Avista System Planning Assessment

2014 Local Planning Report

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I EXECUTIVE SUMMARY

Avista's System Planning Department has conducted an assessment of the Avista Transmission System. The purpose of the Planning Assessment is to determine where the System may have the inability to meet performance requirements as defined in the NERC Reliability Standards and to develop Corrective Action Plans addressing how the performance requirements will be met. Emphasis is given to determining where the System exhibits an inability to meet performance requirements as defined in the NERC Reliability Standards, and develop Corrective Action Plans addressing how the performance requirements will be met. Key findings from the assessment include:

Big Bend Area: The Big Bend area transmission system performance will significantly improve upon completion of the Benton – Othello SS 115 kV Transmission Line Rebuild project. Further improvements are made through additional reconductor projects, the Saddle Mountains integration, and the addition of communication aided protection schemes.

Coeur d'Alene Area: Completion of the Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild project and Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild project will provide greatly improved transmission system performance in the near and long term planning horizon. Reinforcement of the system around Sandpoint is necessary and requires the development of a long range plan.

Lewiston/Clarkson Area: The transmission system in the Lewiston/Clarkson area exhibits relatively good performance. Issues are limited primarily to N-1-1 outages on the 230 kV system and voltage exceeding facility ratings during light loading conditions.

Palouse Area: Completion of the Moscow 230 Station Rebuild project in 2014 has mitigated several performance issues. The remaining issue is an outage of both the Moscow and Shawnee 230/115 kV transformers. An operational and strategic long term plan is under development to best address the double transformer outage.

Spokane Area: Several performance issues exist in the present state of the transmission system in the Spokane area and worsen with time. The staged construction of new 230 kV facilities to reinforce the area is gaining justification through analysis of N-1-1 contingencies. Dependency on Beacon Station leave the system susceptible to performance issues for outages related to the station.

A list of corrective actions plans, developed to mitigate performance issues observed during the assessment, is provided in the following table. The plans are categorized as complete, planned (included in five year budget), needs further analysis (has been discussed but actionable plans are under development), and new proposal (has not been presented in previous assessments).

	Year Issue Starts	Construction Start	Construction End	Priority	Cost Estimate
Big Bend				**77.25**	**$82,125,000**
1-Completed					
Chelan - Stratford 115 kV Transmission Line River Crossing				0.01	
Stratford 115 kV Station Rebuild				0.01	
2-Planned					
Addy - Devils Gap 115 kV Transmission Line Reconductor	Present	2017	2018	4.16	$2,025,000
Benton - Othello SS 115 kV Transmission Line Rebuild	Present	2015	2016	77.25	$7,100,000
3-Needs Further Analysis					
Chelan - Stratford 115 kV Transmission Line Rebuild	Present			2.48	$13,000,000
Lind – Warden 115 kV Transmission Line Rebuild	2033			0.14	$9,000,000
Saddle Mountain Integration	Present			23.18	$16,400,000
4-New Proposal					
Addy - Kettle Falls Protection Scheme	Present			45.00	$1,000,000
Devils Gap - Stratford 115 kV Transmisison Line Rebuild	2019			1.40	$30,100,000
Devils Gap Station Reconfiguration	Present			16.00	$3,000,000
Kettle Falls Capacitor Bank	2024			0.02	$500,000
Coeur d'Alene				**90.30**	**$46,300,000**
1-Completed					
Lancaster Interconnection					
2-Planned					
Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild	Present	2015	2017	76.88	$7,500,000
Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild	Present	2016	2018	90.30	$12,750,000
Pine Creek Transformer Replacement	2034			0.01	$500,000
4-New Proposal					
Cabinet 230/115 kV Transformer Automatic LTC	2019			0.21	$50,000
Rathdrum 115 kV Bus Reconfiguration	2034			1.29	$5,000,000
Sandpoint Reinforcement	Present			16.31	$20,000,000
St. Maries Cap Bank	Present			3.13	$500,000
Lewiston/Clarkston				**150.00**	**$15,325,000**
3-Needs Further Analysis					
North Lewiston Reactors	Present	2015	2016	150.00	$4,900,000
4-New Proposal					
Hatwai - Lolo #2 230 KV Transmission Line	Present	2017	2019	7.97	$8,025,000
Lolo Transformer Replacement	Present			0.13	$1,000,000
South Lewiston Station Rebuild	2030	2015	2016	0.06	$1,400,000
Palouse				**107.25**	**$2,500,000**
1-Completed					
Moscow 230 Station Rebuild				0.01	
4-New Proposal					
Shawnee #2 230/115 kV Transformer	Present			107.25	$2,500,000
Spokane				**157.50**	**$146,965,000**
2-Planned					
Garden Springs 115 kV Station Integration	Present	2017	2019	12.50	$8,200,000
Ninth & Central - Sunset 115 kV Transmisison Line Rebuild	2023	2015	2016	0.05	$925,000
Spokane Valley Transmission Reinforcement	Present	2015	2016	157.50	$8,890,000
Westside Transformer Replacement	Present	2015	2016	1.38	$1,750,000
3-Needs Further Analysis					
Bell Second Tranformer	Present			128.25	$0
Garden Springs 230 kV Station Integration	2032			0.14	$15,000,000
Nine Mile - Westside Protection Upgrade	Present			26.00	$200,000
4-New Proposal					
Beacon - Francis & Cedar 115 kV Transmission Line Reconductor	2032			0.01	$1,500,000
Beacon 230 kV Capacitor	Present			25.00	$1,500,000
Garden Springs - Ninth & Central 230 kV Transmission Line	2034			1.25	$30,000,000
Garden Springs - Thornton 230 kV Transmission Line	Present			5.63	$30,000,000
Ninth & Central 230 kV Integration	Present			56.25	$15,000,000
Rathdrum - Westside 230 kV Transmission Line	2034			0.09	$30,000,000
Silver Lake Switching Station	2032			0.01	$4,000,000
System	**Present**			**600.00**	**$220,000**
3-Needs Further Analysis					
230 kV Capacitor Automatic Switching	Present			25.00	$20,000
RAS Update	Present			600.00	$200,000
Grand Total					**$293,435,000**

125 YEARS OF SERVICE 1889–2014 AVISTA

Additional projects not categorized as corrective action plans are listed in the following table:

	Construction Start	Construction End	Cost Estimate
Big Bend	**2019**	**2019**	**$18,747,700**
1-Completed			
Odessa Cap Bank			
2-Planned			
Devils Gap - Lind 115 kV Transmission Line Rebuild	2015	2016	$7,997,700
Ford Station Rebuild	2018	2019	$1,275,000
Gifford Station Rebuild	2015	2015	$1,200,000
Harrington Station Rebuild	2015	2016	$3,000,000
Little Falls Station Rebuild	2015	2017	$4,275,000
Valley Station Rebuild	2019	2019	$1,000,000
3-Needs Further Analysis			
49 Degrees Station			
Bruce Siding Station			
Lee and Reynolds Transformation			
Coeur d'Alene	**2019**	**2019**	**$44,625,000**
1-Completed			
Blue Creek Station Rebuild			
Julia Street			
Noxon Construction Station			
2-Planned			
Beck Road Station	2015	2014	
Benewah - Pine Creek 230 kV Transmision Line Rebuild	2018	2019	$15,000,000
Big Creek Station Rebuild	2016	2017	$1,300,000
Burke - Pine Creek #3 & #4 115 kV Transmission Line Rebuild	2015	2015	$3,500,000
Cabinet - Noxon 230 kV Transmission Line Rebuild	2017	2018	$1,500,000
Noxon Rapids 230 kV Switchyard Rebuild	2015	2019	$21,075,000
Priest River Station			
Sandpoint, Sagle, and Oden Grid Modernization			
St. Maries SCADA Upgrade/Add Feeder	2018	2018	$750,000
3-Needs Further Analysis			
Bronx Station	2019	2019	$1,500,000
Cabinet Gorge Switching Station			
Carlin Bay Station			
Noxon - Pine Creek #2 230 kV Transmision Line			
Lewiston/Clarkston	**2018**	**2019**	**$5,625,000**
1-Completed			
10th & Stewart Station Rebuild			
Lewiston Mill Road Station			
North Lewiston Distribution Station Relocation			
2-Planned			
Clearwater Station Upgrade	2015	2016	$1,000,000
Grangeville Station Rebuild	2018	2019	$2,025,000
Kamiah Wood Station Rebuild	2017	2018	$1,300,000
Kooskia Transformer Replacement			
Pound Land Station Rebuild	2017	2018	$1,300,000
3-Needs Further Analysis			
Wheatland Station			$0
Palouse	**2018**	**2019**	**$29,053,800**
2-Planned			
Benewah - Moscow 230 kV Transmission Line Rebuild	2015	2017	$24,178,800
Diamond Station Minor Rebuild			
Moscow City 115 SCADA/Minor Rebuild			
North Moscow Transformation	2018	2019	$1,800,000
Potlatch Transformer Replacement			
Tekoa SCADA Upgrade/Minor Rebuild			
3-Needs Further Analysis			
Deary - Potlatch 115 kV Transmission Line			
Tamarack Station	2018	2019	$3,075,000
Spokane	**2017**	**2019**	**$39,785,000**
2-Planned			
Chester Station Rebuild	2017	2018	$1,460,000

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	Construction Start	Construction End	Cost Estimate
Deer Park Partial Rebuild	2015	2015	$750,000
Downtown West Station	2016	2018	$2,275,000
Greenacres/Otis Orchards Stations	2015	2015	$1,375,000
Hallett & White - Silver Lake 115 kV Transmission Line Rebuild	2017	2018	$2,025,000
Irvin Distribution	2016	2017	$1,875,000
Metro Station Rebuild	2016	2019	$13,150,000
Ninth & Central Station Upgrade	2015	2017	$2,950,000
Northwest Station Rebuild	2016	2017	$1,675,000
Ross Park Station Rebuild	2015	2017	$6,000,000
Southeast Capacity Increase	2016	2016	$450,000
Sunset Station Rebuild	2017	2019	$3,775,000
3-Needs Further Analysis			
Beacon - Bell - Francis & Cedar - Waikiki Reconfiguration	2016	2017	$2,025,000
Beacon Station Rebuild			
College and Walnut Consolidation/Rebuild			
Downtown East Station			
Hallett & White Capacitor Bank			
Hawthorne Station			
Hillyard Station			
Westside Station Rebuild			
System	**2015**	**2017**	**$9,794,000**
2-Planned			
Line Ratings Mitigation	2015	2017	$8,794,000
Spokane - Coeur d'Alene 115 kV Relay Upgrades	2015	2015	$1,000,000
Grand Total	**2019**	**2019**	**$147,630,500**

The significant changes in the 2014 assessment from previous assessment include the following:

- Analysis of N-1-1 contingencies presented several new performance issues and therefore added justification to existing corrective action plans or development of new corrective actions plans.
- Completion of the Lancaster Interconnection project provided improved performance to the Spokane area.
- Generators losing synchronism for N-1 contingencies are not permitted under TPL-001-4, R4.1.1 and therefore require a corrective action plan.

Executing the Corrective Action Plans will ensure the System is able to meet performance requirements as defined in the NERC Reliability Standards. A majority of the Corrective Action Plans are required to mitigate performance issues observed in the operating horizon (0-1 years).

II INTRODUCTION

Avista's 2014 Local Planning Report is the end product of both the Local Transmission Planning Process and the annual Planning Assessment. The Local Transmission Planning Process (Process) is outlined in Attachment K to Avista Corporation's (Avista) Open Access Transmission Tariff (OATT) FERC Electric Volume No. 8. The purpose of the Process is to identify Single System Projects needed to mitigate future reliability and load-service requirements for the Avista Transmission System. The Planning Assessment is outlined in the NERC Reliability Standard TPL-001-4. The purpose of the Planning Assessment is to determine where the System may have the inability to meet performance requirements as defined in the NERC Reliability Standards and to develop Corrective Action Plans addressing how the performance requirements will be met. The Planning Assessment of the Transmission System included performing steady state contingency analysis, voltage collapse, and transient technical studies. Development of the Local Planning Report supports compliance with applicable NERC Reliability Standards as well as satisfying necessary steps in the Local Transmission Planning Process.

The Local Planning Report, and associated collection of Corrective Action Plans and Single System Projects, provides a ten year Transmission System expansion plan by including all Transmission System Facility improvements.

1 REPORT ORGANIZATION

The Local Planning Report is organized by providing information about Avista's Transmission System in Section II.2 followed by a summary of the Local Planning Process in Section II.3. The Planning Assessment is covered in Section III beginning with an overview and project prioritization description. The remaining sections of the Local Planning Report are divided into the five geographical areas representing sections of Avista's Transmission System. The complete Planning Assessment includes all five area assessments. Sensitivity Analysis studies are presented in Section III.8.

2 COMPANY DESCRIPTION

2.1 Overview

Avista is a publicly held energy company primarily involved in the production, transmission and distribution of energy (natural gas and electricity). Avista, formerly known as The Washington Water Power Company, was founded on March 13, 1889, in Spokane, Washington, by ten enterprising men who saw the potential of one of the Northwest's most abundant natural resources — moving water.

Avista's primary market area covers more than 30,000 square miles, with energy generation, transmission, and distribution facilities in four Western states. The company serves more than 335,000 electric customers in eastern Washington and northern Idaho. Avista's electric power generation and transmission assets range in age from modern 21st century equipment to equipment that was patented and placed in service over 100 years ago.

The service territory served by the Avista electrical system is generally centered on the Spokane, Washington and Coeur d'Alene, Idaho load centers. Avista also serves a smaller southern load center located near Lewiston, Idaho and Clarkston, Washington. Figure II-1 geographically displays the Avista service territory.

FIGURE II-1: AVISTA SERVICE TERRITORY

2.2 Transmission System

2.2.1 Transmission Lines

Avista owns and operates a system of over 2,200 miles of electric transmission facilities which include approximately 685 miles of 230 kV transmission lines and 1,527 miles of 115 kV transmission lines. Figure II-2 illustrates Avista's Transmission System on a map of the region.

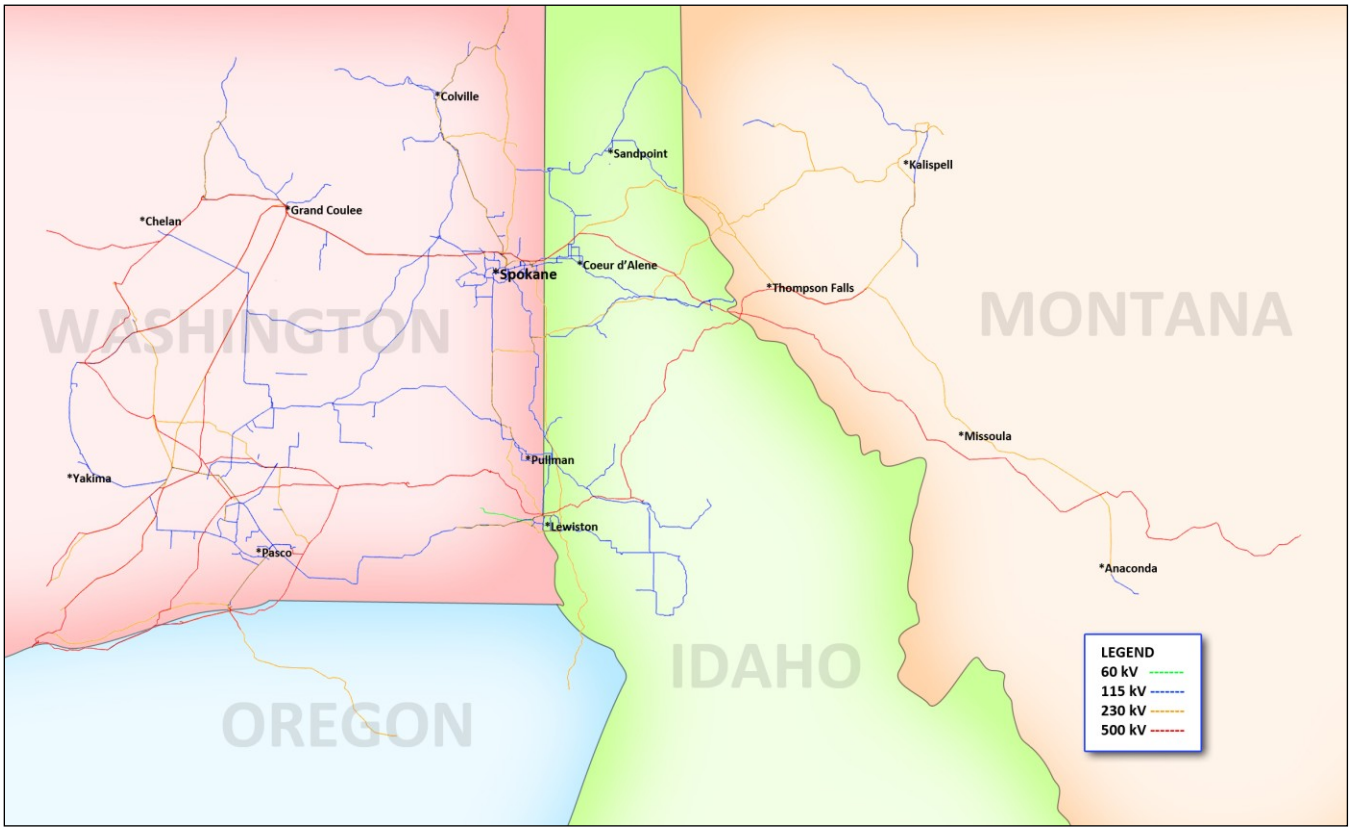


FIGURE II-2: AVISTA TRANSMISSION LINE MAP

The Avista 230 kV transmission lines are the backbone of Avista's Transmission. Figure II-3 shows a station level drawing of Avista's 230 kV Transmission System including interconnections to foreign utilities. Avista's 230kV Transmission System is interconnected to the BPA 500 kV transmission system at the Bell, Hot Springs and Hatwai Stations.

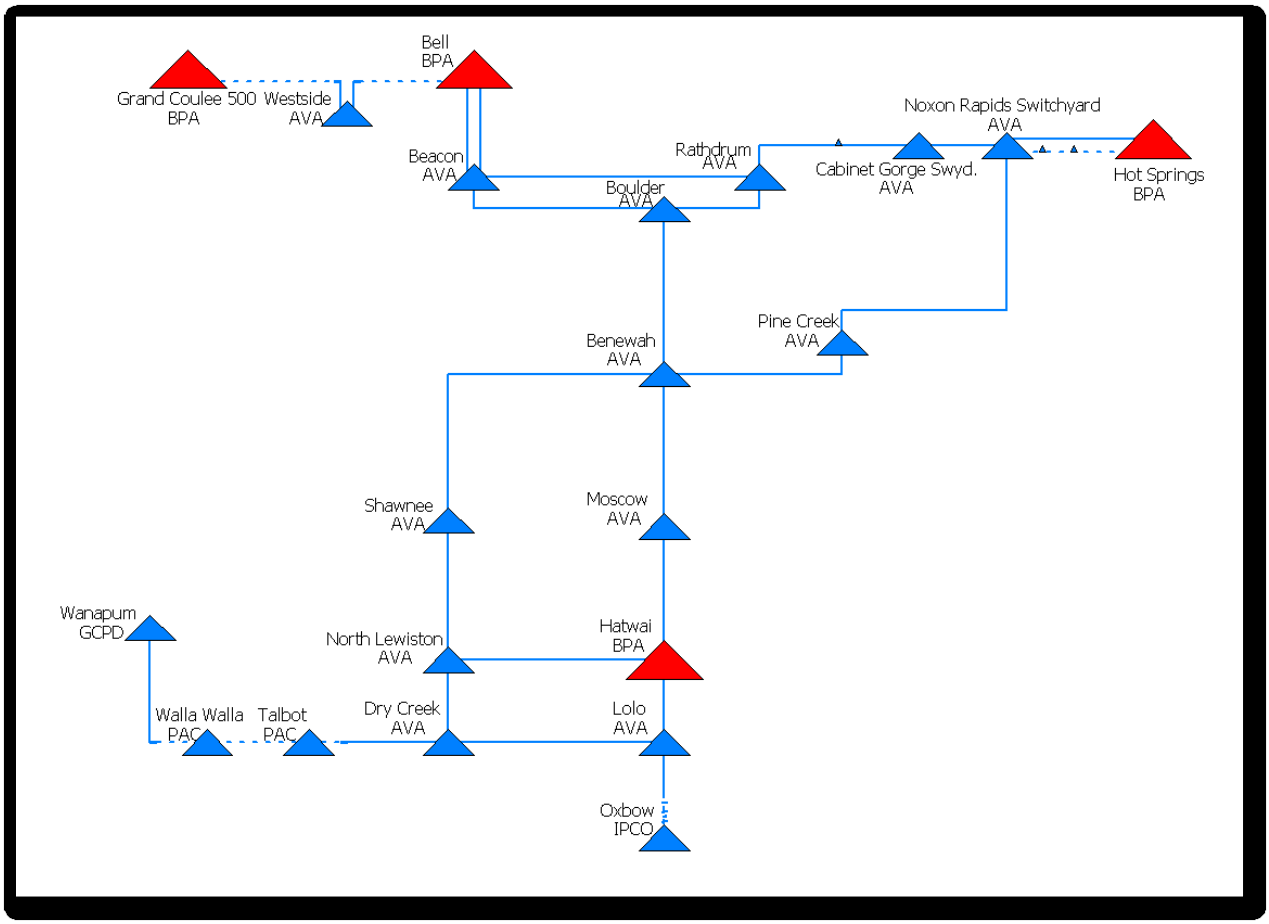


FIGURE II-3: AVISTA 230 KV TRANSMISSION SYSTEM

2.2.2 Transmission System Areas

Avista has separated its Transmission System into five geographical areas:

- Big Bend
- Coeur d'Alene
- Lewiston-Clarkston
- Palouse
- Spokane

The areas are shown with their approximate boundaries in Figure II-4. The Transmission System Assessment described in Section 0 is a compilation of assessments on each of the five areas.

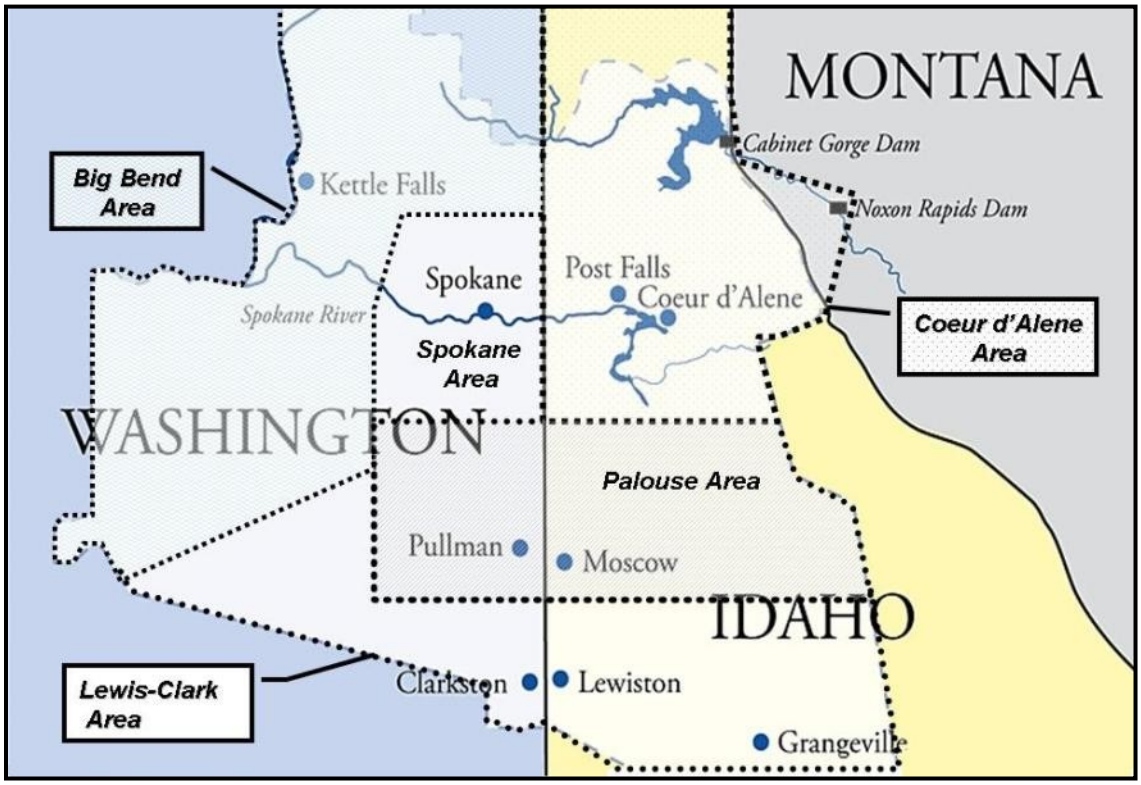


FIGURE II-4: AVISTA TRANSMISSION SYSTEM REGIONS

2.2.3 WECC Rated Paths

Avista owns transmission assets in the following WECC transfer paths:

- Path 6: West of Hatwai
- Path 8: Montana to Northwest
- Path 14: Idaho to Northwest

2.2.4 Points of Interconnection

Avista's Balancing Authority Area (BAA) is directly interconnected to the Balancing Authority Areas operated by Bonneville Power Administration (BPA), Public Utility District No. 2 of Grant County (GCPD), Public Utility District No. 1 of Chelan County, Idaho Power Company, PacifiCorp, NorthWestern Energy, and Seattle City Light.

