Allston-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'South_of_Allston_gen_drop_value_less300' MW in generator merit order by opening
N-1: Allston-Napavine 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAVINE_ 500.0 (40774) CKT 1
N-1: Allston-Paul #2 500 kV	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-1: Alvery-Dixonville 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO DIXONVLE_ 500.0 (45095) CKT 1
N-1: Alvey-Marion 500 kV	OPEN MultiSectionLine ALVEY_ 500.0 (40051) TO MARION_ 500.0 (40699) CKT 1
N-1: Ashe-Hanford 500 kV	OPEN Line ASHE_ 500.0 (40061) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Ashe-Low Mon 500 kV	OPEN Line ASHE_ 500.0 (40061) TO LOW MON_ 500.0 (40683) CKT 1
N-1: Ashe-Marion 500 kV	OPEN Bus ASHE R1_ 500.0 (40062)
N-1: Ashe-Slatt 500 kV	OPEN Line ASHE_ 500.0 (40061) TO SLATT_ 500.0 (40989) CKT 1
N-1: Bell-Coulee 500 kV	OPEN Bus COULE R1_ 500.0 (40288)
N-1: Bell-Taft 500 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-1: Big Eddy-Celilo 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO CELILO1_ 500.0 (41311) CKT 1
N-1: Big Eddy-John Day 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO JOHN DAY_ 500.0 (40585) CKT 1
N-1: Big Eddy-Knight 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO KNIGHT_ 500.0 (41450) CKT 1
N-1: Big Eddy-Ostrander 500 kV	OPEN Line BIG EDDY_ 500.0 (40111) TO OSTRNDER_ 500.0 (40809) CKT 1
N-1: Boise Bench-Brownlee #3 230 kV	OPEN MultiSectionLine BOISEBCH_ 230.0 (60045) TO BROWNLEE_ 230.0 (60095) CKT 3
N-1: Brady-Antelope 230 kV	OPEN Line BRADY_ 230.0 (60073) TO ANTLOPE_ 230.0 (65075) CKT 1
N-1: Broadview-Garrison #1 500 kV	OPEN Bus GAR1EAST_ 500.0 (40451)
N-1: Broadview-Garrison #1 500 kV	OPEN Bus TOWN1_ 500.0 (62013)
N-1: Brownlee-Ontario 230 kV	OPEN MultiSectionLine BROWNLEE_ 230.0 (60095) TO ONTARIO_ 230.0 (60265) CKT 1
N-1: Buckley-Grizzly 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO GRIZZLY_ 500.0 (40489) CKT 1
N-1: Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO MARION_ 500.0 (40699) CKT 1
N-1: Buckley-Slatt 500 kV	OPEN MultiSectionLine BUCKLEY_ 500.0 (40155) TO SLATT_ 500.0 (40989) CKT 1
N-1: Captain Jack-Olinda 500 kV	OPEN MultiSectionLine CAPTJACK_ 500.0 (45035) TO OLINDA_ 500.0 (30020) CKT 1
N-1: CaptJack-Kfalls 500 kV	OPEN Line CAPTJACK_ 500.0 (45035) TO KFALLS_ 500.0 (45262) CKT 1
N-1: Cascade Crossing 500 kV	OPEN Bus CDR SPRG_ 500.0 (43950)
N-1: Cascade Crossing 500 kV	OPEN Bus CDRSBET1_ 500.0 (43951)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHCRS1_ 500.0 (43491)
N-1: Cascade Crossing 500 kV	OPEN Bus BETHLS_ 500.0 (43041)
N-1: Chief Jo-Coulee 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO COULEE_ 500.0 (40287) CKT 1
N-1: Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-1: Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_ 500.0 (40233) TO SICKLER_ 500.0 (40973) CKT 1
N-1: Coulee-Hanford 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO HANFORD_ 500.0 (40499) CKT 1
N-1: Coulee-Schultz 500 kV	OPEN MultiSectionLine COULEE_ 500.0 (40287) TO SCHULTZ_ 500.0 (40957) CKT 1
N-1: Covington4-Raver 500 kV	OPEN Line COVINGT4_ 500.0 (40302) TO RAVER_ 500.0 (40869) CKT 1
N-1: Covington5-Raver 500 kV	OPEN Line COVINGT5_ 500.0 (40306) TO RAVER_ 500.0 (40869) CKT 2
N-1: Coyote-Longhorn 500 kV	OPEN Line COYOTE_ 500.0 (43123) TO LONGHORN_ 500.0 (40724) CKT 1
N-1: CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-1: Dixonville-Meridian 500 kV	OPEN MultiSectionLine DIXONVLE_ 500.0 (45095) TO MERIDINP_ 500.0 (45197) CKT 1
N-1: Drycreek-Lolo 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO LOLO_ 230.0 (48197) CKT 1
N-1: Drycreek-N Lewiston 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO N LEWIST_ 230.0 (48255) CKT 1
N-1: Drycreek-Wala Ava 230 kV	OPEN Line DRYCREEK_ 230.0 (48512) TO WALA AVA_ 230.0 (48451) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWORSHAK_ 500.0 (40369) TO HATWAI_ 500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Line DWOR 1_ 13.8 (40361) TO DWOR 2_ 13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS	OPEN Shunt GARRISON_ 500.0 (40459) #s

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Line DWORSHAK_500.0 (40369) TO HATWAI_500.0 (40521) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	OPEN Shunt GARRISON_500.0 (40459) #s
N-1: Dworshak-Hatwai 500 kV + RAS+PTSN	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Dworshak-Taft 500 kV	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-1: Echo Lake-Maple Valley 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO MAPLE VL_500.0 (40693) CKT 1
N-1: Echo Lake-Raver 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO RAVER_500.0 (40869) CKT 1
N-1: Echo Lake-Schultz 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-1: Echo Lake-Snok Tap 500 kV	OPEN Line ECHOLAKE_500.0 (40381) TO SNOK TAP_500.0 (41001) CKT 1
N-1: Garrison-Taft #2 500 kV	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-1: Garrison-Taft #2 500 kV	OPEN Shunt GARRISON_500.0 (40459) #r
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSHE1_115.0 (32229)
N-1: Goldhill-Placer 115 kV	OPEN Bus HORSESHE_115.0 (32230)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTL1_115.0 (32233)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_115.0 (32234)
N-1: Goldhill-Placer 115 kV	OPEN Bus NEWCSTLE_13.2 (32460)
N-1: Goldhill-Placer 115 kV	OPEN Bus FLINT1_115.0 (32236)
N-1: Grassland-Coyote 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-1: Grassland-Slatt 500 kV	OPEN Line GRASSLND_500.0 (43049) TO SLATT_500.0 (40989) CKT 1
N-1: Grizzly-John Day #2 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-1: Grizzly-Malin 500 kV	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN MultiSectionLine PONDROSA_500.0 (40837) TO SUMMER L_500.0 (41043) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZ R3_500.0 (40488) TO PONDROSA_500.0 (40837) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO GRIZZ R3_500.0 (40488) CKT 1
N-1: Grizzly-Ponderosa A-Summer L 500 kV	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN MultiSectionLine CAPTJACK_500.0 (45035) TO PONDROSB_500.0 (40834) CKT 1
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Grizzly-Round Bu 500 kV	OPEN Line GRIZZLY_500.0 (40489) TO ROUND BU_500.0 (43485) CKT 1
N-1: Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-1: Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-1: Hanford-Wautoma 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Transformer HATWAI_500.0 (40521) TO HATWAI_230.0 (40519) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	OPEN Line DWOR 1_13.8 (40361) TO DWOR 2_13.8 (40363) CKT 1
N-1: Hatwai 500/230 kV Xfmr + RAS	SET SWITCHED SHUNT AT BUS DRYCREEK_230.0 (48512) TO 67.1 MVR
N-1: Hatwai-Lolo 230 kV	OPEN Line HATWAI_230.0 (40519) TO LOLO_230.0 (48197) CKT 1
N-1: Hatwai-Low Gran 500 kV	OPEN Line HATWAI_500.0 (40521) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Hatwai-N Lewiston 230 kV	OPEN Line HATWAI_230.0 (40519) TO N LEWIST_230.0 (48255) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Line HELLSYN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-1: Hells Canyon-Brownlee 230 kV	OPEN Gen HELLSYN1_14.4 (60151) #1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN Line HELLSYN_230.0 (60150) TO HURICANE_230.0 (45103) CKT 1
N-1: Hells Canyon-Walla Walla 230 kV	OPEN MultiSectionLine HURICANE_230.0 (45103) TO WALAWALA_230.0 (45327) CKT 1
N-1: Hemingway-Grassland 500 kV	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 31.7 MVR
N-1: Hemingway-Grassland 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_161.0 (62084) TO 27.9 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 200 MVR
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	OPEN Shunt MALIN_500.0 (40687) #s
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt MALIN_500.0 (40687) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-1: Hemingway-Grassland 500 kV + FACRI	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-1: Hemingway-Grassland 500 kV + FACRI	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	OPEN MultiSectionLine HEMINWAY_500.0 (60155) TO GRASSLND_500.0 (43049) CKT 1
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS HEMINWAY_500.0 (60155) TO 400 MVR
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Hemingway-Summer Lake 500 kV	OPEN Line HEMINWAY_500.0 (60155) TO BURNS_500.0 (45029) CKT 1
N-1: Hemingway-Summer Lake 500 kV	OPEN MultiSectionLine BURNS_500.0 (45029) TO SUMMER L_500.0 (41043) CKT 1
N-1: Hill Top 345/230 Xfmr	OPEN Transformer HIL TOP_230.0 (40537) TO HIL TOP_345.0 (64058) CKT 1
N-1: Horse Hv-McNary 230 kV	OPEN Line HORSE HV_230.0 (40549) TO MCNRY S1_230.0 (41351) CKT 1
N-1: Hot Springs-Taft 500 kV	OPEN Line HOT SPR_500.0 (40553) TO TAFT_500.0 (41057) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line COYTECR_345.0 (64032) TO HUMBOLDT_345.0 (64059) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Line MAGGIECR_120.0 (64070) TO CARLIN_120.0 (64169) CKT 1
N-1: Humboldt-Coyote Ck 345 kV	OPEN Shunt EIGHTMFK_120.0 (64457) #b
N-1: Humboldt-Coyote Ck 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Humboldt-Coyote Ck 345 kV	CLOSE Shunt HUMBOLT1_24.9 (64216) #b
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO &1_345.0 (67582)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO_345.0 (66225)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #2_99.0 (65014)
N-1: Huntington-Pinto-Four Corners 345 kV	OPEN Bus PINTO #3_99.0 (65017)
N-1: Ing500-CusterW 500 kV	OPEN Line ING 500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-1: John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-1: John Day-Rock Ck 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-1: John Day-Slatt 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-1: Kfalls-Meridian 500 kV	OPEN Line KFALLS_500.0 (45262) TO MERIDINP_500.0 (45197) CKT 1
N-1: Knight-Wautoma 500 kV	OPEN MultiSectionLine KNIGHT_500.0 (41450) TO WAUTOMA_500.0 (41138) CKT 1
N-1: LaGrande-North Powder 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO N POWDER_230.0 (60312) CKT 1
N-1: Lanes-Marion 500 kV	OPEN Line LANE_500.0 (40629) TO MARION_500.0 (40699) CKT 1
N-1: Lit Goose-Central Ferry 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO CEN FERY_500.0 (40666) CKT 1
N-1: Lit Goose-Low Mon 500 kV	OPEN Line LIT GOOS_500.0 (40665) TO LOW MON_500.0 (40683) CKT 1
N-1: Low Gran-Central Ferry 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-1: Low Mon-Sac Tap 500 kV	OPEN Line LOW MON_500.0 (40683) TO SACJWA T_500.0 (40917) CKT 1
N-1: Malin 500/230 Xfmr	OPEN Transformer MALIN_230.0 (45189) TO MALIN_500.0 (40687) CKT 1
N-1: Malin-Hilltop 230 kV	OPEN Line CANBYTAP_230.0 (40171) TO HIL TOP_230.0 (40537) CKT 1
N-1: Malin-Round Mtn #1 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-1: Malin-Round Mtn #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-1: Malin-Summer Lake 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER L_500.0 (41043) CKT 1
N-1: Maple Vly-Rocky RH 345 kV	OPEN MultiSectionLine MAPLE VL_345.0 (40691) TO ROCKY RH_345.0 (40891) CKT 1
N-1: Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Line MARION_500.0 (40699) TO SANTIAM_500.0 (40941) CKT 1
N-1: Marion-Santiam 500 kV	OPEN Shunt SANTIAM_230.0 (40939) #s
N-1: McLouglin-Ostrander 230 kV	OPEN Bus OSTRNDER_230.0 (40810)
N-1: McNary 500/230 kV Xfmr	OPEN Transformer MCNARY_500.0 (40723) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary S2-McNary S3 230 kV	OPEN Line MCNRY S2_230.0 (41352) TO MCNRY S3_230.0 (41353) CKT 1
N-1: McNary-Board T1 230 kV	OPEN Line BOARD T1_230.0 (40121) TO MCNRY S1_230.0 (41351) CKT 1
N-1: McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-1: McNary-Longhorn 500 kV	OPEN Line LONGHORN_500.0 (40724) TO MCNARY_500.0 (40723) CKT 1
N-1: McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-1: McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-1: McNary-Roundup 230 kV	OPEN Line MCNRY S1_230.0 (41351) TO ROUNDUP_230.0 (40905) CKT 1
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJWA T_500.0 (40917)
N-1: McNary-Sac Tap-Low Mon 500 kV	OPEN Bus SACJAWEA_500.0 (40913)
N-1: McNary-Sac Tap-Low Mon 500 kV	CLOSE Gen ICE H1-2_13.8 (40559) #1
N-1: Midpoint-Hemingway 500 kV	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	OPEN MultiSectionLine MIDPOINT_500.0 (60240) TO HEMINWAY_500.0 (60155) CKT 1
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	SET SWITCHED SHUNT AT BUS PTRSNFLT_230.0 (62030) TO 63.4 MVR
N-1: Midpoint-Humboldt 345 kV	OPEN Bus IDAHO-NV_345.0 (64061)
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS HIL TOP_230.0 (40537) TO 52.2 MVR
N-1: Midpoint-Humboldt 345 kV	SET SWITCHED SHUNT AT BUS ALTURAS_69.0 (45005) TO 10.8 MVR
N-1: Napavine-Paul 500 kV	OPEN Line NAPA VINE_500.0 (40774) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Line OLYMPIA_500.0 (40797) TO PAUL_500.0 (40821) CKT 1
N-1: Olympia-Paul 500 kV	OPEN Shunt OLY E_230.0 (40794) #s
N-1: Ontario-Caldwell 230 kV	OPEN MultiSectionLine CALDWELL_230.0 (60110) TO LANGLEY_230.0 (60266) CKT 1

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-1: Ostrander-Knight 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-1: Ostrander-Pearl 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO PEARL_500.0 (40827) CKT 1
N-1: Ostrander-Troutdale 500 kV	OPEN Line OSTRNDER_500.0 (40809) TO TROUTDAL_500.0 (41095) CKT 1
N-1: Oxbow-Brownlee #2 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 2
N-1: Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-1: Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-1: Paul-Satsop 500 kV	OPEN Line PAUL_500.0 (40821) TO SATSOP_500.0 (40949) CKT 1
N-1: Pearl-Keeler 500 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-1: Pearl-Keeler 500 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_less300' MW in generator merit order by opening
N-1: Pinto-Four Corner 345 kV	OPEN Bus PINTO PS_345.0 (66235)
N-1: Ponderosa A 500/230 kV Xfmr	OPEN Transformer PONDROSA_500.0 (40837) TO PONDROSS_230.0 (40838) CKT 1
N-1: Ponderosa B 500/230 kV Xfmr	OPEN Transformer PONDROSB_500.0 (40834) TO PONDROSN_230.0 (40836) CKT 1
N-1: Raver-Paul 500 kV	OPEN Line PAUL_500.0 (40821) TO RAVER_500.0 (40869) CKT 1
N-1: Raver-Tacoma 500 kV	OPEN MultiSectionLine RAVER_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus H ALLEN_345.0 (18001)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus HA PS_345.0 (18002)
N-1: Red Butte-Harry Allen 345 kV	OPEN Bus UTAH-NEV_345.0 (67657)
N-1: Robinson-Harry Allen 500 kV	OPEN Line ROBINSON_500.0 (64895) TO H ALLEN_500.0 (18450) CKT 1
N-1: Rock Ck-Wautoma 500 kV	OPEN Line ROCK CK_500.0 (41401) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Round Mtn-Table Mtn 500 kV	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-1: Roundup-Lagrande 230 kV	OPEN Line LAGRANDE_230.0 (40621) TO ROUNDUP_230.0 (40905) CKT 1
N-1: Schultz-Sickler 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-1: Schultz-Vantage 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-1: Schultz-Wautoma 500 kV	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-1: Sigurd-Glen Canyon 230 kV	OPEN Bus SIGURDPS_230.0 (66355)
N-1: Slatt 500/230 kV Xfmr	OPEN Transformer SLATT_500.0 (40989) TO SLATT_230.0 (40986) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-1: Slatt-Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-1: Snok Tap-Snoking 500 kV	OPEN Line SNOK TAP_500.0 (41001) TO SNOKING_500.0 (41007) CKT 1
N-1: Table Mtn-Tesla 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-1: Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO VACA-DIX_500.0 (30030) CKT 1
N-1: Vantage 500/230 kV Xfmr #1	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 1
N-1: Vantage 500/230 kV Xfmr #2	OPEN Transformer VANTAGE_500.0 (41113) TO VANTAGE_230.0 (41111) CKT 2
N-1: Walla Walla-Talbot 230 kV	OPEN Line TALBOT_230.0 (44912) TO WALAWALA_230.0 (45327) CKT 1
N-1: Walla Walla-Wallula 230 kV	OPEN Line WALAWALA_230.0 (45327) TO WALLULA_230.0 (45331) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Ashe-Slatt 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Buckley-Marion 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Buckley 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN MultiSectionLine ASHE R1_500.0 (40062) TO MARION_500.0 (40699) CKT 2
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Line JOHN DAY_500.0 (40585) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Marion & Slatt-John Day 500 kV	OPEN Bus ASHE R1_500.0 (40062)
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & McNary-John Day 500 kV	OPEN Line MCNARY_500.0 (40723) TO JOHN DAY_500.0 (40585) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Line ASHE_500.0 (40061) TO SLATT_500.0 (40989) CKT 1
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	OPEN Bus COYOTETP_500.0 (40725)
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine BELL SC_500.0 (40096) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN MultiSectionLine DWORSHAK_500.0 (40369) TO TAFT_500.0 (41057) CKT 1
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	OPEN InjectionGroup RAS Libby Gen Drop
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHEL_230.0 (43039) TO ROUND N_230.0 (43483) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Round Butte 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN MultiSectionLine BETHEL_230.0 (43039) TO SANTIAM_230.0 (40939) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap BETHEL5_500.0 (43041) TO BETHCRS1_500.0 (43491) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Line BETHCRS1_500.0 (43491) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Bethel-Cedar Spring 500 kV & Bethel-Santiam 230 kV	OPEN Series Cap CDR SPRG_500.0 (43950) TO CDRSBET1_500.0 (43951) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	OPEN MultiSectionLine BIGEDDY2_230.0 (41342) TO CHEMAWA_230.0 (40213) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	OPEN Bus PARKDALE_230.0 (40813)
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 2
N-2: Boise Bench-Brownlee #1 & #2 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO31_230.0 (61996) CKT 3 TO 50 % of present
N-2: Boise Bench-Brownlee #1 & #2 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIHOR41_230.0 (61995) CKT 4 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO BROWNLEE_230.0 (60095) CKT 3
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	OPEN MultiSectionLine BOISEBCH_230.0 (60045) TO HORSEFLT_230.0 (60102) CKT 4
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO11_230.0 (61998) CKT 1 TO 50 % of present
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	SET SERIES CAP REACTANCE AT BOISEBCH_230.0 (60045) TO BOIBRO21_230.0 (61997) CKT 2 TO 50 % of present
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 1
N-2: Bridger-Populus #1 & #2 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine POPULUS_345.0 (67790) TO BRIDGER_345.0 (60085) CKT 2
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	OPEN MultiSectionLine BRIDGER_345.0 (60085) TO 3MIKNOLL_345.0 (60084) CKT 1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	CLOSE Shunt KINPORT_345.0 (60190) #1
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	SET SWITCHED SHUNT AT BUS DILLON S_69.0 (62345) TO 27.9 MVR
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Series Cap GAR1EAST_500.0 (40451) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Line GAR1EAST_500.0 (40451) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN1_500.0 (62013) CKT 1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Series Cap GAR2EAST_500.0 (40453) TO GARRISON_500.0 (40459) CKT 1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Line GAR2EAST_500.0 (40453) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Line BROADVU_500.0 (62046) TO TOWN2_500.0 (62012) CKT 2
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Gen COLSTP 4_26.0 (62047) #1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Gen COLSTP 2_22.0 (62049) #1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Shunt PTRSNFLT_230.0 (62030) #1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Shunt OREBASIN_230.0 (66145) #1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Shunt FRANNIE2_34.5 (67145) #1
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	SET SWITCHED SHUNT AT BUS ROSEBUD_230.0 (63012) TO -10 MVR
N-2: Broadview-Garristont #1 & #2 500 kV + RAS	OPEN Shunt GARLAND1_34.5 (67147) #1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN MultiSectionLine OXBOW_230.0 (60275) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Line LOLO_230.0 (48197) TO IMNAHA_230.0 (60278) CKT 1
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line OXBOW_230.0 (60275) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Line HELLSYCN_230.0 (60150) TO BROWNLEE_230.0 (60095) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Transformer HELLSYCN_230.0 (60150) TO HELSCYN1_14.4 (60151) CKT 1
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	OPEN Gen HELSCYN1_14.4 (60151) #1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: Buckley-Marion & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN MultiSectionLine CHIEF JO_500.0 (40233) TO MONROE_500.0 (40749) CKT 1
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	OPEN Line MONROE_230.0 (40747) TO NOVELTY_230.0 (42304) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO SICKLER_500.0 (40973) CKT 1
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus CHIEF J3_345.0 (40223)
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	OPEN Bus SNOHOMS3_345.0 (40993)
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Line CHIEF JO_500.0 (40233) TO COULEE_500.0 (40287) CKT 1
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus CHIEF J4_345.0 (40225)