Significant points of interconnection are associated with the BPA 500/230 kV transformers located at the following BPA stations: G.H. Bell (Spokane, WA), Hatwai (Lewiston, ID), and Hot Springs (Hot Springs, MT).

Within Avista's BAA, Avista's Transmission and Distribution System is interconnected with Pend Oreille PUD's Transmission System and several Load Serving Entities including: Asotin

County PUD, Big Bend Electric Cooperative, City of Cheney, City of Chewelah, Clearwater Power Company, Fairchild Air Force Base, Idaho County Light & Power Cooperative, Inland Power & Light Company, Kootenai Electric Cooperative, Modern Electric Water Company, Northern Lights, and City of Plummer. Avista owned generation and distribution stations not connected directly to Avista's transmission system are typically telemetered into Avista's BAA.

2.3 Generation Resources

Avista has a diverse mix of generation with a majority of its generation being hydro power based on various projects located on the Spokane River and Clark Fork River. Avista owns eight hydroelectric generating plants as well as coal (partial ownership), natural gas, and wood-waste combustion plants in five eastern Washington, northern Idaho, eastern Oregon, and eastern Montana locations. Avista also utilizes power supply purchase and sale arrangements of varying lengths to meet a portion of its load requirements. Table II-1and Table II-2 summarize the operational capacities of Avista generating projects. Table II-1 includes the expected energy output of each facility based on the 70-year hydrologic record for the year ending 2012.

Project Name	Fuel	Location	Area	Project Start Date	Maximum Capability (MW)[1]	Expected Energy (aMW)
Monroe Street	Spokane River	Spokane, WA	Spokane	1890	15.0	**11.6**
Post Falls	Spokane River	Post Falls, ID	Coeur d'Alene	1906	18.0	**10.0**
Nine Mile	Spokane River	Nine Mile Falls, WA	Spokane	1925	26.0	**12.5**
Little Falls	Spokane River	Ford, WA	Big Bend	1910	35.2	**22.1**
Long Lake	Spokane River	Ford, WA	Big Bend	1915	89.0	**53.4**
Upper Falls	Spokane River	Spokane, WA	Spokane	1922	10.2	**7.5**
Cabinet Gorge	Clark Fork	Clark Fork, ID	Coeur d'Alene	1952	270.5	**124.8**
Noxon Rapids	Clark Fork	Noxon, MT	Coeur d'Alene	1959	610.0	**198.3**
Total	All Hydro				1073.9	440.2

TABLE II-1: AVISTA HYDROELECTRIC GENERATION RESOURCES

[1] The maximum capability is the higher of the name plate capacity or the maximum capability—these numbers may vary from the 2013 Electric IRP numbers.

Project Name	Fuel	Location	Area	Project Start Date	Maximum Capability (MW)[2]
Colstrip 3&4 (15%)	Coal	Colstrip, MT	N/A	1984	**247.0**
Rathdrum (CT)	Gas	Rathdrum, ID	Coeur d'Alene	1995	**178.0**
Northeast (CT)	Gas/Oil	Spokane, WA	Spokane	1978	**68.0**
Boulder Park (IC)	Gas	Spokane, WA	Spokane	2002	**24.6**
Coyote Springs 2 (CC)	Gas	Boardman, OR	N/A	2003	**312.0**
Kettle Falls	Wood	Kettle Falls, WA	Big Bend	1983	**50.7**
Kettle Falls (CT)	Gas	Kettle Falls, WA	Big Bend	2002	**11.0**
Total	All Thermal				891.3

TABLE II-2: AVISTA THERMAL GENERATION RESOURCES

For more information on Avista's generation, please refer to the Integrated Resource Plan.

2.4 Distribution System

Avista's distribution system consists of over 18,300 miles of distribution lines operated at voltages ranging from 4 kV to 35 kV. The majority of the distribution system is configured as radial feeders with ties to adjacent feeders and substations for redundancy. The distribution system serving the downtown Spokane area is an exception as it operates in a networked configuration.

2.5 Customer Demand

Avista biennially develops an Electric Integrated Resource Plan (IRP) which is a thoroughly researched and data-driven document to guide responsible resource planning for the company. Included in the IRP is a detailed process for native load forecasting. For more information on Avista's load and load forecasting methodology, please refer to the IRP.

2.5.1 Native Load

Avista's typical peak hour is in the winter months, between November and early February. Air conditioning loads have created some summer months where peak loads exceeded those of winter. This phenomenon has transformed Avista into a dual peaking utility. Even though

[2] The maximum capability figures associated with thermal power plants is the highest of either the summer, winter, or nameplate capacities. These numbers may conflict with the project description numbers.

summer peaks may be higher than winter, Avista still expects to have its highest electricity load in the winter. Avista's all-time native peak load was in the winter of 2009 at 1,821 MW.

As documented in the IRP, Avista's 20-year native peak load growth rate was 0.84 percent in the winter and 0.90 percent in the summer. Figure II-5 illustrates the growth levels compared to historical peaks for both summer and winter.

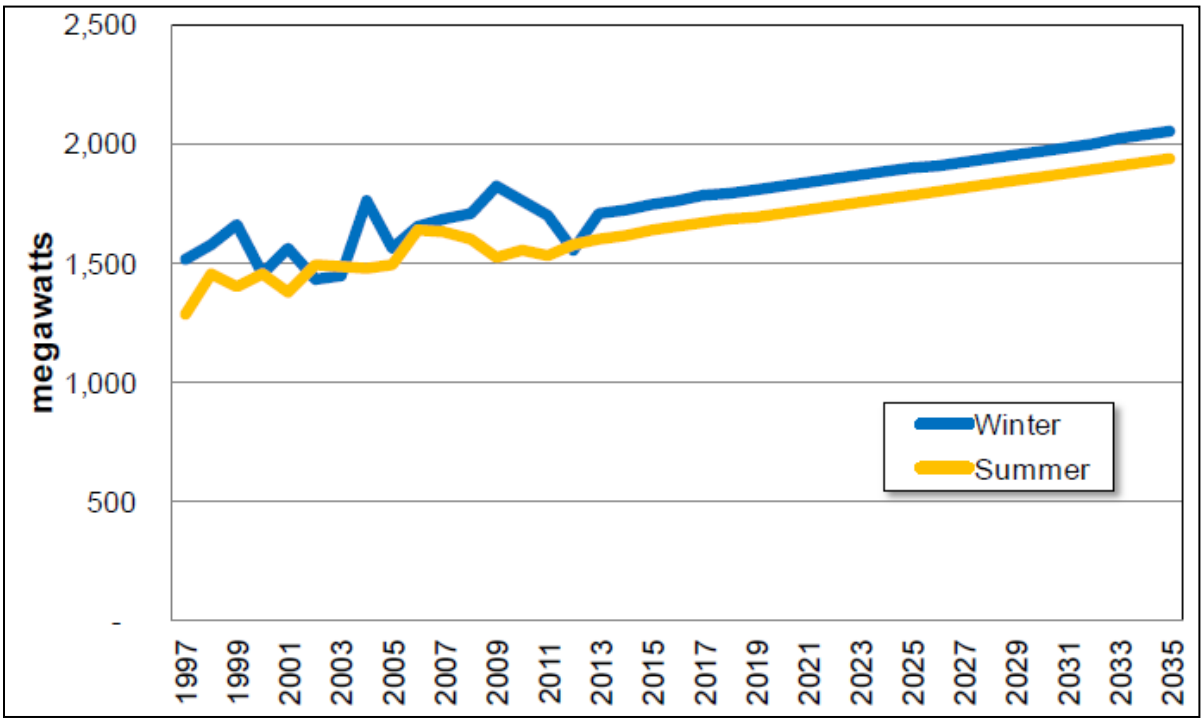


FIGURE II-5: WINTER AND SUMMER NATIVE LOAD PEAK DEMAND, 1997-2035

2.5.2 Balancing Authority Area (BAA) Load

Avista's BAA load peaks around 2,200 MW in the winter and 2,050 MW in the summer. Figure II-6 shows the BAA load historical monthly peaks from 2001-2013 and the forecasted monthly peaks for 2014-2030. The power factor of typical loads at a station vary from 0.95 in the summer to unity in the winter. During light load conditions, some loads may have leading power factor. Variation in power factor affects how the Transmission System needs to be operated. Under low power factor scenarios, additional reactive resources are required to maintain applicable facility voltage ratings.

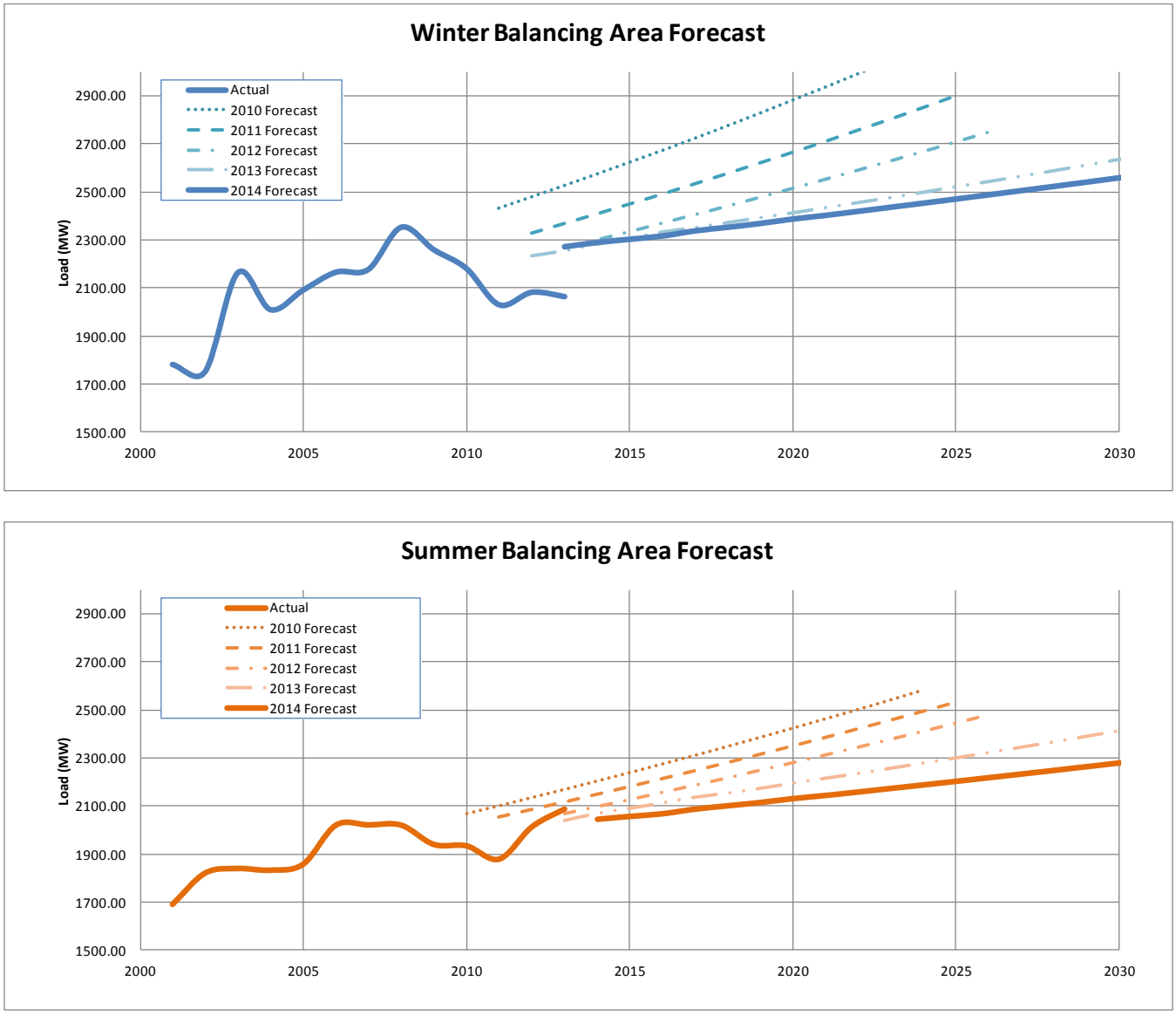


FIGURE II-6: ACTUAL AND FORECASTED PEAK BALANCING AUTHORITY AREA LOAD

The BAA load growth rate is expected to be similar to the native load growth rate. The forecast data for the loads which are not Avista's native loads are provided by the Bonneville Power Administration on behalf of the Load Serving Entity of each load.

3 LOCAL PLANNING PROCESS

The development of the Local Planning Report follows the Local Transmission Planning Process provided in Attachment K, Part III – The Avista Local Transmission Planning Process of Avista's OATT. The Local Planning Report has been prepared within the two-year process as defined in Avista's OATT Attachment K. The Local Planning Report identifies the Transmission System facility additions required to reliably interconnect forecasted generation resources and serve the forecasted Network Customers' load, Native Load Customers' load, and Point-to-Point Transmission Customers' requirements, including both grandfathered, non-OATT agreements and rollover rights, over a ten (10) year planning horizon. Additionally, the Local Planning Report incorporates the results of any stakeholder-requested economic congestion studies results that were performed. For the 2013-2014 planning cycle, no economic congestion studies were requested or incorporated. The Process is open to all Interested Stakeholders, including, but not limited to, all Transmission Customers, interconnection customers, and state authorities.

Avista coordinates its planning processes with other transmission providers through membership in the ColumbiaGrid, Northern Tier Transmission Group (NTTG) and the Western Electricity Coordinating Council (WECC). Avista uses the ColumbiaGrid process for its Regional Planning Process[3]. The results from both years of the biennial planning process are provided to ColumbiaGrid for incorporation into their planning process. Avista uses the WECC for its interconnection wide planning and development of wide-area planning proposals.

Avista's OATT is located on its Open Access Same-time Information System (OASIS) at http://www.oatioasis.com/avat. Additional information regarding Avista's Transmission Planning is located in the Transmission Planning folder on Avista's OASIS.

3.1 Study Development Meeting

Avista held a Study Development Meeting during the second quarter of 2013 providing participants an opportunity to provide comments for data gathering, initial assumptions and input into the study development. All comments received at the Study Development Meeting, or during the 30 days following, were incorporated into the Local Planning Report.

The purpose of the Process is to identify Single System Projects needed to mitigate future reliability and load-service requirements for the Avista Transmission System.

3.2 Local Planning Report Development

Avista uses the data gathered from the Study Development Meeting to perform a Planning Assessment. The results of the Planning Assessment are documented in the Local Planning Report. The Local Planning Report may also include additional information regarding projects and System modifications developed through others means then the Planning Assessment.

[3] As described in FERC Order 890 and its subsequent Orders, and Order 1000

3.2.1 Access to Planning Data

The Transmission System models used in the Planning Assessment can be provided within 10 calendar days, via email or other media, to any WECC member that makes a request. Non-WECC members will be required to sign a confidentiality agreement with the WECC before any base cases can be shared. Once the WECC confirms a confidentiality agreement has been signed, the requested base case(s) shall be provided within 10 calendar days. Any additional information needed to replicate the technical study results of the Planning Assessment can be provided, upon written request.

3.2.2 Identification of Analytical Tools

The following Analytical Tools were used to perform technical studies in the Planning Assessment:

- PowerWorld Simulator Software, Version 18
  - PowerWorld Simulator is an interactive power systems simulation package designed to simulate high voltage power systems operation on a time frame ranging from several minutes to several days. The software contains a highly effective power flow analysis package capable of efficiently solving systems with up to 100,000 buses using mathematical calculations based on system impedances, load levels and generation output. PowerWorld provides the user with a variety of sophisticated study tools such as an automated contingency processor, an Available Transfer Capability (ATC) tool, an Optimal Power Flow tools, various voltage stability tools (i.e. PV and QV tools), and a Transient Stability Analysis tool.

3.3 Draft Local Planning Report Meeting

Avista held a Draft Study Report meeting in the fall of 2013 to discuss the Draft Local Planning Report. After the comment period following that meeting, Avista confirmed and finalized the 2013 Local Planning Report.

3.4 Point of Contact

A Point of Contact for questions regarding the Local Planning Report and the projects described within it has been designated. Please contact the party named below for any questions:

Transmission Planning Department
PO Box 3727, MSC-16
Spokane, WA 99220
TransmissionPlanning@avistacorp.com

III PLANNING ASSESSMENT

1 ASSESSMENT OVERVIEWS

Each area Transmission System assessment was conducted using the same analysis techniques. The assessments consisted of steady state analysis and stability analysis.

1.1 Transmission System Models (TPL-001-4, R1)

Avista's System Planning Department develops a set of transmission system models (Planning Cases) biannually to model its Transmission Planner and Planning Coordinator areas as well as the regional Transmission System. The Planning Case development process outlined in the internal document *TP-SPP-04 – Data Preparation for Steady State and Dynamic Studies* outlines the use of WECC approved base cases and applying steady state and dynamic data modifications as required representing desired scenarios. The resulting Planning Cases represent a normal System condition (N-0). Planning Cases include the following:

- All existing facilities i.e. no planned transmission expansion project models. In past studies, inclusion of non-committed planned transmission models has incorrectly hidden potential reliability and load-service issues. Subsequently, a Corrective Action Plan was not developed as necessary (TPL-001-4, R1.1.1)
- Known outages of generation or Transmission Facilities with a duration of at least six months. Presently, Avista does not have planned outages outside the operations planning horizon. Long duration outages outside of Avista's Transmission Planner or Planning Coordinator areas are typically modeled in WECC approved base cases. (TPL-001-4, R1.1.2, R2.1.3)
- New planned Facilities and changes to existing Facilities. The Transmission System models are updated bi-annually to incorporate constructed projects and changes to existing Facilities. Planning Cases are developed to represent scenarios with and without planned Facilities and changes to existing Facilities; refer to table in Appendix A. (TPL-001-4, R1.1.3)
- Real and reactive Load forecasts. Load forecasts are developed annually and incorporated into the Planning Cases. (TPL-001-4, R1.1.4)
- Known commitments for Firm Transmission Service and Interchange. Developing sensitivity cases with WECC Rated Paths at their limits represents scenarios with all existing known commitments modeled. Future commitments exceeding the limits of WECC Rated Paths are not presently studied. (TPL-001-4, R1.1.5)
- Resources (supply or demand side) required for Load. Resource dispatch forecasts are developed based on historical data and represented accordingly in the Planning Cases. (TPL-001-4, R1.1.6)
- Normal operating procedures. All established pre-contingency operating procedures are

represented. Manual application of each operating procedure is followed in the process of developing each Planning Case.

- Reactive Power Resources. All existing Reactive Power Resources are modeled to ensure adequate reactive resources are available.

1.2 Steady State Analysis (TPL-001-4, R2.1-2.2 & R3)

For the Steady State portion of the Planning Assessment, Avista performs contingency analysis based on computer simulation models according to the following section.

1.2.1 Analysis Development

The following Transmission System models are developed to represent various seasonal conditions:

- Heavy Summer and Heavy Winter:
  - Year two (next year, i.e. 2015 case if case is created and used in 2014) (TPL-001-4, R2.1.1, R2.4.1)
  - Year five (TPL-001-4, R2.1.1, R2.4.1)
  - Year ten (TPL-001-4, R2.2.1, R2.5)
- Light Summer and Light Winter
  - Year two (next year, i.e. 2015 case if case is created and used in 2014) (TPL-001-4, R2.1.2, R2.4.2)
  - Year five (TPL-001-4, R2.1.2, R2.4.2)
- Heavy Summer with Low Local Hydro Generation (generation dispatch scenario sensitivity):
  - Year five (TPL-001-4, R2.1.4, R2.4.3 for R2.1.1 and R2.4.1)
  - Year ten (TPL-001-4, R2.1.4 for R2.1.1)
- Transfer Scenarios
  - West of Hatwai – East to West (TPL-001-4, R2.1.4, R2.4.3 for R2.1.2 and R2.4.2)
  - Montana to Northwest – East to West (TPL-001-4, R2.1.4, R2.4.3 for R2.1.2 and R2.4.2)
  - Montana to Northwest – West to East (TPL-001-4, R2.1.4, R2.4.3 for R2.1.1 and R2.4.1)
  - Idaho to Northwest – East to West (TPL-001-4, R2.1.4, R2.4.3 for R2.1.2 and R2.4.2)
  - Idaho to Northwest – West to East (TPL-001-4, R2.1.4, R2.4.3 for R2.1.1 and R2.4.1)

A detailed summary of specific flows and loading levels for the Planning Cases used in the 2014 Planning Assessments is provided in Appendix A - Planning Case Summary.

Figure III-1 and Figure III-2 provide a comparison of the Summer and Winter model to

historical Balancing Authority Area load and Balancing Authority Area interchange excluding dynamic imports.

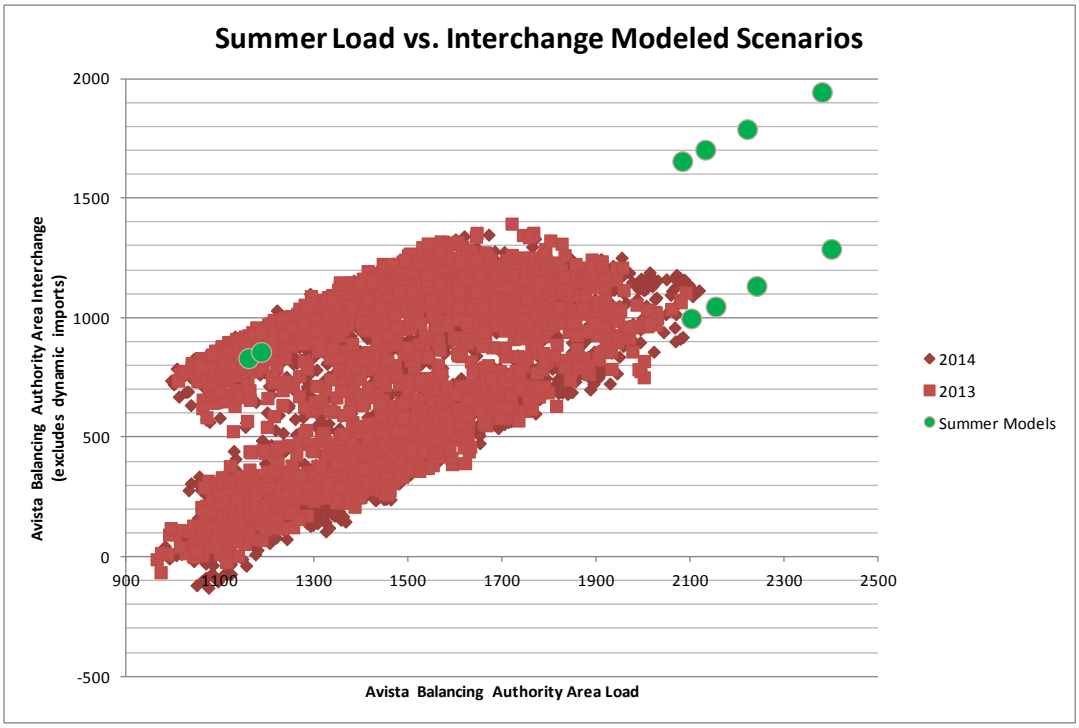


FIGURE III-1: SUMMER MODEL SCENARIOS

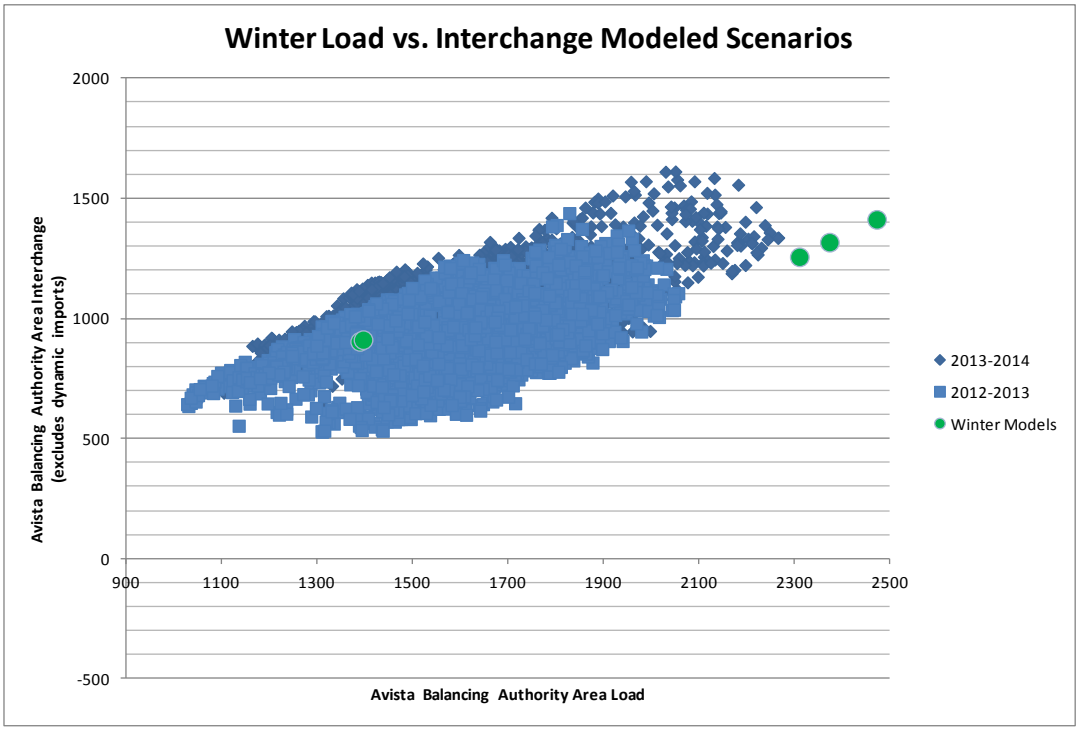


FIGURE III-2: WINTER MODEL SCENARIOS

Load Forecast

Load forecasts for Network Customers and Point-to-Point Customers were requested at the Study Development Meeting. The BPA submitted its forecast load information as a Network Customer to Avista for inclusion in the technical studies. Avista's System Planning Department incorporated forecast load data for the Avista LSE into the technical studies.