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	OPEN Bus SNOHOMS4_345.0 (40994)
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO HANFORD_500.0 (40499) CKT 1
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	OPEN Line HANFORD_500.0 (40499) TO VANTAGE_500.0 (41113) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Coulee-Schultz #1 & #2 500 kV	OPEN MultiSectionLine COULEE_500.0 (40287) TO SCHULTZ_500.0 (40957) CKT 2
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN Line ING_500_500.0 (50194) TO CUSTER W_500.0 (40323) CKT 1
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN MultiSectionLine CUSTER W_500.0 (40323) TO MONROE_500.0 (40749) CKT 2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA1_13.8 (42111) #1
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen FREDONA2_13.8 (42112) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN2_13.8 (42042) #2
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Gen WHITHRN3_13.8 (42043) #3
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS BCH-NW Gen Drop Units BY 'BCH-NW_gen_drop_value1' MW in generator merit order by opening
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO1_13.8 (41214) #I
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO3_13.8 (41216) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO4_13.8 (41217) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO5_13.8 (41218) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO6_13.8 (41219) #F
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	OPEN Load INTALCO7_13.8 (41220) #F
N-2: DC-BIPOLE	OPEN Shunt MALIN_500.0 (40687) #s
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: DC-BIPOLE	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: DC-BIPOLE	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: DC-BIPOLE	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: DC-BIPOLE	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: DC-BIPOLE	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: DC-BIPOLE	CHANGE INJECTION GROUP RAS PDCI Gen Drop Units BY 'PDCI_gen_drop_value_less300' MW in generator merit order by opening
N-2: DC-BIPOLE	OPEN Bus SYLMAR1_230.0 (26097)
N-2: DC-BIPOLE	OPEN Bus SYLMAR2_230.0 (26099)
N-2: DC-BIPOLE	OPEN Shunt SYLMAR S_230.0 (24147) #b
N-2: DC-BIPOLE	OPEN Shunt SYLMARLA_230.0 (26094) #b
N-2: DC-BIPOLE	OPEN Shunt BIGEDDY2_230.0 (41342) #s
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #b
N-2: DC-BIPOLE	CLOSE Shunt ANTELOPE_230.0 (24401) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS ANTELOPE_230.0 (24401) TO 158.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt BARRE_230.0 (24016) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS BARRE_230.0 (24016) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt CHINO_230.0 (24025) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS CHINO_230.0 (24025) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt DEVERS_230.0 (24804) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS DEVERS_230.0 (24804) TO 316.8 MVR
N-2: DC-BIPOLE	CLOSE Shunt EL NIDO_230.0 (24040) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS EL NIDO_230.0 (24040) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt GOULD_230.0 (24059) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS GOULD_230.0 (24059) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LCIENEGA_230.0 (24082) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LCIENEGA_230.0 (24082) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt LAGUBELL_230.0 (24076) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS LAGUBELL_230.0 (24076) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOMW_230.0 (24093) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOMW_230.0 (24093) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRALOME_230.0 (25656) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRALOME_230.0 (25656) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MIRAGE_230.0 (24806) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MIRAGE_230.0 (24806) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt MOORPARK_230.0 (24099) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS MOORPARK_230.0 (24099) TO 158.4 MVR

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: DC-BIPOLE	CLOSE Shunt OLINDA_230.0 (24100) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS OLINDA_230.0 (24100) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt PADUA_230.0 (24112) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PADUA_230.0 (24112) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt PARDEE_230.0 (24114) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS PARDEE_230.0 (24114) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt RIOHONDO_230.0 (24126) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS RIOHONDO_230.0 (24126) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt SANBRDNO_230.0 (24132) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS SANBRDNO_230.0 (24132) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt S.CLARA_230.0 (24128) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS S.CLARA_230.0 (24128) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #b
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #2
N-2: DC-BIPOLE	CLOSE Shunt VALLEYSC_115.0 (24160) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VALLEYSC_115.0 (24160) TO 187.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt VILLA PK_230.0 (24154) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VILLA PK_230.0 (24154) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VINCENT_230.0 (24155) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VINCENT_230.0 (24155) TO 158.4 MVR
N-2: DC-BIPOLE	CLOSE Shunt VSTA_230.0 (24901) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS VSTA_230.0 (24901) TO 79.2 MVR
N-2: DC-BIPOLE	CLOSE Shunt WALNUT_230.0 (24158) #ei
N-2: DC-BIPOLE	SET SWITCHED SHUNT AT BUS WALNUT_230.0 (24158) TO 79.2 MVR
N-2: DC-BIPOLE	OPEN Bus CELILO4_230.0 (41314)
N-2: DC-BIPOLE	OPEN Bus CELILO3_230.0 (41313)
N-2: DC-BIPOLE	OPEN Bus CELILO2_500.0 (41312)
N-2: DC-BIPOLE	OPEN Bus CELILO1_500.0 (41311)
N-2: Double Palo Verde	OPEN Shunt CAPTJACK_500.0 (45035) #s
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c1
N-2: Double Palo Verde	CLOSE Shunt CAPTJACK_500.0 (45035) #c2
N-2: Double Palo Verde	OPEN Shunt MALIN_500.0 (40687) #s
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c1
N-2: Double Palo Verde	CLOSE Shunt MALIN_500.0 (40687) #c2
N-2: Double Palo Verde	CLOSE Shunt OLINDA_500.0 (30020) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c1
N-2: Double Palo Verde	CLOSE Shunt TABLE MT_500.0 (30015) #c2
N-2: Double Palo Verde	INSERVICE SeriesCap GRIMAL23_500.0 (90070) TO GRIMAL24_500.0 (90071) CKT 2
N-2: Double Palo Verde	INSERVICE SeriesCap PONSUM13_500.0 (90101) TO PONSUM14_500.0 (90102) CKT 1
N-2: Double Palo Verde	INSERVICE SeriesCap CAPPON13_500.0 (90139) TO CAPPON14_500.0 (90140) CKT 1
N-2: Double Palo Verde	OPEN Gen PALOVRD2_24.0 (14932) #1
N-2: Double Palo Verde	OPEN Gen PALOVRD1_24.0 (14931) #1
N-2: Double Palo Verde	CHANGE LOAD AT BUS AGUAFAPS_69.0 (14400) BY -120 MW (cnst pf)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	OPEN Line COVINGTN_230.0 (40303) TO MAPLEV12_230.0 (40692) CKT 2
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_345.0 (40691)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus ROCKY RH_345.0 (40891)
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	OPEN Bus MAPLE VL_500.0 (40693)
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 1
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN MultiSectionLine GARRISON_500.0 (40459) TO TAFT_500.0 (41057) CKT 2
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Shunt GARRISON_500.0 (40459) #r
N-2: Garrison-Taft #1 & #2 500 kV + RAS	OPEN Gen COLSTP 3_26.0 (62048) #1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN Line CDR SPRG_500.0 (43950) TO GRASSLND_500.0 (43049) CKT 1
N-2: Grassland-Cedar Spring & Slatt - Buckley 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO SLATT_500.0 (40989) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line GRASSLND_500.0 (43049) TO COYOTE_500.0 (43123) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line SLATT_500.0 (40989) TO COYOTETP_500.0 (40725) CKT 1
N-2: Grassland-Coyote & Slatt - Longhorn 500 kV	OPEN Line COYOTETP_500.0 (40725) TO LONGHORN_500.0 (40724) CKT 1
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	OPEN Bus PONDROSB_500.0 (40834)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus PONDROSA_500.0 (40837)
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order by opening
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	OPEN Bus GRIZZ R3_500.0 (40488)
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO MALIN_500.0 (40687) CKT 2
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CHANGE INJECTION GROUP RAS Coulee and Chief Jo gen drop BY -2700 MW in generator merit order
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	OPEN MultiSectionLine MALIN_500.0 (40687) TO SUMMER_L_500.0 (41043) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line ASHE_500.0 (40061) TO HANFORD_500.0 (40499) CKT 1
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	OPEN Line HANFORD_500.0 (40499) TO LOW MON_500.0 (40683) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Hanford-Wautoma #1 & #2 500 kV	OPEN Line HANFORD_500.0 (40499) TO WAUTOMA_500.0 (41138) CKT 2
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy #1 & #2 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Big Eddy & John Day-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 1
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine GRIZZLY_500.0 (40489) TO JOHN DAY_500.0 (40585) CKT 2
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO GRIZZLY_500.0 (40489) CKT 1
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Buckley-Marion 500 kV	OPEN MultiSectionLine BUCKLEY_500.0 (40155) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN MultiSectionLine JOHN DAY_500.0 (40585) TO MARION_500.0 (40699) CKT 1
N-2: John Day-Marion & Marion-Pearl 500 kV	OPEN Line MARION_500.0 (40699) TO PEARL_500.0 (40827) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Line JOHN DAY_500.0 (40585) TO ROCK CK_500.0 (41401) CKT 1
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Line KEELER_500.0 (40601) TO PEARL_500.0 (40827) CKT 1
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus CASCADTP_230.0 (40185)
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	OPEN Bus WINDSHAR_230.0 (41155)
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	OPEN Line BIG EDDY_500.0 (40111) TO OSTRNDER_500.0 (40809) CKT 1
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus ROSS_345.0 (40901)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN Bus MCNARY_345.0 (40721)
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus ALFALFA_230.0 (40039)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN Bus OUTLOOK_230.0 (45229)
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	OPEN MultiSectionLine OSTRNDER_500.0 (40809) TO KNIGHT_500.0 (41450) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 1
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	OPEN Line CEN FERY_500.0 (40666) TO LOW GRAN_500.0 (40679) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN MultiSectionLine MALIN_500.0 (40687) TO ROUND MT_500.0 (30005) CKT 2
N-2: Malin-Round Mtn #1 & #2 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS1_13.2 (38775) #6
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen BUENAVS2_13.2 (38780) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG1_13.2 (38750) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DOS AMG2_13.2 (38755) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD1_13.2 (38785) #5
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_13.2 (38790) #2

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #3
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WHLR RD2_ 13.2 (38790) #4
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_ 13.2 (38795) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP1_ 13.2 (38795) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_ 13.2 (38800) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP2_ 13.2 (38800) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_ 13.2 (38805) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_ 13.2 (38810) #1
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP3_ 13.2 (38805) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen WINDGAP4_ 13.2 (38810) #2
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_ 13.2 (38760) #10
N-2: Malin-Round Mtn #1 & #2 500 kV	OPEN Gen DELTA E_ 13.2 (38760) #11
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line JOHN DAY_ 500.0 (40585) TO ROCK CK_ 500.0 (41401) CKT 1
N-2: McNary-John Day & Rock Creek-John Day 500 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN MultiSectionLine MCNARY_ 345.0 (40721) TO ROSS_ 345.0 (40901) CKT 1
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	OPEN Line MCNARY_ 500.0 (40723) TO JOHN DAY_ 500.0 (40585) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Line HORSE HV_ 230.0 (40549) TO MCNRY S1_ 230.0 (41351) CKT 1
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus MCNARY_ 345.0 (40721)
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	OPEN Bus ROSS_ 345.0 (40901)
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN MultiSectionLine MIDPOINT_ 500.0 (60240) TO HEMINWAY_ 500.0 (60155) CKT 1
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	OPEN Line KING_ 230.0 (60177) TO MIDPOINT_ 230.0 (60232) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CUSTER W_ 500.0 (40323) TO MONROE_ 500.0 (40749) CKT 1
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	OPEN MultiSectionLine CHIEF JO_ 500.0 (40233) TO MONROE_ 500.0 (40749) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO NAPAIVINE_ 500.0 (40774) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_ less300' MW in generator merit order by opening
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_ 115.0 (40539) TO VALLEY T_ 115.0 (41272) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 1
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line NAPAIVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line ALLSTON_ 500.0 (40045) TO PAUL_ 500.0 (40821) CKT 2
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	CHANGE INJECTION GROUP RAS P-A/N-A Gen Drop Units BY 'Paul-Allston_gen_drop_value_ less300' MW in generator merit order by opening
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line HOLCOMB_ 115.0 (40539) TO VALLEY T_ 115.0 (41272) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 1
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	OPEN Line CHEHALIS_ 230.0 (40207) TO LONGVW T_ 230.0 (40673) CKT 2
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Paul-Raver & Raver-Covingt4 500 kV	OPEN Bus COVINGT4_ 500.0 (40302)
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line KEELER_ 500.0 (40601) TO PEARL_ 500.0 (40827) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	OPEN Line PEARL #_ 230.0 (43773) TO SHERWOOD_ 230.0 (43527) CKT 1
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	CHANGE INJECTION GROUP RAS South of Allston Gen Drop BY 'Keeler-Pearl_gen_drop_value_ less300' MW in generator merit order by opening
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	OPEN MultiSectionLine BIGEDDY3_ 230.0 (41343) TO MCLOUGLN_ 230.0 (43313) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	OPEN Line OSTRNDER_ 500.0 (40809) TO PEARL_ 500.0 (40827) CKT 1
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	OPEN Bus OSTRNDER_ 230.0 (40810)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT4_ 500.0 (40302)
N-2: Raver-Covington #1 & #2 500 kV	OPEN Bus COVINGT5_ 500.0 (40306)
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line ECHOLAKE_ 500.0 (40381) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 3
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Paul & Napavine-Paul 500 kV	OPEN Line NAPAIVINE_ 500.0 (40774) TO PAUL_ 500.0 (40821) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus COULEE_ 300.0 (40285)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	OPEN Bus OLYMPIA_ 300.0 (40795)
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_ less300' MW in generator merit order by opening
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Line PAUL_ 500.0 (40821) TO RAVER_ 500.0 (40869) CKT 1
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	OPEN Bus CENTR SS_ 230.0 (47748)

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	CHANGE INJECTION GROUP RAS Raver-Paul Gen Drop Units BY 'RAVER-PAUL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Schultz #1 & #2 500 kV	OPEN MultiSectionLine ECHOLAKE_500.0 (40381) TO SCHULTZ_500.0 (40957) CKT 1
N-2: Raver-Tacoma & Raver-Covington4 500 kV	OPEN Line COVINGT4_500.0 (40302) TO RAVR_500.0 (40869) CKT 1
N-2: Raver-Tacoma & Raver-Covington4 500 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN MultiSectionLine RAVR_500.0 (40869) TO TACOMA_500.0 (41051) CKT 1
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	OPEN Bus CHRISTOP_230.0 (42505)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 1
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN MultiSectionLine ROUND MT_500.0 (30005) TO TABLE MT_500.0 (30015) CKT 2
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA A_13.2 (38820)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA B_13.2 (38815)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA D_13.2 (38765)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA E_13.2 (38760)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DELTA C_13.2 (38770)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP3_13.2 (38805)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP4_13.2 (38810)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WINDGAP1_13.2 (38795)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD2_13.2 (38790)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus WHLR RD1_13.2 (38785)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG2_13.2 (38755)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus DOS AMG1_13.2 (38750)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMBP_13.2 (25618)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Bus PEARBMAP_13.2 (25617)
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OPEN Transformer ROUND MT_500.0 (30005) TO RD MT 1M_500.0 (30065) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO WAUTOMA_500.0 (41138) CKT 1
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_DLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO SICKLER_500.0 (40973) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	OPEN Line SCHULTZ_500.0 (40957) TO VANTAGE_500.0 (41113) CKT 1
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	CHANGE INJECTION GROUP RAS NOH Gen Drop Units BY 'NOH_SLL_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN MultiSectionLine TABLE MT_500.0 (30015) TO TESLA_500.0 (30040) CKT 1
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CHANGE INJECTION GROUP RAS High Gen Drop Units BY 'High_gen_drop_value_less300' MW in generator merit order by opening
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 1_12.5 (38825)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 2_12.5 (38830)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 3_12.5 (38835)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 4_12.5 (38840)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HYATT 5_12.5 (38845)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT1_13.8 (38700)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT2_13.8 (38705)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT3_13.8 (38710)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus THERMLT4_13.8 (38715)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 4-5_13.8 (31782)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMCP_13.8 (25619)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMDP_13.8 (25620)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA A_13.2 (38820)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA B_13.2 (38815)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA D_13.2 (38765)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA E_13.2 (38760)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DELTA C_13.2 (38770)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS1_13.2 (38775)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus BUENAVS2_13.2 (38780)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP2_13.2 (38800)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP3_13.2 (38805)

Appendix L - 16hs2a_2250idnw_N_nvmod Studied Contingencies & Associated Actions

Contingency Studied	Actions Taken in the Contingency
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP4_ 13.2 (38810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WINDGAP1_ 13.2 (38795)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD2_ 13.2 (38790)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus WHLR RD1_ 13.2 (38785)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG2_ 13.2 (38755)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus DOS AMG1_ 13.2 (38750)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMBP_ 13.2 (25618)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus PEARBMAP_ 13.2 (25617)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBOU2-3_ 11.5 (31808)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus CRBU 1_ 11.5 (31810)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 1_ 18.0 (34600)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 2_ 18.0 (34602)
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OPEN Bus HELMS 3_ 18.0 (34604)
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus ADDY N_ 230.0 (40021)
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL S3_ 230.0 (40090) TO LANCASTR_ 230.0 (40624) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Line BELL BPA_ 115.0 (40087) TO BIGELOW_ 115.0 (40113) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine LANCASTR_ 230.0 (40624) TO NOXONBPA_ 230.0 (40787) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN MultiSectionLine BELL SC_ 500.0 (40096) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	OPEN Bus BELL SC_ 500.0 (40096)
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine DWORSHAK_ 500.0 (40369) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN MultiSectionLine GARRISON_ 500.0 (40459) TO TAFT_ 500.0 (41057) CKT 1
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	OPEN Shunt GARRISON_ 500.0 (40459) #r
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Bus MABTON_ 230.0 (40685)
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	OPEN Line ROCK CK_ 500.0 (41401) TO WAUTOMA_ 500.0 (41138) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN MultiSectionLine RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 1
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 3
N-3: Schultz-Raver #1 & #2 & #3 500 kV	OPEN Line RAVER_ 500.0 (40869) TO SCHULTZ_ 500.0 (40957) CKT 4

Appendix M

16hs2a_2250idnw_ms_swips Base Case (MSTI & SWIP, SWIP South – 1770 MW)

Appendix M - 16hs2a_2250idnw_ms_swips Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 11L12 Meridian-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11L22 Capt Jack-Klam Falls 500 kV+KFGEN2+ST	No Violations							
BF 11R1 Meridian-Klam Falls 500 kV & Meridian 500/230 kV Xfmr	MERIDINP (45197) -> MERIDINP (45195) CKT 2 at MERIDINP	Branch MVA	362.2	670.8	650.0	103.2%	1286.0	52.2%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	636.6	1188.8	979.0	121.4%	1287.7	92.3%
BF 11R6 Meridian-Dixonville 500 kV & Meridian 500/230 kV Xfmr	GLENDL (45113) -> GRANT PS (45123) CKT 1 at GLENDL	Branch Amp	302.0	759.7	722.9	105.1%	1265.2	60.0%
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4028 Taft-Dworshak & Taft Reactor 500kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1583.0	1550.0	102.1%	1782.5	88.8%
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1573.4	1550.0	101.5%	1782.5	88.3%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1650.5	2833.4	2442.0	116.0%	3235.5	87.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1650.5	2833.4	2199.9	128.8%	3235.5	87.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1648.1	2825.4	2666.9	105.9%	3999.9	70.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1642.7	2817.7	2667.0	105.7%	4000.0	70.4%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1604.5	2736.1	2699.7	101.3%	3999.9	68.4%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at ROUND MT	Branch Amp	1600.8	2724.1	2699.7	100.9%	4000.0	68.1%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4111 Hot Springs-Taft & Taft-Dworshak 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1593.8	1550.0	102.8%	1782.5	89.4%
BF 4114 Garrison-Taft #1 +Taft Reactor 500kV	No Violations							
BF 4119 Garrison-Taft #1 & Taft-Bell 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1556.6	1550.0	100.4%	1782.5	87.3%
BF 4148 Hot Springs-Taft & Garrison-Taft #2 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1650.5	2866.5	2442.0	117.4%	3235.5	88.6%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1650.5	2866.5	2199.9	130.3%	3235.5	88.6%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1648.1	2858.2	2666.9	107.2%	3999.9	71.5%
BF 4186 (or 4582) Malin-Round Mtn 500 kV & Malin 500/230 Xfmr	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at ROUND MT	Branch Amp	1642.7	2850.7	2667.0	106.9%	4000.0	71.3%
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1560.9	1550.0	100.7%	1782.5	87.6%
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4234 McNary-Longhorn & McNary-Hermcalp 500 kV	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1568.5	1550.0	101.2%	1782.5	88.0%
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4268 Monroe-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4276 Ing500-CusterW 500 kV & CusterW 500/230 Xfmr	No Violations							
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.4	327.7	320.0	102.4%	370.0	88.6%
BF 4280 Keeler-Pearl & Pearl-Marion 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	678.3	1040.8	950.0	109.6%	1286.0	80.9%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.4	334.4	320.0	104.5%	370.0	90.4%
BF 4280 Keeler-Pearl & Pearl-Ostrander 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	678.3	1052.4	950.0	110.8%	1286.0	81.8%
BF 4287 Pearl-Ostrander 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4293 Schultz-Raver & Raver Covington5 500 kV	No Violations							
BF 4336 Chief Jo-Sickler 500 kV & Sickler 500/230 Xfmr	No Violations							
BF 4336 Sickler-Schultz 500 kV & Sickler 500/230 Xfmr	No Violations							

Appendix M - 16hs2a_2250idnw_ms_swips Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1050.0	1009.1	104.0%	1285.2	81.7%
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4432 Ostrander-Troutdale & Split Ostrander 500 kV	No Violations							
BF 4439 Big Eddy-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4442 Big Eddy-Ostrander 500 kV & Ostrander-McLoughlin 230 kV	No Violations							
BF 4448 Knight-Ostrander & Ostrander-Troutdale 500 kV	No Violations							
BF 4450 Knight-Ostrander & Ostrander-Pearl 500 kV	No Violations							
BF 4502 Paul-Allston & Allston-Keeler 500 kV + RAS	No Violations							
BF 4510 Pearl-Marion 500 kV & Pearl 500/230 Xfmr & Pearl Caps	No Violations							
BF 4526 CusterW-Monroe & Monroe-Echo Lake 500 kV + RAS	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV	No Violations							
BF 4530 Raver-Paul & Paul-Satsop 500 kV + RAS	No Violations							
BF 4540 Paul-Napavine & Paul-Satsop 500 kV	No Violations							
BF 4542 Paul-Allston 500 kV & Center G2	No Violations							
BF 4542 Paul-Napavine 500 kV & Center G1	No Violations							
BF 4550 Olympia-Paul & Paul-Allston 500 kV	No Violations							
BF 4554 Olympia-Paul 500 kV & Tono 500/115 Xfmr	No Violations							
BF 4572 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1573.0	1550.0	101.5%	1782.5	88.2%
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4652 Taft-Dworshak & Taft-Hatwai 500 kV + RAS	No Violations							
BF 4672 Monroe-Chief Jo 500 kV & Monroe Caps	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4690 Paul-Allston 500 kV & Allston 500/230 Xfmr	No Violations							
BF 4700 Hatwai 500kV & 230 kV + RAS	No Violations							
BF 4708 Hatwai 500 kV Bus	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1629.3	1550.0	105.1%	1782.5	91.4%
BF 4728 Coulee-Chief Jo 500 kV & Cheif Jo 500/230 Xfmr	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1609.3	1550.0	103.8%	1782.5	90.3%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1561.4	1550.0	100.7%	1782.5	87.6%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1570.1	1550.0	101.3%	1782.5	88.1%
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1567.7	1550.0	101.1%	1782.5	88.0%
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1550.8	1550.0	100.1%	1782.5	87.0%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1571.5	1550.0	101.4%	1782.5	88.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1581.0	1550.0	102.0%	1782.5	88.7%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Buckley & Slatt-Boardman 500 kV	No Violations							
BF 5006 Slatt-Longhorn & Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt & Slatt-Buckley 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1576.1	1550.0	101.7%	1782.5	88.4%
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1562.3	1550.0	100.8%	1782.5	87.6%
BF 5021 Slatt-John Day & Slatt-Longhorn 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1600.5	1550.0	103.3%	1782.5	89.8%
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1554.3	1550.0	100.3%	1782.5	87.2%
BF 5114 Echo Lake-Raver & Echo Lake- Snok Tap 500 kV	No Violations							
BF 5117 Echo Lake-Maple Valley & Echo Lake-Raver 500 kV	No Violations							

Appendix M - 16hs2a_2250idnw_ms_swips Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5187 McNary-Longhorn & Longhorn-Slatt 500 kV	No Violations							
BF 5193 Grassland-Coyote & Coyote-Longhorn 500 kV	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary 500/230 kV Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1573.0	1550.0	101.5%	1782.5	88.2%
BF 5214 Low Mon-McNary & Calpine PH 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1571.7	1550.0	101.4%	1782.5	88.2%
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1557.4	1550.0	100.5%	1782.5	87.4%
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1563.6	1550.0	100.9%	1782.5	87.7%
BF 5266 Slatt-Buckly 500 kV	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1714.9	1550.0	110.6%	1782.5	96.2%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1317.4	1237.0	106.5%	1396.0	94.4%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	945.5	920.0	102.8%	1046.8	90.3%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1590.9	1550.0	102.6%	1782.5	89.3%
BF IPC Populus-Chill-Hemingway 500 kV & Hem 500/230 Xfmr	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	2509.4	2477.9	101.3%	3999.9	62.7%
BF Lolo 230kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1559.0	1550.0	100.6%	1782.5	87.5%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1725.3	1550.0	111.3%	1782.5	96.8%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1317.2	1237.0	106.5%	1396.0	94.4%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	943.0	920.0	102.5%	1046.8	90.1%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1022.0	1009.1	101.3%	1285.2	79.5%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1723.2	1550.0	111.2%	1782.5	96.7%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1314.2	1237.0	106.2%	1396.0	94.1%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	939.5	920.0	102.1%	1046.8	89.7%
BF PGE Grassland-Cedar Sp 500kV & Grassland-Hem 500kV+PTSN	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1021.4	1009.1	101.2%	1285.2	79.5%
BF PGE Grassland-Coyote Sp 500kV & Carty Gas Plant	No Violations							
BF PGE Grassland-Slatt 500kV & Boardman Plant	No Violations							
Bus: Alvey 500 kV + RAS	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1031.0	1009.1	102.2%	1285.2	80.2%
Bus: Bell BPA 500 kV	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Dixonville 500 kV	No Violations							
Bus: Hot Springs 500 kV	No Violations							
Bus: Keeler 500 kV + RAS	CLATSOP (40243) -> LWSClARK (45314) CKT 1 at CLATSOP	Branch MVA	80.1	94.0	94.0	100.0%	139.0	67.6%
Bus: Rock Creek 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1563.4	1550.0	100.9%	1782.5	87.7%
Bus: Sickler 500 kV	No Violations							
Bus: Summer Lake 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1575.7	1550.0	101.7%	1782.5	88.4%
N-1: Allston-Keeler 500 kV + RAS	CLATSOP (40243) -> LWSClARK (45314) CKT 1 at CLATSOP	Branch MVA	80.1	94.0	94.0	100.0%	139.0	67.6%
N-1: Allston-Napavine 500 kV	No Violations							
N-1: Allston-Paul #2 500 kV	No Violations							
N-1: Alvery-Dixonville 500 kV	No Violations							
N-1: Alvey-Marion 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1092.4	1009.1	108.3%	1285.2	85.0%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1568.1	1550.0	101.2%	1782.5	88.0%
N-1: Bell-Coulee 500 kV	No Violations							
N-1: Bell-Taft 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Broadview-Garrison #1 500 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 1 at COTWDWAP	Branch Amp	299.0	866.4	785.7	110.3%	926.3	93.5%
N-1: Captain Jack-Olinda 500 kV	COTWDWAP (37545) -> OLINDAW (37565) CKT 2 at COTWDWAP	Branch Amp	299.0	866.4	785.7	110.3%	926.3	93.5%
N-1: Captain Jack-Olinda 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1650.5	2495.4	2442.0	102.2%	3235.5	77.1%
N-1: Captain Jack-Olinda 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1650.5	2495.4	2199.9	113.4%	3235.5	77.1%
N-1: Captain Jack-Olinda 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1809.2	2407.0	2199.9	109.4%	3280.5	73.4%
N-1: Captain Jack-Olinda 500 kV	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1793.9	2386.7	2199.9	108.5%	3280.5	72.8%
N-1: Captain Jack-Olinda 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABVAC11	Branch Amp	2142.9	2770.4	2667.0	103.9%	3999.9	69.3%
N-1: Captain Jack-Olinda 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	2770.4	2477.9	111.8%	3999.9	69.3%
N-1: Captain Jack-Olinda 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at TABVAC12	Branch Amp	2118.3	2733.8	2667.0	102.5%	4000.0	68.3%
N-1: CaptJack-Kfalls 500 kV	No Violations							
N-1: Cascade Crossing 500 kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1033.8	1009.1	102.4%	1285.2	80.4%
N-1: Cedar Hill-Robinson 500 kV (SWIP)	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	2490.7	2477.9	100.5%	3999.9	62.3%
N-1: Chief Jo-Coulee 500 kV	No Violations							
N-1: Chief Jo-Monroe 500 kV	No Violations							
N-1: Chief Jo-Sickler 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Covington4-Raver 500 kV	No Violations							
N-1: Covington5-Raver 500 kV	No Violations							
N-1: Coyote-Longhorn 500 kV	No Violations							
N-1: CusterW-Monroe 500 kV	No Violations							
N-1: Dixonville-Meridian 500 kV	DIXNV230 (44900) -> DIXONVLE (45093) CKT 1 at DIXONVLE	Branch Amp	636.6	1146.3	979.0	117.1%	1287.7	89.0%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1636.9	1550.0	105.6%	1782.5	91.8%
N-1: Dworshak-Taft 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1583.0	1550.0	102.1%	1782.5	88.8%
N-1: Echo Lake-Maple Valley 500 kV	No Violations							
N-1: Echo Lake-Raver 500 kV	No Violations							
N-1: Echo Lake-Schultz 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Echo Lake-Snok Tap 500 kV	No Violations							
N-1: Garrison-Taft #2 500 kV	No Violations							
N-1: Goldhill-Placer 115 kV	No Violations							
N-1: Grassland-Coyote 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1553.1	1550.0	100.2%	1782.5	87.1%
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1583.9	1550.0	102.2%	1782.5	88.9%
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hatwai 500/230 kV Xfmr + RAS	No Violations							
N-1: Hatwai-Lolo 230 kV	No Violations							
N-1: Hatwai-Low Gran 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1561.2	1550.0	100.7%	1782.5	87.6%
N-1: Hatwai-N Lewiston 230 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1554.1	1550.0	100.3%	1782.5	87.2%
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	948.4	920.0	103.1%	1046.8	90.6%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1707.2	1550.0	110.1%	1782.5	95.8%
N-1: Hemingway-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1302.7	1237.0	105.3%	1396.0	93.3%
N-1: Hemingway-Grassland 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	931.8	920.0	101.3%	1046.8	89.0%
N-1: Hemingway-Grassland 500 kV + FACRI	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1609.5	1550.0	103.8%	1782.5	90.3%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1700.7	2768.2	2400.0	115.3%	3199.9	86.5%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1708.4	2787.7	2400.0	116.2%	3800.0	73.4%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1713.7	1550.0	110.6%	1782.5	96.1%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1297.2	1237.0	104.9%	1396.0	92.9%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	926.4	920.0	100.7%	1046.8	88.5%
N-1: Hemingway-Summer Lake 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1551.8	1550.0	100.1%	1782.5	87.1%
N-1: Hill Top 345/230 Xfmr	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: Hot Springs-Taft 500 kV	No Violations							
N-1: Humboldt-Coyote Ck 345 kV	No Violations							
N-1: Huntington-Pinto-Four Corners 345 kV	No Violations							
N-1: Ing500-CusterW 500 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1562.6	1550.0	100.8%	1782.5	87.7%
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Kfalls-Meridian 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1555.7	1550.0	100.4%	1782.5	87.3%
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lanes-Marion 500 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-Sac Tap 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1562.8	1550.0	100.8%	1782.5	87.7%
N-1: Malin 500/230 Xfmr	No Violations							
N-1: Malin-Hilltop 230 kV	No Violations							
N-1: Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1650.5	2835.1	2442.0	116.1%	3235.5	87.6%
N-1: Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1650.5	2835.1	2199.9	128.9%	3235.5	87.6%
N-1: Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALROU21	Branch Amp	1648.1	2826.8	2666.9	106.0%	3999.9	70.7%
N-1: Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1642.7	2819.6	2667.0	105.7%	4000.0	70.5%
N-1: Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1604.5	2806.5	2699.7	104.0%	3999.9	70.2%
N-1: Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1600.8	2796.8	2699.7	103.6%	4000.0	69.9%
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: Maple Vly-Rocky RH 345 kV	No Violations							
N-1: Marion-Pearl 500 kV	No Violations							
N-1: Marion-Santiam 500 kV	No Violations							
N-1: McLouglin-Ostrander 230 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: McNary-Sac Tap-Low Mon 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1564.6	1550.0	100.9%	1782.5	87.8%
N-1: Midpoint-Hemingway 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1581.8	1550.0	102.1%	1782.5	88.7%
N-1: Midpoint-Humboldt 345 kV	No Violations							
N-1: Midpoint-Townsend 500 kV (MISTI)	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	1001.0	920.0	108.8%	1046.8	95.6%
N-1: Midpoint-Townsend 500 kV (MISTI)	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1270.0	1237.0	102.7%	1396.0	91.0%
N-1: Midpoint-Townsend 500 kV (MISTI)	MIDHEM11 (61988) -> MIDPOINT (60240) CKT 1 at MIDPOINT	Branch Amp	1048.1	1802.7	1732.1	104.1%	2338.3	77.1%
N-1: Midpoint-Townsend 500 kV (MISTI)	PTRSNFUR (62386)	% Δ Volts	1.019	0.956				6.18%
N-1: Midpoint-Townsend 500 kV (MISTI)	PTRSNFLT (62030)	% Δ Volts	1.001	0.941				5.99%
N-1: Midpoint-Townsend 500 kV (MISTI)	AMPS (65025)	% Δ Volts	1.007	0.951				5.56%
N-1: Midpoint-Townsend 500 kV (MISTI)+PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	998.9	920.0	108.6%	1046.8	95.4%
N-1: Midpoint-Townsend 500 kV (MISTI)+PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1099.7	1268.5	1237.0	102.5%	1396.0	90.9%
N-1: Midpoint-Townsend 500 kV (MISTI)+PTSN Shunt	MIDHEM11 (61988) -> MIDPOINT (60240) CKT 1 at MIDPOINT	Branch Amp	1048.1	1797.3	1732.1	103.8%	2338.3	76.9%
N-1: Napavine-Paul 500 kV	No Violations							
N-1: Olympia-Paul 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1558.6	1550.0	100.6%	1782.5	87.4%
N-1: Paul-Satsop 500 kV	No Violations							
N-1: Pearl-Keeler 500 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.4	350.2	320.0	109.4%	370.0	94.7%
N-1: Pearl-Keeler 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	678.3	1176.7	950.0	123.9%	1286.0	91.5%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Pearl-Keeler 500 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.4	326.3	320.0	102.0%	370.0	88.2%
N-1: Pearl-Keeler 500 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	678.3	1036.3	950.0	109.1%	1286.0	80.6%
N-1: Pinto-Four Corner 345 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Raver-Paul 500 kV	No Violations							
N-1: Raver-Tacoma 500 kV	No Violations							
N-1: Red Butte-Harry Allen 345 kV	No Violations							
N-1: Robinson-Harry Allen 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	89.0	172.5	150.0	115.0%	180.0	95.9%
N-1: Robinson-Harry Allen 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	300.2	462.5	415.7	111.3%	483.5	95.7%
N-1: Robinson-Harry Allen 500 kV	CHCGO PK (32224) -> HIGGINS (32232) CKT 1 at CHCGO PK	Branch Amp	537.5	694.2	652.7	106.4%	893.6	77.7%
N-1: Robinson-Harry Allen 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1809.2	2216.6	2199.9	100.8%	3280.5	67.6%
N-1: Robinson-Harry Allen 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	2574.1	2477.9	103.9%	3999.9	64.4%
N-1: Rock Ck-Wautoma 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1562.5	1550.0	100.8%	1782.5	87.7%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1809.2	3241.2	2199.9	147.3%	3280.5	98.8%
N-1: Round Mtn-Table Mtn 500 kV	ROUND MT (30005) -> ROUTAB21 (30018) CKT 2 at ROUTAB21	Branch Amp	1809.2	3241.2	2667.0	121.5%	4000.0	81.0%
N-1: Round Mtn-Table Mtn 500 kV	ROUTAB22 (30019) -> TABLE MT (30015) CKT 2 at ROUTAB22	Branch Amp	1802.1	3230.1	2667.0	121.1%	4000.0	80.8%
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Sickler 500 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Sigurd-Glen Canyon 230 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Slatt-Longhorn 500 kV	No Violations							
N-1: Snok Tap-Snoking 500 kV	No Violations							
N-1: Table Mtn-Tesla 500 kV	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABVAC11	Branch Amp	2142.9	3176.9	2667.0	119.1%	3999.9	79.4%
N-1: Table Mtn-Tesla 500 kV	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	3176.9	2477.9	128.2%	3999.9	79.4%
N-1: Table Mtn-Tesla 500 kV	TABVAC12 (30032) -> VACA-DIX (30030) CKT 1 at VACA-DIX	Branch Amp	2118.3	3158.0	2667.0	118.4%	4000.0	79.0%
N-1: Table Mtn-Tesla 500 kV	VACTES11 (30044) -> TESLA (30040) CKT 1 at VACTES11	Branch Amp	1399.1	2355.5	2230.0	105.6%	3555.9	66.2%
N-1: Table Mtn-Vaca Dixon 500 kV	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	717.6	832.0	830.9	100.1%	926.3	89.8%
N-1: Table Mtn-Vaca Dixon 500 kV	FRUTLDJT (31120) -> FTSWRDJT (31122) CKT 1 at FRUTLDJT	Branch Amp	285.4	304.2	303.1	100.4%	339.7	89.6%
N-1: Table Mtn-Vaca Dixon 500 kV	BRDGVLL (31110) -> FRUTLDJT (31120) CKT 1 at BRDGVLL	Branch Amp	311.5	331.0	328.1	100.9%	371.4	89.1%
N-1: Table Mtn-Vaca Dixon 500 kV	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	277.2	343.4	326.3	105.2%	416.7	82.4%
N-1: Table Mtn-Vaca Dixon 500 kV	TABLE MT (30015) -> TABTES11 (30041) CKT 1 at TABTES11	Branch Amp	1598.3	2848.7	2667.0	106.8%	3555.9	80.1%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES11 (30041) -> TABTES12 (30043) CKT 1 at TABTES11	Branch Amp	1598.3	2848.7	2230.0	127.7%	3999.9	71.2%
N-1: Table Mtn-Vaca Dixon 500 kV	TABTES12 (30043) -> TESLA (30040) CKT 1 at TESLA	Branch Amp	1569.4	2814.9	2667.0	105.5%	4000.0	70.4%
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1612.7	1550.0	104.0%	1782.5	90.5%
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1568.9	1550.0	101.2%	1782.5	88.0%
N-2: Ashe-Marion & Slatt-Coyote Tap-Longhorn 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							