Planned Generation Facilities

Only potential generation projects in the Avista Interconnection Request queue that have executed Interconnection Agreements are modeled (with corresponding upgrades) in the base cases for technical studies.

The 2014 Planning Assessments did not include any potential generation in the technical studies.

1.2.2 Spare Equipment Analysis (TPL-001-4, R2.1.5)

Avista's spare 230/115 kV transformer spare equipment strategy is to purchase a new transformer upon failure resulting in potential lead times exceeding one year or more. Therefore, a study assessing the impact of the unavailability of transformers is conducted for each area. The study methodology involves each transformer in an area being taken out of service and all single transmission line or transformer, bus outage, and breaker failure contingencies assessed (P0, P1, and P2). Only the Heavy Summer scenario in the five year planning horizon is studied.

1.2.3 Voltage Stability Analysis

Steady state analysis techniques are used to evaluate the voltage stability performance of the transmission system. PV analysis of a particular area or of a particular transfer path reveals the static stability margin of the area or of the path under study.

A PV curve is obtained in steady state simulation by monitoring a voltage at a bus of interest and varying (increasing) the power (load or transfer) in small increments until power-flow divergence is encountered. Each equilibrium point represents a steady-state operating condition. For each area, all loads within the area were increased until voltage collapse occurred. An assumption was made that all additional generation necessary to supply the increase in load came from a distribution of all generation in WECC. Each area consisted of a Load Ramp PV Curve analysis with the five year heavy summer scenario. Transfer Path PV Curve analysis is conducted on the sensitivity scenario representing WECC paths operating at their limits.

A set of contingencies depicting one or more transmission outages was used to produce a series of PV curves for both the Load Ramp and Transfer Path PV Curve analysis. The operating limit can be established as the lowest of the following as obtained from the PV analysis results:

1. 5% below the area load magnitude at the 'nose-point' for Category P0 performance,
2. 5% below the area load magnitude corresponding to the 'nose-point' on the PV curve representing the worst Category P1 contingency,
3. 2.5% below the area load magnitude corresponding to the 'nose-point' on the PV curve representing the worst Category P2-P7 contingency.

1.2.4 Steady State Performance Criteria

The criteria used in evaluating the performance of the Transmission System are the present North American Electric Reliability Corporation (NERC) Reliability Standards and WECC regional criterion including the following:

- TPL-001-WECC-CRT-2.1 – System Performance
- TPL-001-4 – Transmission System Planning Performance Requirements
- FAC-010 – System Operating Limit Methodology for the Planning Horizon

The contingencies evaluated for steady state studies are a standard contingency set used by Avista's System Planning Department, reviewed and updated annually. Documentation on the contingency set is provided by Transmission Planning Standards, Policies and Procedures TP-SPP-06 Contingency Analysis. The standard contingency set includes outages in Avista's Transmission System as well as outages in adjacent Planning Coordinator and Transmission Planner areas. TP-SPP-06 Contingency Analysis provides detailed explanation of the contingencies evaluated. The steady state studies are performed to determine whether the BES meets the performance requirements listed below: (TPL-001-4, R3.1, R3.4)

Category P0: For normal operating conditions, no facilities shall exceed their applicable facility ratings or exceed the desired voltage range.

Category P1: For single contingency scenarios, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.

Category P2: For single contingency scenarios, including but not limited to line end open and relocation of normally open points, opening of a line section without a fault, bus section fault, and internal breaker fault (non bus tie and bus tie breaker), no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage range.

Category P3: (Multiple Contingency) For a loss of a generator unit with system adjustments and then the loss of any other single contingency scenario, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.

Category P4: (Multiple Contingency) For the loss of multiple elements caused by fault plus stuck breaker, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.

Category P5: (Multiple Contingency) For a delayed fault clearing scenario due to protection

system failure for any single node outage, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.

Category P6: (Multiple Contingency) For a single contingency followed by system adjustment and then overlapped with another single contingency, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.

Category P7: (Multiple Contingency) For the loss of any two adjacent circuits on common structures, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.

Extreme Events: For extreme contingencies system performance is analyzed on a case-by-case basis for performance and potential mitigation.

The steady state studies simulate the removal of all elements that the Protection System and other automatic controls are expected to disconnect for each Contingency without operator intervention. Transformer LTC's and phase shifters within Avista's System and those within neighboring System's are controlled by manual operator intervention. Shunt capacitors and reactors are allowed to switch in the studies at their automatic relay control points. (TPL-001-4, R3.3.1, R3.3.2)

Studies conducted for the 2014 System Assessment did not evaluate the tripping of generators where simulations show generator bus voltages or high side of the generation step up (GSU) voltages are less than known or assumed minimum generator steady state or ride through voltage limitations. Further studies or will be included in next years assessment or future years studies (TPL-001-4, R3.3.1.1)

Studies conducted for the 2014 System Assessment did not evaluate the tripping of Transmission elements where relay loadability limits were exceeded. Further studies or will be included in next years assessment or future years studies (TPL-001-4, R3.3.1.2)

1.3 Stability Analysis (TPL-001-4, R2.4, R4)

For the Stability portion of the Planning Assessment, Avista performs contingency analysis based on computer simulation models according to the following section.

1.3.1 Analysis Development

The same Transmission System models described in Section 1.2.1 are used for Stability Analysis. The loads represented include models which represent the expected dynamic behavior of loads that could impact the study area, considering the behavior of induction motor loads. WECC approved base cases have historically used an 80% induction motor load model. During 2014, WECC began to use the composite load model which more accurate captures the characteristics of the loads. (TPL-001-4, R2.4.1)

1.3.2 Stability Performance Criteria

The criteria used in evaluating the performance of the Transmission System are the present North American Electric Reliability Corporation (NERC) Reliability Standards and WECC regional criterion including the following:

- TPL-001-WECC-CRT-2.1 – System Performance
- TPL-001-4 – Transmission System Planning Performance Requirements
- FAC-010 – System Operating Limit Methodology for the Planning Horizon

The contingencies evaluated for stability studies are a standard contingency set used by Avista's System Planning Department, reviewed and updated annually. Documentation on the contingency set is provided by Transmission Planning Standards, Policies and Procedures TP-SPP-06 Contingency Analysis. The standard contingency set includes outages in Avista's Transmission System as well as outages in adjacent Planning Coordinator and Transmission Planner areas. TP-SPP-06 Contingency Analysis provides detailed explanation of the contingencies evaluated. The stability studies are performed to determine whether the BES meets the performance requirements listed below: (TPL-001-4, R4.1, R4.4)

- Category P0: Applicable to steady state only.
- Category P1:
  - During single contingency scenarios, no generating unit shall pull out of synchronism. A generator being disconnected from the System by fault clearing action or by a Special Protection System is not considered pulling out of synchronism.
  - Power oscillations shall exhibit acceptable damping as established by Avista. The 2014 System Assessment did not include systematic monitoring of oscillations damping.
  - Voltage and frequency deviations for Category B in Table III-1.
- Category P2-P7:
  - When a generator pulls out of synchronism in the simulations, the resulting apparent impedance swings shall not result in the tripping of any Transmission system elements other than the generating unit and its directly connected Facilities.
  - Power oscillations shall exhibit acceptable damping as established by Avista. The 2014 System Assessment did not include systematic monitoring of oscillations damping.
  - Voltage and frequency deviations for Category C in Table III-1.
- Extreme Events: During extreme contingencies, system performance is analyzed on a case-by-case basis for performance and potential mitigation. (TPL-001-4, R4.2)

NERC and WECC Categories	Outage Frequency Associated with the Performance Category (outage/year)	Transient Voltage Dip Standard	Minimum Transient Frequency Standard	Post Transient Voltage Deviation Standard (See Note 3)
A	Not Applicable	Nothing in addition to NERC.		
B	≥ 0.33	Not to exceed **25%** at load buses or **30%** at non-load buses. Not to exceed **20% for more than 20 cycles** at load buses.	Not below **59.6** Hz for 6 cycles or more at a load bus.	Not to exceed **5%** at any bus.
C	0.033 – 0.33	Not to exceed **30%** at any bus. Not to exceed **20% for more than 40 cycles** at load buses.	Not below **59.0** Hz for 6 cycles or more at a load bus.	Not to exceed **10%** at any bus.
D	< 0.033	Nothing in addition to NERC.		

TABLE III-1: WECC DISTURBANCE-PERFORMANCE TABLE FROM TPL-001-WECC-CRT-2.1

The stability studies simulate the removal of all elements that the Protection System and other automatic controls are expected to disconnect for each Contingency without operator intervention. Generator exciter control and power system stabilizers, static var compensators, power flow controllers and DC Transmission controllers are included in the simulations. (TPL-001-4, R4.3.1, R4.3.2)

Studies conducted for the 2014 System Assessment did not evaluate successful or unsuccessful high speed reclosing. Avista's typical reclosing practice is to reclose at one second. (TPL-001-4, R4.3.1.1)

Studies conducted for the 2014 System Assessment did not evaluate the tripping of generators where simulations show generator bus voltages or high side of the generation stud up (GSU) voltages are less than known or assumed minimum generator steady state or ride through voltage limitations. (TPL-001-4, R4.3.1.2)

Studies conducted for the 2014 System Assessment did not evaluate the tripping of Transmission lines and transformers where transient sings cause Protection System operation based on generic or actual relay models. (TPL-001-4, R4.3.1.3)

1.4 Corrective Action Plans (R2.7)

When the studies conducted indicate an inability of the System to meet the performance requirements, a Corrective Action Plan(s) addressing how the performance requirements will be met is developed. Revisions to the Corrective Action Plan(s) are allowed in subsequent Planning Assessments but the planned System shall continue to meet the performance requirements. Corrective Action Plan(s) do not need to be developed solely to meet the performance requirements for a single sensitivity case analyzed.

Corrective Action Plan(s) will list System deficiencies and the associated actions needed to achieve required System performance. Actions may include (TPL-001-4, R2.7.1):

- Installation, modification, retirement, or removal of Transmission and generation Facilities and any associated equipment
- Installation, modification, or removal of Protection Systems or Special Protection Systems
- Installation or modification or automatic generation tripping as a response to a single or multiple Contingency to mitigate Stability performance violations
- Installation or modification of manual and automatic generation

Corrective Action Plans will be developed to resolve performance deficiencies identified in multiple sensitivity studies or rationale will be provided for why actions are not necessary. (TPL-001-4, R2.7.2)

If situations arise that are beyond the control of Avista that prevent the implementation of a Corrective Action Plan in the required timeframe, then Avista is permitted to utilize Non-Consequential Load Loss and curtailment of Firm Transmission Service to correct the situation that would normally not be permitted, provided Avista documents that they are taking actions to resolve the situation. Avista shall document the situation causing the problem, alternatives evaluated, and the use of Non-Consequential Load Loss or curtailment of Firm Transmission Service. (TPL-001-4, R2.7.3)

Each Corrective Action Plan will be reviewed in subsequent annual Planning Assessments for continued validity and implementation status of identified System Facilities and Operating Procedures. (TPL-001-4, R2.7.4)

2 PERFORMANCE ISSUE PRIORITIZATION

Prioritization of System performance issues identified in the planning assessment is developed based on the consequences and risk of the event and associated problem. The consequence of an issue is determined through consideration of criteria violations (stability, thermal, and voltage) and the amount of load and generation affected. The probability of the issue considers the likelihood of the event to occur and the timeframe from the present assessment year the issue exists. The priority of the issue is then determined by the product of the consequence factor and probability factor.

$$\text{Consequence Factor} = (\text{Stability} + \text{Thermal} + \text{Voltage}) \times (\text{Load} + \text{Generation})$$

Stability and Thermal Factors		Voltage Factors	
Extreme, widespread	10	**Load Loss**	10
Severe, multiple	5	**Very Low (<0.8pu)**	5
Moderate, localized	2	**Low (<0.95pu)**	2
Minor, small impact	1	**High**	2
None	0	**None**	0
Load Affected		Generation Affected	
Total MW of load subjected to inadequate performance or required to drop to mitigate violations		Total MW of generation subjected to inadequate performance or required to drop to mitigate violations	

TABLE III-2: CONSEQUENCE RATING FACTORS

$$\text{Probability Factor} = \text{Seasonal Condition} \times \text{System Condition} \times \text{Time Frame}$$

Seasonal Condition Factors		System Condition Factors	
All Seasons	1	**P0 – All line in service**	1
Average (occurs frequently)	0.75	**P1 – N-1**	0.5
Light Loading	0.25	**P2, P4, P5, or P7 – Multiple outages**	0.1
Summer and Winter Peak	0.25	**P3 or P6 – N-1-1**	0.075
Summer or Winter Peak	0.125		
Time Frame Factor			
Present		1	
Future		$1/(Start - 2014)$	

TABLE III-3: PROBABILITY RATING FACTORS

	Consequence						Probability				
	Stability?	Thermal?	Voltage?	Total Load	Total Generation	Consequence Factor	Seasonal Condition?	System Condition?	Time Frame?	Probability Factor?	Priority Factor
P1											
Libby 230/115	0	5	0	41		205	0.750	0.500	1.0000	0.38	**76.88**
Addy - Kettle Falls Zone 2	2	0	0		45	90	1.000	0.500	1.0000	0.50	**45.00**
Nine Mile - Weside Zone 2	2	0	0		26	52	1.000	0.500	1.0000	0.50	**26.00**
Maintain voltage SOL's	0	0	2	100		200	0.250	0.500	1.0000	0.13	**25.00**
Hatwai 500/230	0	0	2	25		50	0.125	0.500	1.0000	0.06	**3.13**
P2											
Rathdrum Tie Breaker Failure	0	5	2	172		1204	0.750	0.100	1.0000	0.08	**90.30**
Sand Dunes Breaker Failure	0	5	5	103		1030	0.750	0.100	1.0000	0.08	**77.25**
Beacon Tie Breaker Failure	0	5	0	150		750	0.750	0.100	1.0000	0.08	**56.25**
Devils Gap East Bus Outage	5	0	0		32	160	1.000	0.100	1.0000	0.10	**16.00**
Bell S2 & S3 Tie Breaker Failure	0	5	0	22		110	0.125	0.100	1.0000	0.01	**1.38**
Sand Creek Bus Outage	0	0	2	41		82	0.125	0.100	0.2000	0.00	**0.21**
Ninth & Central Tie Breaker Failure	0	2	0	100		200	0.125	0.100	0.0556	0.00	**0.14**
P6											
Bell #6 230/115 + Beacon - Northeast	0	5	10	114		1710	1.000	0.075	1.0000	0.08	**128.25**
Moscow 230/115 + Shawnee 230/115	0	5	5	143		1430	1.000	0.075	1.0000	0.08	**107.25**
Benton - Othello + Sand Dunes - Warden #2	0	2	2	103		412	0.750	0.075	1.0000	0.06	**23.18**
Albeni Falls - Sand Creek + Cabinet 230/115	0	0	10	174		1740	0.125	0.075	1.0000	0.01	**16.31**
Dry Creek - North Lewiston 230 + Hatwai - Lolo	0	5	0	170		850	0.125	0.075	1.0000	0.01	**7.97**
Benewah - Pine Creek + Hatwai 500/230	0	2	0	300		600	0.125	0.075	1.0000	0.01	**5.63**
Airway Heights - Devils Gap + Nine Mile - Westside	0	2	0		37	74	0.750	0.075	1.0000	0.06	**4.16**
Devils Gap - Stratford + Larson - Stratford	0	2	0		22	44	0.750	0.075	1.0000	0.06	**2.48**
Dry Creek 230/115 + North Lewiston 230/115	0	1	0	14		14	0.125	0.075	1.0000	0.01	**0.13**
Beacon - Ross Park + Bell - Westside	0	2	0	100		200	0.125	0.075	0.0500	0.00	**0.09**
N-1-1 outages in L/C Area	0	2	0	50		100	0.125	0.075	0.0625	0.00	**0.06**
Airway Heights - Devils Gap + Metro - Post Street	0	1	0	50		50	0.125	0.075	0.1111	0.00	**0.05**
Boundary - Box Canyon - Colville + Addy 230/115	0	0	2	11		22	0.125	0.075	0.1000	0.00	**0.02**
Airway Heights Cap + Airway Heights - Garden Springs	0	0	2	12		24	0.125	0.075	0.0556	0.00	**0.01**
Francis & Cedar - Ross Park + Northwest - Westside	0	1	0	22		22	0.125	0.075	0.0556	0.00	**0.01**
Benewah - Pine Creek + Pine Creek #2 230/115	0	1	0	5		5	0.125	0.075	0.0500	0.00	**0.01**
Reliability Improvement											
Minimize generator tripping	0	2	0		400	800	0.750	0.000	1.0000	0.75	**600.00**
Improve Spokane Valley Reliability	0	1	0	210		210	0.750	0.000	1.0000	0.75	**157.50**
L/C High Voltage	0	0	2	100		200	0.750	0.000	1.0000	0.75	**150.00**
Spokane Low Voltages	0	0	2	100		200	0.125	0.000	1.0000	0.13	**25.00**
West Spokane Reinforcement	0	2	0	100		200	0.125	0.000	1.0000	0.13	**12.50**
Stratford - Wilson Creek section	0	0	2	28		56	0.125	0.000	0.2000	0.03	**1.40**
Diamond - Shawnee Section	0	1	2	7		21	0.125	0.000	0.0526	0.01	**0.14**

TABLE III-4: PERFORMANCE ISSUE PRIORITIZATION

The process to prioritize performance issues is under development. The results shown in Table III-4 are derived from the first iteration of a process. Subsequent planning assessment will include improved processes to reduce the subjective nature of assigning weight factors to each performance issue. Further improvements can be seen by incorporating the issues intended to be addressed by further single system projects. The present Avista budgeting process is intended to prioritize projects through business cases which may be presented as either individual projects or programs containing several projects. The concept of prioritizing performance issues is both evolutionary and revolutionary to Avista's present methodologies.

3 BIG BEND AREA PLANNING ASSESSMENT

3.1 Executive Summary

The Big Bend area transmission system demonstrated performance issues in the near term and long term planning horizons. Several performance issues exist in the present state of the system and worsen with time. The most severe performance issue in the Big Bend area is caused by the breaker failure of GB1250 at Grant County PUD's Sand Dunes Station. The area's dependence on the Sand Dunes Station leaves the system with a single point of failure causing widespread performance issues.

Completion of the Benton – Othello SS 115 kV Transmission Line Rebuild project will provide greatly improved transmission system performance in the near and long term planning horizon. Further improvements are made through additional reconductor projects and the addition of communication aided protection schemes.

A list of the corrective action plans proposed for the Big Bend area is provided in Table III-5.

	Year Problem Starts	Construction Start	Construction End	Consequence	Probability Factor	Priority	Cost Estimate
1-Completed							
Chelan - Stratford 115 kV Transmission Line River Crossing						0.0100	
Stratford 115 kV Station Rebuild						0.0100	
2-Planned							
Addy - Devils Gap 115 kV Transmission Line Reconductor	Present	2017	2018	74	0.0563	4.1625	$2,025,000
Benton - Othello SS 115 kV Transmission Line Rebuild	Present	2015	2016	1030	0.0750	77.2500	$7,100,000
3-Needs Further Analysis							
Chelan - Stratford 115 kV Transmission Line Rebuild	Present			44	0.0563	2.4750	$13,000,000
Lind – Warden 115 kV Transmission Line Rebuild	2033			21	0.0066	0.1382	$9,000,000
Saddle Mountain Integration	Present			412	0.0563	23.1750	$16,400,000
4-New Proposal							
Addy - Kettle Falls Protection Scheme	Present			90	0.5000	45.0000	$1,000,000
Devils Gap Station Reconfiguration	Present			160	0.1000	16.0000	$3,000,000
Kettle Falls Capacitor Bank	2024			22	0.0009	0.0206	$500,000
Devils Gap - Stratford 115 kV Transmission Line Rebuild	2019			56	0.0250	1.4000	$30,100,000

TABLE III-5: BIG BEND CORRECTIVE ACTION PLANS

Additional projects not categorized as corrective action plans are listed in Table III-6.

	Construction Start	Construction End	Cost Estimate
1-Completed			
Odessa Cap Bank			
2-Planned			
Devils Gap - Lind 115 kV Transmission Line Rebuild	2015	2016	$7,997,700
Ford Station Rebuild	2018	2019	$1,275,000
Gifford Station Rebuild	2015	2015	$1,200,000
Harrington Station Rebuild	2015	2016	$3,000,000
Little Falls Station Rebuild	2015	2017	$4,275,000
Valley Station Rebuild	2019	2019	$1,000,000
3-Needs Further Analysis			
49 Degrees Station			
Bruce Siding Station			
Lee and Reynolds Transformation			

TABLE III-6: BIG BEND FURTHER SINGLE SYSTEM PROJECTS

3.2 System Description

The Avista Big Bend area is located primarily in the Ferry, Stevens, Pend Oreille, Lincoln, Grant, Adams, Franklin, and Walla Walla counties in the state of Washington. The majority of the load served in the area can be categorized as rural, low density load with areas around Warden that are highly influenced by irrigation load. Colville, Ritzville, and Othello represent the largest urban loads in the Big Bend, with 2014 peak summer loading around Othello at 47 MW.

The west portion of the 115 kV transmission system in the Big Bend area is operated with normally open points referred to as “star points”. A star point is used to minimize power flow to mitigate overloads on the 115 kV system in the event of an outage on the overlying 230 kV or 500 kV transmission system. These overloads also occur with no outages on the 230 kV and 500 kV systems throughout the summer during high east to west transfers, therefore these lines cannot be operated normally closed. Operating in a “star” configuration reduces exposure to loads served by long transmission lines and also reduces overall system losses in the area. In the Big Bend area, “star point” switches may be operated open or closed based on outages, specific flow conditions, or due to operational constraints. The areas around Colville and Othello are operated as a network, with the 115 kV lines closed-in. The central area around Lind is primarily operated in a “star point” configuration with the 115 kV lines open.

3.2.1 Area Transmission

Transmission Lines

The main 230 kV transmission lines in the northern portion of the Big Bend area are:

- Boundary – Addy – Bell (BPA)
- Boundary – Cusick – Usk – Bell (BPA)
- Boundary – Sacheen – Bell (BPA).

In the western portion the 230 kV transmission lines are:

- Columbia – Larson (GCPD)
- Larson – Wheeler – Sand Dunes (GCPD)
- Sand Dunes –Frenchman Hills – Midway (GCPD).

In the southern portion the 230 kV transmission lines are[4]:

- Wanapum – Walla Walla (AVA/PACW)

[4] The southern portion 230 kV transmission lines do not serve any Big Bend area load; they merely cross the geographic area.

- Talbot – Walla Walla (PACW)
- Talbot – Dry Creek (AVA/PACW).

Transmission Sources

The main transmission sources that feed the load in the Big Bend area are:

- 230/115 kV, 167 MVA transformer at Boundary (POPD)
- 230/115 kV, 150 MVA transformer at Addy (BPA)
- 230/115 kV, 250 MVA transformer at Larson (GCPD)
- 230/115 kV, 250 MVA transformer at Sand Dunes (GCPD)
- 230/115 kV, 280 MVA transformer at Benton (BPA).

3.2.2 Area Generation

Non-Avista owned local generation facilities within the Big Bend area include the following:

- Main Canal HED Unit 1 @ 22 MW GCPHA[5]
- Summer Falls HED Unit 1 & 2 @ 46.2 MW GCPHA

There are no active Generation Interconnection Requests within the Big Bend area (as of October 2014).