Appendix M - 16hs2a_2250idnw_ms_swips Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Ashe-Slatt & McNary-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1577.8	1550.0	101.8%	1782.5	88.5%
N-2: Ashe-Slatt & Slatt-Coyote Tap-Longhorn 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1574.7	1550.0	101.6%	1782.5	88.3%
N-2: Bell-Taft & Taft-Dworskak 500 kV + RAS	No Violations							
N-2: Bethel-Cedar Sp 500kV & Bethel-Round Butte 230 kV	No Violations							
N-2: Bethel-Cedar Sp 500kV & Bethel-Santiam 230kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1045.9	1009.1	103.7%	1285.2	81.4%
N-2: Bethel-Cedar Sp 500kV & Santiam-Mikkalo 500kV	ALBANY (40025) -> HAZELWOD (45131) CKT 1 at HAZELWOD	Branch Amp	920.4	1033.5	1009.1	102.4%	1285.2	80.4%
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Bridger-Populus #1 & #2 345 kV	No Violations							
N-2: Bridger-Populus #2 & Bridger-3MileKnoll 345 kV	No Violations							
N-2: Broadview-Townsend #1 & #2 500 kV + RAS	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1613.0	1550.0	104.1%	1782.5	90.5%
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1555.8	1550.0	100.4%	1782.5	87.3%
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at LOLO	Branch Amp	754.4	920.4	920.0	100.0%	1046.8	87.9%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Chief Jo-Monroe & Chief Jo-Sickler 500 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Chief Jo-Snohoms4 345 kV	No Violations							
N-2: Chief Jo-Monroe 500 kV & Monroe-Sammamsh 230 kV	No Violations							
N-2: Chief Jo-Sickler 500 kV & Chief J3-Snohoms3 345 kV	No Violations							
N-2: Coulee-Chief Jo 500 kV & Chief J4-Snohoms4 345 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1576.1	1550.0	101.7%	1782.5	88.4%
N-2: Coulee-Schultz #1 & #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1568.2	1550.0	101.2%	1782.5	88.0%
N-2: CusterW-Ing500 & CusterW-Monroe 500 kV	No Violations							
N-2: CusterW-Monroe #1 & #2 500 kV + RAS	No Violations							
N-2: DC-BIPOLE	SCATERGD (26066) -> OLYMPC (26087) CKT 2 at OLYMPC	Branch Amp	807.2	908.4	876.1	103.7%	1001.6	90.7%
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1700.7	2861.2	2400.0	119.2%	3199.9	89.4%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1708.4	2875.8	2400.0	119.8%	3800.0	75.7%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1809.2	2363.7	2199.9	107.4%	3280.5	72.1%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1793.9	2343.7	2199.9	106.5%	3280.5	71.4%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1650.5	2256.4	2199.9	102.6%	3235.5	69.7%
N-2: DC-BIPOLE	TABLE MT (30015) -> TABVAC11 (30031) CKT 1 at TABVAC11	Branch Amp	2142.9	2683.5	2667.0	100.6%	3999.9	67.1%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	2683.5	2477.9	108.3%	3999.9	67.1%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1557.8	2176.7	2134.0	102.0%	3499.9	62.2%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1540.6	2153.0	2134.0	100.9%	3499.9	61.5%
N-2: DC-BIPOLE	ROBINSON (64895)	% Δ Volts	1.095	1.031				5.84%
N-2: DC-BIPOLE	ROBINSON (64885)	% Δ Volts	1.042	0.987				5.28%
N-2: Double Palo Verde	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1625.1	1550.0	104.8%	1782.5	91.2%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1700.7	2696.0	2400.0	112.3%	3199.9	84.3%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1708.4	2713.0	2400.0	113.0%	3800.0	71.4%
N-2: Double Palo Verde	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1809.2	2230.1	2199.9	101.4%	3280.5	68.0%
N-2: Double Palo Verde	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1793.9	2211.3	2199.9	100.5%	3280.5	67.4%
N-2: Double Palo Verde	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	2142.9	2553.1	2477.9	103.0%	3999.9	63.8%
N-2: Double Palo Verde	YORKCANY (12091)	% Δ Volts	1.005	0.924				8.06%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Double Palo Verde	SPRINGER (12077)	% Δ Volts	1.006	0.929				7.65%
N-2: Double Palo Verde	CIMARRON (12148)	% Δ Volts	1.007	0.93				7.65%
N-2: Double Palo Verde	RAINVL T (12130)	% Δ Volts	1.008	0.931				7.64%
N-2: Double Palo Verde	RAINVL1 (12129)	% Δ Volts	1.009	0.932				7.63%
N-2: Double Palo Verde	ROBINSON (64895)	% Δ Volts	1.095	1.015				7.31%
N-2: Double Palo Verde	MONTROSE (79049)	% Δ Volts	0.996	0.928				6.83%
N-2: Double Palo Verde	ROBINSON (64885)	% Δ Volts	1.042	0.973				6.62%
N-2: Double Palo Verde	PTRSNFUR (62386)	% Δ Volts	1.019	0.952				6.58%
N-2: Double Palo Verde	LOSTCANY (79045)	% Δ Volts	0.974	0.911				6.47%
N-2: Double Palo Verde	PTRSNFLT (62030)	% Δ Volts	1.001	0.937				6.39%
N-2: Double Palo Verde	STORRIE (12079)	% Δ Volts	1.019	0.954				6.38%
N-2: Double Palo Verde	GALLINAT (10484)	% Δ Volts	1.02	0.955				6.37%
N-2: Double Palo Verde	ARRIBA (10016)	% Δ Volts	1.019	0.955				6.28%
N-2: Double Palo Verde	GRANDJCT (79036)	% Δ Volts	1.009	0.947				6.14%
N-2: Double Palo Verde	VALENCIA (10356)	% Δ Volts	0.999	0.938				6.11%
N-2: Double Palo Verde	BACA (10026)	% Δ Volts	0.997	0.937				6.02%
N-2: Double Palo Verde	BULLOCK (79079)	% Δ Volts	0.986	0.927				5.98%
N-2: Double Palo Verde	HAPPYCAN (79082)	% Δ Volts	0.987	0.928				5.98%
N-2: Double Palo Verde	CEDARHIL (60159)	% Δ Volts	1.088	1.023				5.97%
N-2: Double Palo Verde	NORTHMSA (79085)	% Δ Volts	0.988	0.929				5.97%
N-2: Double Palo Verde	SPRCKTAP (79115)	% Δ Volts	0.988	0.929				5.97%
N-2: Double Palo Verde	VALENCIA (10357)	% Δ Volts	1.023	0.962				5.96%
N-2: Double Palo Verde	MONTROSE (79048)	% Δ Volts	0.991	0.932				5.95%
N-2: Double Palo Verde	BLUEDOOR (79073)	% Δ Volts	0.983	0.925				5.90%
N-2: Double Palo Verde	E.CORTEZ (79074)	% Δ Volts	0.983	0.925				5.90%
N-2: Double Palo Verde	LOSTCANY (79044)	% Δ Volts	0.984	0.926				5.89%
N-2: Double Palo Verde	PEACHVLY (72801)	% Δ Volts	0.988	0.93				5.87%
N-2: Double Palo Verde	CORTEZ (79012)	% Δ Volts	0.983	0.926				5.80%
N-2: Double Palo Verde	GRANDJCT (70205)	% Δ Volts	1.003	0.945				5.78%
N-2: Double Palo Verde	EMPIRETS (79075)	% Δ Volts	0.986	0.929				5.78%
N-2: Double Palo Verde	DOUGHSPN (79182)	% Δ Volts	0.987	0.93				5.78%
N-2: Double Palo Verde	GRCUT TP (79180)	% Δ Volts	0.987	0.93				5.78%
N-2: Double Palo Verde	GRT CUT (79179)	% Δ Volts	0.987	0.93				5.78%
N-2: Double Palo Verde	GARNET M (79103)	% Δ Volts	0.988	0.931				5.77%
N-2: Double Palo Verde	STRNELSN (79183)	% Δ Volts	0.989	0.932				5.76%
N-2: Double Palo Verde	CLIFTON (70113)	% Δ Volts	1.007	0.949				5.76%
N-2: Double Palo Verde	TOWAOC (79122)	% Δ Volts	0.985	0.929				5.69%
N-2: Double Palo Verde	GUNVAL (79184)	% Δ Volts	0.987	0.931				5.67%
N-2: Double Palo Verde	GRT CUT (79178)	% Δ Volts	0.989	0.933				5.66%
N-2: Double Palo Verde	AMPS (65025)	% Δ Volts	1.007	0.95				5.66%
N-2: Double Palo Verde	GARNETAP (79104)	% Δ Volts	0.991	0.935				5.65%
N-2: Double Palo Verde	GOODMNPT (72780)	% Δ Volts	0.986	0.931				5.58%
N-2: Double Palo Verde	MAIN CO (79110)	% Δ Volts	0.986	0.931				5.58%
N-2: Double Palo Verde	SANDCANY (79121)	% Δ Volts	0.986	0.931				5.58%
N-2: Double Palo Verde	HOVENWEP (79108)	% Δ Volts	0.987	0.932				5.57%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Double Palo Verde	Y.JACK W (79118)	% Δ Volts	0.987	0.932				5.57%
N-2: Double Palo Verde	MCPHEE (79177)	% Δ Volts	1.006	0.95				5.57%
N-2: Double Palo Verde	GRANDJCT (70214)	% Δ Volts	1.009	0.953				5.55%
N-2: Double Palo Verde	MANCOSTP (79111)	% Δ Volts	0.994	0.939				5.53%
N-2: Double Palo Verde	HORIZON (70233)	% Δ Volts	1.018	0.962				5.50%
N-2: Double Palo Verde	MIDPOINT (60240)	% Δ Volts	1.092	1.032				5.49%
N-2: Double Palo Verde	Y.JACK 2 (79117)	% Δ Volts	0.988	0.934				5.47%
N-2: Double Palo Verde	PLESNTVW (72782)	% Δ Volts	0.99	0.936				5.45%
N-2: Double Palo Verde	ADOBE (70268)	% Δ Volts	1.025	0.97				5.37%
N-2: Double Palo Verde	GRANDJCT (79034)	% Δ Volts	0.99	0.937				5.35%
N-2: Double Palo Verde	CAHONE (79011)	% Δ Volts	0.992	0.939				5.34%
N-2: Double Palo Verde	DOECANYN (72781)	% Δ Volts	0.992	0.939				5.34%
N-2: Double Palo Verde	VINELAND (70454)	% Δ Volts	1.014	0.96				5.33%
N-2: Double Palo Verde	WBK 25 (50742)	% Δ Volts	1.016	0.962				5.31%
N-2: Double Palo Verde	HOTCHKIS (79042)	% Δ Volts	1.001	0.948				5.29%
N-2: Double Palo Verde	MCKENZIX (79193)	% Δ Volts	0.991	0.939				5.25%
N-2: Double Palo Verde	SOCANAL (79192)	% Δ Volts	0.992	0.94				5.24%
N-2: Double Palo Verde	UINTAH (70438)	% Δ Volts	1.032	0.978				5.23%
N-2: Double Palo Verde	UINTAH (70437)	% Δ Volts	1.018	0.965				5.21%
N-2: Double Palo Verde	CAMEO (70076)	% Δ Volts	1.019	0.966				5.20%
N-2: Double Palo Verde	HRD 25 (51210)	% Δ Volts	1.022	0.969				5.19%
N-2: Double Palo Verde	GRANDJCT (79035)	% Δ Volts	0.987	0.936				5.17%
N-2: Double Palo Verde	GLADSTON (12101)	% Δ Volts	1.01	0.958				5.15%
N-2: Double Palo Verde	DEBEQUE (70140)	% Δ Volts	0.994	0.943				5.13%
N-2: Double Palo Verde	JUANITA (79083)	% Δ Volts	0.994	0.943				5.13%
N-2: Double Palo Verde	BLACKLAK (12011)	% Δ Volts	1.018	0.966				5.11%
N-2: Double Palo Verde	DILLON S (62084)	% Δ Volts	1.006	0.955				5.07%
N-2: Double Palo Verde	CAMEO (70078)	% Δ Volts	1.017	0.966				5.01%
N-2: Echolake-Maple Vly 500 kV & Covington-Maple Vly 230 kV	No Violations							
N-2: Echolake-Maple Vly 500 kV & Rocky RH-Maple Vly 345 kV	No Violations							
N-2: Garrison-Taft #1 & #2 500 kV + RAS	No Violations							
N-2: Grassland-Cedar Sp 500kV & Slatt-Buckley 500kV	No Violations							
N-2: Grassland-Coyote 500kV & Slatt-Longhorn 500kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1582.7	1550.0	102.1%	1782.5	88.8%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1708.4	3310.8	2400.0	137.9%	3800.0	87.1%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1379.2	3165.0	2700.0	117.2%	4000.0	79.1%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1597.3	3136.2	2400.0	130.7%	3800.0	82.5%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1583.2	3122.8	2400.0	130.1%	3800.0	82.2%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1597.3	3103.0	2400.0	129.3%	3800.0	81.7%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1583.2	3092.8	2400.0	128.9%	3800.0	81.4%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1567.8	1550.0	101.2%	1782.5	88.0%
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	1835.8	3129.1	2900.0	107.9%	4350.0	71.9%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	1840.0	3488.1	3000.0	116.3%	4050.0	86.1%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1562.4	1550.0	100.8%	1782.5	87.7%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.4	346.7	320.0	108.4%	370.0	93.7%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	678.3	1176.9	950.0	123.9%	1286.0	91.5%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CLATSOP (40243) -> LWSCLARK (45314) CKT 1 at CLATSOP	Branch MVA	80.1	96.8	94.0	103.0%	139.0	69.6%
N-2: Keeler-Pearl 500 & Sherwood-Carlton 230 kV	CARLTON (40181)	% Δ Volts	1.026	0.972				5.26%
N-2: Knight-Ostrander & Ostrander-Big Eddy 500 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1609.3	1550.0	103.8%	1782.5	90.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	89.0	160.2	150.0	106.8%	180.0	89.0%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1833.8	3694.7	2667.4	138.5%	4099.2	90.1%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI11	Branch Amp	1798.2	3587.0	2667.4	134.5%	4099.2	87.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1798.2	3587.0	2667.4	134.5%	4099.2	87.5%
N-2: Malin-Round Mtn #1 & #2 500 kV	DRUM (32218) -> DTCH FL1 (32220) CKT 1 at DRUM	Branch Amp	300.2	417.7	415.7	100.5%	483.5	86.4%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	2048.6	3247.2	2993.0	108.5%	4514.9	71.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	2048.6	3247.2	2993.0	108.5%	4514.9	71.9%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	2021.6	3217.4	2993.0	107.5%	4514.9	71.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at MAXWELL	Branch Amp	2021.6	3217.4	2993.0	107.5%	4514.9	71.3%
N-2: Malin-Round Mtn #1 & #2 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	2000.7	3181.4	2993.0	106.3%	4514.9	70.5%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1579.0	1550.0	101.9%	1782.5	88.6%
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1582.7	1550.0	102.1%	1782.5	88.8%
N-2: Monroe-CusterW & Chief Jo-Monroe 500 kV	No Violations							
N-2: Napavine-Allston & Paul-Allston #2 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1554.2	1550.0	100.3%	1782.5	87.2%
N-2: Paul-Napavine & Paul-Allston #2 500 kV + RAS	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1554.4	1550.0	100.3%	1782.5	87.2%
N-2: Paul-Raver & Raver-Covingt4 500 kV	No Violations							
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	HORIZN (43740) -> SUNSETPG (43739) CKT 1 at SUNSETPG	Branch MVA	270.4	328.2	320.0	102.6%	370.0	88.7%
N-2: Pearl-Keeler 500 kV & Pearl-Sherwood 230 kV + RAS	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	678.3	1041.7	950.0	109.6%	1286.0	81.0%
N-2: Pearl-Ostrander 500 kV & Big Eddy-McLougIn 230 kV	No Violations							
N-2: Pearl-Ostrander 500 kV & Ostrander-McLougIn 230 kV	No Violations							
N-2: Raver-Covington #1 & #2 500 kV	No Violations							
N-2: Raver-Echo Lake & Raver-Schultz 500 kV	No Violations							
N-2: Raver-Paul & Napavine-Paul 500 kV	No Violations							
N-2: Raver-Paul 500 kV & Coulee-Olympia 300 kV	No Violations							
N-2: Raver-Paul 500 kV & Tacoma A-Chehalis 230 kV	No Violations							
N-2: Raver-Schultz #1 & #2 500 kV	No Violations							
N-2: Raver-Tacoma & Raver-Covingt4 500 kV	No Violations							
N-2: Raver-Tacoma 500 kV & Tacoma-Christop-Covington 230 kV	No Violations							
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAL SUB (64025) -> CAL S PS (64023) CKT 1 at CAL S PS	Branch MVA	89.0	167.5	150.0	111.7%	180.0	93.1%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	717.6	933.5	830.9	112.3%	926.3	100.8%

Appendix M - 16hs2a_2250idnw_ms_swips Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	FRUTLDJT (31120) -> FTSWRDJT (31122) CKT 1 at FRUTLDJT	Branch Amp	285.4	322.6	303.1	106.4%	339.7	95.0%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	BRDGVLE (31110) -> FRUTLDJT (31120) CKT 1 at BRDGVLE	Branch Amp	311.5	349.9	328.1	106.6%	371.4	94.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	FTSWRDJT (31122) -> GRBRVLE (31116) CKT 1 at FTSWRDJT	Branch Amp	279.4	316.5	303.1	104.4%	339.7	93.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1833.8	3416.9	2667.4	128.1%	4099.2	83.4%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1798.2	3327.6	2667.4	124.8%	4099.2	81.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPTJACK	Branch Amp	1798.2	3311.2	2667.4	124.1%	4099.2	80.8%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	2048.6	3532.6	2993.0	118.0%	4514.9	78.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	2048.6	3532.6	2993.0	118.0%	4514.9	78.2%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	2021.6	3516.1	2993.0	117.5%	4514.9	77.9%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at MAXWELL	Branch Amp	2021.6	3516.1	2993.0	117.5%	4514.9	77.9%
N-2: Round Mtn-Table Mtn #1 & #2 500 kV + RAS	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	2000.7	3484.5	2993.0	116.4%	4514.9	77.2%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	DELEVN (30114) -> CORTINA (30450) CKT 1 at CORTINA	Branch Amp	717.6	949.2	830.9	114.2%	926.3	102.5%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	FRUTLDJT (31120) -> FTSWRDJT (31122) CKT 1 at FRUTLDJT	Branch Amp	285.4	324.8	303.1	107.2%	339.7	95.6%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	BRDGVLE (31110) -> FRUTLDJT (31120) CKT 1 at BRDGVLE	Branch Amp	311.5	352.1	328.1	107.3%	371.4	94.8%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	FTSWRDJT (31122) -> GRBRVLE (31116) CKT 1 at FTSWRDJT	Branch Amp	279.4	318.7	303.1	105.1%	339.7	93.8%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	PEASE (32200) -> E.MRY J1 (32288) CKT 1 at PEASE	Branch Amp	391.1	459.4	441.8	104.0%	507.1	90.6%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	ROUND MT (30245) -> COTWD_E (30105) CKT 3 at COTWD_E	Branch Amp	292.7	663.7	635.1	104.5%	745.5	89.0%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	277.2	364.1	326.3	111.6%	416.7	87.4%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OLIMAX11 (30026) -> OLIMAX12 (30027) CKT 1 at OLIMAX11	Branch Amp	2048.6	3282.8	2993.0	109.7%	4514.9	72.7%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OLINDA (30020) -> OLIMAX11 (30026) CKT 1 at OLIMAX11	Branch Amp	2048.6	3282.8	2993.0	109.7%	4514.9	72.7%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MAXWELL (30025) -> MAXTRA11 (30036) CKT 1 at MAXWELL	Branch Amp	2021.6	3263.6	2993.0	109.0%	4514.9	72.3%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	OLIMAX12 (30027) -> MAXWELL (30025) CKT 1 at MAXWELL	Branch Amp	2021.6	3263.6	2993.0	109.0%	4514.9	72.3%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CAPOLI12 (90134) -> OLINDA (30020) CKT 1 at OLINDA	Branch Amp	1833.8	2954.3	2667.4	110.8%	4099.2	72.1%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	MAXTRA11 (30036) -> TRACY (30035) CKT 1 at TRACY	Branch Amp	2000.7	3233.0	2993.0	108.0%	4514.9	71.6%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CAPOLI11 (90133) -> CAPOLI12 (90134) CKT 1 at CAPOLI12	Branch Amp	1798.2	2870.5	2667.4	107.6%	4099.2	70.0%
N-2: Table Mtn-Tesla & Table Mtn-Vaca Dixon 500 kV	CAPTJACK (45035) -> CAPOLI11 (90133) CKT 1 at CAPOLI11	Branch Amp	1798.2	2868.7	2667.4	107.5%	4099.2	70.0%
N-2: Taft-Bell 500 kV & Bell-Lancaster 230 kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Boundary #3 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Lancaster 230kV	No Violations							
N-2: Taft-Bell 500kV & Bell-Trentwood #2 115kV	No Violations							
N-2: Taft-Bell 500kV & Lancaster-Noxon 230kV	No Violations							
N-2: Taft-Dworshak & Garrison-Taft #1 500kV	No Violations							
N-2: Townsend-Garrison #1 & #2 500 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1569.9	1550.0	101.3%	1782.5	88.1%
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	TOWNSEND (62500) -> TWNSNDPS (62503) CKT 1 at TOWNSEND	Branch MVA	1517.7	1569.9	1550.0	101.3%	1782.5	88.1%
N-3: Schultz-Raver #1 & #2 & #3 500 kV	No Violations							

Appendix N

Idaho-Northwest v West of McNary & West of Slatt Studies

N1.0 Simultaneous Interaction Study: Idaho-Northwest (W-E) v West of McNary, Grassland Terminus

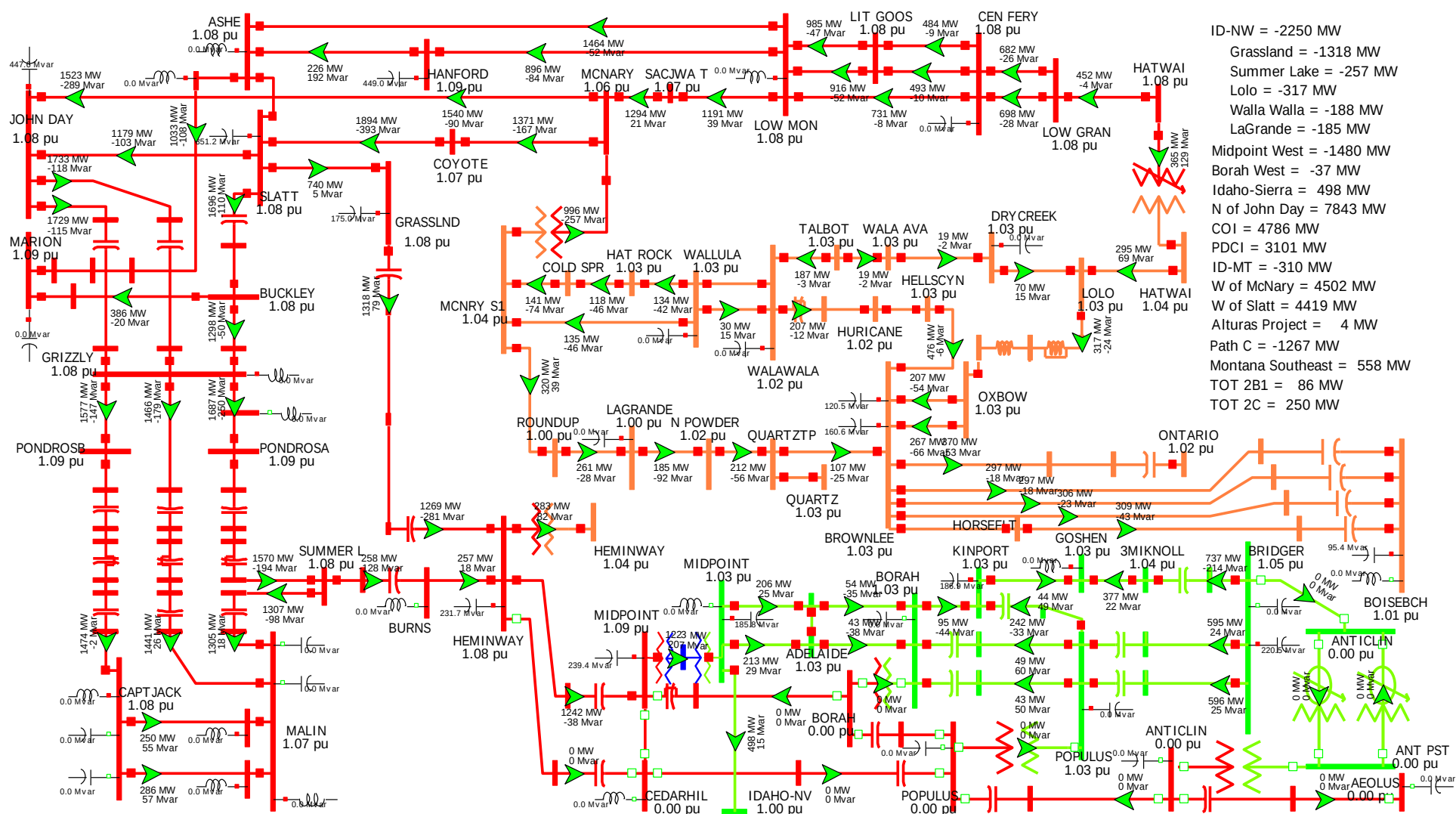


Figure N1: Idaho-Northwest 2250 MW west-to-east, West of McNary 4500 MW, Grassland Terminus

N1.1 Background & Need for Simultaneous Interaction Study

The Hemingway-Boardman Phase II study review group requested that the impacts of the Hemingway to Boardman project be evaluated with the West of McNary path at its 4500 MW east-to-west rating simultaneous with Idaho-Northwest at 2250 MW west-to-east. The study group also requested that the study be performed leaving out other planned projects such as Stage One of Gateway West, and the Cascade Crossings Transmission Project.

The West of McNary path is made up of the following lines: (1) Coyote-Slatt 500 kV, (2) McNary-John Day 500 kV, (3) McNary-Ross 345 kV, (4) Jones Canyon-Tumble Creek 230 kV and (5) Harvalum-Big Eddy 230 kV.

N1.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_2250idnw_4500wom.

Step-by-step development of the 16hs2a 2250idnw 4500wom base case:

Step 1: Begin with the 16hs2a_2250idnw_solo base case.

Utilize the base case developed in Section 4.10.2 Steady State Case Stressing. This case does not include Stage One of Gateway West or the Cascade Crossings Transmission Project.

Step 2: Stress the West of McNary path.

Generation east of McNary was increased to stress the West of McNary path to 4,500 MW. The path flows were increased by modifying generation in the Pacific Northwest, mostly in Southeast Washington, and the Lower Columbia Basin. The generation increase east of McNary corresponds with a reduction in generation west of McNary at places such as John Day, The Dalles, and Bonneville.

Step 3: Re-stress Idaho-Northwest

The Idaho-Northwest path was re-stressed to 2250 MW in the west-to-east direction by reducing PacifiCorp East (PACE) and Idaho Power generation and replacing the generation with a schedule from the Northwest. No other paths were significantly altered.

N1.3 Post Transient Results

Post-transient contingency results for the 16hs2a_2250idnw_4500wom case can be found at the end of this section. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Hemingway-Grassland 500 kV & Hem 500/230 Xfmr

This is the limiting contingency for the Idaho-Northwest path in the west-to-east direction. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 110% of its 1237 Amp nominal rating (97.3% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N1.1: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	110% (1237 Amp Rating)	97.3% (1396 Amp Rating)
Oxbow – Lolo 230 kV	112% (920 Amp SOL)	98.7% (1047 Amp Rating)

A breaker failure at Hemingway significantly stresses the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines. Section 2.4 considers different Hemingway 500 kV substation configurations to avoid severe breaker failures, however, at this time this breaker failure is considered to be credible.

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #2 – Hemingway-Grassland 500 kV + PTSN Shunt

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 109% of its 1237 Amp nominal rating (96.1% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N1.2: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	109% (1237 Amp Rating)	97.3% (1396 Amp Rating)
Oxbow – Lolo 230 kV	112% (920 Amp SOL)	98.7% (1047 Amp Rating)

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Conclusion

Two of the notable post transient contingencies resulting in more severe system stressing were noted above. These contingencies, as well as all other post-transient contingencies, result in acceptable performance. Ultimately, the results indicate that Idaho-Northwest can achieve a 2250 MW west-to-east rating simultaneous with West of McNary at 4500 MW.