[5] Main Canal and Summer Falls are owned by the Grand Coulee Project Hydro Authority, operated by and telemetered into Seattle City Light

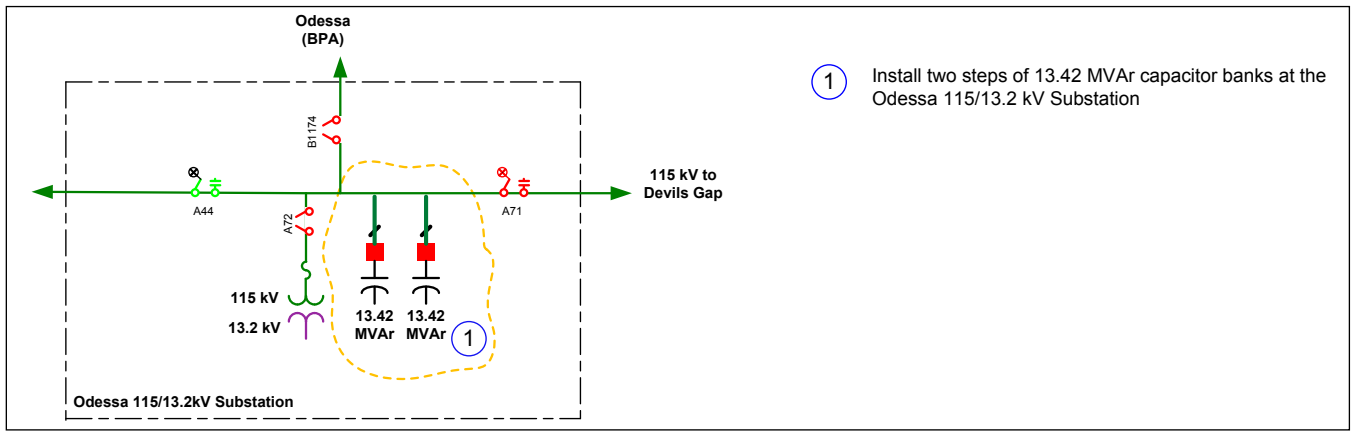
3.3 Corrective Action Plans

3.3.1 Completed

Odessa Capacitor Bank

Two steps of 13.42 MVAr capacitor banks were installed at Odessa Station to improve restoration capability to stations connected to the Devils Gap – Stratford 115 kV Transmission Line during outage conditions. The capacitor bank addition required expanding the existing station property.

Construction was completed in summer 2014.



Chelan – Stratford 115 kV Transmission Line River Crossing

Project Scope/Description

The Chelan – Stratford 115 kV Transmission Line is 49.36 miles long. Avista owns 49.12 miles of the transmission line, which includes the Columbia River crossing. The Chelan – Headwork section of the transmission line overloads during light summer conditions for outages causing the loss of the Larson – Stratford 115 kV Transmission Line. The conductor types, lengths and current capacity on the Chelan – Headworks section of the transmission line are 250 CU for 33.89 miles with 85.9 MVA capacity at 40 ° C ambient temperature, 19#8 CW for 0.39 miles with 78.3 MVA capacity at 40 ° C ambient temperature and 556.5 for 0.53 miles with 115 MVA capacity at 40 ° C ambient temperature. Reconductoring the 19#8 CW conductor to 795 ACSS will mitigate the performance issues observed in the light summer conditions in the ten year planning horizon for all contingencies except the P6 N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV.

Replacing the 19#8 CW conductor on the Chelan – Stratford 115 kV Transmission Line does not address all of the observed performance issues.

Timeline

System performance analysis indicates an inability of the System to meet the performance

requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2014.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P6				
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV				
HEADWORK (48149) -> CHELAN (46805) CKT 1	**126.1 %**	**126.2 %**	**125.2 %**	**124.4 %**
STRATFRD (48419) -> COULECTY (46021) CKT 1	**102.0 %**	**102.5 %**	**101.9 %**	**101.6 %**

	15LS	19LS
P1		
N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**109.3 %**	**108.6 %**
P2		
BF: GB1410 Larson 115 kV, Larson-Sand Dunes-Warden		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**105.1 %**	**104.4 %**
BF: GB1412 Larson 115 kV, Larson-Stratford		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**109.2 %**	**108.5 %**
BUS: Larson 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**105.2 %**	**104.5 %**
N-1: Larson - Stratford 115 kV Open @ LAR		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**105.2 %**	**104.5 %**
N-1: Larson - Stratford 115 kV Open @ STR		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**109.3 %**	**108.6 %**
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**133.3 %**	**133.2 %**
STRATFRD (48419) -> COULECTY (46021) CKT 1	**102.9 %**	**102.9 %**
CHELAN (46805) -> BRAYS LD (47127) CKT 1	**107.1 %**	**107.0 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Chelan – Stratford 115 kV Reconductor Study Report

Stratford 115 kV Station Rebuild

Project Scope/Description

The Larson – Stratford 115 kV Transmission Line shows overloads for the P6 N-1: Columbia - Larson 230 kV + N-1: Devils Gap - Stratford 115 kV (STR-WIL) contingency with no system adjustments between outages. The current transformer and strain bus conductor within the Stratford Station are the most limiting elements. The Stratford Station will be completely rebuilt due to Substation Engineering requirements and the transmission line constraints will be mitigated.

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance

requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2014.

Performance Criteria Violations

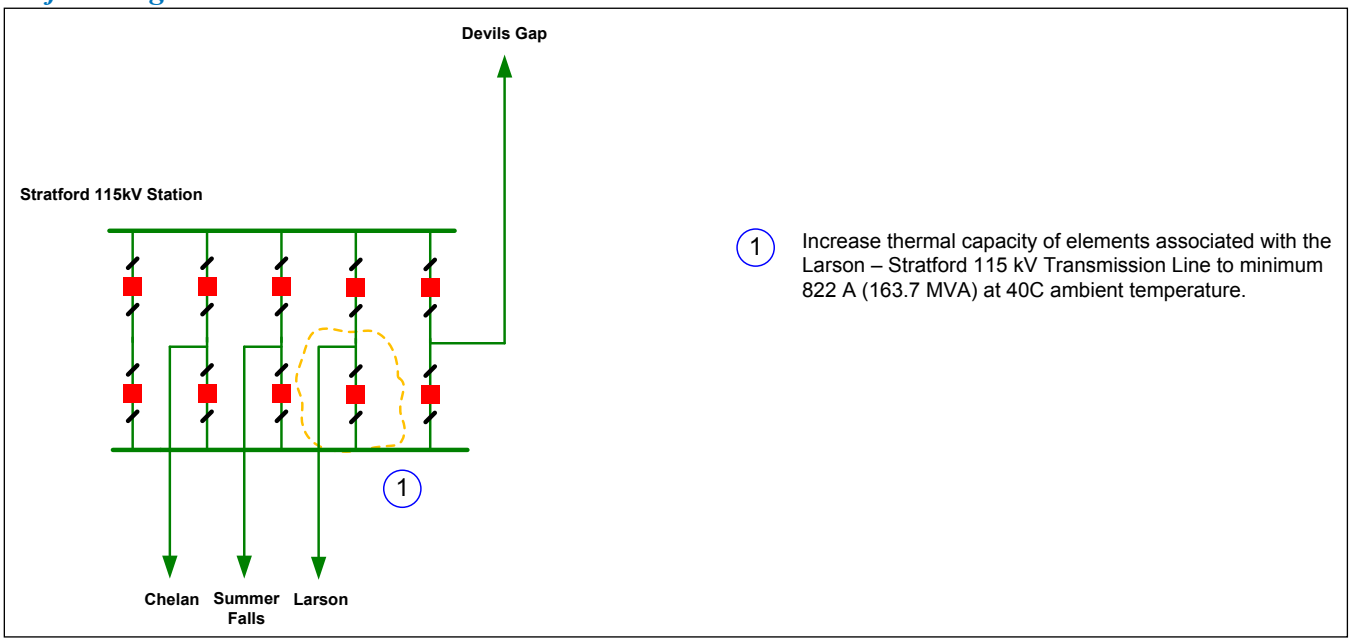
	15HS	19HS
P6		
N-1: Columbia - Larson 230 kV + N-1: Devils Gap - Stratford 115 kV (STR-WIL)		
STRATFRD (48419) -> ROUNDLKT (46373) CKT 1	**101.9 %**	**102.3 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Stratford Station Rebuild Study

Project Diagram



3.3.2 Planned

Addy – Devils Gap 115 kV Transmission Line Reconductor

Project Scope/Description

The Ford – Long Lake Tap segment of the Addy – Devil's Gap 115 kV Transmission Line fails to meet performance requirements for the outage of Airway Heights – Devil's Gap and Devil's Gap – Nine Mile 115 kV transmission lines. The transmission line segment under consideration is 5.19 miles long, and it is primarily constructed with 266.8 ACSR and 397.5 ACSR conductor with a rating of 71.5 MVA at 40C. The new conductor will be 556 kcmil conductor with a minimum thermal capacity rating of 120 MVA at 40C.

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2016.

Performance Criteria Violations

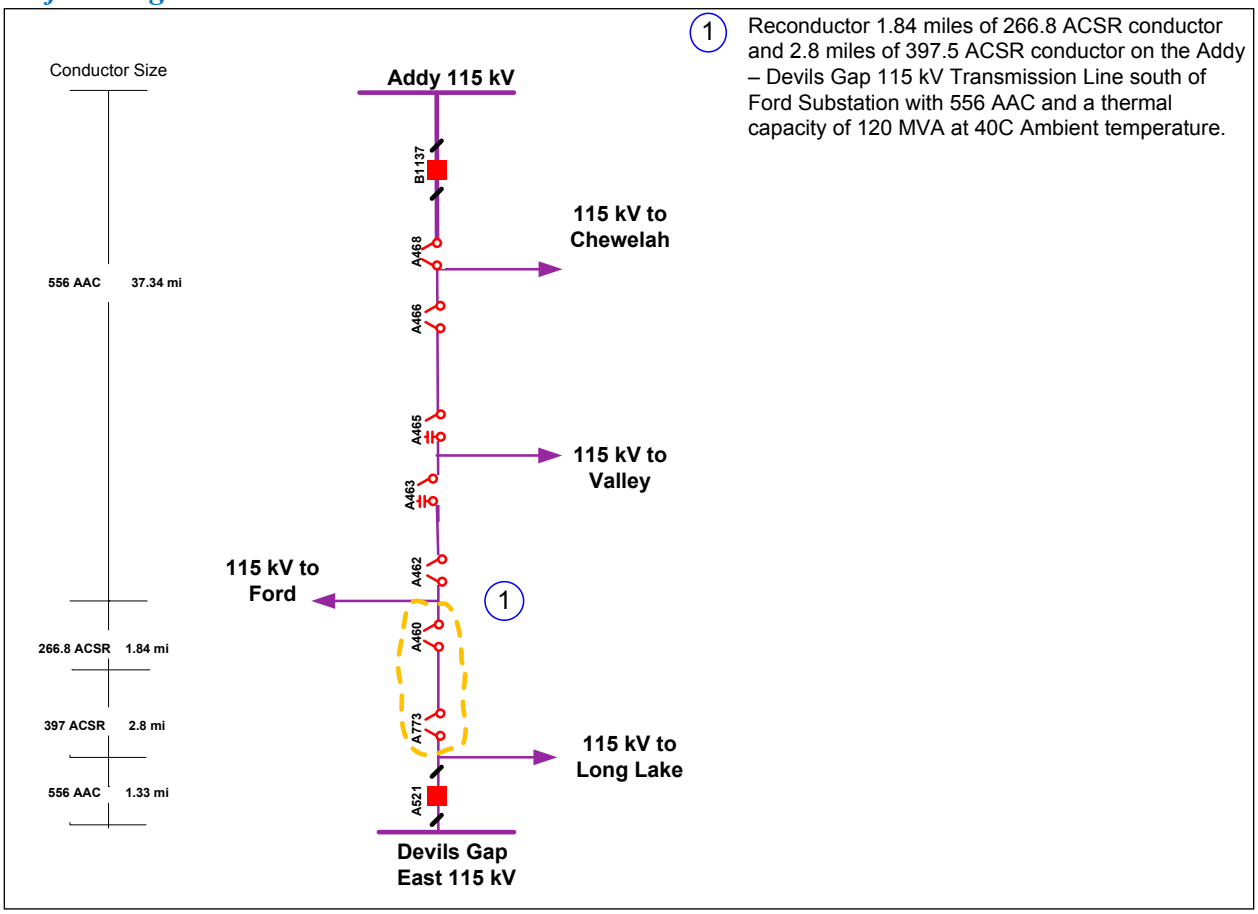
	15HS	19HS	24HS	34HS
NA				
RES: N-2 (ROW and ADJ): Airway Heights - Devils Gap 115 kV and Devils Gap - Nine Mile 115 kV				
LONGLAKT (48203) -> FORD (48123) CKT 1	**138.0 %**	**137.3 %**	**136.7 %**	**134.9 %**
P6				
N-1: Airway Heights - Devils Gap 115 kV + N-1: Devils Gap - Nine Mile 115 kV				
LONGLAKT (48203) -> FORD (48123) CKT 1	**138.0 %**	**137.3 %**	**136.7 %**	**134.9 %**
N-1: Airway Heights - Devils Gap 115 kV + N-1: Nine Mile - Westside 115 kV				
LONGLAKT (48203) -> FORD (48123) CKT 1	**146.4 %**	**145.7 %**	**145.1 %**	**143.4 %**
SSEE				
N-2 (ROW and ADJ): Airway Heights - Devils Gap 115 kV and Devils Gap - Nine Mile 115 kV				
LONGLAKT (48203) -> FORD (48123) CKT 1	**138.0 %**	**137.3 %**	**136.7 %**	**134.9 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Addy – Devils Gap 115 kV Reconductor Study Report

Project Diagram



Benton – Othello SS 115 kV Transmission Line Rebuild

Project Scope/Description

The 2014 System Planning Assessment identified thermal capacity issues on the Avista owned segments of the Benton – Othello SS 115 kV Transmission Line. Stations served by the Benton – Othello SS 115 kV Transmission Line are observed with low voltages during several contingencies. Transmission Planning recommends the Avista owned portion of the Benton – Othello SS 115 kV Transmission Line be reconductored to a conductor capable of providing a minimum of 205 MVA thermal capacity at 40° C ambient temperature. The Bonneville Power Administration (BPA) owns 11 miles of the 37 mile transmission line. The portion of the transmission line owned by the BPA was rebuilt to 795 ACSR/TW (Toutle) conductor in 2013. The minimum proposed conductor of 205 MVA thermal capacity at 40° C Ambient temperature matches the thermal capacity of the conductor being used by the BPA for their portion of the transmission line.

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2016.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
NA				
RES: BUS: Shawnee 115 kV				
WARDEN A (48455) -> ROXBORO (48375) CKT 1				**101.2 %**
RES: N-1: Lind - Shawnee 115 kV Open @ SHN				
WARDEN A (48455) -> ROXBORO (48375) CKT 1				**101.2 %**
RES: N-2 (STR): Shawnee -Thornton 230 kV & Lind - Shawnee 115 kV				
WARDEN A (48455) -> ROXBORO (48375) CKT 1				**101.2 %**
P1				
N-1: Lind 115kV Switched Shunt				
MARENGO (48221)				0.9492
RALSTONB (47073)				0.9497
RITZVILL (48365)				0.94
WASHTUNA (48457)				0.9497
N-1: Sand Dunes - Warden #2 115 kV				
DELIGHT (47025)			0.9458	0.9296
LEE&REYN (48308)				0.9484
LIND (48187)			0.9476	0.9319
MARENGO (48221)			0.9451	0.9288
OTHELLO (48307)				0.9487
RALSTONB (47073)			0.9455	0.9293
RITZVILL (48365)		0.9453	0.9365	0.9194
ROXBORO (48375)			0.9441	0.9304
WASHTUNA (48457)			0.9455	0.9292
P2				
BF: A253 Warden 115 kV, Lind-Warden				
BENTNAVA (48039) -> SOTHELOT (48393) CKT 1				**101.6 %**
LEE&REYN (48308)	0.9498			
OTHELLO (48307)	**5.2 %**			
BF: A254 Warden 115 kV, Larson-Sand Dunes-Warden				
BENTNAVA (48039) -> SOTHELOT (48393) CKT 1				**101.7 %**

	15HS	19HS	24HS	34HS
LEE&REYN (48308)	0.9486			
OTHELLO (48307)	0.9491			
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden				
BENTNAVA (48039)				6.9 %
BENTNAVA (48039) -> SOTHELOT (48393) CKT 1	184.4 %	195.6 %	210.8 %	270.3 %
DELIGHT (47025)	0.8654	0.834	0.7975	0.6513
LEE&REYN (48308)	0.885	0.8595	0.831	0.7149
LIND (48187)	0.8672	0.8361	0.8001	0.6555
MARENGO (48221)	0.8648	0.8334	0.7969	0.6504
OTHELLO (48307)	0.8857	0.8603	0.8319	0.7164
OTHELOSS (48309)	0.894	0.8693	0.8418	0.7298
OTHELOSS (48309) -> OTHELLO (48307) CKT 1				122.8 %
RALSTONB (47073)	0.8652	0.8338	0.7974	0.6512
RITZVILL (48365)	0.8559	0.8239	0.7866	0.6372
ROXBORO (48375)	0.8651	0.8356	0.8017	0.6651
SOTHELLO (48391)	0.8982	0.8746	0.8485	0.7422
SOTHELOT (48393)	0.902	0.8787	0.8529	0.7476
SOTHELOT (48393) -> OTHELOSS (48309) CKT 1	150.4 %	158.9 %	170.6 %	218.2 %
WARDEN A (48455)	0.8836	0.8572	0.8276	0.7071
WARDEN A (48455) -> ROXBORO (48375) CKT 1				126.8 %
WASHTUNA (48457)	0.865	0.8335	0.797	0.6504
BUS: Othello SS 115 kV				
RITZVILL (48365)				0.9498
BUS: Sand Dunes 115 kV				
DELIGHT (47025)		0.9442	0.9396	0.9215
LEE&REYN (48308)				0.9437
LIND (48187)		0.9458	0.9414	0.9238
MARENGO (48221)		0.9435	0.9389	0.9206
OTHELLO (48307)				0.9443
RALSTONB (47073)		0.9439	0.9393	0.9211
RITZVILL (48365)	0.9452	0.9351	0.9301	0.9111
ROXBORO (48375)		0.9416	0.9381	0.9226
WARDEN A (48455)				0.9442
WASHTUNA (48457)		0.9438	0.9392	0.921
BUS: Warden 115 kV				
BENTNAVA (48039) -> SOTHELOT (48393) CKT 1				101.6 %
LEE&REYN (48308)	0.9498			
OTHELLO (48307)	5.2 %			
P6				
N-1: 3TM Larson - Sand Dunes - Warden 115 kV + N-1: Sand Dunes - Warden #2 115 kV				
BENTNAVA (48039) -> SOTHELOT (48393) CKT 1	184.4 %	195.3 %	210.8 %	270.6 %
DELIGHT (47025)	0.8654	0.8358	0.7974	0.6502
LEE&REYN (48308)	0.885	0.8611	0.8308	0.714
LIND (48187)	0.8672	0.8379	0.8	0.6544
MARENGO (48221)	0.8648	0.8351	0.7967	0.6493
OTHELLO (48307)	0.8857	0.8619	0.8318	0.7155
OTHELOSS (48309)	0.894	0.8708	0.8417	0.7288
OTHELOSS (48309) -> OTHELLO (48307) CKT 1				123.0 %
RALSTONB (47073)	0.8652	0.8356	0.7972	0.65
RITZVILL (48365)	0.8559	0.8257	0.7865	0.6361
ROXBORO (48375)	0.8651	0.8373	0.8016	0.6641
SOTHELLO (48391)	0.8982	0.8761	0.8484	0.7413
SOTHELOT (48393)	0.902	0.8801	0.8528	0.7467
SOTHELOT (48393) -> OTHELOSS (48309) CKT 1	150.4 %	158.6 %	170.6 %	218.5 %
WARDEN A (48455)	0.8836	0.8588	0.8275	0.7062
WARDEN A (48455) -> ROXBORO (48375) CKT 1				126.9 %
WASHTUNA (48457)	0.865	0.8353	0.7968	0.6493
N-1: Frenchman Hills 230/115 kV + N-1: Sand Dunes 230/115 kV				
DELIGHT (47025)				0.9487
MARENGO (48221)				0.9478
RALSTONB (47073)				0.9483
RITZVILL (48365)				0.9386
ROXBORO (48375)				0.9488
WASHTUNA (48457)				0.9483
N-1: Othello SS - Warden #1 115 kV + N-1: Othello SS - Warden #2 115 kV (WAR-L&R)				
BENTNAVA (48039) -> SOTHELOT (48393) CKT 1				101.6 %
N-1: Othello SS - Warden #1 115 kV + N-1: Sand Dunes - Warden #2 115 kV				

125 YEARS OF SERVICE 1889–2014 AVISTA

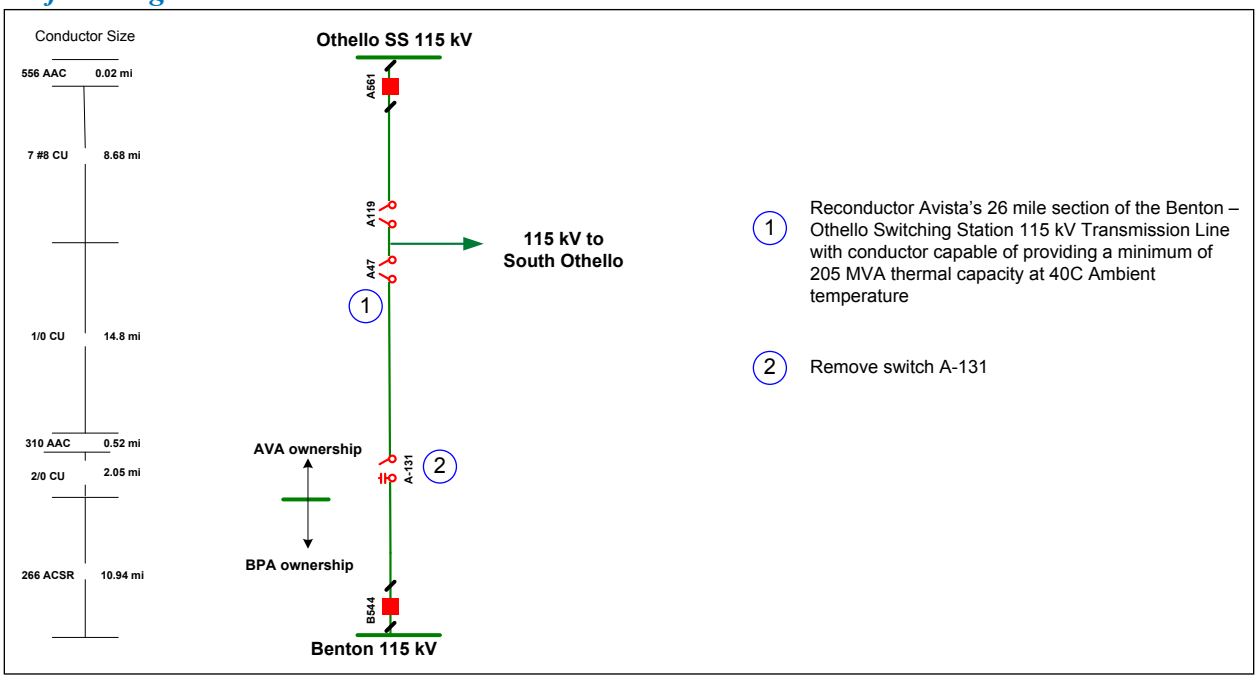
	15HS	19HS	24HS	34HS
ROXBORO (48375)		0.9491		
WARDEN A (48455)				0.9487
WARDEN G (46115)				0.9486
WARDEN T (46117)				0.9491
N-1: San Dunes 115kV Switched Shunt + N-1: Sand Dunes 230/115 kV				
DELIGHT (47025)				0.9458
LIND (48187)				0.948
MARENGO (48221)				0.945
RALSTONB (47073)				0.9455
RITZVILL (48365)			0.9491	0.9357
ROXBORO (48375)				0.946
WASHTUNA (48457)				0.9454

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Benton – Othello SS 115 kV Reconductor Study Report

Project Diagram



3.3.3 Need Further Analysis

The following sections describe system deficiencies assuming completion of the planned projects as described above.

Lind – Warden 115 kV Transmission Line Rebuild

Project Scope/Description

The Roxboro – Warden segment of the Lind – Warden 115 kV Transmission Line is proposed to be reconductored with 795 ACSR conductor with a minimum thermal capacity of 150 MVA at 40C. The reconductor project will mitigate thermal overloads on the transmission line during restoration of service to stations connected to the Devils Gap – Lind and Lind – Shawnee 115 kV transmission lines. The section from Warden to Roxboro is 21 miles and consists primarily of 7#8 CU conductor with a rating of 57 MVA at 40C.

The Lind – Warden 115 kV Transmission Line show thermal overloads for various outages in the Big Bend area. The observed overloads are primarily caused by significant increase in reactive power flow due to loss of sources to the Warden Station. Mitigating the issues related to losing sources at Warden Station will mitigate the observed thermal overloads on the Lind – Warden 115 kV Transmission Line without the need to reconductor the transmission line.

Timeline

System performance analysis indicates an inability of the System to restore service to customers under conditions represent 2034 heavy summer.

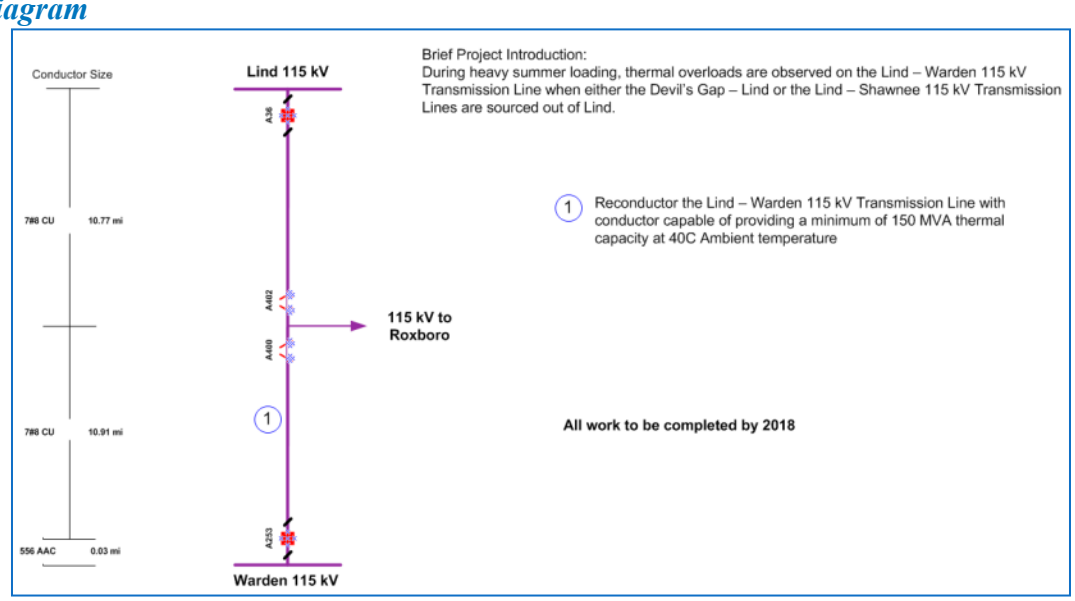
Performance Criteria Violations

	15HS	19HS	24HS	34HS
NA				
RES: BUS: Shawnee 115 kV				
DIAMOND (48109)				0.9448
EWAN (48121)				0.9474
WARDEN A (48455) -> ROXBORO (48375) CKT 1				**101.2 %**
RES: N-1: Lind - Shawnee 115 kV Open @ SHN				
DIAMOND (48109)				0.9448
EWAN (48121)				0.9474
WARDEN A (48455) -> ROXBORO (48375) CKT 1				**101.2 %**
RES: N-2 (STR): Shawnee -Thornton 230 kV & Lind - Shawnee 115 kV				
DIAMOND (48109)				0.9446
EWAN (48121)				0.9472
WARDEN A (48455) -> ROXBORO (48375) CKT 1				**101.2 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

Project Diagram



Chelan – Stratford 115 kV Transmission Line Rebuild

Project Scope/Description

The Chelan – Headworks Tap segment of the Chelan – Stratford 115 kV Transmission Line failed to meet performance requirements beginning in 2014 for several outages around Larson Station. The transmission line segments under consideration are 0.38 miles of 19#8 CW and 33.89 miles of 250 CU conductor, leaving the line with a rating of 78.3 MVA at 40C. The new line will be 556 kcmil conductor with a minimum thermal capacity rating of 120 MVA at 40C. This rating is enough to mitigate thermal violations over the ten year planning horizon.

During heavy summer and light summer conditions, the outage of the Larson – Stratford and Devils Gap – Stratford 115 kV transmission lines causes generation from Summer Falls and Main Canal to exceed the thermal facility ratings on the Chelan – Stratford 115 kV Transmission Line (see Figure III-3). A complete rebuild of the Chelan – Stratford 115 kV Transmission Line will mitigate the thermal overloads.

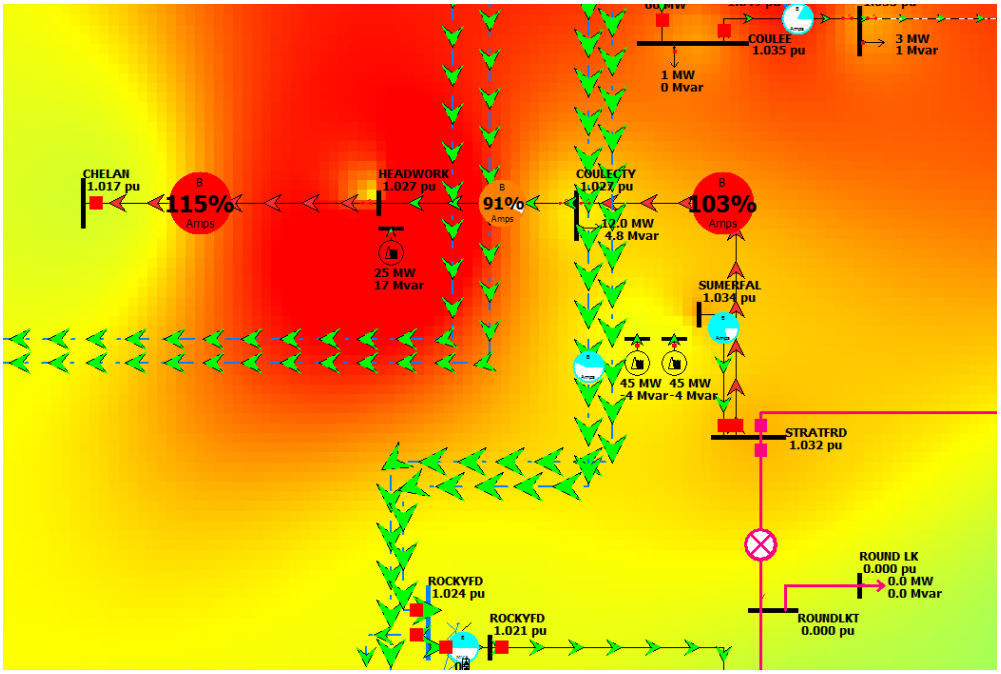


FIGURE III-3: N-1: DEVILS GAP - STRATFORD 115 KV (STR-WIL) + N-1: LARSON - STRATFORD 115 KV IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 heavy and light summer.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P6				
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV				
HEADWORK (48149) -> CHELAN (46805) CKT 1	**126.1 %**	**126.2 %**	**125.2 %**	**124.4 %**
STRATFRD (48419) -> COULECTY (46021) CKT 1	**102.0 %**	**102.5 %**	**101.9 %**	**101.6 %**

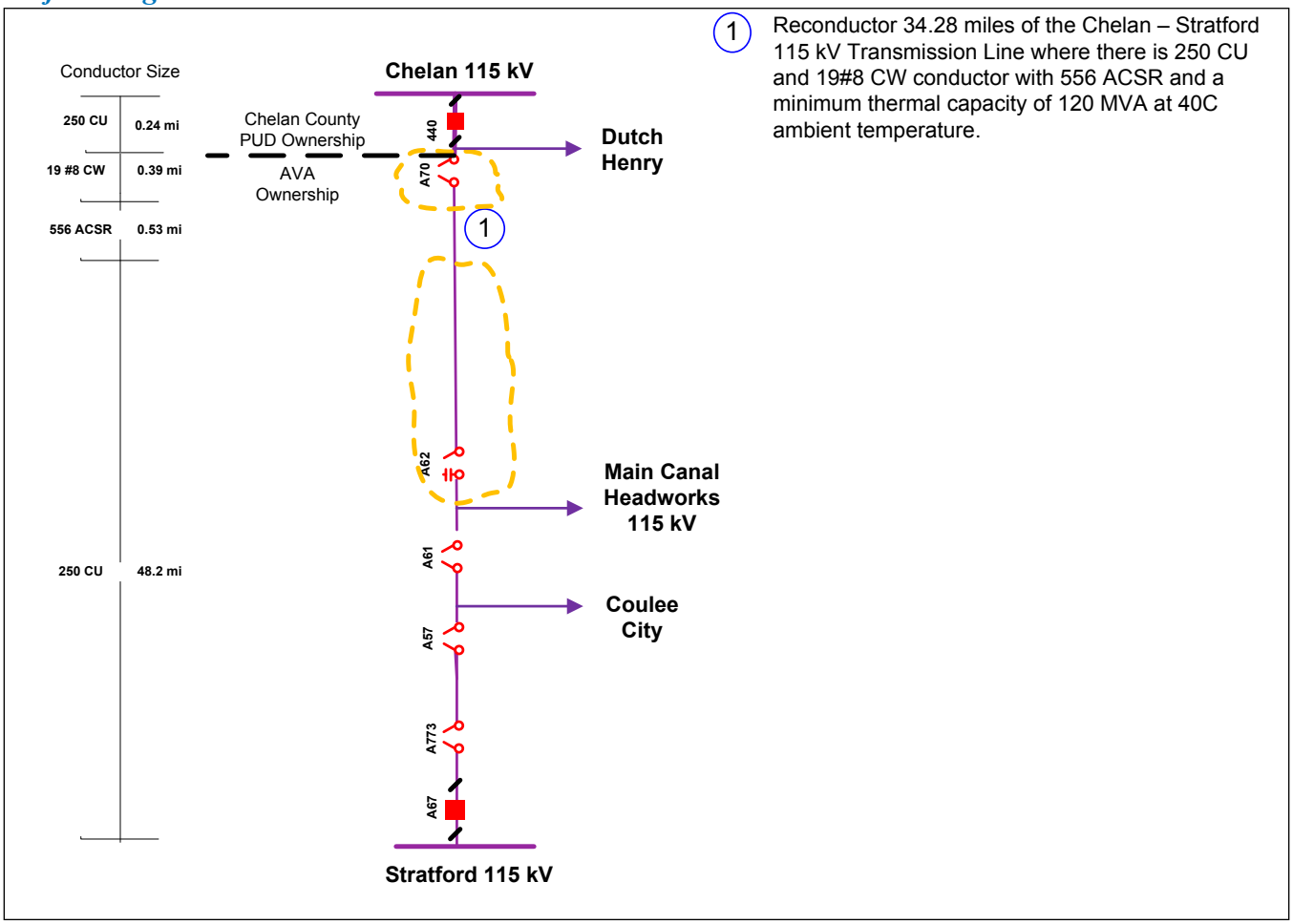
	15LS	19LS
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	**133.3 %**	**133.2 %**
STRATFRD (48419) -> COULECTY (46021) CKT 1	**102.9 %**	**102.9 %**
CHELAN (46805) -> BRAYS LD (47127) CKT 1	**107.1 %**	**107.0 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Chelan – Stratford 115 kV Reconductor Study Report

Project Diagram



Saddle Mountain Integration

Project Scope/Description

The construction of a new 230/115 kV station at the intersection of the Walla Walla – Wanapum 230 kV and Benton – Othello SS 115 kV transmission lines is desired to mitigate performance criteria violations. The project will include the construction of a new 115 kV transmission line from the new station to Warden Station potentially utilizing existing transmission paths. Coordination with adjacent Transmission Planners and Planning Coordinators was initiated in Q4 of 2014. The Benton – Othello 115 kV Transmission Line Rebuild project, scheduled for completion in 2016, is not sufficient to mitigate the N-1-1 outage of Benton – Othello and Sand Dunes – Warden #2 115 kV transmission lines.

The local area around the Othello and Warden stations has performance issues during contingencies causing the outage of two or more transmission lines serving the area. The worst performing contingency is the N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1:

Sand Dunes - Warden #2 115 kV (see Figure III-4). A long term plan is under development for the Othello and Warden area. Presently the preferred plan of service includes a new 230 kV station on the Walla Walla – Wanapum 230 kV Transmission Line and interconnected to the 115 kV system. The project includes a new 115 kV transmission line from the new 230 kV station to Othello or Warden station.

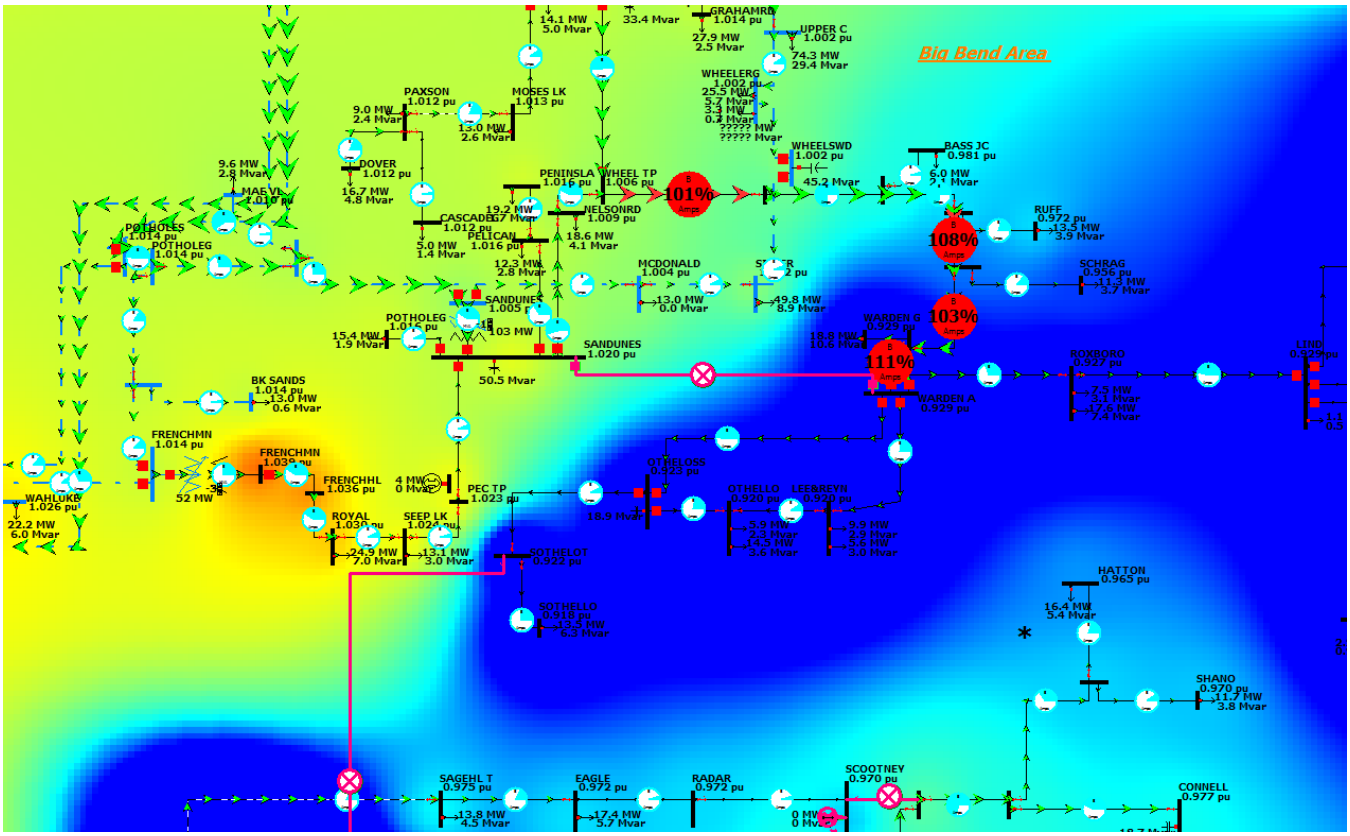


FIGURE III-4: N-1: BENTON - OTHELLO SS 115 KV (BENT-SOT) + N-1: SAND DUNES - WARDEN #2 115 KV IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 heavy summer.

Performance Criteria Violations

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS
P2			
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden			
DELIGHT (47025)			0.9461
LIND (48187)			0.9483
MARENGO (48221)			0.9453
RALSTONB (47073)			0.9458
RITZVILL (48365)			0.936
ROXBORO (48375)			0.9463
WARDEN A (48455)			0.9493
WASHTUNA (48457)			0.9457
BUS: Sand Dunes 115 kV			
RITZVILL (48365)	0.9475		0.9445
P6			

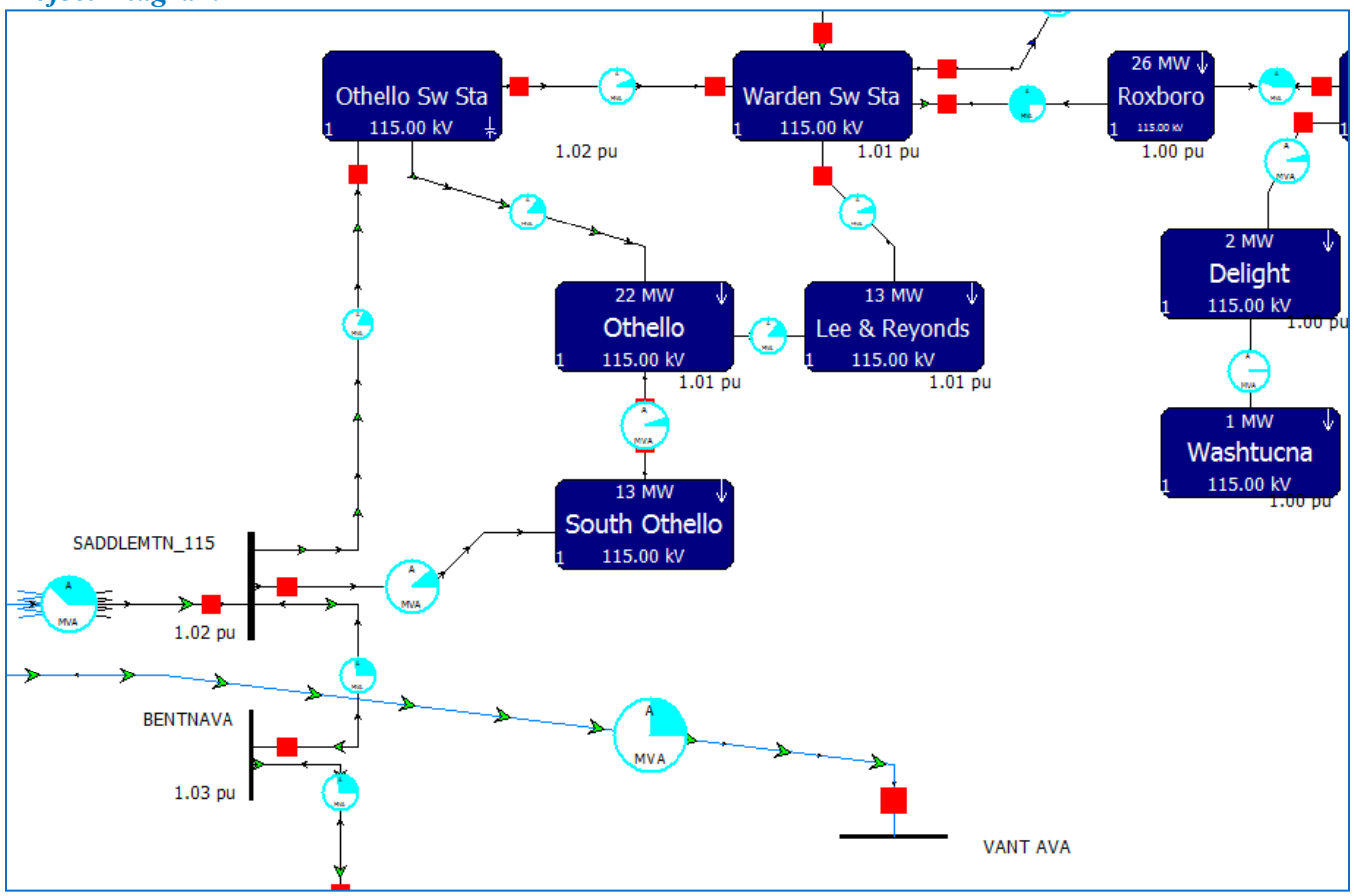
	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Sand Dunes - Warden #2 115 kV			
BASS JCT (46130) -> RUFF TP (46085) CKT 1	**118.2 %**		
DELIGHT (47025)	0.9041	0.9276	0.9024
LEE&REYN (48308)	0.9126	0.9204	0.8991
LIND (48187)	0.9059	0.9294	0.9048
MARENGO (48221)	0.9035	0.9269	0.9015
OTHELLO (48307)	0.9125	0.9203	0.899
OTHELOSS (48309)	0.9153	0.9231	0.9018
RALSTONB (47073)	0.9038	0.9273	0.902
RITZVILL (48365)	0.8947	0.918	0.8918
ROXBORO (48375)	0.903	0.9265	0.9042
RUFF TP (46085) -> SCHRAG T (46091) CKT 1	**105.3 %**	**108.1 %**	**116.5 %**
SCHRAG (40955)	0.9467		0.9427
SCHRAG T (46091)			0.9487
SCHRAG T (46091) -> WARDEN T (46117) CKT 1	**100.3 %**	**102.9 %**	**111.5 %**
SOTHELLO (48391)	0.9101	0.9178	0.8959
SOTHELOT (48393)	0.914	0.9218	0.9003
WARDEN A (48455)	0.9205	0.9286	0.9087
WARDEN G (46115)	0.921	0.9291	0.9099
WARDEN T (46117)	0.9216	0.9297	0.9105
WARDEN T (46117) -> WARDEN A (48455) CKT 1	**108.3 %**	**110.7 %**	**122.0 %**
WASHTUNA (48457)	0.9037	0.9272	0.9019
WHEEL TI (46119) -> BASS JCT (46130) CKT 1	**122.5 %**		
WHEEL TP (46121) -> WHEEL TI (46119) CKT 1		**100.6 %**	**107.7 %**
N-1: Benton - Othello SS 115 kV (OSS-SOT) + N-1: Sand Dunes - Warden #2 115 kV			
BASS JCT (46130) -> RUFF TP (46085) CKT 1	**105.3 %**		
DELIGHT (47025)	0.9298		0.9347
LEE&REYN (48308)	0.9396	0.9487	0.9333
LIND (48187)	0.9315		0.937
MARENGO (48221)	0.9292		0.9339
OTHELLO (48307)	0.9398	0.9489	0.9335
OTHELOSS (48309)	0.9438		0.9378
RALSTONB (47073)	0.9296		0.9343
RITZVILL (48365)	0.9207	0.9446	0.9245
ROXBORO (48375)	0.9278		0.9353
RUFF TP (46085) -> SCHRAG T (46091) CKT 1			**101.5 %**
WARDEN A (48455)	0.9439		0.9387
WARDEN G (46115)	0.9433		0.9385
WARDEN T (46117)	0.9439		0.9392
WARDEN T (46117) -> WARDEN A (48455) CKT 1			**101.6 %**
WASHTUNA (48457)	0.9295		0.9343
WHEEL TI (46119) -> BASS JCT (46130) CKT 1	**109.5 %**		
N-1: Benton 230/115 kV + N-1: Othello SS - Warden #2 115 kV (WAR-L&R)			
WARDEN A (48455) -> OTHELOSS (48309) CKT 1	**101.5 %**	**112.1 %**	**113.9 %**
N-1: Lind 115kV Switched Shunt + N-1: Sand Dunes - Warden #2 115 kV			
DELIGHT (47025)	0.9243	0.9478	0.9368
LIND (48187)	0.926	0.9496	0.9391
MARENGO (48221)	0.9237	0.9471	0.936
RALSTONB (47073)	0.9241	0.9475	0.9365
RITZVILL (48365)		0.9384	0.9266
ROXBORO (48375)	0.931		0.946
WASHTUNA (48457)	0.924	0.9475	0.9364

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Othello Area Transmission Feasibility Study

Project Diagram



3.3.4 New Proposals

Devils Gap – Stratford 115 kV Transmission Line Rebuild

Project Scope/Description

Low voltage criteria violations occur at the station connected to the Devils Gap – Stratford 115 kV Transmission Line when the transmission line is operated open at Stratford Station (see Figure III-5). Capacitor banks were installed at Odessa station in 2014 but they are insufficient to hold the voltage in the long term planning horizon. A complete rebuild of the Devils Gap – Stratford 115 kV Transmission Line will improve voltage performance.

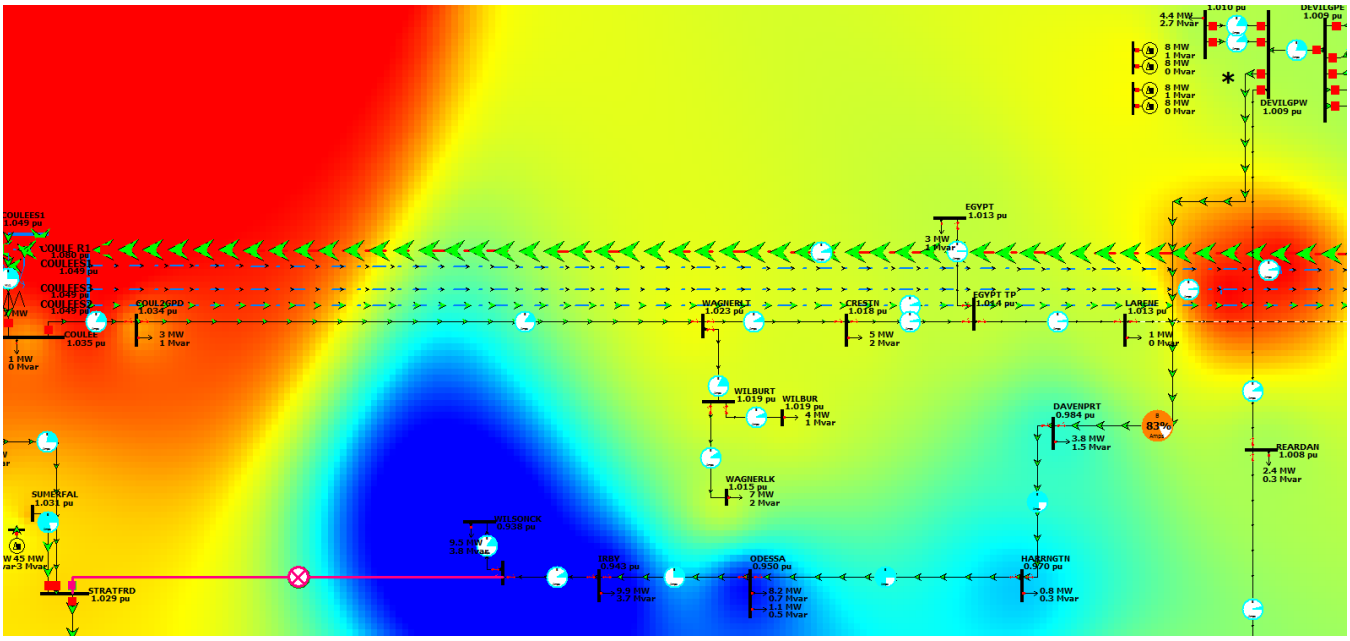


FIGURE III-5: RES: N-1: DEVILS GAP - STRATFORD 115 KV OPEN @ STR IN 24HS

Timeline

System performance analysis indicates an inability of the System to reliably restore service to load in scenarios representing 2019 heavy summer.