Appendix N1 - 16hs2a_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1690.3	2924.8	2199.7	133.0%	3235.5	90.4%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1690.3	2924.8	2199.7	133.0%	3235.5	90.4%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1688.3	2917.0	2666.9	109.4%	3999.9	72.9%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1681.6	2907.9	2667.0	109.0%	4000.0	72.7%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1643.6	2815.5	2229.7	126.3%	3514.0	80.1%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1643.6	2815.5	2699.7	104.3%	3999.9	70.4%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1638.4	2806.8	2699.7	104.0%	4000.0	70.2%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1238.2	1237.0	100.1%	1396.0	88.7%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	KINGEN (47332)	% Δ Volts	1.017	0.966				-5.01%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	KINGEN T (40608)	% Δ Volts	1.016	0.965				-5.02%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	LAGRAND2 (40620)	% Δ Volts	1.008	0.957				-5.06%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40621)	% Δ Volts	1.004	0.953				-5.08%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	BOARD T2 (40123)	% Δ Volts	1.035	0.981				-5.22%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40905)	% Δ Volts	1.001	0.945				-5.59%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	LAGRANDE (40619)	% Δ Volts	0.952	0.898				-5.67%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	DR W TP (45162)	% Δ Volts	1.030	0.970				-5.83%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	DR E TP (45160)	% Δ Volts	1.030	0.970				-5.83%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	DALREED (45075)	% Δ Volts	1.030	0.970				-5.83%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	ROUNDUP2 (41253)	% Δ Volts	0.984	0.925				-6.00%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	JONESCYN (47814)	% Δ Volts	1.032	0.969				-6.10%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	MCKAY (45322)	% Δ Volts	0.979	0.919				-6.13%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	ROUNDUP (40903)	% Δ Volts	0.984	0.923				-6.20%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	PENDLT T (41248)	% Δ Volts	0.974	0.913				-6.26%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	PENDLBPA (41247)	% Δ Volts	0.974	0.913				-6.26%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	BUCKAROO (45027)	% Δ Volts	0.972	0.911				-6.28%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	PENDLTON (45235)	% Δ Volts	0.971	0.910				-6.28%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	MISSIONT (47191)	% Δ Volts	0.970	0.908				-6.39%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	ATHENA (45015)	% Δ Volts	0.960	0.898				-6.46%
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	PILOT RK (45413)	% Δ Volts	0.960	0.897				-6.56%
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1259.5	1237.0	101.8%	1396.0	90.2%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	924.5	920.0	100.5%	1046.8	88.3%
BF 5006 Slatt-Grassland 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1254.1	1237.0	101.4%	1396.0	89.8%
BF 5015 Ashe-Slatt 500 kV & Slatt 500 kV Caps	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1240.5	1237.0	100.3%	1396.0	88.9%
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5043 Coyote-Slatt & Slatt 500 kV Caps	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1238.6	1237.0	100.1%	1396.0	88.7%
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5211 Low Mon-McNary & McNary-John Day 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV & Slatt 500 kV Caps	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	1033.1	920.0	112.3%	1046.8	98.7%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1358.8	1237.0	109.8%	1396.0	97.3%
BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr	IMNAHA (60278)	% Δ Volts	0.982	0.926				-5.70%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1242.4	1237.0	100.4%	1396.0	89.0%
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1252.5	1237.0	101.2%	1396.0	89.7%
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 2	No Violations							
BF McNary 230 kV SECT 3	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	986.4	920.0	107.2%	1046.8	94.2%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1307.2	1237.0	105.7%	1396.0	93.6%
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	HEMBOA11 (61953)	% Δ Volts	1.102	1.021				-7.35%
Bus: Buckley 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	QUARTZ (60305) -> NELSN TP (61055) CKT 1 at QUARTZ	Branch Amp	227.8	409.7	400.0	102.4%	491.2	83.4%
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Coyote-Slatt 500 kV	No Violations							
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1254.1	1237.0	101.4%	1396.0	89.8%
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	997.0	920.0	108.4%	1046.8	95.2%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1689.9	2890.4	2400.0	120.4%	3199.9	90.3%
N-1: Hemingway-Grassland 500 kV + FACRI	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1253.9	1237.0	101.4%	1396.0	89.8%
N-1: Hemingway-Grassland 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1698.2	2908.6	2400.0	121.2%	3800.0	76.5%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	1006.1	920.0	109.4%	1046.8	96.1%
N-1: Hemingway-Grassland 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1332.5	1237.0	107.7%	1396.0	95.5%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							

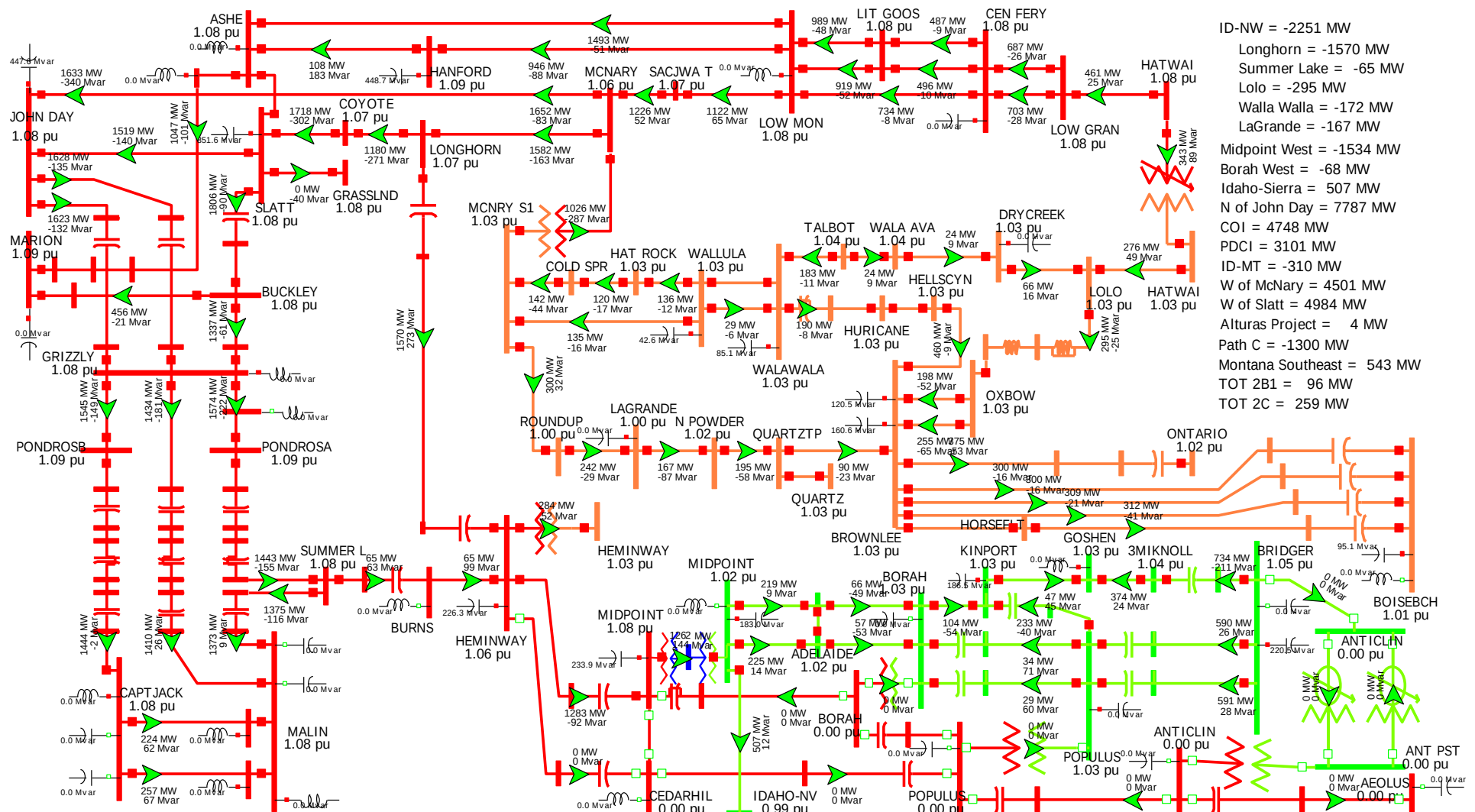
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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Low Mon-McNary 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	JONESCYN (47814)	% Δ Volts	1.032	0.978				-5.23%
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-Calpine PH	No Violations							
N-1: McNary-Coyote 500 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1266.1	1237.0	102.4%	1396.0	90.7%
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1252.7	1237.0	101.3%	1396.0	89.7%
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1270.1	1237.0	102.7%	1396.0	91.0%
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1248.5	1237.0	100.9%	1396.0	89.4%
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	948.5	920.0	103.1%	1046.8	90.6%
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Coyote-Slatt 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1256.4	1237.0	101.6%	1396.0	90.0%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	JONTMB11 (90164)	% Δ Volts	1.003	0.948				-5.48%
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1307.0	1237.0	105.7%	1396.0	93.6%
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	977.3	920.0	106.2%	1046.8	93.4%
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	PTRSNFUR (62386)	% Δ Volts	1.021	0.970				-5.00%
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	ASHMAR22 (90007)	% Δ Volts	1.089	1.034				-5.05%
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	JONTMB11 (90164)	% Δ Volts	1.003	0.943				-5.98%
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	812.1	972.4	920.0	105.7%	1046.8	92.9%
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1689.9	2661.8	2400.0	110.9%	3199.9	83.2%
N-2: DC-BIPOLE	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	295.5	331.5	326.3	101.6%	416.7	79.5%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1807.8	2362.4	2199.9	107.4%	3280.5	72.0%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1792.5	2342.4	2199.9	106.5%	3280.5	71.4%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1690.3	2292.1	2199.7	104.2%	3235.5	70.8%
N-2: DC-BIPOLE	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1690.3	2292.1	2199.7	104.2%	3235.5	70.8%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1698.2	2677.7	2400.0	111.6%	3800.0	70.5%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1616.8	2303.3	2134.0	107.9%	3499.9	65.8%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDVIN11	Branch Amp	1595.1	2269.5	2134.0	106.3%	3499.9	64.8%
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at VINCENT	Branch Amp	1573.4	2240.8	2134.0	105.0%	3499.9	64.0%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1936.3	2494.7	2477.9	100.7%	3999.9	62.4%
N-2: DC-BIPOLE	YORKCANY (12091)	% Δ Volts	1.0	1.0				-5.2%
N-2: Double Palo Verde	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM14	Branch Amp	1689.9	2438.8	2400.0	101.6%	3199.9	76.2%
N-2: Double Palo Verde	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1698.2	2460.2	2400.0	102.5%	3800.0	64.7%
N-2: Double Palo Verde	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1616.8	2158.8	2134.0	101.2%	3499.9	61.7%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1698.2	3107.2	2400.0	129.5%	3800.0	81.8%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1393.2	2987.2	2700.0	110.6%	4000.0	74.7%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1597.0	2942.7	2400.0	122.6%	3800.0	77.4%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1581.9	2927.3	2400.0	122.0%	3800.0	77.0%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1597.0	2966.2	2400.0	123.6%	3800.0	78.1%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1581.9	2955.2	2400.0	123.1%	3800.0	77.8%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1813.7	3038.7	2900.0	104.8%	4350.0	69.9%
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	No Violations							
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	1840.8	3366.1	3000.0	112.2%	4050.0	83.1%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 + RAS	No Violations							
N-2: McNary-John Day & Rock Creek-John Day 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1241.2	1237.0	100.3%	1396.0	88.9%
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	MCNRY S1 (41351) -> MCNARY (40723) CKT 1 at MCNARY	Branch MVA	1052.5	1480.4	1368.0	108.2%	1644.0	90.0%
N-2: Midpoint-Hemingway 500 kV & Midpoint-King 230 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1159.7	1258.0	1237.0	101.7%	1396.0	90.1%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							

N2.0 Simultaneous Interaction Study: Idaho-Northwest (W-E) v West of McNary, Longhorn Terminus, Longhorn Generation



ID-NW = -2251 MW
Longhorn = -1570 MW
Summer Lake = -65 MW
Lolo = -295 MW
Walla Walla = -172 MW
LaGrande = -167 MW
Midpoint West = -1534 MW
Borah West = -68 MW
Idaho-Sierra = 507 MW
N of John Day = 7787 MW
COI = 4748 MW
PDCI = 3101 MW
ID-MT = -310 MW
W of McNary = 4501 MW
W of Slatt = 4984 MW
Alturas Project = 4 MW
Path C = -1300 MW
Montana Southeast = 543 MW
TOT 2B1 = 96 MW
TOT 2C = 259 MW

Figure N2: Idaho-Northwest 2250 MW west-to-east, West of McNary 4500 MW, Longhorn Terminus, High Longhorn Gen

N2.1 Background & Need for Simultaneous Interaction Study

The Hemingway-Boardman Phase II study review group requested that the impacts of the Hemingway to Boardman project be evaluated with the West of McNary path at its 4500 MW east-to-west rating simultaneous with Idaho-Northwest at 2250 MW west-to-east. The study group also requested that the study be performed leaving out other planned projects such as Stage One of Gateway West, and the Cascade Crossings Transmission Project. Given the uncertainty of the northwest terminus of the Hemingway-Boardman project, this section looks at a Longhorn terminus option.

Due to the location of Longhorn, just east of the West of McNary cut plane, generation east of the cutplane had to increase substantially compared to the Grassland terminus alternative studied in Section N1. This section models Longhorn generation is at its maximum in order to restress the West of McNary path. The following section, Section N3, models Stanfield (McNary 500 kV) generation at its maximum.

Terminating the Hemingway-Boardman 500 kV transmission project at Longhorn is assumed not to affect the definition of the West of McNary path. This may change in the future. The West of McNary path is made up of the following lines: (1) Coyote-Slatt 500 kV, (2) McNary-John Day 500 kV, (3) McNary-Ross 345 kV, (4) Jones Canyon-Tumble Creek 230 kV and (5) Harvalum-Big Eddy 230 kV.

N2.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_lh_2250idnw_4500wom.

Step-by-step development of the 16hs2a lh 2250idnw 4500wom base case:

Step 1: Begin with the 16hs2a_2250idnw_4500wom base case.

Utilize the base case developed in Section N1.2 Steady State Case Stressing. Shift the terminus of the Hemingway-Boardman transmission project from Grassland to Longhorn.

Step 2: Stress the West of McNary path.

Over 1500 MW of generation drops off at Longhorn, toward Hemingway, in this configuration, and does not reach the West of McNary cutplane. In the Grassland terminus option, this flow would have crossed the West of McNary cutplane before sinking toward Hemingway. To make up for this reduction in flow across West of McNary, wind generation at Longhorn was stressed

to maximum levels (1214 MW), and generation at Stanfield (McNary 500 kV) was also ramped up to 362 MW. Combining Longhorn & Stanfield, this is 1576 MW of additional generation east of the cutplane when compared to the Section N1 base case. The generation increase at Longhorn & Stanfield cooresponds with a reduction in generation west of McNary at places such as John Day, The Dalles, Bonneville and Boardman. Perhaps in the future, West of McNary would be redefined if the Hemingway-Boardman transmission project terminates at Longhorn.

Step 3: Re-stress Idaho-Northwest

The Idaho-Northwest path was re-stressed to 2250 MW in the west-to-east direction by reducing PacifiCorp East (PACE) and Idaho Power generation and replacing the generation with a schedule from the Northwest. No other paths were significantly altered.

N2.3 Post Transient Results

Post-transient contingency results for the 16hs2a_lh_2250idnw_4500wom case can be found at the end of this section. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Hemingway-Longhorn 500 kV & Hem 500/230 Xfmr

This is the limiting contingency for the Idaho-Northwest path in the west-to-east direction. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 111% of its 1237 Amp nominal rating (98.4% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N2.1: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	111% (1237 Amp Rating)	98.4% (1396 Amp Rating)
Oxbow – Lolo 230 kV	111% (920 Amp SOL)	97.3% (1047 Amp Rating)

A breaker failure at Hemingway significantly stresses the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines. Section 2.4 considers different Hemingway 500 kV substation configurations to avoid severe breaker failures, however, at this time this breaker failure is considered to be credible.

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #2 – Hemingway-Longhorn 500 kV + PTSN Shunt

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 110% of its 1237 Amp nominal rating (97.1% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-

Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N2.2: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	110% (1237 Amp Rating)	97.1% (1396 Amp Rating)
Oxbow – Lolo 230 kV	109% (920 Amp SOL)	95.6% (1047 Amp Rating)

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #3 – BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 107% of its 1237 Amp nominal rating (95.0% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N2.3: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	107% (1237 Amp Rating)	95.0% (1396 Amp Rating)
Oxbow – Lolo 230 kV	106% (920 Amp SOL)	93.5% (1047 Amp Rating)

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Conclusion

Three of the notable post transient contingencies resulting in more severe system stressing were noted above. These contingencies, as well as all other post-transient contingencies, result in acceptable performance. Ultimately, the results indicate that Idaho-Northwest can achieve a 2250 MW west-to-east rating simultaneous with West of McNary at 4500 MW even if the Hemingway-Boardman 500 kV transmission project has a Longhorn northwest terminus.

Appendix N2 - 16hs2a_lh_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1676.0	2901.0	2199.7	131.9%	3235.5	89.7%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1676.0	2901.0	2199.7	131.9%	3235.5	89.7%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALIN	Branch Amp	1674.0	2893.4	2666.9	108.5%	3999.9	72.3%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1667.4	2884.1	2667.0	108.1%	4000.0	72.1%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1629.7	2793.5	2229.7	125.3%	3514.0	79.5%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1629.7	2793.5	2699.7	103.5%	3999.9	69.8%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1624.6	2784.7	2699.7	103.1%	4000.0	69.6%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	RATSN C1 (47891)	% Δ Volts	1.030	0.978				-5.05%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	WHT F C1 (47896)	% Δ Volts	1.030	0.978				-5.05%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LJ2 C1 (47807)	% Δ Volts	1.034	0.980				-5.22%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LEANJ C1 (44886)	% Δ Volts	1.036	0.978				-5.60%
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LJ2 C2 (47811)	% Δ Volts	1.043	0.977				-6.33%
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	MCNRY S1 (41351) -> MCNARY (40723) CKT 1 at MCNARY	Branch MVA	1093.0	1376.1	1368.0	100.6%	1644.0	83.7%
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	No Violations							
BF 5006 Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt 500 kV & Slatt 500 kV Caps	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	LONGHORN (40724) -> HEMLON12 (61955) CKT 1 at HEMLON12	Branch Amp	1702.8	2033.0	2000.1	101.6%	3000.0	67.8%

Appendix N2 - 16hs2a_lh_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	HEMLON11 (61956) -> HEMINWAY (60155) CKT 1 at HEMINWAY	Branch Amp	1675.9	2026.8	2000.1	101.3%	3000.0	67.6%
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5043 Coyote-Slatt & Slatt 500 kV Caps	LONGHORN (40724) -> HEMLON12 (61955) CKT 1 at HEMLON12	Branch Amp	1702.8	2038.3	2000.1	101.9%	3000.0	67.9%
BF 5043 Coyote-Slatt & Slatt 500 kV Caps	HEMLON11 (61956) -> HEMINWAY (60155) CKT 1 at HEMINWAY	Branch Amp	1675.9	2022.6	2000.1	101.1%	3000.0	67.4%
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5211 Low Mon-McNary & McNary-John Day 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV & Slatt 500 kV Caps	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1120.9	1373.6	1237.0	111.0%	1396.0	98.4%
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	750.9	1018.9	920.0	110.8%	1046.8	97.3%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	No Violations							
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1120.9	1288.6	1237.0	104.2%	1396.0	92.3%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	750.9	947.3	920.0	103.0%	1046.8	90.5%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1120.9	1333.0	1237.0	107.8%	1396.0	95.5%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	750.9	965.4	920.0	104.9%	1046.8	92.2%
BF LH Longhorn-Coyote 500 kV & Longhorn Gen	No Violations							
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1120.9	1326.7	1237.0	107.2%	1396.0	95.0%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	750.9	978.5	920.0	106.4%	1046.8	93.5%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	No Violations							
BF LH McNary-Longhorn 500 kV & Longhorn Gen	No Violations							
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 2	No Violations							
BF McNary 230 kV SECT 3	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							

Appendix N2 - 16hs2a_lh_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Coyote-Slatt 500 kV	LONGHORN (40724) -> HEMLON12 (61955) CKT 1 at LONGHORN	Branch Amp	1702.8	2023.6	2000.1	101.2%	3000.0	67.5%
N-1: Coyote-Slatt 500 kV	HEMLON11 (61956) -> HEMINWAY (60155) CKT 1 at HEMINWAY	Branch Amp	1675.9	2006.7	2000.1	100.3%	3000.0	66.9%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	750.9	928.6	920.0	100.9%	1046.8	88.7%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Longhorn 500 kV + FACRI	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1120.9	1268.7	1237.0	102.6%	1396.0	90.9%
N-1: Hemingway-Longhorn 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1550.1	2847.2	2400.0	118.6%	3199.9	89.0%
N-1: Hemingway-Longhorn 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1557.7	2867.0	2400.0	119.5%	3800.0	75.4%
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1120.9	1354.9	1237.0	109.5%	1396.0	97.1%
N-1: Hemingway-Longhorn 500 kV + PTSN Shunt	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	750.9	1001.0	920.0	108.8%	1046.8	95.6%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Longhorn-Coyote 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-McNary 500 kV	MCNRY S1 (41351) -> MCNARY (40723) CKT 1 at MCNARY	Branch MVA	1093.0	1371.3	1368.0	100.2%	1644.0	83.4%
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-Calpine PH	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: McNary-Roundup 230 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Coyote-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	1928.7	2920.4	2900.0	100.7%	4350.0	67.1%
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	LONGHORN (40724) -> HEMLON12 (61955) CKT 1 at HEMLON12	Branch Amp	1702.8	2019.3	2000.1	101.0%	3000.0	67.3%
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	MIDPOINT (60240) -> MPSNT501 (60237) CKT 1 at MIDPOINT	Branch MVA	1270.2	1500.2	1500.0	100.0%	1650.0	90.9%
N-2: DC-BIPOLE	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	294.9	330.5	326.3	101.3%	416.7	79.3%
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1550.1	2424.6	2400.0	101.0%	3199.9	75.8%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1794.7	2343.9	2199.9	106.5%	3280.5	71.5%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1779.5	2324.1	2199.9	105.6%	3280.5	70.8%
N-2: DC-BIPOLE	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1676.0	2270.6	2199.7	103.2%	3235.5	70.2%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1676.0	2270.6	2199.7	103.2%	3235.5	70.2%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1599.6	2289.0	2134.0	107.3%	3499.9	65.4%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1578.2	2255.4	2134.0	105.7%	3499.9	64.4%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1557.7	2438.0	2400.0	101.6%	3800.0	64.2%

Appendix N2 - 16hs2a_lh_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	1556.7	2227.0	2134.0	104.4%	3499.9	63.6%
N-2: DC-BIPOLE	TABVAC11 (30031) -> TABVAC12 (30032) CKT 1 at TABVAC11	Branch Amp	1923.2	2478.0	2477.9	100.0%	3999.9	62.0%
N-2: DC-BIPOLE	YORKCANY (12091)	% Δ Volts	1.001	0.949				-5.19%
N-2: Double Palo Verde	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1599.6	2140.1	2134.0	100.3%	3499.9	61.1%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1557.7	2929.0	2400.0	122.0%	3800.0	77.1%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1467.3	3012.6	2700.0	111.6%	4000.0	75.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1563.1	2812.6	2400.0	117.2%	3800.0	74.0%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1548.0	2797.6	2400.0	116.6%	3800.0	73.6%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1563.1	2953.6	2400.0	123.1%	3800.0	77.7%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1548.0	2942.3	2400.0	122.6%	3800.0	77.4%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at SLATT	Branch Amp	1928.7	3059.8	2900.0	105.5%	4350.0	70.3%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH11	Branch Amp	1728.9	3213.5	3000.0	107.1%	4050.0	79.3%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							

N3.0 Simultaneous Interaction Study: Idaho-Northwest (W-E) v West of McNary, Longhorn Terminus, Stanfield Generation

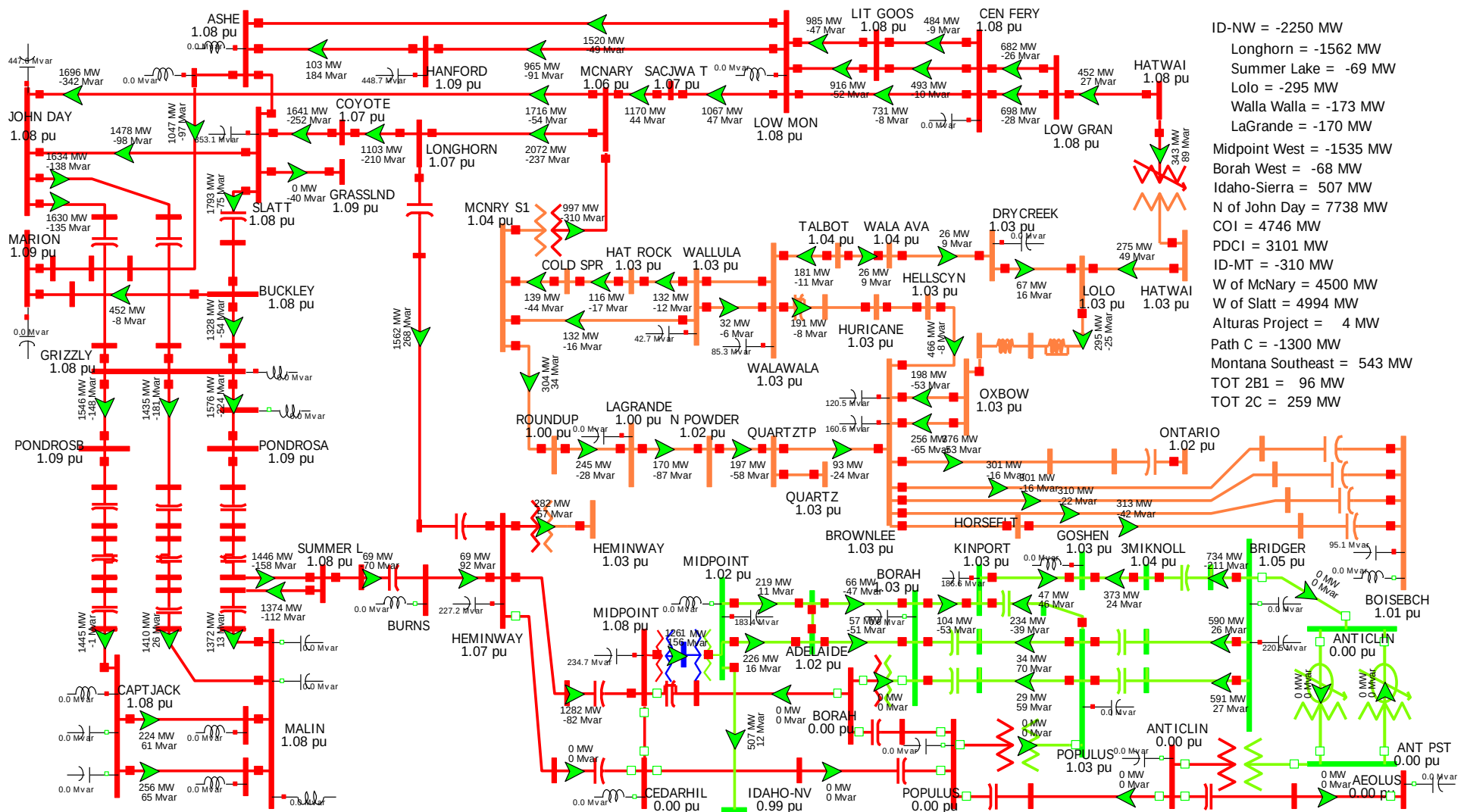


Figure N3: Idaho-Northwest 2250 MW west-to-east, West of McNary 4500 MW, Longhorn Terminus, High Stanfield Gen

N3.1 Background & Need for Simultaneous Interaction Study

This section is the same as Section N2 except Stanfield generation (located at McNary 500 kV) is modeled at its maximum, rather than Longhorn generation at its maximum. This section will determine whether there is an issue if the generation that stresses West of McNary were to be located at McNary rather than at Longhorn. Idaho-Northwest is stressed to 2250 MW west-to-east simultaneous with West of McNary at 4500 MW east-to-west.

N3.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16hs2a_lh_stanfield_2250idnw_4500wom.

Step-by-step development of the 16hs2a lh stanfield 2250idnw 4500wom base case:

Step 1: Begin with the 16hs2a_lh_2250idnw_4500wom base case.

Utilize the base case developed in Section N2.2 Steady State Case Stressing.

Step 2: Stress the West of McNary path.

This base case is intended to model Stanfield generation at its 1000 MW maximum capability. Utilizing the case from Section N2, Stanfield generation was increased from 362 MW to 1000 MW. Increases in Stanfield generation resulted in a corresponding decrease in Longhorn generation, from 1214 MW in the Section N2 base case to 620 MW in this base case. Total generation between Longhorn & Stanfield is 1620 MW, compared to the 1576 MW in the Section N2 base case, and 0 MW in the Section N1 base case.

Step 3: Re-stress Idaho-Northwest

The Idaho-Northwest path was re-stressed to 2250 MW in the west-to-east direction by reducing PacifiCorp East (PACE) and Idaho Power generation and replacing the generation with a schedule from the Northwest. No other paths were significantly altered.

N3.3 Post Transient Results

Post-transient contingency results for the 16hs2a_lh_stanfield_2250idnw_4500wom case can be found at the end of this section. Details for the severe/notable contingencies can be found below.

Severe Post-Transient Contingency #1 – BF IPC Hemingway-Longhorn 500 kV & Hem 500/230 Xfmr

This is the limiting contingency for the Idaho-Northwest path in the west-to-east direction. This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 112% of its 1237 Amp nominal rating (99.3% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N2.4: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	112% (1237 Amp Rating)	99.3% (1396 Amp Rating)
Oxbow – Lolo 230 kV	111% (920 Amp SOL)	97.2% (1047 Amp Rating)

A breaker failure at Hemingway significantly stresses the Brownlee-Hells Canyon and Oxbow-Lolo 230 kV lines. Section 2.4 considers different Hemingway 500 kV substation configurations to avoid severe breaker failures, however, at this time this breaker failure is considered to be credible.

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #2 – Hemingway-Longhorn 500 kV + PTSN Shunt

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 110% of its 1237 Amp nominal rating (97.9% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N2.5: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	110% (1237 Amp Rating)	97.9% (1396 Amp Rating)
Oxbow – Lolo 230 kV	108% (920 Amp SOL)	95.3% (1047 Amp Rating)

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Severe Post-Transient Contingency #3 – BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV

This contingency results in overloading the Brownlee-Hells Canyon 230 kV line to 107% of its 1237 Amp nominal rating (94.5% of its 1396 Amp emergency rating). Since the overload is less than the Brownlee-

Hells Canyon 230 kV line's emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Table N2.6: Post-transient results – BF IPC Midpoint-Hemingway 500 kV & Hem 500/230 Xfmr

Element	Nominal % Loading	Emergency % Loading
Brownlee-Hells Canyon 230 kV	107% (1237 Amp Rating)	94.5% (1396 Amp Rating)
Oxbow – Lolo 230 kV	104% (920 Amp SOL)	91.5% (1047 Amp Rating)

In reality, with high north-to-south loading on the COI, loss of Hemingway-Boardman 500 kV depresses the voltage at Malin to a value less than 1.05 pu, resulting in FACRI insertion of the Fort Rock series capacitors. The results above do not include the operation of the FACRI, as a conservative planning assumption. The Fort Rock series capacitors are located in the 500 kV lines south of Grizzly.

Conclusion

Three of the notable post transient contingencies resulting in more severe system stressing were noted above. These contingencies, as well as all other post-transient contingencies, result in acceptable performance. Ultimately, the results indicate that Idaho-Northwest can achieve a 2250 MW west-to-east rating simultaneous with West of McNary at 4500 MW even if the Hemingway-Boardman 500 kV transmission project has a Longhorn northwest terminus and generation is high at Stanfield rather than Longhorn.

Appendix N3 - 16hs2a_lh_stanfield_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1675.0	2898.9	2199.7	131.8%	3235.5	89.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1675.0	2898.9	2199.7	131.8%	3235.5	89.6%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALIN (40687) -> MALROU21 (40696) CKT 2 at MALROU21	Branch Amp	1673.0	2891.2	2666.9	108.4%	3999.9	72.3%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU23 (40698) -> ROUND MT (30005) CKT 2 at MALROU23	Branch Amp	1666.5	2882.1	2667.0	108.1%	4000.0	72.1%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU11 (90079) -> MALROU12 (90080) CKT 1 at MALROU11	Branch Amp	1628.7	2791.1	2229.7	125.2%	3514.0	79.4%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALIN (40687) -> MALROU11 (90079) CKT 1 at MALIN	Branch Amp	1628.7	2791.1	2699.7	103.4%	3999.9	69.8%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	MALROU12 (90080) -> ROUND MT (30005) CKT 1 at MALROU12	Branch Amp	1623.8	2782.5	2699.7	103.1%	4000.0	69.6%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	No Violations							
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LJ2 C1 (47807)	% Δ Volts	1.033	0.981		-5.03%		
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LJ2 C2 (47811)	% Δ Volts	1.043	0.979		-6.14%		
BF 4231 McNary-Longhorn 500 kV & McNary 500/230 kV Xfmr	LEANJ C1 (44886)	% Δ Volts	1.036	0.980		-5.41%		
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV + RAS	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV + RAS	No Violations							
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	No Violations							
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	No Violations							
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	No Violations							
BF 5006 Slatt-Grassland 500 kV	No Violations							
BF 5015 Ashe-Slatt 500 kV & Slatt 500 kV Caps	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	No Violations							
BF 5021 Slatt-John Day 500 kV	No Violations							
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	LONGHORN (40724) -> HEMLON12 (61955) CKT 1 at HEMLON12	Branch Amp	1684.4	2014.0	2000.1	100.7%	3000.0	67.1%
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	HEMLON11 (61956) -> HEMINWAY (60155) CKT 1 at HEMINWAY	Branch Amp	1660.2	2009.9	2000.1	100.5%	3000.0	67.0%
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							

Appendix N3 - 16hs2a_lh_stanfield_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5043 Coyote-Slatt & Slatt 500 kV Caps	LONGHORN (40724) -> HEMLON12 (61955) CKT 1 at HEMLON12	Branch Amp	1684.4	2002.4	2000.1	100.1%	3000.0	66.7%
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5211 Low Mon-McNary & McNary-John Day 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV & Slatt 500 kV Caps	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1386.0	1237.0	112.0%	1396.0	99.3%
BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	751.7	1016.9	920.0	110.5%	1046.8	97.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	No Violations							
BF IPC Midpoint-Hem 500 kV & Adel-Midpoint 345 kV + PTSN	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1246.3	1237.0	100.7%	1396.0	89.3%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1337.8	1237.0	108.1%	1396.0	95.8%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	751.7	975.8	920.0	106.1%	1046.8	93.2%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1318.9	1237.0	106.6%	1396.0	94.5%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	751.7	958.1	920.0	104.1%	1046.8	91.5%
BF LH Longhorn-Coyote 500 kV & Longhorn Gen	No Violations							
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1296.3	1237.0	104.8%	1396.0	92.9%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	751.7	946.0	920.0	102.8%	1046.8	90.4%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	No Violations							
BF LH McNary-Longhorn 500 kV & Longhorn Gen	No Violations							
BF McNary 230 kV SECT 1	No Violations							
BF McNary 230 kV SECT 2	No Violations							
BF McNary 230 kV SECT 3	No Violations							
BF PGE Slatt-Grassland 500 kV & Boardman Coal Gen	No Violations							
Bus: Buckley 500 kV	No Violations							
Bus: Summer Lake 500 kV	No Violations							
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Coyote-Slatt 500 kV	No Violations							

Appendix N3 - 16hs2a_lh_stanfield_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV + RAS	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	751.7	931.2	920.0	101.2%	1046.8	89.0%
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Longhorn 500 kV	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1366.1	1237.0	110.4%	1396.0	97.9%
N-1: Hemingway-Longhorn 500 kV	LOLO (48197) -> IMNAHA (60278) CKT 1 at IMNAHA	Branch Amp	751.7	997.5	920.0	108.4%	1046.8	95.3%
N-1: Hemingway-Longhorn 500 kV + FACRI	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1552.7	2843.3	2400.0	118.5%	3199.9	88.9%
N-1: Hemingway-Longhorn 500 kV + FACRI	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1560.4	2863.0	2400.0	119.3%	3800.0	75.3%
N-1: Hemingway-Longhorn 500 kV + FACRI	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1281.3	1237.0	103.6%	1396.0	91.8%
N-1: Hemingway-Summer Lake 500 kV	No Violations							
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Longhorn-Coyote 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-McNary 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary S2-McNary S3 230 kV	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-Calpine PH	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV + PTSN Shunt	HELLSCYN (60150) -> BROWNLEE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1237.8	1237.0	100.1%	1396.0	88.7%
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							

Appendix N3 - 16hs2a_lh_stanfield_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	HELLSCYN (60150) -> BROWNL EE (60095) CKT 1 at HELLSCYN	Branch Amp	1135.0	1239.6	1237.0	100.2%	1396.0	88.8%
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Coyote-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	No Violations							
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	YORKCANY (12091)	% Δ Volts	1.001	0.949		-5.19%		
N-2: DC-BIPOLE	MIDPOINT (60240) -> MPSNT501 (60237) CKT 1 at MIDPOINT	Branch MVA	1270.6	1500.5	1500.0	100.0%	1650.0	90.9%
N-2: DC-BIPOLE	E.NICOLS (32212) -> RIO OSO (32214) CKT 1 at E.NICOLS	Branch Amp	294.8	330.4	326.3	101.2%	416.7	79.3%
N-2: DC-BIPOLE	PONSUM13 (90101) -> PONSUM14 (90102) CKT 1 at PONSUM13	Branch Amp	1552.7	2427.9	2400.0	101.2%	3199.9	75.9%
N-2: DC-BIPOLE	ROUTAB21 (30018) -> ROUTAB22 (30019) CKT 2 at ROUTAB21	Branch Amp	1793.8	2342.8	2199.9	106.5%	3280.5	71.4%
N-2: DC-BIPOLE	ROUTAB11 (30016) -> ROUTAB12 (30017) CKT 1 at ROUTAB11	Branch Amp	1778.6	2322.9	2199.9	105.6%	3280.5	70.8%
N-2: DC-BIPOLE	MALROU21 (40696) -> MALROU22 (40697) CKT 2 at MALROU22	Branch Amp	1675.0	2269.3	2199.7	103.2%	3235.5	70.1%
N-2: DC-BIPOLE	MALROU22 (40697) -> MALROU23 (40698) CKT 2 at MALROU22	Branch Amp	1675.0	2269.3	2199.7	103.2%	3235.5	70.1%
N-2: DC-BIPOLE	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1599.8	2289.1	2134.0	107.3%	3499.9	65.4%
N-2: DC-BIPOLE	MIDWAY (30060) -> MIDVIN11 (30061) CKT 1 at MIDWAY	Branch Amp	1578.5	2255.4	2134.0	105.7%	3499.9	64.4%
N-2: DC-BIPOLE	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM11	Branch Amp	1560.4	2441.5	2400.0	101.7%	3800.0	64.3%
N-2: DC-BIPOLE	MIDVIN12 (30062) -> VINCENT (24156) CKT 1 at MIDVIN12	Branch Amp	1556.9	2227.1	2134.0	104.4%	3499.9	63.6%
N-2: Double Palo Verde	MIDVIN22 (30064) -> VINCENT (24156) CKT 2 at MIDVIN22	Branch Amp	1599.8	2140.6	2134.0	100.3%	3499.9	61.2%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	PONSUM11 (90099) -> PONSUM12 (90100) CKT 1 at PONSUM12	Branch Amp	1560.4	2931.8	2400.0	122.2%	3800.0	77.2%

Appendix N3 - 16hs2a_lh_stanfield_2250idnw_4500wom Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV + RAS	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1465.3	3011.0	2700.0	111.5%	4000.0	75.3%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1563.3	2813.9	2400.0	117.2%	3800.0	74.0%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1548.3	2798.9	2400.0	116.6%	3800.0	73.7%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON16	Branch Amp	1563.3	2953.2	2400.0	123.0%	3800.0	77.7%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV + RAS	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1548.3	2942.0	2400.0	122.6%	3800.0	77.4%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV + RAS	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1910.3	3048.4	2900.0	105.1%	4350.0	70.1%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV + RAS	GRIJOH12 (90065) -> GRIJOH11 (90064) CKT 1 at GRIJOH12	Branch Amp	1735.7	3218.4	3000.0	107.3%	4050.0	79.5%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV + RAS	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV + RAS	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							

N4.0 Simultaneous Interaction Study: Idaho-Northwest (E-W) v West of Slatt, Grassland Terminus

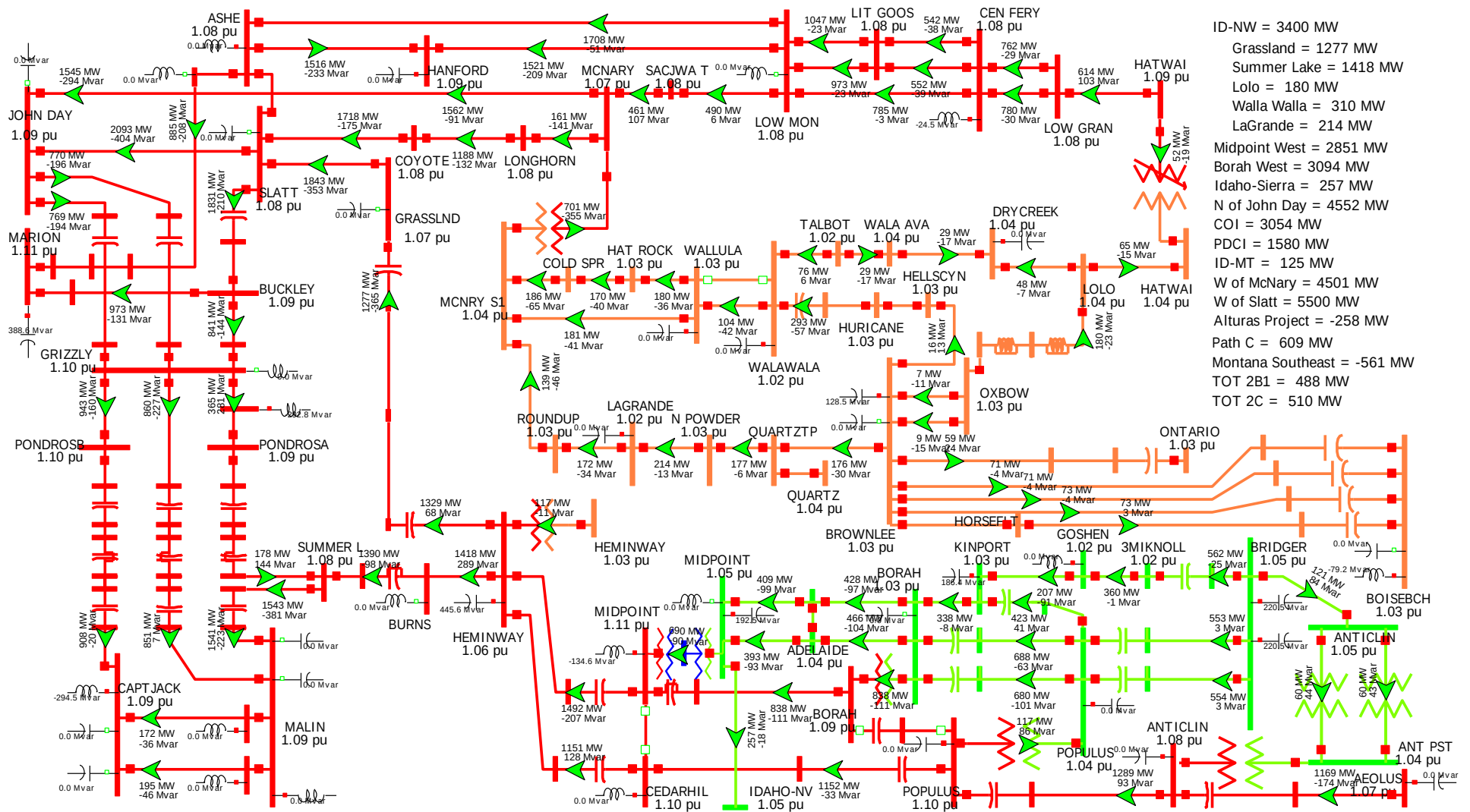


Figure N4: Idaho-Northwest 3400 MW east-to-west, West of Slatt 5500 MW, Grassland Terminus

N4.1 Background & Need for Simultaneous Interaction Study

The Hemingway-Boardman Phase II study review group requested that the impacts of the Hemingway to Boardman project be evaluated with the West of Slatt path at its 5500 MW rating simultaneous with Idaho-Northwest at 3400 MW east-to-west. The study group also requested that the study be performed leaving out the Cascade Crossings Transmission Project.

The West of Slatt path is made up of the following lines: (1) McNary-John Day 500 kV, (2) Slatt-John Day 500 kV and (3) Slatt-Buckley 500 kV.

N4.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16la1sa_3400idnw_5500wos.

Step-by-step development of the 16la1sa 3400idnw 5500wos base case:

Step 1: Begin with the 16la1sa_3400idnw_N base case.

Utilize the base case developed in Section 5.1.2 Steady State Case Stressing. Remove the Cascade Crossing Transmission Project from the case.

Step 2: Stress the West of Slatt path.

Generation east of Slatt was increased to stress the West of Slatt path to 5,500 MW. The path flows were increased by modifying generation in the Pacific Northwest, mostly in Southeast Washington, and the Lower Columbia Basin, including ~1000 MW of Longhorn wind generation modeled as connecting to Longhorn 500 kV. The generation increase east of Slatt corresponds with a reduction in generation west of Slatt at places such as Western Oregon/Washington, Centrailia, John Day, The Dalles, and Bonneville. Generation was also scheduled from the Northwest to California.

Step 3: Re-stress Idaho-Northwest

The Idaho-Northwest path was re-stressed to 3400 MW in the east-to-west direction by adjusting schedules between PacifiCorp East (PACE), Idaho Power, and the Northwest. In order to achieve 3400 MW on Idaho-Northwest in this configuration, the Hines 138/115 kV transformer had to be opened, and the Burns 500 kV series capacitor was completely bypassed.

N4.3 Post Transient Results

Post-transient contingency results for the 16la1sa_3400idnw_5500wos case can be found at the end of this section. Details for the severe/notable contingencies can be found below.

Post-Transient Contingency #1 – BF IPC Hemingway-Grassland 500 kV & Hemingway 500/230 Xfmr

This is the limiting contingency for the Idaho-Northwest path in the east-to-west direction. In previous east-to-west study cases in Section 5, this contingency resulted in overloading the Burns series capacitor to its emergency rating. In this case, the Burns series capacitor is bypassed pre-contingency, due to the pre-contingency loading of the Hemingway-Summer Lake 500 kV line. In real life, during peak Idaho-Northwest east-to-west flow conditions, the COI is generally flowing at a value less than 2000 MW north-to-south. In order to stress West of Slatt, COI is stressed to 3000+ MW in this case, putting pressure on the Hemingway-Summer Lake 500 kV line. The end result is the need to bypass the Burns series capacitor, which will generally be avoided, if possible.

Post-Transient Contingency #2 – N-1: Hemingway-Grassland 500 kV

Removal of the Burns series capacitor results in less robust voltage performance across Idaho-Northwest busses for Idaho-Northwest line outages. To make up for this poor voltage performance, the LaGrande series capacitor is modeled as switching in, post-disturbance, otherwise post-transient voltage deviation at LaGrande would have exceeded 5% for this N-1 contingency. In real life, the LaGrande shunt capacitor switches in when the LaGrande 230 kV bus voltage falls below 1.0 pu for a certain number of seconds. This action is not controlled via RAS.

Post-Transient Contingency #3 – BF IPC Populus-CHill-Hemingway 500 kV & Hem 500/230 Xfmr + RAS

This contingency results in overloading the Midpoint 500 kV series capacitor to 134% of its 1732 Amp nominal rating (99.5% of its 2338 Amp emergency rating). Since the overload is less than the Midpoint 500 kV series capacitors emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Conclusion

Three of the notable post transient contingencies resulting in more severe system stressing were noted above. These contingencies, as well as all other post-transient contingencies, result in acceptable performance. Ultimately, the results indicate that Idaho-Northwest can achieve a 3400 MW east-to-west rating simultaneous with West of Slatt at 5500 MW.