Performance Criteria Violations

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
NA			
RES: BUS: Stratford 115 kV			
HEADWORK (48149)		1.0524	
IRBY (40577)		0.9425	0.9248
ODESSA (48295)			0.9333
WILSNCKT (48471)		0.938	0.9199
WILSONCK (46129)		0.9378	0.9198
RES: N-1: Devils Gap - Stratford 115 kV Open @ STR			
IRBY (40577)	0.9454	0.9425	0.9248
ODESSA (48295)			0.9333
WILSNCKT (48471)	0.941	0.938	0.92
WILSONCK (46129)	0.9409	0.9379	0.9198

Kettle Falls Capacitor Bank

The area around Kettle Falls station experiences low voltage in heavy winter scenarios with outages of the Addy 230/115 kV Transformer and Boundary – Box Canyon – Colville 115 kV Transmission Line. A capacitor bank at Kettle Falls Station will provide additional voltage support to the area mitigating low voltage issues.

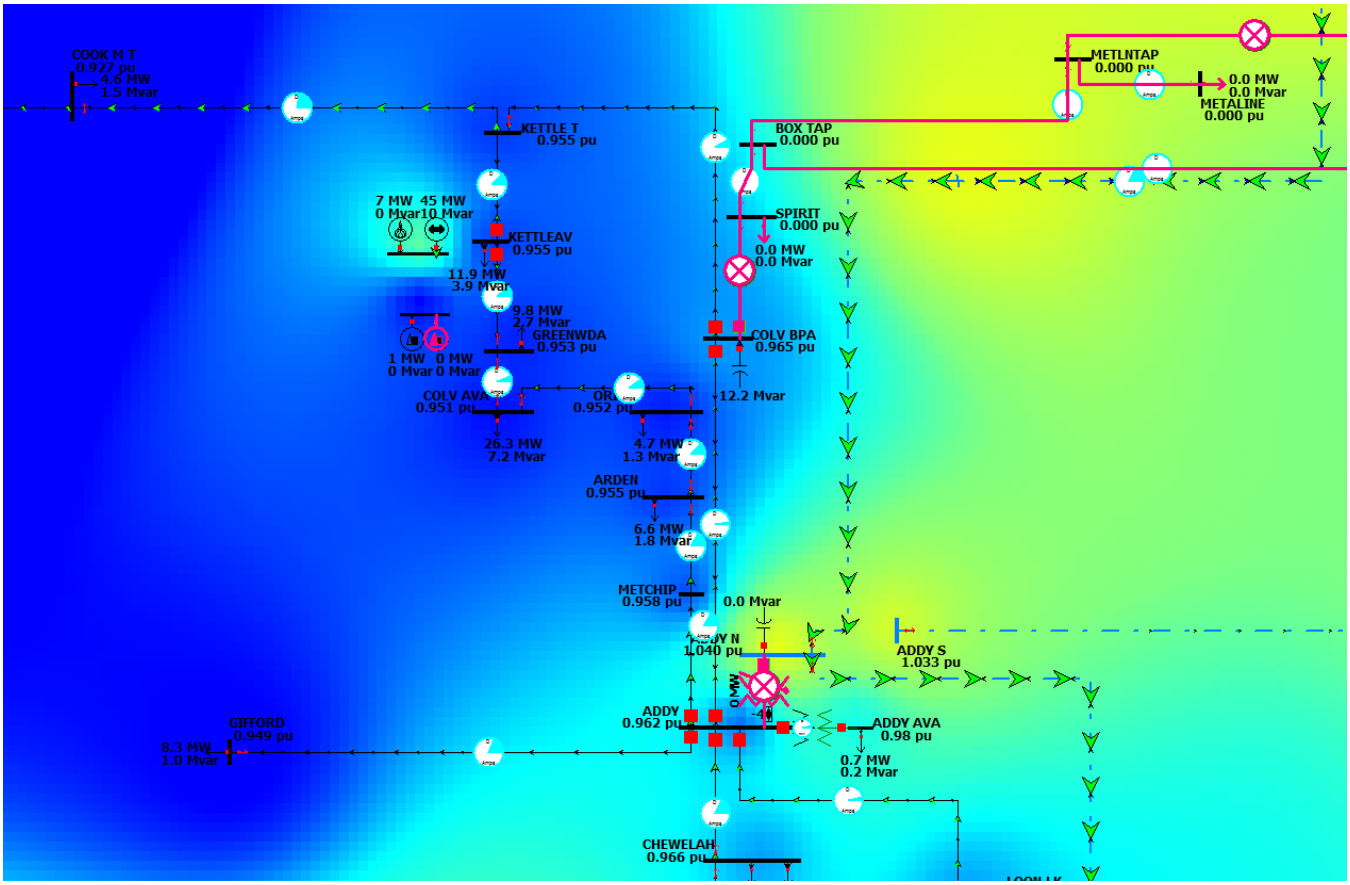


FIGURE III-6: N-1: 3TM BOUNDARY - BOX CANYON - COLVILLE BPA 115 KV + N-1: ADDY #3 230/115 KV IN 24HW

Addy – Kettle Falls POTT Scheme

Project Scope/Description

Implementation of a high speed, communication aided tripping scheme on the Addy – Kettle Falls 115 kV Transmission Line is necessary to improve stability performance of the Kettle Falls units during zone 2 time delayed clearing of a fault on the Addy – Kettle Falls 115 kV Transmission Line near Addy Station. A new communication path is required between Addy and Kettle Falls Stations. Upgrades and setting changes to relays at each station are also required to implement Avista's standard permissive overreaching transfer trip scheme.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in requirement R4.1.1 of TPL-001-4 in scenarios representing 2015 heavy summer.

Performance Criteria Violations

Row Labels	15HS Max of Voltage Dip or Frequency	15HS Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	19HSPROJECTS Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	24HSPROJECTS Max of Duration or Time
P1						
N-1: Addy - Kettle Falls 115 kV 3P @ ADD						
Out of Step Generator						
KETTLEAV 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.7 s
WECC Category B Frequency						
KETTLEAV 13.8kV					59.3 Hz	8.5 ~
WECC Category B Voltage Dip Load Bus						
COOK M T 115kV	-28.8 %		-26.5 %		-26.3 %	
KETTLEAV 115kV	-27.8 %		-26.6 %		-25.4 %	
KETTLEAV 13.8kV	-64.4 %		-63.6 %		-61.8 %	
REPUBLIC 115kV	-28.9 %				-26.4 %	
WECC Category B Voltage Dip Load Bus Duration						
KETTLEAV 13.8kV	-64.4 %	INF	-63.6 %	INF	-61.8 %	INF

Devils Gap Station Reconfiguration

Project Scope/Description

During faults causing the clearing of the Devils Gap east bus, an island is created with the Little Falls units and load radially connected to the Devils Gap west bus. The ability for the Little Falls units to maintain acceptable voltage and frequency within the island depends on the present load and generation levels. Further analysis is necessary to determine existing generation protection schemes deployed and the capabilities of the existing and proposed controls systems installed on the Little Falls units.

The present configuration of Devils Gap Station has both Little Falls transmission lines connected to the west bus and both Long Lake transmission lines connected to the east bus. The configuration was initially developed to meet historical operational concepts associated with the West of Hatwai path. Following the redevelopment of how the local area is operated, a re-evaluation of the Devils Gap configuration did not occur. Conceptually, re-terminating the Little Falls and Long Lake transmission lines such that both lines to a single plant are not connected to the same Devils Gap bus will increase the reliability of the plants and eliminate the potential islanding condition for loss of the east bus.

Timeline

System performance analysis indicates an inability of the System to maintain a high level of reliability representing 2015 heavy summer.

Performance Criteria Violations

Row Labels	Max of Voltage Dip or Frequency	Max of Duration or Time	Max of Voltage Dip or Frequency	Max of Duration or Time	Max of Voltage Dip or Frequency	Max of Duration or Time
P2						
BUS: Devils Gap East 115 kV SLG						
Out of Step Generator						
LITFAL12 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s
LITFAL34 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s
P4						
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @ADD)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
WECC Category C Voltage Dip Any Bus						
DEVILGPW 115kV					-82.3 %	
GAFFNEY 115kV					-82.9 %	
LITFAL12 4kV					-57.1 %	
LITFAL34 4kV					-58.1 %	
LITTFALL 115kV					-82.3 %	
REARDAN 115kV					-82.7 %	
SPRAGUE 115kV					-83.0 %	
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @DGP)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV SLG (DGP-LL #1 @DGP)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
WECC Category C Voltage Dip Any Bus						
DEVILGPW 115kV					-30.9 %	
GAFFNEY 115kV					-31.2 %	
LITTFALL 115kV					-30.9 %	
REARDAN 115kV					-31.1 %	
SPRAGUE 115kV					-31.2 %	
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @DGP)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
WECC Category C Voltage Dip Any Bus						
DEVILGPW 115kV					-59.4 %	
GAFFNEY 115kV					-59.9 %	
LITFAL12 4kV					-35.7 %	
LITFAL34 4kV					-35.3 %	
LITTFALL 115kV					-59.4 %	
REARDAN 115kV					-59.7 %	
SPRAGUE 115kV					-59.9 %	
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @NMS)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
WECC Category C Voltage Dip Any Bus						
DEVILGPW 115kV					-40.5 %	
GAFFNEY 115kV					-40.9 %	
LITTFALL 115kV					-40.5 %	
REARDAN 115kV					-40.7 %	
SPRAGUE 115kV					-40.9 %	
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @AIR)						

Row Labels	Max of Voltage Dip or Frequency	Max of Duration or Time	Max of Voltage Dip or Frequency	Max of Duration or Time	Max of Voltage Dip or Frequency	Max of Duration or Time
Out of Step Generator						
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @DGP)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV SLG (DGP-LL #2 @DGP)						
Out of Step Generator						
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
WECC Category C Voltage Dip Any Bus						
DEVILGPW 115kV					-41.7 %	
GAFFNEY 115kV					-42.0 %	
LITTFALL 115kV					-41.7 %	
REARDAN 115kV					-41.9 %	
SPRAGUE 115kV					-42.1 %	
P5						
PSF: Devils Gap East 115 kV SLG						
Out of Step Generator						
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s
WECC Category C Voltage Dip Any Bus						
DEVILGPW 115kV					-31.0 %	
GAFFNEY 115kV					-31.3 %	
LITTFALL 115kV					-31.0 %	
REARDAN 115kV					-31.2 %	
SPRAGUE 115kV					-31.3 %	

3.4 Single System Projects (non-corrective action plans)

3.4.1 Devil's Gap – Lind 115 kV Transmission Line Structure Replacement

The age and condition of the Devil's Gap – Lind 115 kV Transmission Line has reached a trigger within the Avista Asset Management process, and this line will be rebuilt to current standards. No capacity change is expected.

3.4.2 Forty Nine Degrees Station

The 49 Degrees North Ski Resort added a new double chair lift in 2012 and a mid mountain lodge is scheduled for construction in summer 2014. This is phase one of their five phase master plan. The existing distribution is being reinforced to accommodate the planned expansion, but there is limited additional capacity. A dedicated feeder at a higher voltage level and a new transformation at Chewelah Station or a new distribution station and a 115 kV radial transmission tap line will be required if the resort continues to expand.

3.4.3 Ford Station Rebuild

Currently, Ford Station sits on land that the Dawn Mining Company needs to reclaim. They are required to fence and secure the non operational uranium mine property due to ongoing reclamation activities at the uranium mill site. This would require Avista to move the substation less than half a mile. This will be an opportunity to remove the (3) single phase 115/13 kV transformer bank and the 115/2.4 kV transformer. This project is also in the 5 to 10 year planning horizon and mentioned here for completeness.

3.4.4 Gifford Station Rebuild

There is currently a 115/34.5 kV, 12 MVA transformer serving load in the area. There is an additional (3) single phase 34.5/13.2 kV, 1500 kVA pole mounted, bucking transformation outside of the station. This project will add a new 115-13.2 kV, 3.75 MVA transformer, feeder position and regulator at the Gifford Station and create a new GIF12F1 feeder to serve the north branch load. The project is scheduled for construction in 2015.

3.4.5 Harrington Station Rebuild

Harrington is the last area Avista serves at the legacy 4 kV voltage. This voltage is obsolete for serving utility distribution systems and we have very limited spare equipment to continue service at this voltage. The Harrington station is very old and the transformer will be difficult and time consuming to replace if it fails. Avista does not have a 4 kV mobile substation, so all the customers served by Harrington feeders will be out of service until the transformer is replaced. This could easily be up to 48 hours.

3.4.6 Little Falls Station Rebuild

Several components of the Little Falls hydroelectric dam will be worked on or replaced during the several years. The exsting Little Falls Station integrates the generation to Avista's transmission system. The station's condition warrants a complete rebuild. The scheduled generation outages necessary for the generator replacement provides an opportunity to take outages at the station for construction of the rebuild.

3.4.7 Bruce Siding Station

Currently there is a large agricultural processing center about 6 miles east of Othello in addition to typical irrigation load. This area is served out of Lee & Reynolds Station by two, 5 mile long distribution feeders and the existing load is approximately 2.2 MW. A customer had proposed a new local industrial load in 2007, which would require a new distribution substation local to the area. This proposed load has been subsequently delayed. A new Bruce Siding Station remains a 5 to 10 year project, mentioned here for reference. The OthelloSS – Warden #2115 kV Transmission Line passes directly through the area and the station property has not been purchased.

3.4.8 Valley Station Rebuild

The Valley Station is planned to be rebuilt.

3.4.9 Lee and Reynolds Transformation

The Othello industrial district is home to some of our largest customers. Currently taking a transformer outage in the area is very difficult due to the high load factor and limited backup capacity. The first step in increasing operational flexibility in the area would be the addition of a second transformer at Lee and Reynolds. Currently L&R is one of two transformers on our system that serves 4 feeders, and in a semi-urban area. This is currently not scheduled, but should be looked at in the 5-10 year horizon.

3.5 Steady State Study Results

	19HSPR OJECT S	24HSPR OJECT S	34HSPR OJECT S	
NA				
RES: BUS: Stratford 115 kV				
HEADWORK (48149)		1.0524		
IRBY (40577)		0.9425	0.9248	
ODESSA (48295)			0.9333	
WILSNCKT (48471)		0.938	0.9199	Devils Gap – Stratford 115 kV Transmission Line Rebuild
WILSONCK (46129)		0.9378	0.9198	
RES: N-1: Devils Gap - Stratford 115 kV Open @ STR				
IRBY (40577)	0.9454	0.9425	0.9248	
ODESSA (48295)			0.9333	
WILSNCKT (48471)	0.941	0.938	0.92	
WILSONCK (46129)	0.9409	0.9379	0.9198	
RES: N-1: Lind - Warden 115 kV Open @ WAR				
DELIGHT (47025)		0.946	0.9283	
LIND (48187)		0.9478	0.9306	
MARENGO (48221)			0.947	??
RALSTONB (47073)			0.9424	
RITZVILL (48365)		0.9499	0.935	
ROXBORO (48375)	0.9339	0.9279	0.9084	
WASHTUNA (48457)		0.9456	0.9279	
P1				
N-1: Lind 115kV Switched Shunt				Saddle Mountains Integration
RITZVILL (48365)	0.9466			
P2				
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden				
DELIGHT (47025)			0.9461	
LIND (48187)			0.9483	
MARENGO (48221)			0.9453	
RALSTONB (47073)			0.9458	
RITZVILL (48365)			0.936	Saddle Mountains Integration
ROXBORO (48375)			0.9463	
WARDEN A (48455)			0.9493	
WASHTUNA (48457)			0.9457	
BUS: Sand Dunes 115 kV				
RITZVILL (48365)	0.9475		0.9445	
P6				
N-1: 3TM Larson - Sand Dunes - Warden 115 kV + N-1: Sand Dunes - Warden #2 115 kV				
DELIGHT (47025)			0.946	
LIND (48187)			0.9482	
MARENGO (48221)			0.9452	
RALSTONB (47073)			0.9456	
RITZVILL (48365)	0.9495		0.9359	
ROXBORO (48375)			0.9462	
WARDEN A (48455)			0.9492	
WASHTUNA (48457)			0.9456	
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Frenchman Hills 230/115 kV				
RITZVILL (48365)	0.9465			Saddle Mountains Integration
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Lind 115kV Switched Shunt				
DELIGHT (47025)	0.9308			
LIND (48187)	0.9324			
MARENGO (48221)	0.9301			
RALSTONB (47073)	0.9305			
RITZVILL (48365)			0.9465	
ROXBORO (48375)	0.9373			
SOTHELLO (48391)	0.9486			
WASHTUNA (48457)	0.9304			
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Othello SS - Warden #2 115 kV (WAR-L&R)				
LEE&REYN (48308)	0.9432		0.9467	

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
OTHELLO (48307)	0.9438		0.9473
SOTHELLO (48391)	0.9455		0.949
SOTHELOT (48393)	0.9493		
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Othello SS 115kV Switched Shunt			
RITZVILL (48365)	0.9426		
ROXBORO (48375)	0.9488		
SOTHELLO (48391)	0.9472		
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: San Dunes 115kV Switched Shunt			
RITZVILL (48365)	0.9467		
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Sand Dunes - Warden #2 115 kV			
BASS JCT (46130) -> RUFF TP (46085) CKT 1	**118.2 %**		
DELIGHT (47025)	0.9041	0.9276	0.9024
LEE&REYN (48308)	0.9126	0.9204	0.8991
LIND (48187)	0.9059	0.9294	0.9048
MARENGO (48221)	0.9035	0.9269	0.9015
OTHELLO (48307)	0.9125	0.9203	0.899
OTHELOSS (48309)	0.9153	0.9231	0.9018
RALSTONB (47073)	0.9038	0.9273	0.902
RITZVILL (48365)	0.8947	0.918	0.8918
ROXBORO (48375)	0.903	0.9265	0.9042
RUFF TP (46085) -> SCHRAG T (46091) CKT 1	**105.3 %**	**108.1 %**	**116.5 %**
SCHRAG (40955)	0.9467		0.9427
SCHRAG T (46091)			0.9487
SCHRAG T (46091) -> WARDEN T (46117) CKT 1	**100.3 %**	**102.9 %**	**111.5 %**
SOTHELLO (48391)	0.9101	0.9178	0.8959
SOTHELOT (48393)	0.914	0.9218	0.9003
WARDEN A (48455)	0.9205	0.9286	0.9087
WARDEN G (46115)	0.921	0.9291	0.9099
WARDEN T (46117)	0.9216	0.9297	0.9105
WARDEN T (46117) -> WARDEN A (48455) CKT 1	**108.3 %**	**110.7 %**	**122.0 %**
WASHTUNA (48457)	0.9037	0.9272	0.9019
WHEEL TI (46119) -> BASS JCT (46130) CKT 1	**122.5 %**		
WHEEL TP (46121) -> WHEEL TI (46119) CKT 1		**100.6 %**	**107.7 %**
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Sand Dunes 230/115 kV			
SOTHELLO (48391)			0.9499
N-1: Benton - Othello SS 115 kV (OSS-SOT) + N-1: Lind 115kV Switched Shunt			
DELIGHT (47025)	0.9422		
LIND (48187)	0.9438		
MARENGO (48221)	0.9415		
RALSTONB (47073)	0.9419		
ROXBORO (48375)	0.9484		
WASHTUNA (48457)	0.9419		
N-1: Benton - Othello SS 115 kV (OSS-SOT) + N-1: Sand Dunes - Warden #2 115 kV			
BASS JCT (46130) -> RUFF TP (46085) CKT 1	**105.3 %**		
DELIGHT (47025)	0.9298		0.9347
LEE&REYN (48308)	0.9396	0.9487	0.9333
LIND (48187)	0.9315		0.937
MARENGO (48221)	0.9292		0.9339
OTHELLO (48307)	0.9398	0.9489	0.9335
OTHELOSS (48309)	0.9438		0.9378
RALSTONB (47073)	0.9296		0.9343
RITZVILL (48365)	0.9207	0.9446	0.9245
ROXBORO (48375)	0.9278		0.9353
RUFF TP (46085) -> SCHRAG T (46091) CKT 1			**101.5 %**
WARDEN A (48455)	0.9439		0.9387
WARDEN G (46115)	0.9433		0.9385
WARDEN T (46117)	0.9439		0.9392
WARDEN T (46117) -> WARDEN A (48455) CKT 1			**101.6 %**
WASHTUNA (48457)	0.9295		0.9343
WHEEL TI (46119) -> BASS JCT (46130) CKT 1	**109.5 %**		
N-1: Benton 230/115 kV + N-1: Othello SS - Warden #2 115 kV (WAR-L&R)			
WARDEN A (48455) -> OTHELOSS (48309) CKT 1	**101.5 %**	**112.1 %**	**113.9 %**
N-1: Benton 230/115 kV + N-1: Sand Dunes - Warden #2 115 kV			
DELIGHT (47025)	0.9497		0.9483
LEE&REYN (48308)			0.9475

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	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS	
MARENGO (48221)	0.9491		0.9475	
OTHELLO (48307)			0.9478	
RALSTONB (47073)	0.9494		0.9479	
RITZVILL (48365)	0.9407		0.9382	
ROXBORO (48375)	0.947		0.9484	
WASHTUNA (48457)	0.9494		0.9479	
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV				Chelan – Stratford 115 kV Transmission Line Rebuild
HEADWORK (48149) -> CHELAN (46805) CKT 1	**115.4 %**	**115.0 %**	**114.1 %**	
STRATFRD (48419) -> COULECTY (46021) CKT 1	**102.8 %**	**102.9 %**	**102.6 %**	
N-1: Frenchman Hills 230/115 kV + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.947			
N-1: Larson - Rocky Ford 115 kV + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9494			
N-1: Larson - Stratford 115 kV + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9483			
N-1: Larson 115kV Switched Shunt + N-1: Lind 115kV Switched Shunt				
DELIGHT (47025)	0.949			
MARENGO (48221)	0.9483			
RALSTONB (47073)	0.9487			
WASHTUNA (48457)	0.9487			
N-1: Larson 115kV Switched Shunt + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9432			
ROXBORO (48375)	0.9494			
N-1: Larson 230/115 kV + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9455			
N-1: Lind 115kV Switched Shunt + N-1: Othello SS 115kV Switched Shunt				
DELIGHT (47025)	0.9481			
LIND (48187)	0.9497			
MARENGO (48221)	0.9475			
RALSTONB (47073)	0.9478			
WASHTUNA (48457)	0.9478			
N-1: Lind 115kV Switched Shunt + N-1: San Dunes 115kV Switched Shunt				
DELIGHT (47025)	0.9453			
LIND (48187)	0.9469			Saddle Mountains Integration
MARENGO (48221)	0.9446			
RALSTONB (47073)	0.945			
WASHTUNA (48457)	0.9449			
N-1: Lind 115kV Switched Shunt + N-1: Sand Dunes - Warden #2 115 kV				
DELIGHT (47025)	0.9243	0.9478	0.9368	
LIND (48187)	0.926	0.9496	0.9391	
MARENGO (48221)	0.9237	0.9471	0.936	
RALSTONB (47073)	0.9241	0.9475	0.9365	
RITZVILL (48365)		0.9384	0.9266	
ROXBORO (48375)	0.931		0.946	
WASHTUNA (48457)	0.924	0.9475	0.9364	
N-1: Othello SS - Warden #1 115 kV + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9458			
N-1: Othello SS 115kV Switched Shunt + N-1: Sand Dunes - Warden #2 115 kV				
DELIGHT (47025)	0.9469			
LIND (48187)	0.9485			
MARENGO (48221)	0.9462			
RALSTONB (47073)	0.9466			
RITZVILL (48365)	0.9378		0.9479	
ROXBORO (48375)	0.9442			
WASHTUNA (48457)	0.9465			
N-1: Rocky Ford 230/115 kV + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9467			
N-1: San Dunes 115kV Switched Shunt + N-1: Sand Dunes - Warden #2 115 kV				
RITZVILL (48365)	0.9456			

	19HWP ROJECTS	24HWP ROJECTS	Mitigation
P2			
BF: A388 Bell S2 & S3 230 kV			
ARDEN (48015)		5.1 %	Kettle Falls Capacitor Bank
GIFFORD (48135)	5.1 %	5.4 %	
P3			
G-1: Kettle Falls Thermal Unit 1 + N-1: 3TM Bell - Boundary #3 230 kV			
REPUBLIC (40879)	0.9256	0.9235	
COOK M T (40275)	0.9284	0.9265	BPA Issue
G-1: Kettle Falls Thermal Unit 1 + N-1: Addy #3 230/115 kV			
REPUBLIC (40879)	0.9295	0.9266	
COOK M T (40275)	0.9322	0.9296	
P6			
N-1: Benton - Othello SS 115 kV (OSS-SOT) + N-1: Sand Dunes - Warden #2 115 kV			
DELIGHT (47025)	0.9498		
LEE&REYN (48308)	0.9496		Manage capacitor banks dispatch in area
OTHELLO (48307)	0.9493		
RITZVILL (48365)	0.9444		
WASHTUNA (48457)	0.9491		
N-1: 3TM Boundary - Box Canyon - Colville BPA 115 kV + N-1: Addy #3 230/115 kV			
GIFFORD (48135)		0.949	Kettle Falls Capacitor Bank
N-1: Addy - Colville BPA 115 kV + N-1: Kettle Falls Tap 115 kV			
COLV BPA (40263)	1.0657	1.0657	BPA Issue
SSEE			
N-2 (ROW): Bell - Boundary #1 230 kV and Bell - Boundary #3 230 kV and Boundary - Usk 230 kV and 3TM Boundary - Box Canyon - Colville 115 kV			
ARDEN (48015)	5.4 %		
COLV AVA (48083)	5.3 %		
GIFFORD (48135)	5.6 %		
GREENWDA (48143)	5.1 %		Acceptable for extreme event
KETTLEAV (48175)	5.0 %		
ORIN (48301)	5.3 %		

	19LSPROJECTS	Mitigation
NA		
RES: BUS: Stratford 115 kV		
COULECTY (46021)	1.0555	
HEADWORK (48149)	1.0558	Adjust voltage regulation at Main Canal
RES: N-2 (ROW and STR): Chelan - Stratford 115 kV and Stratford - Summer Falls 115 kV		
COULECTY (46021)	1.0555	
HEADWORK (48149)	1.0558	
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	122.2 %	Chelan – Stratford 115 kV Transmission Line Rebuild
STRATFRD (48419) -> COULECTY (46021) CKT 1	103.8 %	
CHELAN (46805) -> BRAYS LD (47127) CKT 1	107.5 %	

3.6 Spare Equipment Study

Avista does not own any 230/115 kV autotransformers within the Big Bend area therefore, a spare equipment study was not conducted. The BPA and Grant County PUD's spare equipment methodology includes the ability to replace an autotransformer in less than one year.