Appendix N4 - 16la1sa_3400idnw_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	No Violations							
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	No Violations							
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	No Violations							
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1973.9	2905.3	2900.0	100.2%	4350.0	66.8%
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	BELL SC (40096) -> BELL BPA (40091) CKT 1 at BELL BPA	Branch Amp	1916.9	2871.3	2200.1	130.5%	3000.0	95.7%
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	1768.7	1732.1	102.1%	2338.3	75.6%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	BELL SC (40096) -> BELL BPA (40091) CKT 1 at BELL BPA	Branch Amp	1916.9	2282.5	2200.1	103.7%	3000.0	76.1%
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	1759.4	1732.1	101.6%	2338.3	75.2%
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	314.7	300.0	104.9%	370.0	85.0%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	307.8	300.0	102.6%	370.0	83.2%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	251.5	302.9	300.0	101.0%	370.0	81.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	251.5	302.9	300.0	101.0%	370.0	81.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1449.2	2210.0	2000.1	110.5%	3000.0	73.7%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1470.1	2174.7	2000.1	108.7%	3000.0	72.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	314.8	300.0	104.9%	370.0	85.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	308.1	300.0	102.7%	370.0	83.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	251.5	301.0	300.0	100.3%	370.0	81.4%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	251.5	301.0	300.0	100.3%	370.0	81.4%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1449.2	2206.2	2000.1	110.3%	3000.0	73.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1470.1	2166.8	2000.1	108.3%	3000.0	72.2%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	319.8	300.0	106.6%	370.0	86.4%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	312.8	300.0	104.3%	370.0	84.6%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	88.5	123.8	112.0	110.5%	146.7	84.4%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	751.2	1100.8	1008.1	109.2%	1250.1	88.1%

Appendix N4 - 16la1sa_3400idnw_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	734.8	1079.7	1000.1	108.0%	1250.1	86.4%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	N POWDER (60312)	% Δ Volts	1.032	0.980				-5.04%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	LAGRANDE (40621)	% Δ Volts	1.024	0.971				-5.18%
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	N POWDER (60313)	% Δ Volts	1.011	0.957				-5.34%
BF 5015 Ashe-Slatt 500 kV & Slatt 500 kV Caps	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1973.9	2915.7	2900.0	100.5%	4350.0	67.0%
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5043 Slatt-Coyote 500 kV & Slatt 500 kV Caps	No Violations							
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary-John Day 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV & Slatt 500 kV Caps	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	88.5	124.3	112.0	111.0%	146.7	84.7%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	308.9	300.0	103.0%	370.0	83.5%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	302.6	300.0	100.9%	370.0	81.8%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	751.2	1048.9	1008.1	104.0%	1250.1	83.9%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at WALAWALA	Branch Amp	734.8	1028.5	1000.1	102.8%	1250.1	82.3%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	88.5	125.7	112.0	112.2%	146.7	85.7%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	314.1	300.0	104.7%	370.0	84.9%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	307.6	300.0	102.5%	370.0	83.1%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	251.5	300.2	300.0	100.1%	370.0	81.1%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	251.5	300.2	300.0	100.1%	370.0	81.1%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	751.2	1079.5	1008.1	107.1%	1250.1	86.4%
BF IPC Hem-Grassland 500 kV & Hem 500/230 Xfmr + RAS	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	734.8	1058.6	1000.1	105.9%	1250.1	84.7%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	311.5	300.0	103.8%	370.0	84.2%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	305.2	300.0	101.7%	370.0	82.5%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1449.2	2252.9	2000.1	112.6%	3000.0	75.1%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1470.1	2217.6	2000.1	110.9%	3000.0	73.9%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	265.8	310.0	300.0	103.3%	370.0	83.8%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	304.0	300.0	101.3%	370.0	82.2%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	751.2	1034.9	1008.1	102.7%	1250.1	82.8%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	734.8	1014.6	1000.1	101.5%	1250.1	81.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	2326.7	1732.1	134.3%	2338.3	99.5%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1120.6	1605.4	1492.7	107.5%	2264.2	70.9%
Bus: Buckley 500 kV	No Violations							
Bus: Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	315.3	300.0	105.1%	370.0	85.2%
Bus: Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	308.5	300.0	102.8%	370.0	83.4%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	251.5	303.0	300.0	101.0%	370.0	81.9%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	251.5	303.0	300.0	101.0%	370.0	81.9%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
Bus: Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1449.2	2208.3	2000.1	110.4%	3000.0	73.6%
Bus: Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1470.1	2173.3	2000.1	108.7%	3000.0	72.4%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV + RAS	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Coyote-Slatt 500 kV	No Violations							
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							
N-1: Dworshak-Hatwai 500 kV	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	319.5	300.0	106.5%	370.0	86.3%
N-1: Grassland-Slatt 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	312.5	300.0	104.2%	370.0	84.5%
N-1: Grassland-Slatt 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	88.5	123.5	112.0	110.3%	146.7	84.2%
N-1: Grassland-Slatt 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	751.2	1094.9	1008.1	108.6%	1250.1	87.6%
N-1: Grassland-Slatt 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	734.8	1073.9	1000.1	107.4%	1250.1	85.9%
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	No Violations							
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Grassland 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	88.5	124.5	112.0	111.1%	146.7	84.9%
N-1: Hemingway-Grassland 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	308.2	300.0	102.7%	370.0	83.3%
N-1: Hemingway-Grassland 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	301.9	300.0	100.6%	370.0	81.6%
N-1: Hemingway-Grassland 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	751.2	1067.9	1008.1	105.9%	1250.1	85.4%
N-1: Hemingway-Grassland 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	734.8	1047.2	1000.1	104.7%	1250.1	83.8%
N-1: Hemingway-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	265.8	311.5	300.0	103.8%	370.0	84.2%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Hemingway-Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	259.3	305.1	300.0	101.7%	370.0	82.5%
N-1: Hemingway-Summer Lake 500 kV	HEMBOA13 (61951) -> GRASSLND (43049) CKT 1 at GRASSLND	Branch Amp	1449.2	2244.1	2000.1	112.2%	3000.0	74.8%
N-1: Hemingway-Summer Lake 500 kV	HEMINWAY (60155) -> HEMBOA11 (61953) CKT 1 at HEMINWAY	Branch Amp	1470.1	2209.5	2000.1	110.5%	3000.0	73.7%
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-McNary 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	No Violations							
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-Coyote 500 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	No Violations							
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	984.8	1038.1	950.0	109.3%	1286.0	80.7%
N-1: Ostrander-Troutdale 500 kV	TROUTDAL (41095)	% Δ Volts	1.081	1.023				-5.37%
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Populus-Cedar Hill-Hemingway 500 kV + RAS	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	2005.1	1732.1	115.8%	2338.3	85.7%
N-1: Populus-Cedar Hill-Hemingway 500 kV + RAS	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1120.6	1607.8	1492.7	107.7%	2264.2	71.0%
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Coyote-Slatt 500 kV	PORT ANG (40841)	% Δ Volts	1.000	0.950				-5.00%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	HOOD RVR (45145)	% Δ Volts	0.970	0.921				-5.05%

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Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Ashe-Marion & Coyote-Slatt 500 kV	POWERDLE (45251)	% Δ Volts	0.969	0.920				-5.06%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	WILRDJON (41163)	% Δ Volts	0.967	0.918				-5.07%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	CONDITPH (45057)	% Δ Volts	0.965	0.916				-5.08%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	BALD MT (41185)	% Δ Volts	0.965	0.916				-5.08%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	ROSS (40901)	% Δ Volts	1.023	0.971				-5.08%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	BINGEN (40115)	% Δ Volts	0.963	0.914				-5.09%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	LJ2 1 (47808)	% Δ Volts	1.013	0.961				-5.13%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	TMBLCR T (41079)	% Δ Volts	1.012	0.960				-5.14%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	LJ2 C1 (47807)	% Δ Volts	1.031	0.977				-5.24%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	SAPPHO (40945)	% Δ Volts	0.971	0.920				-5.25%
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	1733.1	1732.1	100.1%	2338.3	74.1%
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	251.5	302.3	300.0	100.8%	370.0	81.7%
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	251.5	302.3	300.0	100.8%	370.0	81.7%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	251.5	323.3	300.0	107.8%	370.0	87.4%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	251.5	323.3	300.0	107.8%	370.0	87.4%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO	Branch MVA	251.9	328.0	315.0	104.1%	394.0	83.2%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO	Branch MVA	251.9	326.8	315.0	103.7%	394.0	82.9%
N-2: Double Palo Verde	CHOLLA (14000) -> CHOSAG11 (14014) CKT 1 at CHOSAG11	Branch Amp	971.6	1071.5	1026.0	104.4%	1538.1	69.7%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM12	Branch Amp	1693.8	2814.9	2700.0	104.3%	4000.0	70.4%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	No Violations							
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	975.5	2514.5	2400.0	104.8%	3800.0	66.2%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON12	Branch Amp	957.1	2497.1	2400.0	104.0%	3800.0	65.7%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	BELL SC (40096) -> BELL BPA (40091) CKT 1 at BELL SC	Branch Amp	1916.9	2565.0	2200.1	116.6%	3000.0	85.5%
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV	No Violations							
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	No Violations							
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							

Appendix N4 - 16la1sa_3400idnw_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	BELL SC (40096) -> BELL BPA (40091) CKT 1 at BELL BPA	Branch Amp	1916.9	2871.3	2200.1	130.5%	3000.0	95.7%
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	1768.7	1732.1	102.1%	2338.3	75.6%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	No Violations							
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	DALREED (45075) -> DR W TP (45162) CKT 1 at DALREED	Branch Amp	462.2	810.2	795.7	101.8%	1006.6	80.5%
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	1800.5	1732.1	104.0%	2338.3	77.0%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	KEELER (40601) -> KEELER (40599) CKT 1 at KEELER	Branch MVA	984.8	1019.8	950.0	107.3%	1286.0	79.3%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	DALREED (45075) -> DR W TP (45162) CKT 1 at DALREED	Branch Amp	462.2	801.9	795.7	100.8%	1006.6	79.7%
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1660.0	1792.5	1732.1	103.5%	2338.3	76.7%
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	No Violations							
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							

N5.0 Simultaneous Interaction Study: Idaho-Northwest (E-W) v West of McNary & West of Slatt, Longhorn Terminus

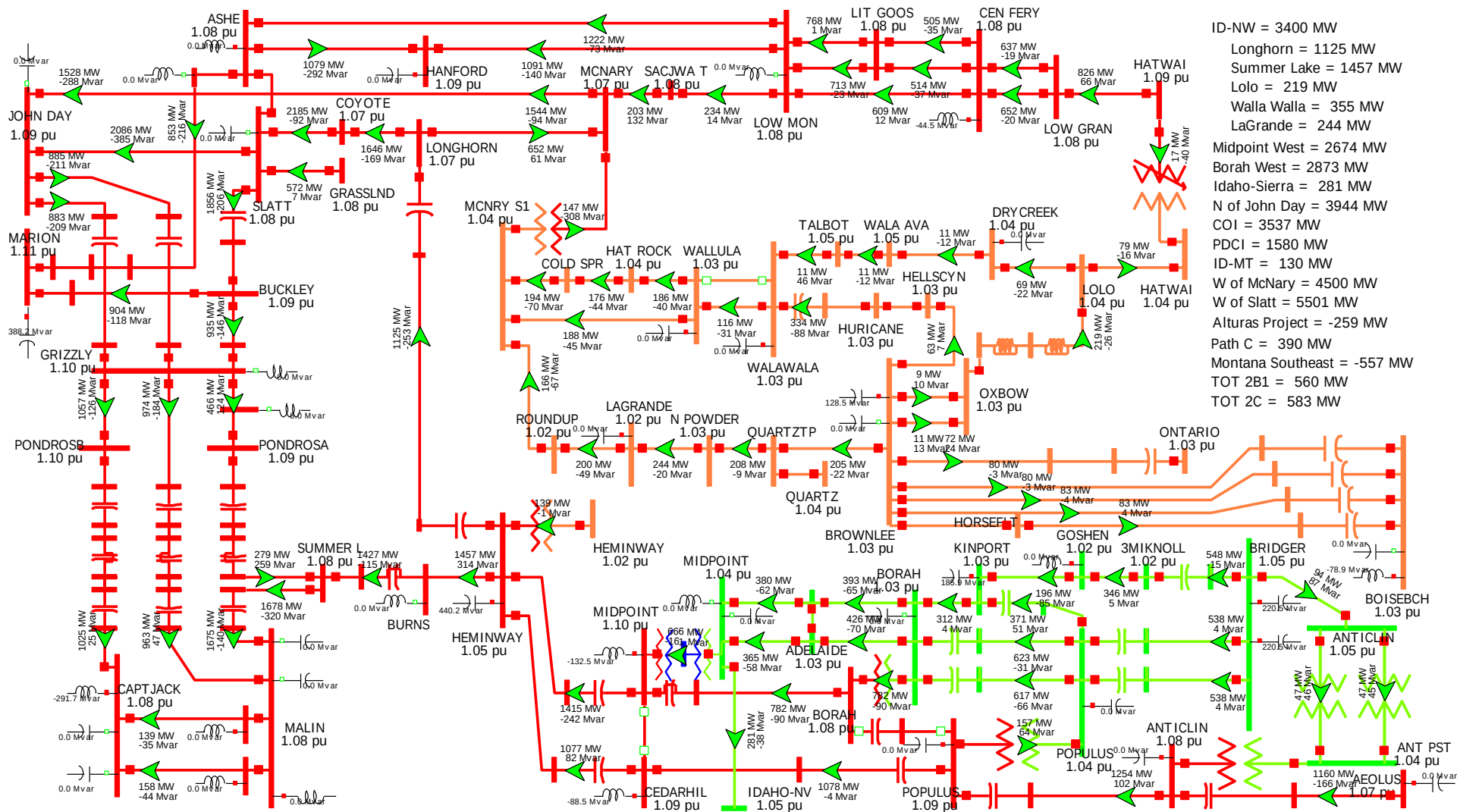


Figure N5: Idaho-Northwest 3400 MW east-to-west, West of McNary 4500 MW, West of Slatt 5500 MW, Longhorn Terminus

N5.1 Background & Need for Simultaneous Interaction Study

The Hemingway-Boardman Phase II study review group requested that the impacts of the Hemingway to Boardman project be evaluated with the West of McNary path at its 4500 MW rating and West of Slatt path at its 5500 MW rating simultaneous with Idaho-Northwest at 3400 MW east-to-west. The study group also requested that the study be performed leaving out the Cascade Crossings Transmission Project. Given the uncertainty of the northwest terminus of the Hemingway-Boardman project, this section looks at a Longhorn terminus option.

Terminating the Hemingway-Boardman 500 kV transmission project at Longhorn is assumed not to affect the definition of the West of McNary path. This may change in the future. The West of McNary path is made up of the following lines: (1) Coyote-Slatt 500 kV, (2) McNary-John Day 500 kV, (3) McNary-Ross 345 kV, (4) Jones Canyon-Tumble Creek 230 kV and (5) Harvalum-Big Eddy 230 kV. The West of Slatt path is made up of the following lines: (1) McNary-John Day 500 kV, (2) Slatt-John Day 500 kV and (3) Slatt-Buckley 500 kV.

N5.2 Steady State Case Stressing

For the best information about path flows, generation patterns, etc, base cases can be downloaded from the following FTP site for approximately 90 days after this report is submitted to WECC:

<https://fileexch.idahopower.com/>

User Name: B2HPhase2

Password: Data4Study

The case name for this study is 16la1sa_lh_3400idnw_4500wom_5500wos.

Step-by-step development of the 16la1sa lh 3400idnw 4500wom 5500wos base case:

Step 1: Begin with the 16la1sa_3400idnw_5500wos base case.

Utilize the base case developed in Section N4.2 Steady State Case Stressing. Shift the terminus of the Hemingway-Boardman transmission project from Grassland to Longhorn.

Step 2: Stress the West of McNary & West of Slatt paths.

By moving the terminus of the Hemingway-Boardman transmission project to Longhorn, the case was almost already stressed to 4500 MW on West of McNary and 5500 MW on West of Slatt. Generation at Longhorn was switched in, and schedules between the Northwest, Idaho and California were adjusted to complete the case modification.

N5.3 Post Transient Results

Post-transient contingency results for the 16la1sa_lh_3400idnw_4500wom_5500wos case can be found at the end of this section. Details for the severe/notable contingencies can be found below.

Post-Transient Contingency #1 – BF IPC Hemingway-Longhorn 500 kV & Hemingway 500/230 Xfmr

This is the limiting contingency for the Idaho-Northwest path in the east-to-west direction. In previous east-to-west study cases in Section 5, this contingency resulted in overloading the Burns series capacitor to its emergency rating. In this case, the Burns series capacitor is bypassed pre-contingency, due to the pre-contingency loading of the Hemingway-Summer Lake 500 kV line. In real life, during peak Idaho-Northwest east-to-west flow conditions, the COI is generally flowing at a value less than 2000 MW north-to-south. In order to stress West of Slatt, COI is stressed to 3000+ MW in this case, putting pressure on the Hemingway-Summer Lake 500 kV line. The end result is the need to bypass the Burns series capacitor, which will generally be avoided, if possible.

Post-Transient Contingency #2 – N-1: Hemingway-Longhorn 500 kV

Removal of the Burns series capacitor results in less robust voltage performance across Idaho-Northwest busses for Idaho-Northwest line outages. To make up for this poor voltage performance, the LaGrande series capacitor is modeled as switching in, post-disturbance, otherwise post-transient voltage deviation at LaGrande would have exceeded 5% for this N-1 contingency. In real life, the LaGrande shunt capacitor switches in when the LaGrande 230 kV bus voltage falls below 1.0 pu for a certain number of seconds. This action is not controlled via RAS.

Post-Transient Contingency #3 – BF IPC Populus-CHill-Hemingway 500 kV & Hem 500/230 Xfmr + RAS

This contingency results in overloading the Midpoint 500 kV series capacitor to 135% of its 1732 Amp nominal rating (99.8% of its 2338 Amp emergency rating). Since the overload is less than the Midpoint 500 kV series capacitors emergency rating, this contingency results in acceptable performance. Refer to the table below for more information about the overloads caused by this contingency.

Conclusion

Three of the notable post transient contingencies resulting in more severe system stressing were noted above. These contingencies, as well as all other post-transient contingencies, result in acceptable performance. Ultimately, the results indicate that Idaho-Northwest can achieve a 3400 MW east-to-west rating simultaneous with West of Slatt at 5500 MW.

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4003 Hanford-Vantage & Hanford Caps	No Violations							
BF 4019 CaptJack-Malin #2 & Malin 500/230 Xfmr	No Violations							
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	303.3	300.0	101.1%	370.0	82.0%
BF 4046 John Day-Grizzly #2 & Grizzly-Malin #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	303.3	300.0	101.1%	370.0	82.0%
BF 4064 CaptJack-Malin & Malin-Round Mtn #1 500 kV	MALROU22 (90083) -> MALROU23 (90084) CKT 2 at MALROU22	Branch Amp	1285.3	2236.7	2199.9	101.7%	3235.5	69.1%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	307.1	300.0	102.4%	370.0	83.0%
BF 4072 Grizzly-Malin #2 & Malin-Round Mtn #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	307.1	300.0	102.4%	370.0	83.0%
BF 4095 Low Mon-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4104 Ashe-Hanford & Hanford-Wautoma 500 kV	No Violations							
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	300.4	300.0	100.1%	370.0	81.2%
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	300.4	300.0	100.1%	370.0	81.2%
BF 4131 Slatt-John Day & John Day-Grizzly #2 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1997.9	2973.1	2900.0	102.5%	4350.0	68.3%
BF 4143 (or 4134) John Day-Grizzly #1 & John Day Caps 500 kV	No Violations							
BF 4170 John Day-Marion & John Day Caps 500 kV	No Violations							
BF 4194 Rock Ck-John Day & Big Eddy-John Day 500 kV	No Violations							
BF 4197 John Day-Big Eddy #1 & John Day Caps 500 kV	No Violations							
BF 4202 John Day-Big Eddy#2 & Big Eddy-Ostrander 500 kV	No Violations							
BF 4231 McNary-Coyote 500 kV & McNary 500/230 kV Xfmr	No Violations							
BF 4247 Lit Goos-Low Mon #2 & Low Mon-McNary 500 kV	No Violations							
BF 4259 Lit Goos-Low Mon #2 & Low Mon-Hanford 500 kV	No Violations							
BF 4377 Ashe-Marion & Marion-Alvey 500 kV	No Violations							
BF 4386 Buckley-Marion & Marion-Santiam 500 kV	No Violations							
BF 4630 Cen Ferry-Lit Goos #1 & Lit Goos-Low Mon #1 500 kV	No Violations							
BF 4676 Lit Goos-Low Mon & Low Mon-Ashe 500 kV	No Violations							
BF 4775 Cen Ferry-Low Gran #1 & #2 500 kV	BELL SC (40096) -> BELL BPA (40091) CKT 1 at BELL SC	Branch Amp	1534.7	2290.2	2200.1	104.1%	3000.0	76.3%
BF 4776 Hatwai-Low Gran & Low Gran-Cen Ferry 500 kV	No Violations							
BF 4870 John Day-Big Eddy 500 kV & Big Eddy 500/230 kV	No Violations							
BF 4888 Ashe-Slatt & CGS 500 kV	No Violations							
BF 4891 Low Mon-Ashe & Ashe-Slatt 500 kV	No Violations							
BF 4901 Low Mon-Ashe & Ashe-Hanford 500 kV	No Violations							
BF 4940 Low Mon-Ashe & Ashe-Marion 500 kV	No Violations							
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	336.7	300.0	112.2%	370.0	91.0%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	336.7	300.0	112.2%	370.0	91.0%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	316.0	300.0	105.3%	370.0	85.4%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	331.3	315.0	105.2%	394.0	84.1%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	330.6	315.0	104.9%	394.0	83.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	309.2	300.0	103.1%	370.0	83.6%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1074.4	999.1	107.5%	1250.1	85.9%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1052.7	1000.1	105.3%	1250.1	84.2%
BF 4957 Summer L-Malin & Summer L-Hemingway 500 kV	HEMINWAY (60155) -> HEMLON11 (61956) CKT 1 at HEMINWAY	Branch Amp	1310.8	2036.0	2000.1	101.8%	3464.1	58.8%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	337.2	300.0	112.4%	370.0	91.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	337.2	300.0	112.4%	370.0	91.1%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	315.5	300.0	105.2%	370.0	85.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	331.7	315.0	105.3%	394.0	84.2%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	331.0	315.0	105.1%	394.0	84.0%