3.7 Voltage Stability Study

A Load Ramp PV Curve analysis was conducted while monitoring all buses in the Big Bend area. All loads within the Big Bend area were increased until voltage collapse occurred. All additional generation necessary to supply the increase in load came from a distribution of all generation in WECC except those within the Big Bend area.

The theoretical flow limit is 736 MW for all lines in service condition. The critical bus under all lines in service condition is Ritzville Station. As load increases in the Big Bend area, the limiting contingency is a breaker failure of GB1250 on the Sand Dunes 115 kV bus with total area load of 228 MW (see Figure III-7). The critical bus under the GB1250 breaker failure contingency is Ritzville Station.

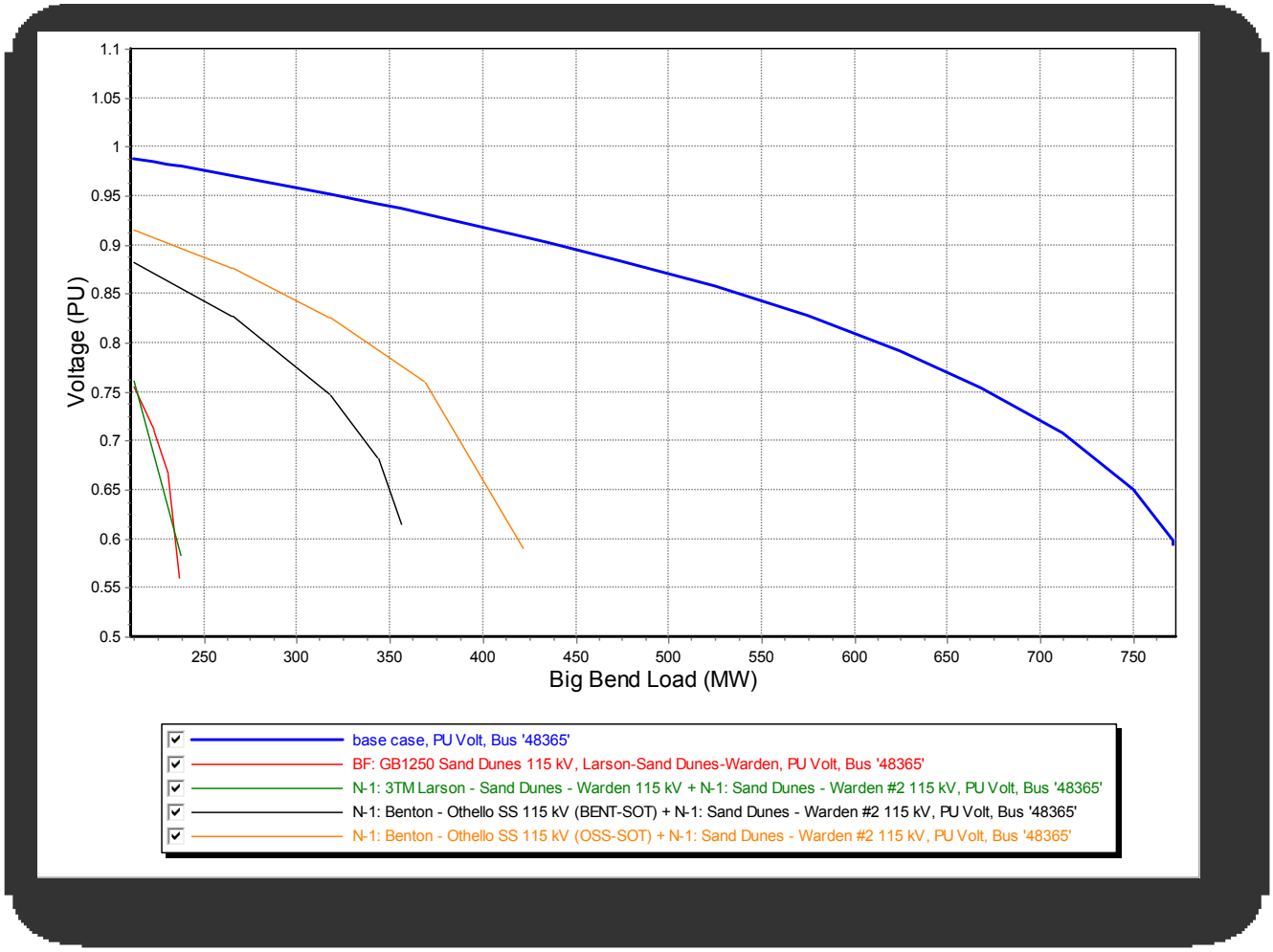

FIGURE III-7: BIG BEND LOAD RAMP PV CURVE RESULTS – EXISTING SYSTEM

The load ramp PV curve analysis was repeated with the assumption that all planned corrective action plans listed above are constructed. The limiting contingency remains the GB1250 breaker failure at Sand Dunes Station but with a total area load of 340 MW, an increase of 112 MW prior to project construction. The N-1-1 outage of Benton – Othello and Sand Dunes – Warden #2 115 kV transmission lines is more limiting with a total area load of 327 MW but operator action can be taken in between the outages.

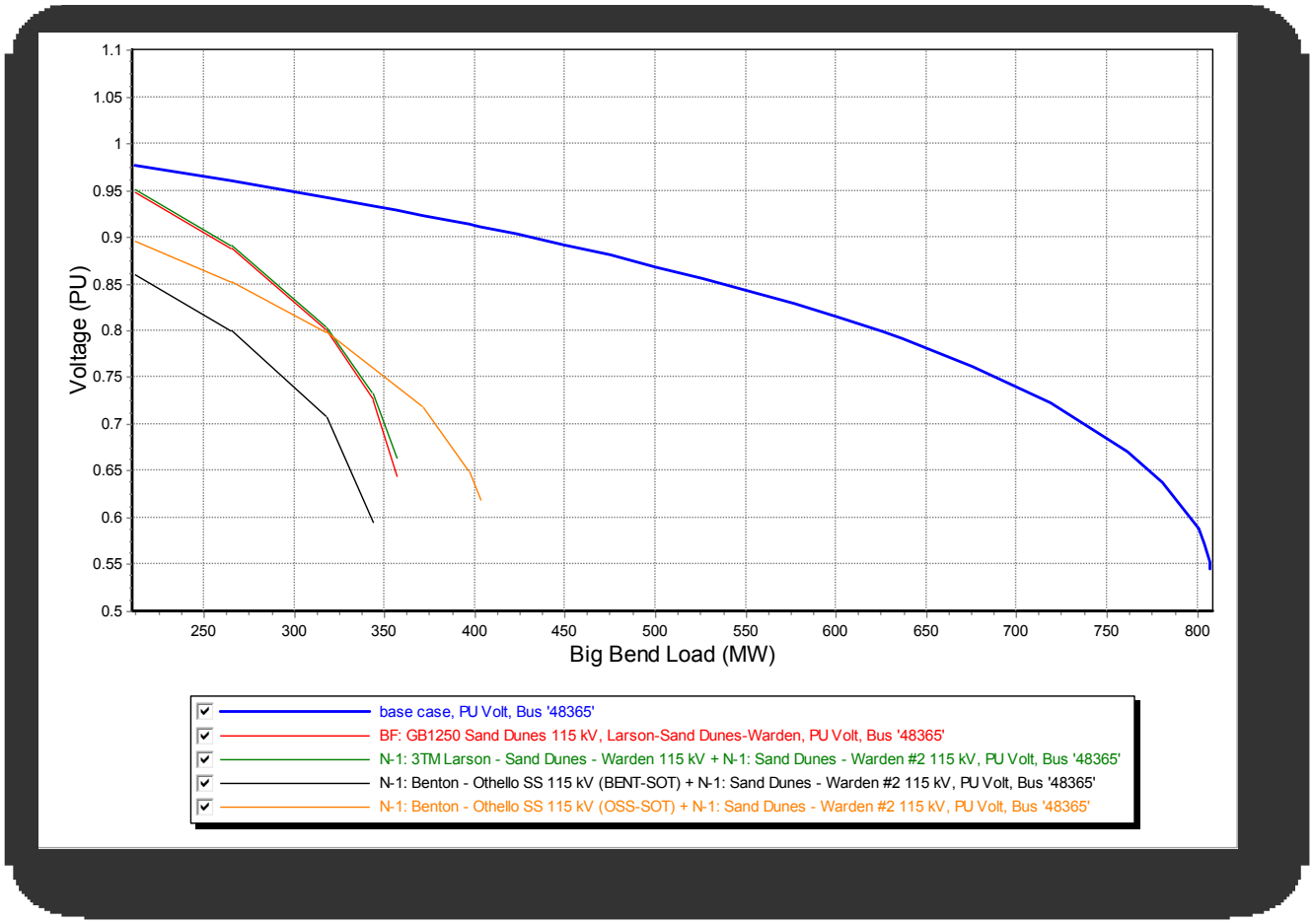

FIGURE III-8: BIG BEND LOAD RAMP PV CURVE RESULTS – PLANNED SYSTEM

3.8 Stability Study Results

	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
P1							
N-1: Addy - Kettle Falls 115 kV 3P @ ADD							
Out of Step Generator							
KETTLEAV 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.7 s	
WECC Category B Frequency							
KETTLEAV 13.8kV					59.3 Hz	8.5 ~	Addy – Kettle Falls POTT Scheme
WECC Category B Voltage Dip Load Bus							
COOK M T 115kV	-28.8 %		-26.5 %		-26.3 %		
KETTLEAV 115kV	-27.8 %		-26.6 %		-25.4 %		
KETTLEAV 13.8kV	-64.4 %		-63.6 %		-61.8 %		
REPUBLIC 115kV	-28.9 %				-26.4 %		
WECC Category B Voltage Dip Load Bus Duration							
KETTLEAV 13.8kV	-64.4 %	INF	-63.6 %	INF	-61.8 %	INF	
P2							
BUS: Devils Gap East 115 kV SLG							Criteria not violated – Devils Gap Reconfiguration
Out of Step Generator							
LITFAL12 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
LITFAL34 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
P4							
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @ADD)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
WECC Category C Voltage Dip Any Bus							
DEVILGPW 115kV					-82.3 %		
GAFFNEY 115kV					-82.9 %		
LITFAL12 4kV					-57.1 %		
LITFAL34 4kV					-58.1 %		
LITTFALL 115kV					-82.3 %		
REARDAN 115kV					-82.7 %		
SPRAGUE 115kV					-83.0 %		
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	Criteria not violated – Devils Gap Reconfiguration
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV SLG (DGP-LL #1 @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
WECC Category C Voltage Dip Any Bus							
DEVILGPW 115kV					-30.9 %		
GAFFNEY 115kV					-31.2 %		
LITTFALL 115kV					-30.9 %		
REARDAN 115kV					-31.1 %		
SPRAGUE 115kV					-31.2 %		
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
WECC Category C Voltage Dip Any Bus							

	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSPR OJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSPR OJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
DEVILGPW 115kV					-59.4 %		
GAFFNEY 115kV					-59.9 %		
LITFAL12 4kV					-35.7 %		
LITFAL34 4kV					-35.3 %		
LITTFALL 115kV					-59.4 %		
REARDAN 115kV					-59.7 %		
SPRAGUE 115kV					-59.9 %		
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @NMS)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
WECC Category C Voltage Dip Any Bus							
DEVILGPW 115kV					-40.5 %		
GAFFNEY 115kV					-40.9 %		
LITTFALL 115kV					-40.5 %		
REARDAN 115kV					-40.7 %		
SPRAGUE 115kV					-40.9 %		
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @AIR)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV SLG (DGP-LL #2 @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
WECC Category C Voltage Dip Any Bus							
DEVILGPW 115kV					-41.7 %		
GAFFNEY 115kV					-42.0 %		
LITTFALL 115kV					-41.7 %		
REARDAN 115kV					-41.9 %		
SPRAGUE 115kV					-42.1 %		
P5							
PSF: Devils Gap East 115 kV SLG							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
WECC Category C Voltage Dip Any Bus							
DEVILGPW 115kV					-31.0 %		
GAFFNEY 115kV					-31.3 %		
LITTFALL 115kV					-31.0 %		
REARDAN 115kV					-31.2 %		
SPRAGUE 115kV					-31.3 %		
SSEE							
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV 3P (ADD-DGP @ADD)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	**Criteria not violated – Devils Gap Reconfiguration**
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV 3P (ADD-DGP @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	

	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSPR OJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSPR OJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV 3P (DGP-LL #1 @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
LITFAL34 4kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
BF: A524 Devils Gap 115 kV, Devils Gap - Little Falls #1 115 kV 3P (DGP-LF #1 @DGP)							
Out of Step Generator							
LONGLKG1 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
LONGLKG2 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
LONGLKG3 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
LONGLKG4 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV 3P (DGP-NMS @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV 3P (DGP-NMS @NMS)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV 3P (AIR-DGP @AIR)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV 3P (AIR-DGP @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A538 Devils Gap 115 kV, Devils Gap - Little Falls #2 115 kV 3P (DGP-LF #2 @DGP)							
Out of Step Generator							
LONGLKG1 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
LONGLKG2 4kV	OOS	1.4 s	OOS	1.4 s	OOS	1.5 s	
LONGLKG3 4kV	OOS	1.4 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG4 4kV	OOS	1.5 s	OOS	1.6 s	OOS	1.6 s	
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV 3P (DGP-LL #2 @DGP)							
Out of Step Generator							
LITFAL12 4kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
LITFAL34 4kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
BUS: Devils Gap East 115 kV 3P							
Out of Step Generator							
LITFAL12 4kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
LITFAL34 4kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
PSF: Beacon North 115 kV 3P							
Out of Step Generator							
LONGLKG1 4kV	OOS	1.7 s					
LONGLKG2 4kV	OOS	7.2 s					
LONGLKG3 4kV	OOS	7.2 s					
PSF: Devils Gap East 115 kV 3P							
Out of Step Generator							
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s	OOS	1.9 s	
PSF: Devils Gap West 115 kV 3P							
Out of Step Generator							

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	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
LONGLKG1 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG2 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG3 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG4 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
PSF: Westside 115 kV 3P							
Out of Step Generator							
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG1 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG2 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG3 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
LONGLKG4 4kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	

Same results for light summer, heavy and light winter.

4 COEUR D'ALENE AREA ASSESSMENT

4.1 Executive Summary

The Coeur d'Alene area transmission system demonstrated performance issues in the near term and long term planning horizons. Several performance issues exist in the present state of the system and worsen with time. The most severe performance issue in the Coeur d'Alene area is caused by the tie breaker failure of A624 at Rathdrum Station. The area's dependence on the Rathdrum Station leaves the system with a single point of failure causing localized area outages.

Completion of the Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild project and Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild project will provide greatly improved transmission system performance in the near and long term planning horizon. Replacement of several aging facilities will also contribute to improved reliability. The Noxon Station Rebuild project is the most prominent project in the area.

A list of the corrective action plans proposed for the Coeur d'Alene area is provided in Table III-7.

	Year Problem Starts	Construction Start	Construction End	Consequence	Probabilty Factor	Priority	Cost Estimate
1-Completed							
Lancaster Interconnection						0.0100	
2-Planned							
Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild	Present	2015	2017	205	0.3750	76.8750	$7,500,000
Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild	Present	2016	2018	1204	0.0750	90.3000	$12,750,000
Pine Creek Transformer Replacement	2034			5	0.0005	0.0100	$500,000
4-New Proposal							
Cabinet 230/115 kV Transformer Automatic LTC	2019			82	0.0025	0.2050	$50,000
Rathdrum 115 kV Bus Reconfiguration	2034			344	0.0038	1.2900	$5,000,000
Sandpoint Reinforcement	Present			1740	0.0094	16.3125	$20,000,000
St. Maries Cap Bank	Present			50	0.0625	3.1250	$500,000

TABLE III-7: COEUR D'ALENE CORRECTIVE ACTION PLANS

Additional projects not categorized as corrective action plans are listed in Table III-8.

	Construction Start	Construction End	Cost Estimate
1-Completed			
Blue Creek Station Rebuild			
Julia Street			
Noxon Construction Station			
2-Planned			
Beck Road Station	2015	2014	
Big Creek Station Rebuild	2016	2017	$1,300,000
Burke - Pine Creek #3 & #4 115 kV Transmission Line Rebuild	2015	2015	$3,500,000
Cabinet - Noxon 230 kV Transmission Line Rebuild	2017	2018	$1,500,000
Noxon Rapids 230 kV Switchyard Rebuild	2015	2019	$21,075,000
Priest River Station			
Sandpoint, Sagle, and Oden Grid Modernization			
St. Maries SCADA Upgrade/Add Feeder	2018	2018	$750,000
Benewah - Pine Creek 230 kV Transmission Line Rebuild	2018	2019	$15,000,000
3-Needs Further Analysis			
Bronx Station	2019	2019	$1,500,000

	Construction Start	Construction End	Cost Estimate
Cabinet Gorge Switching Station			
Carlin Bay Station			
Noxon - Pine Creek #2 230 kV Transmission Line			

TABLE III-8: COEUR D'ALENE FURTHER SINGLE SYSTEM PROJECTS

4.2 System Description

The Avista Coeur d'Alene area is located primarily in Kootenai, Benewah, Bonner, and Shoshone counties in the state of Idaho and Sanders County in the state of Montana. The geographic features, and therefore the characterization of the transmission system, vary greatly throughout the Coeur d'Alene area. The cities of Coeur d'Alene, Post Falls, and Sandpoint contain the majority of the area's load, and the remaining load can be categorized as rural and low density. The transmission system consists of several major elements: a 500 kV source at the BPA's Hot Springs Station, a 230 kV backbone system which provides energy transfer capacity from local hydro generation resources as well as sources to the area, and the underlying 115 kV transmission system which serve the local loads.

The 115 kV transmission system in the Coeur d'Alene area is primarily operated in a networked configuration. Other areas of Avista's Transmission System operate with normally open points referred to as "star points". A star point is used to minimize power flow to mitigate overloads on the 115 kV transmission system in the event of an outage on the overlying 230 kV transmission system, as well as reducing overall system losses in the area. Operating in a "star" configuration also reduces exposure to loads served by long transmission lines. In the Coeur d'Alene area, star point switches can be operated open or closed based on outages, specific flow conditions, or due to operational constraints.

4.2.1 Area Transmission

Transmission Lines

The main 230 kV transmission lines in the Coeur d'Alene area are:

- Benewah – Pine Creek
- Cabinet – Noxon
- Cabinet – Rathdrum
- Hot – Springs Noxon #1 (BPA) and #2 (AVA)
- Libby – Noxon (BPA)
- Noxon – Pine Creek

Transmission Sources

The main transmission sources that feed the load in the Coeur d'Alene area are:

- 230/115 kV, 125 MVA transformer at Cabinet Gorge
- (2) 230/115 kV, 125 MVA transformer at Pine Creek
- (2) 230/115 kV, 250 MVA transformer at Rathdrum

- 230/115 kV, 150 MVA transformer at Libby (BPA)

Transmission Paths

The Western Electricity Coordinating Council (WECC) transfer path Montana to Northwest (Path 8) borders the eastern edge of the Coeur d'Alene area. Avista owns the following transmission facilities within the path

- Burke – Thompson Falls A & B 115 kV

4.2.2 Area Generation

Non-Avista owned local generation facilities within the Coeur d'Alene area include the following:

Albeni Falls HED	Unit 1 – 3 @ 16 MW each	Army Corps of Engineers
Lancaster CCCT	Units 1 & 2 @ 290 MW total, Winter 249 MW total, Summer	Rathdrum Operating Services Co., Inc.
Plummer	Unit 1 @ 5 MW	Stimson Lumber Company

There are no active Generation Interconnection Requests within the Coeur d'Alene area (as of October 2014).

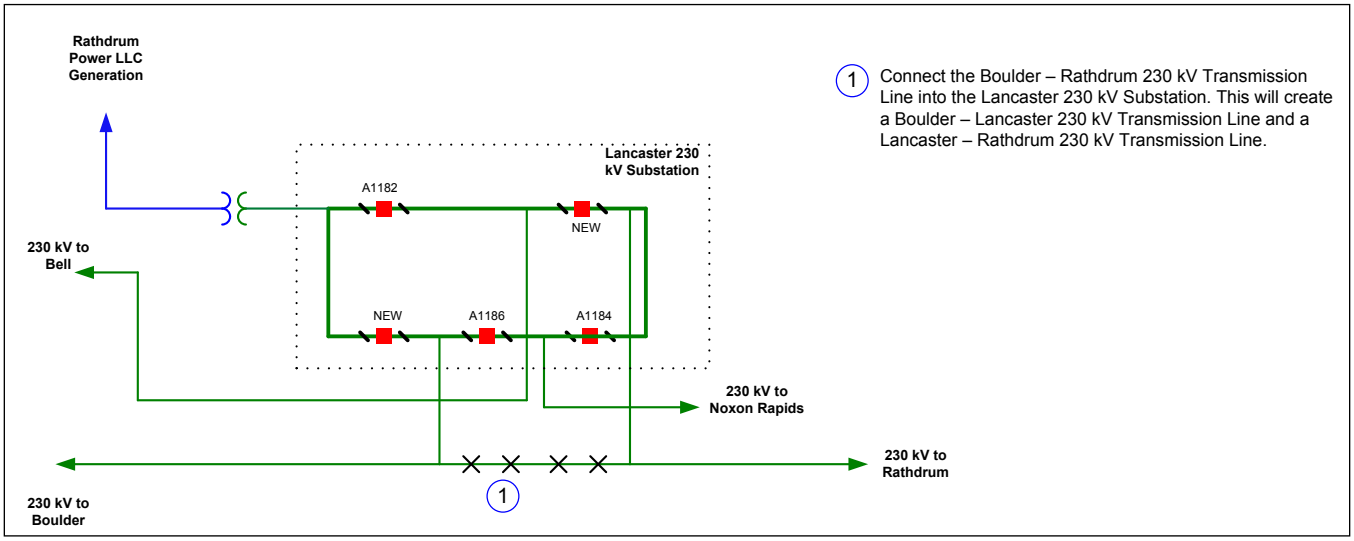
4.3 Corrective Action Plans

4.3.1 Completed

Lancaster Interconnection Project

The Boulder – Rathdrum 230 kV Transmission Line was looped into the existing Lancaster Station. Significant Transmission System performance improvements are gained by the completion of the project. The project included the addition of two new terminal positions at the Lancaster Station making it a five position ring bus.