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	308.4	300.0	102.8%	370.0	83.3%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1068.4	999.1	106.9%	1250.1	85.5%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1047.0	1000.1	104.7%	1250.1	83.8%
BF 4959 Grizzly-Summer L & Summer L-Malin 500 kV	HEMINWAY (60155) -> HEMLON11 (61956) CKT 1 at HEMINWAY	Branch Amp	1310.8	2018.6	2000.1	100.9%	3464.1	58.3%
BF 4996 CaptJack-Malin #1 & #2 500 kV	No Violations							
BF 5003 Slatt-Boardman 500 kV & Slatt 500 kV Caps	No Violations							
BF 5015 Ashe-Slatt 500 kV & Slatt 500 kV Caps	No Violations							
BF 5018 Ashe-Slatt & Slatt-John Day 500 kV	SLATT (40989) -> BUCSLA11 (90020) CKT 1 at BUCSLA11	Branch Amp	1997.9	2988.2	2900.0	103.0%	4350.0	68.7%
BF 5028 Buckley-Grizzly & Grizzly-Summer Lake 500 kV	No Violations							
BF 5040 Grizzly-John Day & Grizzly-Round Bu 500 kV	No Violations							
BF 5043 Slatt-Coyote 500 kV & Slatt 500 kV Caps	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	305.9	300.0	102.0%	370.0	82.7%
BF 5043 Slatt-Coyote 500 kV & Slatt 500 kV Caps	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	305.9	300.0	102.0%	370.0	82.7%
BF 5148 Coulee-Schultz & Echo Lake-Schultz 500 kV	No Violations							
BF 5170 Wautoma-Schultz & Schultz-Raver 500 kV	No Violations							
BF 5179 Vantage-Schultz & Schultz-Raver #4	No Violations							
BF 5211 Low Mon-McNary 500 kV & McNary-John Day 500 kV	No Violations							
BF 5250 Hanford-Wautoma#1 & Wautoma-Knight 500 kV	No Violations							
BF 5259 Hanford-Wautoma#2 & Wautoma-Rock Ck 500 kV	No Violations							
BF 5266 Slatt-Buckly 500 kV & Slatt 500 kV Caps	No Violations							
BF 5339 Vantage-Schultz 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF 5345 Vantage-Hanford 500 kV & Vantage 500/230 Xfmr #1	No Violations							
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	330.9	300.0	110.3%	370.0	89.4%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	330.9	300.0	110.3%	370.0	89.4%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	313.3	300.0	104.4%	370.0	84.7%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	307.1	300.0	102.4%	370.0	83.0%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	326.1	315.0	103.5%	394.0	82.8%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	325.4	315.0	103.3%	394.0	82.6%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1082.9	999.1	108.4%	1250.1	86.6%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1061.0	1000.1	106.1%	1250.1	84.9%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMINWAY (60155) -> HEMLON11 (61956) CKT 1 at HEMINWAY	Branch Amp	1310.8	2076.7	2000.1	103.8%	3464.1	59.9%
BF IPC Hemingway-Summer L 500 kV & Hemingway 500/230 Xfmr	HEMLON12 (61955) -> LONGHORN (40724) CKT 1 at HEMLON12	Branch Amp	1213.3	2019.5	2000.1	101.0%	3464.1	58.3%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	329.6	300.0	109.9%	370.0	89.1%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	329.6	300.0	109.9%	370.0	89.1%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	325.2	315.0	103.2%	394.0	82.5%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	324.5	315.0	103.0%	394.0	82.4%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	304.2	300.0	101.4%	370.0	82.2%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	87.4	120.1	112.0	107.2%	146.7	81.9%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1148.4	999.1	114.9%	1250.1	91.9%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at WALAWALA	Branch Amp	844.9	1124.7	1000.1	112.5%	1250.1	90.0%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	330.7	300.0	110.2%	370.0	89.4%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	330.7	300.0	110.2%	370.0	89.4%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	309.5	300.0	103.2%	370.0	83.6%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	87.4	121.6	112.0	108.5%	146.7	82.9%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	326.4	315.0	103.6%	394.0	82.8%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	325.7	315.0	103.4%	394.0	82.7%

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	303.1	300.0	101.0%	370.0	81.9%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1180.3	999.1	118.1%	1250.1	94.4%
BF IPC Hem-Longhorn 500 kV & Hem 500/230 Xfmr + RAS	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1156.2	1000.1	115.6%	1250.1	92.5%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	317.4	300.0	105.8%	370.0	85.8%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	317.4	300.0	105.8%	370.0	85.8%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	266.8	308.5	300.0	102.8%	370.0	83.4%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	302.4	300.0	100.8%	370.0	81.7%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1151.1	999.1	115.2%	1250.1	92.1%
BF IPC Midpoint-Hemingway 500 kV & Hemingway 500/230 Xfmr	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1127.3	1000.1	112.7%	1250.1	90.2%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	335.2	300.0	111.7%	370.0	90.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	335.2	300.0	111.7%	370.0	90.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	329.8	315.0	104.7%	394.0	83.7%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	329.1	315.0	104.5%	394.0	83.5%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTNPS	Branch MVA	266.8	305.5	300.0	101.8%	370.0	82.6%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	87.4	118.8	112.0	106.1%	146.7	81.0%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1086.8	999.1	108.8%	1250.1	86.9%
BF IPC Populus-Chill-Hem 500 kV & Hem 500/230 Xfmr + RAS	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1063.6	1000.1	106.3%	1250.1	85.1%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	YELOWTLP (66750) -> YELOWTLP (66755) CKT 1 at YELOWTLP	Branch MVA	77.4	100.1	100.0	100.1%	112.0	89.4%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	328.4	300.0	109.5%	370.0	88.7%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	326.9	300.0	109.0%	370.0	88.4%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	326.9	300.0	109.0%	370.0	88.4%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	320.7	300.0	106.9%	370.0	86.7%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	87.4	124.4	112.0	111.1%	146.7	84.8%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	319.0	315.0	101.3%	394.0	81.0%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	318.5	315.0	101.1%	394.0	80.8%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1245.0	999.1	124.6%	1250.1	99.6%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at WALAWALA	Branch Amp	844.9	1220.0	1000.1	122.0%	1250.1	97.6%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	HELLSCYN (60150) -> HURICANE (45103) CKT 1 at HELLSCYN	Branch Amp	883.9	1262.7	1199.9	105.2%	1380.1	91.5%
BF LH Hemingway-Longhorn 500 kV & Longhorn Gen	N POWDER (60312) -> LAGRANDE (40621) CKT 1 at N POWDER	Branch Amp	605.3	938.5	910.0	103.1%	1046.5	89.7%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	331.5	300.0	110.5%	370.0	89.6%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	331.5	300.0	110.5%	370.0	89.6%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	326.8	315.0	103.7%	394.0	82.9%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	306.6	300.0	102.2%	370.0	82.9%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	326.1	315.0	103.5%	394.0	82.8%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	300.2	300.0	100.1%	370.0	81.1%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	87.4	117.1	112.0	104.5%	146.7	79.8%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1129.4	999.1	113.0%	1250.1	90.3%
BF LH Longhorn-Coyote & Hemingway-Longhorn 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1106.5	1000.1	110.6%	1250.1	88.5%
BF LH Longhorn-Coyote 500 kV & Longhorn Gen	No Violations							
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	328.8	300.0	109.6%	370.0	88.9%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	328.8	300.0	109.6%	370.0	88.9%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	324.4	315.0	103.0%	394.0	82.3%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	323.8	315.0	102.8%	394.0	82.2%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	303.9	300.0	101.3%	370.0	82.1%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	87.4	117.8	112.0	105.2%	146.7	80.3%

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1162.0	999.1	116.3%	1250.1	93.0%
BF LH McNary-Longhorn & Hemingway-Longhorn 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1138.3	1000.1	113.8%	1250.1	91.1%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	329.5	300.0	109.8%	370.0	89.1%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	328.0	300.0	109.3%	370.0	88.6%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	328.0	300.0	109.3%	370.0	88.6%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	321.8	300.0	107.3%	370.0	87.0%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JEFFERSN	Branch MVA	87.4	124.1	112.0	110.8%	146.7	84.6%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	320.0	315.0	101.6%	394.0	81.2%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	319.4	315.0	101.4%	394.0	81.1%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1230.7	999.1	123.2%	1250.1	98.4%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at WALAWALA	Branch Amp	844.9	1206.1	1000.1	120.6%	1250.1	96.5%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	HELLSCYN (60150) -> HURICANE (45103) CKT 1 at HELLSCYN	Branch Amp	883.9	1248.3	1199.9	104.0%	1380.1	90.4%
BF LH McNary-Longhorn & Longhorn-Coyote 500 kV	N POWDER (60312) -> LAGRANDE (40621) CKT 1 at N POWDER	Branch Amp	605.3	917.6	910.0	100.8%	1046.5	87.7%
BF LH McNary-Longhorn 500 kV & Longhorn Gen	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1603.7	1733.2	1732.1	100.1%	2338.3	74.1%
Bus: Buckley 500 kV	No Violations							
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	338.6	300.0	112.9%	370.0	91.5%
Bus: Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	338.6	300.0	112.9%	370.0	91.5%
Bus: Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	315.9	300.0	105.3%	370.0	85.4%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	333.0	315.0	105.7%	394.0	84.5%
Bus: Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	332.2	315.0	105.5%	394.0	84.3%
Bus: Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	308.7	300.0	102.9%	370.0	83.4%
Bus: Summer Lake 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1073.2	999.1	107.4%	1250.1	85.9%
Bus: Summer Lake 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1051.8	1000.1	105.2%	1250.1	84.1%
Bus: Summer Lake 500 kV	HEMINWAY (60155) -> HEMLON11 (61956) CKT 1 at HEMINWAY	Branch Amp	1310.8	2026.7	2000.1	101.3%	3464.1	58.5%
N-1: Ashe-Hanford 500 kV	No Violations							
N-1: Ashe-Low Mon 500 kV	No Violations							
N-1: Ashe-Marion 500 kV	No Violations							
N-1: Ashe-Slatt 500 kV	No Violations							
N-1: Big Eddy-Celilo 500 kV	No Violations							
N-1: Big Eddy-John Day 500 kV	No Violations							
N-1: Big Eddy-Knight 500 kV	No Violations							
N-1: Big Eddy-Ostrander 500 kV	No Violations							
N-1: Boise Bench-Brownlee #3 230 kV	No Violations							
N-1: Brady-Antelope 230 kV + RAS	No Violations							
N-1: Brownlee-Ontario 230 kV	No Violations							
N-1: Buckley-Grizzly 500 kV	No Violations							
N-1: Buckley-Marion 500 kV	No Violations							
N-1: Buckley-Slatt 500 kV	No Violations							
N-1: Coulee-Hanford 500 kV	No Violations							
N-1: Coulee-Schultz 500 kV	No Violations							
N-1: Coyote-Slatt 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	305.9	300.0	102.0%	370.0	82.7%
N-1: Coyote-Slatt 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	305.9	300.0	102.0%	370.0	82.7%
N-1: Drycreek-Lolo 230 kV	No Violations							
N-1: Drycreek-N Lewiston 230 kV	No Violations							
N-1: Drycreek-Wala Ava 230 kV	No Violations							

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: Dworshak-Hatwai 500 kV	No Violations							
N-1: Dworshak-Taft 500 kV	No Violations							
N-1: Grassland-Slatt 500 kV	No Violations							
N-1: Grizzly-John Day #2 500 kV	No Violations							
N-1: Grizzly-Malin 500 kV	No Violations							
N-1: Grizzly-Ponderosa A-Summer L 500 kV	No Violations							
N-1: Grizzly-Ponderosa B-Capt Jack 500 kV	No Violations							
N-1: Grizzly-Round Bu 500 kV	No Violations							
N-1: Hanford-Low Mon 500 kV	No Violations							
N-1: Hanford-Vantage 500 kV	No Violations							
N-1: Hanford-Wautoma 500 kV	No Violations							
N-1: Hells Canyon-Brownlee 230 kV	No Violations							
N-1: Hells Canyon-Walla Walla 230 kV	No Violations							
N-1: Hemingway-Longhorn 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	328.5	300.0	109.5%	370.0	88.8%
N-1: Hemingway-Longhorn 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	328.5	300.0	109.5%	370.0	88.8%
N-1: Hemingway-Longhorn 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	324.2	315.0	102.9%	394.0	82.3%
N-1: Hemingway-Longhorn 500 kV	JEFFERSN (65850) -> JFRSNPHA (65860) CKT 1 at JFRSNPHA	Branch MVA	87.4	120.5	112.0	107.6%	146.7	82.2%
N-1: Hemingway-Longhorn 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	323.6	315.0	102.7%	394.0	82.1%
N-1: Hemingway-Longhorn 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	303.7	300.0	101.2%	370.0	82.1%
N-1: Hemingway-Longhorn 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1158.2	999.1	115.9%	1250.1	92.7%
N-1: Hemingway-Longhorn 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1134.4	1000.1	113.4%	1250.1	90.7%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	331.0	300.0	110.3%	370.0	89.5%
N-1: Hemingway-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	331.0	300.0	110.3%	370.0	89.5%
N-1: Hemingway-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	313.3	300.0	104.4%	370.0	84.7%
N-1: Hemingway-Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	307.1	300.0	102.4%	370.0	83.0%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	326.1	315.0	103.5%	394.0	82.8%
N-1: Hemingway-Summer Lake 500 kV	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	325.5	315.0	103.3%	394.0	82.6%
N-1: Hemingway-Summer Lake 500 kV	HURICANE (45103) -> HURWAL11 (90145) CKT 1 at HURICANE	Branch Amp	865.2	1085.9	999.1	108.7%	1250.1	86.9%
N-1: Hemingway-Summer Lake 500 kV	HURWAL11 (90145) -> WALAWALA (45327) CKT 1 at HURWAL11	Branch Amp	844.9	1064.0	1000.1	106.4%	1250.1	85.1%
N-1: Hemingway-Summer Lake 500 kV	HEMINWAY (60155) -> HEMLON11 (61956) CKT 1 at HEMINWAY	Branch Amp	1310.8	2074.9	2000.1	103.7%	3464.1	59.9%
N-1: Hemingway-Summer Lake 500 kV	HEMLON12 (61955) -> LONGHORN (40724) CKT 1 at HEMLON12	Branch Amp	1213.3	2016.4	2000.1	100.8%	3464.1	58.2%
N-1: Horse Hv-McNary 230 kV	No Violations							
N-1: John Day-Marion 500 kV	No Violations							
N-1: John Day-Rock Ck 500 kV	No Violations							
N-1: John Day-Slatt 500 kV	No Violations							
N-1: Knight-Wautoma 500 kV	No Violations							
N-1: LaGrande-North Powder 230 kV	No Violations							
N-1: Lit Goose-Central Ferry 500 kV	No Violations							
N-1: Lit Goose-Low Mon 500 kV	No Violations							
N-1: Longhorn-Coyote 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	301.9	300.0	100.6%	370.0	81.6%
N-1: Longhorn-Coyote 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	301.9	300.0	100.6%	370.0	81.6%
N-1: Low Gran-Central Ferry 500 kV	No Violations							
N-1: Low Mon-McNary 500 kV	No Violations							
N-1: Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	305.6	300.0	101.9%	370.0	82.6%
N-1: Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	305.6	300.0	101.9%	370.0	82.6%

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-1: McNary 500/230 kV Xfmr	No Violations							
N-1: McNary-Board T1 230 kV	No Violations							
N-1: McNary-John Day 500 kV	No Violations							
N-1: McNary-Longhorn 500 kV	No Violations							
N-1: McNary-Ross 345 kV	No Violations							
N-1: McNary-Roundup 230 kV	No Violations							
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	311.7	300.0	103.9%	370.0	84.2%
N-1: Midpoint-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	311.7	300.0	103.9%	370.0	84.2%
N-1: Ontario-Caldwell 230 kV	No Violations							
N-1: Ostrander-Knight 500 kV	No Violations							
N-1: Ostrander-Pearl 500 kV	No Violations							
N-1: Ostrander-Troutdale 500 kV	No Violations							
N-1: Oxbow-Brownlee #2 230 kV	No Violations							
N-1: Oxbow-Lolo 230 kV	No Violations							
N-1: Ponderosa A 500/230 kV Xfmr	No Violations							
N-1: Ponderosa B 500/230 kV Xfmr	No Violations							
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	302.5	300.0	100.8%	370.0	81.7%
N-1: Populus-Cedar Hill-Hemingway 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	302.5	300.0	100.8%	370.0	81.7%
N-1: Populus-Cedar Hill-Hemingway 500 kV	MIDPOINT (60240) -> MIDHEM11 (61988) CKT 1 at MIDHEM11	Branch Amp	1603.7	2372.2	1732.1	137.0%	2338.3	101.4%
N-1: Populus-Cedar Hill-Hemingway 500 kV	POPULUS (67790) -> BORPOP11 (61970) CKT 1 at POPULUS	Branch Amp	1014.8	1551.8	1492.7	104.0%	2264.2	68.5%
N-1: Rock Ck-Wautoma 500 kV	No Violations							
N-1: Roundup-Lagrande 230 kV	No Violations							
N-1: Schultz-Vantage 500 kV	No Violations							
N-1: Schultz-Wautoma 500 kV	No Violations							
N-1: Slatt 500/230 kV Xfmr	No Violations							
N-1: Vantage 500/230 kV Xfmr #1	No Violations							
N-1: Vantage 500/230 kV Xfmr #2	No Violations							
N-1: Walla Walla-Talbot 230 kV	No Violations							
N-1: Walla Walla-Wallula 230 kV	No Violations							
N-2: Ashe-Marion & Ashe-Slatt 500 kV	No Violations							
N-2: Ashe-Marion & Buckley-Marion 500 kV	No Violations							
N-2: Ashe-Marion & Coyote-Slatt 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	311.8	300.0	103.9%	370.0	84.3%
N-2: Ashe-Marion & Coyote-Slatt 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	311.8	300.0	103.9%	370.0	84.3%
N-2: Ashe-Marion & Slatt-Buckley 500 kV	No Violations							
N-2: Ashe-Marion & Slatt-John Day 500 kV	No Violations							
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	310.1	300.0	103.4%	370.0	83.8%
N-2: Ashe-Slatt & Coyote-Slatt 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	310.1	300.0	103.4%	370.0	83.8%
N-2: Ashe-Slatt & McNary-John Day 500 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Chemawa 230 kV	No Violations							
N-2: Big Eddy-Ostrander 500 kV & Big Eddy-Troutdale 230 kV	No Violations							
N-2: Boise Bench-Brownlee #1 & #2 230 kV	No Violations							
N-2: Boise Bench-Brownlee #3 & Boise Bench-Horseflat#4 230 kV	No Violations							
N-2: Brownlee-Hells Canyon & Oxbow-Lolo 230 kV	No Violations							
N-2: Brownlee-Oxbow & Brownlee-Hells Canyon 230 kV	No Violations							
N-2: Buckley-Marion & John Day-Marion 500 kV	No Violations							

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: Coulee-Hanford & Hanford-Vantage 500 kV	No Violations							
N-2: Coulee-Schultz #1 & #2 500 kV	No Violations							
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	339.9	300.0	113.3%	370.0	91.9%
N-2: DC-BIPOLE	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	339.9	300.0	113.3%	370.0	91.9%
N-2: DC-BIPOLE	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO PS	Branch MVA	290.2	333.1	315.0	105.8%	394.0	84.6%
N-2: DC-BIPOLE	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO PS	Branch MVA	290.2	332.4	315.0	105.5%	394.0	84.4%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	358.4	300.0	119.5%	370.0	96.9%
N-2: Double Palo Verde	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	358.4	300.0	119.5%	370.0	96.9%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 2 at PINTO	Branch MVA	290.2	364.5	315.0	115.7%	394.0	92.5%
N-2: Double Palo Verde	PINTO (66225) -> PINTO PS (66235) CKT 1 at PINTO	Branch MVA	290.2	363.1	315.0	115.3%	394.0	92.2%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 1 at H ALLEN	Branch MVA	296.7	371.1	357.0	104.0%	415.9	89.2%
N-2: Double Palo Verde	H ALLEN (18001) -> H ALLEN (18019) CKT 2 at H ALLEN	Branch MVA	296.7	371.1	357.0	104.0%	415.9	89.2%
N-2: Double Palo Verde	CHOLLA (14000) -> CHOSAG11 (14014) CKT 1 at CHOSAG11	Branch Amp	978.9	1079.7	1026.0	105.2%	1538.1	70.2%
N-2: Double Palo Verde	ROBINSON (64885)	% Δ Volts	1.026	0.973				-5.17%
N-2: Double Palo Verde	GONDER (64310)	% Δ Volts	1.016	0.963				-5.22%
N-2: Double Palo Verde	HA PS (18002)	% Δ Volts	0.99	0.938				-5.25%
N-2: Double Palo Verde	ROBINSON (64895)	% Δ Volts	1.081	1.024				-5.27%
N-2: Double Palo Verde	GONDER (64056)	% Δ Volts	1.022	0.968				-5.28%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	304.1	300.0	101.4%	370.0	82.2%
N-2: Grizzly-Malin & Grizzly-Captain Jack 500 kV	MALSUM12 (90086) -> MALSUM11 (90085) CKT 1 at MALSUM11	Branch Amp	1823.8	2781.2	2700.0	103.0%	4000.0	69.5%
N-2: Grizzly-Malin & Grizzly-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	300.4	300.0	100.1%	370.0	81.2%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	BRDRTWN (64018) -> BRDRTNPS (64017) CKT 1 at BRDRTWN	Branch MVA	266.8	317.8	300.0	105.9%	370.0	85.9%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HIL TOP (64058) -> HIL TOP (40537) CKT 1 at HIL TOP	Branch MVA	260.8	310.3	300.0	103.4%	370.0	83.9%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	306.4	300.0	102.1%	370.0	82.8%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	306.4	300.0	102.1%	370.0	82.8%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	CAPPON16 (90142) -> CAPPON15 (90141) CKT 1 at CAPPON15	Branch Amp	1092.7	2475.2	2400.0	103.1%	3800.0	65.1%
N-2: Grizzly-Malin & Malin-Summer Lake 500 kV	CAPPON12 (90138) -> CAPPON11 (90137) CKT 1 at CAPPON11	Branch Amp	1081.0	2458.4	2400.0	102.4%	3800.0	64.7%
N-2: Hanford-Ashe & Hanford-Low Mon 500 kV	No Violations							
N-2: Hanford-Wautoma #1 & #2 500 kV	No Violations							
N-2: Hells Canyon-Brownlee & Oxbow-Lolo 230 kV	No Violations							
N-2: John Day-Big Eddy #1 & #2 500 kV	No Violations							
N-2: John Day-Big Eddy & John Day-Marion 500 kV	No Violations							
N-2: John Day-Grizzly #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	307.5	300.0	102.5%	370.0	83.1%
N-2: John Day-Grizzly #1 & #2 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	307.5	300.0	102.5%	370.0	83.1%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	303.8	300.0	101.3%	370.0	82.1%
N-2: John Day-Grizzly #2 & Buckley-Grizzly 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	303.8	300.0	101.3%	370.0	82.1%
N-2: John Day-Marion & Buckley-Marion 500 kV	No Violations							
N-2: John Day-Marion & Marion-Pearl 500 kV	No Violations							
N-2: John Day-Rock Creek 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & McNary-Ross 345 kV	No Violations							
N-2: Knight-Ostrander 500 kV & Midway-Bonneville 230 kV	No Violations							
N-2: Lower Granite-Central Ferry #1 & #2 500 kV	BELL SC (40096) -> BELL BPA (40091) CKT 1 at BELL SC	Branch Amp	1534.7	2290.2	2200.1	104.1%	3000.0	76.3%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	301.9	300.0	100.6%	370.0	81.6%
N-2: McNary-John Day & Rock Creek-John Day 500 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	301.9	300.0	100.6%	370.0	81.6%
N-2: McNary-John Day 500 kV & McNary-Horse Heaven 230 kV	No Violations							

Appendix N5 – 16la1sa_lh_3400idnw_4500wom_5500wos Base Case Post-Transient Contingency Results

Contingency Studied	Element Overloaded	Violation Type	Pre Cont. Value	Post Cont. Value	Limit A	% Limit A	Limit B	% Limit B or % Δ Volts
N-2: McNary-John Day 500 kV & McNary-Ross 345 kV	No Violations							
N-2: McNary-Ross 345 kV & McNary-Horse Heaven 230 kV	No Violations							
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 1 at H ALLEN	Branch MVA	291.5	311.8	300.0	103.9%	370.0	84.3%
N-2: Midpoint-Summer Lake 500 kV & Midpoint-King 230 kV	HA PS (18002) -> H ALLEN (18001) CKT 2 at H ALLEN	Branch MVA	291.5	311.8	300.0	103.9%	370.0	84.3%
N-2: Schultz-Wautoma & Vantage-Schultz 500 kV	No Violations							
N-2: Sickler-Schultz & Schultz-Vantage 500 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Midway-Big Eddy 230 kV	No Violations							
N-2: Wautoma-Rock Ck 500 kV & Springcreek-Big Eddy 230 kV	No Violations							