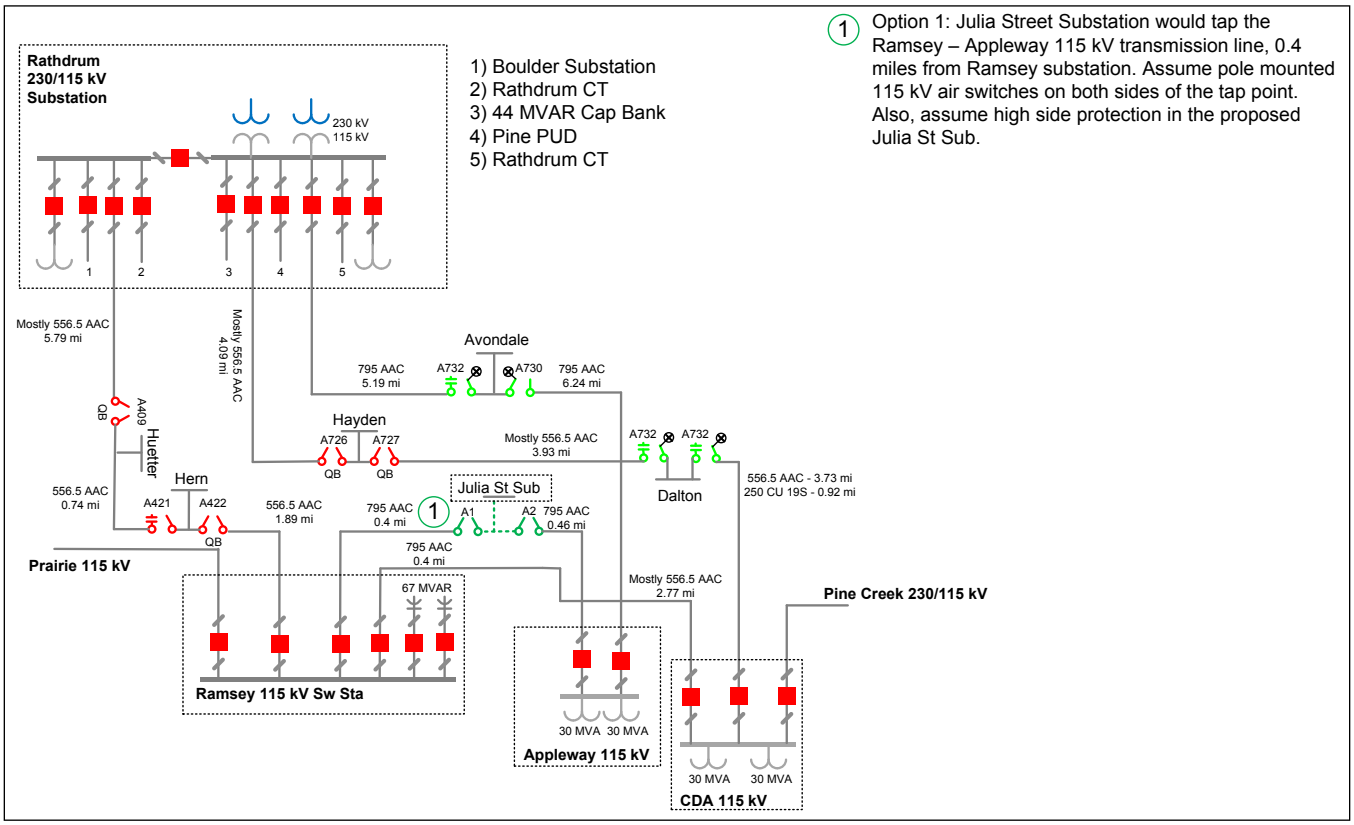
Construction was completed in 2013.



Julia Street Station

Kootenai Electric Cooperative constructed a new distribution station, Julia St., integrated into the Appleway – Ramsey 115 kV Transmission Line.

Construction was completed in 2013.



Noxon Construction Station Rebuild

The Noxon Construction Station 230/13 kV transformer and some of the associated distribution facilities have been replaced.

Construction was completed in 2013.

Blue Creek Station Rebuild

The Blue Creek Station rebuild is presently under construction. A rebuild of the station was necessary to accommodate the replacement of the 20 MVA distribution transformer. as well as transmission switching and associated communications infrastructure additions. The station is being built as a green field substation adjacent to the existing station.

4.3.2 Planned

Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild

Project Scope/Description

The Bronx – Cabinet & Bronx – Sand Creek 115 kV Transmission Line Reconductor project includes reconductoring the transmission lines from the Cabinet Gorge Station to the end of Avista's ownership between the Sandpoint and Sand Creek stations. The new conductor will be capable of providing a minimum of 150 MVA thermal capacity at 40C ambient temperature. The reconductor of the two transmission lines mitigates thermal overloads on the transmission lines for the loss of the Bonneville Power Administration's Libby 230/115 kV Transformer and other contingencies in the area.

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2017.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P1				
N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		100.1 %	100.4 %	105.8 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	104.6 %	107.7 %	108.3 %	114.0 %
ODEN (48293) -> BRONX (48047) CKT 1			100.1 %	105.5 %
P2				
BF: B1337 Sand Creek 115 kV, Albeni Falls-Sand Creek				
BRONX (48047)	6.0 %	5.4 %	5.6 %	5.8 %
ODEN (48293)	5.1 %			
SANDPT A (48377)	6.7 %	6.0 %	6.2 %	6.5 %
BF: B1338 Sand Creek 115 kV, Albeni Falls-Bonners Ferry				
BRONX (48047)	6.1 %	5.5 %	5.7 %	5.9 %
ODEN (48293)	5.2 %			5.0 %
SANDPT A (48377)	6.8 %	6.1 %	6.4 %	6.6 %
BUS: Sand Creek 115 kV				
BRONX (48047)	6.0 %	5.4 %	5.6 %	5.8 %
ODEN (48293)	5.0 %			
SANDPT A (48377)	6.7 %	5.9 %	6.2 %	6.5 %
N-1: Bonner Ferry - Libby 115 kV Open @ LIB				
BRONX (48047) -> SANDPT A (48377) CKT 1		103.0 %	103.3 %	105.5 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	104.3 %	110.3 %	110.9 %	113.7 %
ODEN (48293) -> BRONX (48047) CKT 1		102.7 %	103.0 %	105.2 %
N-1: Bronx - Sand Creek 115 kV Open @ SCR				
BRONX (48047)	5.8 %	5.2 %	5.4 %	5.6 %
SANDPT A (48377)	6.5 %	5.8 %	6.0 %	6.2 %
P3				
G-1: Albeni Falls Hydro Unit 1 + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	100.2 %	105.7 %	106.1 %	108.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	107.3 %	113.1 %	113.7 %	116.5 %
ODEN (48293) -> BRONX (48047) CKT 1		105.4 %	105.8 %	108.0 %
G-1: Albeni Falls Hydro Unit 2 + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	100.2 %	105.7 %	106.1 %	108.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	107.3 %	113.1 %	113.7 %	116.5 %

	15HS	19HS	24HS	34HS
ODEN (48293) -> BRONX (48047) CKT 1		105.4 %	105.8 %	108.0 %
G-1: Albeni Falls Hydro Unit 3 + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	100.2 %	105.7 %	106.1 %	108.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	107.3 %	113.1 %	113.7 %	116.5 %
ODEN (48293) -> BRONX (48047) CKT 1		105.4 %	105.8 %	108.0 %
P6				
N-1: 3TM Bell - Boundary #1 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		105.3 %	104.5 %	107.7 %
CLRKFORK (48077) -> ODEN (48293) CKT 1		112.7 %	112.1 %	116.0 %
ODEN (48293) -> BRONX (48047) CKT 1		105.0 %	104.2 %	107.4 %
N-1: Albeni Falls - Sacheen 115 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		104.0 %	109.3 %	112.5 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	106.2 %	111.6 %	116.9 %	120.7 %
ODEN (48293) -> BRONX (48047) CKT 1		103.6 %	108.9 %	112.1 %
N-1: Albeni Falls - Sand Creek 115 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	108.3 %	124.0 %	126.0 %	129.2 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	116.0 %	131.6 %	134.0 %	138.0 %
ODEN (48293) -> BRONX (48047) CKT 1	107.8 %	123.5 %	125.5 %	128.7 %
N-1: Beacon - Rathdrum 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		101.5 %	104.9 %	107.1 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	106.0 %	109.1 %	112.5 %	115.3 %
ODEN (48293) -> BRONX (48047) CKT 1		101.2 %	104.6 %	106.8 %
N-1: Bell - Taft 500 kV + N-1: Cabinet - Rathdrum 230 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1			100.8 %	103.5 %
N-1: Bell - Taft 500 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	102.0 %	106.9 %	112.2 %	114.5 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	109.1 %	114.5 %	119.8 %	122.6 %
ODEN (48293) -> BRONX (48047) CKT 1	101.7 %	106.5 %	111.8 %	114.1 %
N-1: Benewah - Moscow 230 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		101.4 %	101.5 %	106.9 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	105.8 %	109.0 %	109.4 %	
ODEN (48293) -> BRONX (48047) CKT 1		101.0 %	101.2 %	106.6 %
N-1: Benewah - Pine Creek 230 kV + N-1: Bonners Ferry - Libby 115 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1				102.0 %
N-1: Benewah - Pine Creek 230 kV + N-1: Cabinet - Rathdrum 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		102.4 %	102.0 %	104.1 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	105.7 %	110.2 %	110.1 %	112.8 %
ODEN (48293) -> BRONX (48047) CKT 1		102.0 %	101.6 %	103.7 %
N-1: Benewah - Pine Creek 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	108.8 %	115.5 %	115.5 %	117.8 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	116.0 %	122.9 %	123.2 %	126.1 %
ODEN (48293) -> BRONX (48047) CKT 1	108.4 %	115.2 %	115.1 %	117.4 %
N-1: Bonners Ferry - Libby 115 kV + N-1: Cabinet - Rathdrum 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	118.1 %	119.6 %	120.1 %	122.8 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	125.4 %	127.2 %	128.0 %	131.3 %
ODEN (48293) -> BRONX (48047) CKT 1	117.6 %	119.1 %	119.6 %	122.3 %
N-1: Bonners Ferry - Libby 115 kV + N-1: Hot Springs - Taft 500 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1				101.8 %
N-1: Bonners Ferry - Libby 115 kV + N-1: Hot Springs 500/230 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1				101.8 %
N-1: Bonners Ferry - Libby 115 kV + N-1: Noxon - Pine Creek 230 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1	101.1 %	100.8 %	100.8 %	103.6 %
N-1: Bonners Ferry - Sand Creek 115 kV + N-1: Cabinet - Rathdrum 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	108.0 %	107.4 %	108.0 %	110.6 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	115.2 %	114.9 %	115.9 %	119.0 %
ODEN (48293) -> BRONX (48047) CKT 1	107.6 %	107.0 %	107.7 %	110.2 %
N-1: Boulder - Lancaster 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		102.4 %	105.8 %	108.1 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	106.9 %	110.1 %	113.4 %	116.2 %
ODEN (48293) -> BRONX (48047) CKT 1		102.1 %	105.5 %	107.7 %
N-1: Boundary - Usk 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		106.7 %	107.1 %	109.4 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	106.5 %	114.2 %	114.8 %	117.7 %
ODEN (48293) -> BRONX (48047) CKT 1		106.4 %	106.8 %	109.0 %
N-1: Boundary 230/115 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		101.5 %	105.0 %	107.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	105.9 %	109.1 %	112.6 %	115.5 %

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	15HS	19HS	24HS	34HS
ODEN (48293) -> BRONX (48047) CKT 1		101.2 %	104.7 %	107.0 %
N-1: Box Canyon - Usk 115 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	101.3 %	107.0 %	107.1 %	109.4 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	108.5 %	114.3 %	114.7 %	117.6 %
ODEN (48293) -> BRONX (48047) CKT 1	101.0 %	106.7 %	106.8 %	109.0 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Hot Springs - Noxon #1 230 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1		100.9 %	101.4 %	103.8 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Hot Springs - Noxon #2 230 kV				
CLRKFORK (48077) -> ODEN (48293) CKT 1		100.9 %	101.4 %	103.8 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Hot Springs - Taft 500 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1				100.2 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	102.8 %	106.8 %	106.5 %	108.9 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Hot Springs 500/230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1				100.2 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	102.8 %	106.8 %	106.5 %	108.9 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Lancaster - Noxon 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	102.5 %	105.2 %	105.5 %	107.9 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	109.7 %	112.8 %	113.3 %	116.3 %
ODEN (48293) -> BRONX (48047) CKT 1	102.2 %	104.8 %	105.1 %	107.5 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	139.4 %	142.4 %	143.4 %	146.2 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	146.6 %	149.9 %	151.2 %	154.7 %
ODEN (48293) -> BRONX (48047) CKT 1	138.9 %	141.8 %	142.8 %	145.6 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Noxon - Pine Creek 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	105.3 %	105.9 %	106.2 %	108.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	112.8 %	113.8 %	114.3 %	117.1 %
ODEN (48293) -> BRONX (48047) CKT 1	104.9 %	105.5 %	105.8 %	107.9 %
N-1: Dworshak - Hatwai 500 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	103.0 %	108.5 %	107.5 %	109.7 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	110.3 %	115.8 %	115.1 %	117.9 %
ODEN (48293) -> BRONX (48047) CKT 1	102.7 %	108.1 %	107.2 %	109.4 %
N-1: Dworshak - Taft 500 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	102.9 %	108.7 %	107.8 %	110.0 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	110.1 %	116.0 %	115.4 %	118.2 %
ODEN (48293) -> BRONX (48047) CKT 1	102.6 %	108.3 %	107.4 %	109.7 %
N-1: Flathead - Hot Springs 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		104.5 %	104.8 %	107.1 %
CLRKFORK (48077) -> ODEN (48293) CKT 1		111.8 %	112.4 %	115.2 %
ODEN (48293) -> BRONX (48047) CKT 1		104.2 %	104.6 %	106.8 %
N-1: Hatwai - Lower Granite 500 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	101.0 %	103.5 %	105.2 %	107.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	108.2 %	111.1 %	112.8 %	115.4 %
ODEN (48293) -> BRONX (48047) CKT 1	100.7 %	103.1 %	104.9 %	106.9 %
N-1: Hot Springs - Noxon #1 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	103.4 %	109.4 %	109.7 %	111.8 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	110.6 %	116.8 %	117.4 %	120.0 %
ODEN (48293) -> BRONX (48047) CKT 1	103.1 %	109.1 %	109.4 %	111.5 %
N-1: Hot Springs - Noxon #2 230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	103.4 %	109.3 %	109.6 %	111.7 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	110.6 %	116.7 %	117.3 %	119.9 %
ODEN (48293) -> BRONX (48047) CKT 1	103.1 %	109.0 %	109.3 %	
N-1: Hot Springs - Taft 500 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	109.2 %	115.8 %	115.5 %	117.5 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	116.4 %	123.2 %	123.1 %	125.7 %
ODEN (48293) -> BRONX (48047) CKT 1	108.8 %	115.4 %	115.1 %	117.1 %
N-1: Hot Springs 500/230 kV + N-1: Libby 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	109.2 %	115.8 %	115.5 %	117.5 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	116.4 %	123.2 %	123.1 %	125.7 %
ODEN (48293) -> BRONX (48047) CKT 1	108.8 %	115.4 %	115.1 %	117.1 %
N-1: Libby 230/115 kV + N-1: Noxon - Pine Creek 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	115.9 %	116.8 %	117.1 %	119.4 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	122.9 %	124.2 %	124.7 %	127.6 %
ODEN (48293) -> BRONX (48047) CKT 1	115.6 %	116.4 %	116.7 %	119.0 %
N-1: Libby 230/115 kV + N-1: Pine Street - Usk 115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	103.6 %	108.9 %	112.0 %	114.7 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	110.8 %	116.5 %	119.6 %	122.9 %
ODEN (48293) -> BRONX (48047) CKT 1	103.3 %	108.5 %	111.7 %	114.3 %

125 YEARS OF SERVICE 1889–2014 AVISTA

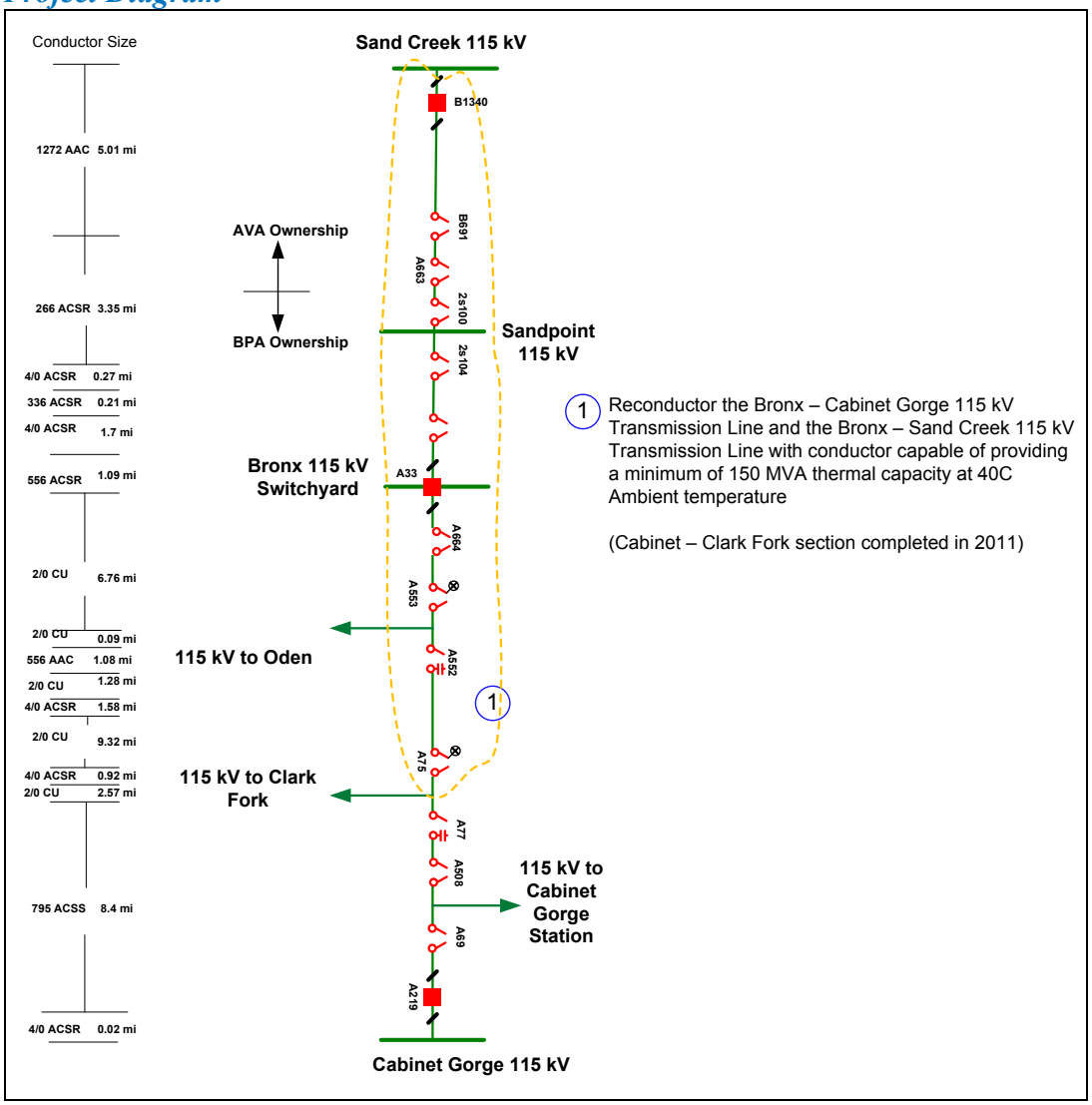
	15HS	19HS	24HS	34HS
N-1: Libby 230/115 kV + N-1: Rathdrum #1 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		102.0 %	105.5 %	107.9 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	106.4 %	109.6 %	113.1 %	116.1 %
ODEN (48293) -> BRONX (48047) CKT 1		101.6 %	105.2 %	107.6 %
N-1: Libby 230/115 kV + N-1: Rathdrum #2 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	100.2 %	106.2 %	106.5 %	109.0 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	107.4 %	113.5 %	114.1 %	117.2 %
ODEN (48293) -> BRONX (48047) CKT 1		105.8 %	106.2 %	108.7 %
N-1: Libby 230/115 kV + N-1: Sacheen 230/115 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1		110.1 %	109.1 %	112.3 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	107.1 %	117.5 %	116.7 %	120.5 %
ODEN (48293) -> BRONX (48047) CKT 1		109.8 %	108.8 %	112.0 %
SSEE				
N-2 (ROW and ADJ): Cabinet - Rathdrum 230kV and Lancaster - Noxon 230kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	102.5 %	105.2 %	105.5 %	107.9 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	109.7 %	112.8 %	113.3 %	116.3 %
ODEN (48293) -> BRONX (48047) CKT 1	102.2 %	104.8 %	105.1 %	107.5 %
N-2 (ROW): Bell - Taft 500 kV and Cabinet - Rathdrum 230 kV and Lancaster - Noxon 230 kV				
BRONX (48047) -> SANDPT A (48377) CKT 1	114.1 %	121.1 %	124.2 %	127.1 %
CLRKFORK (48077) -> ODEN (48293) CKT 1	121.4 %	128.7 %	132.2 %	135.7 %
ODEN (48293) -> BRONX (48047) CKT 1	113.7 %	120.6 %	123.7 %	126.5 %

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- SP-2010-10 – Reconductor/Rebuild of Cabinet-Bronx-Sandcreek 115 kV line

Project Diagram



Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild

Project Scope/Description

Reconductoring the Coeur d'Alene 15th St – Pine Creek 115 kV Transmission Line to 795 ACSR conductor with minimum thermal capacity rating of 150 MVA at 40C and operating the transmission line normally closed has been identified as a mitigating project for several transmission performance issues in the area. Operating the transmission line normally closed provides an additional source into the Coeur d'Alene area. The additional source supports the remaining transmission system following bus outages at Rathdrum Station.

Rebuilding the transmission line also accommodates the installation of fiber optic shield wire allowing for communication aided protection schemes and the potential addition of SCADA to Blue Creek and Mission Stations.

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2018.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P2				
BF: A505 Rathdrum East 115 kV, Coeur d'Alene 15th St-Rathdrum				
RATHDRMW (48355) -> HUETTER (48159) CKT 1				**106.4 %**
BF: A506 Rathdrum 115 kV, Pine Street-Rathdrum				
BLUECRK (48045)				0.9494
DALTON A (48093)				0.9431
HAYDEN (48148)				0.9415
HERN (48155) -> RAMSEY (48349) CKT 1	**101.1 %**	**104.5 %**	**109.0 %**	**119.1 %**
HUETTER (48159) -> HERN (48155) CKT 1	**102.0 %**	**105.4 %**	**109.9 %**	**120.0 %**
RATHDRMW (48355) -> HUETTER (48159) CKT 1	**111.2 %**	**114.8 %**	**119.8 %**	**130.8 %**
BF: A624 Rathdrum East & West 115 kV				
APPLEWAY (48013)	0.9422	0.9339	0.9227	0.8916
AVONDALE (48019)	0.9404	0.932	0.9207	0.8893
BARKER (48021) -> OTIS (48311) CKT 1				**102.4 %**
BLUECRK (48045)	0.9331	0.9245	0.9127	0.8802
BOULDERW (48520) -> OTIS (48311) CKT 1	**108.9 %**	**113.7 %**	**120.5 %**	**134.9 %**
CDA (48067)	0.9343	0.9257	0.914	0.8816
DALTON A (48093)	0.9279	0.919	0.9068	0.8733
DOWER RD (47033)			0.9475	0.9253
DOWERRDT (48111)				0.929
EASTFARM (48117) -> POST FLS (48329) CKT 1	**161.4 %**	**169.2 %**	**179.6 %**	**204.7 %**
HAYDEN (48148)	0.9267	0.9177	0.9054	0.8716
HERN (48155)	0.9426	0.9344	0.9232	0.8921
HUETTER (48159)	0.9424	0.9341	0.9229	0.8918
JULIA ST (48170)	0.9428	0.9346	0.9234	0.8924
OTIS (48311) -> EASTFARM (48117) CKT 1	**169.7 %**	**177.7 %**	**188.7 %**	**214.7 %**
POST FLS (48329)				0.9298
POST FLS (48329) -> PRAIRIEB (40855) CKT 1	**195.8 %**	**204.5 %**	**216.3 %**	**244.8 %**
PRAIRIEB (40855)	0.9492	0.9421	0.9325	0.9054
PRAIRIEB (40855) -> RAMSEY (48349) CKT 1	**126.7 %**	**131.9 %**	**139.4 %**	**157.5 %**
RAMSEY (48349)	0.9434	0.9351	0.924	0.893
BF: A638 Rathdrum 115 kV, Appleway-Rathdrum				

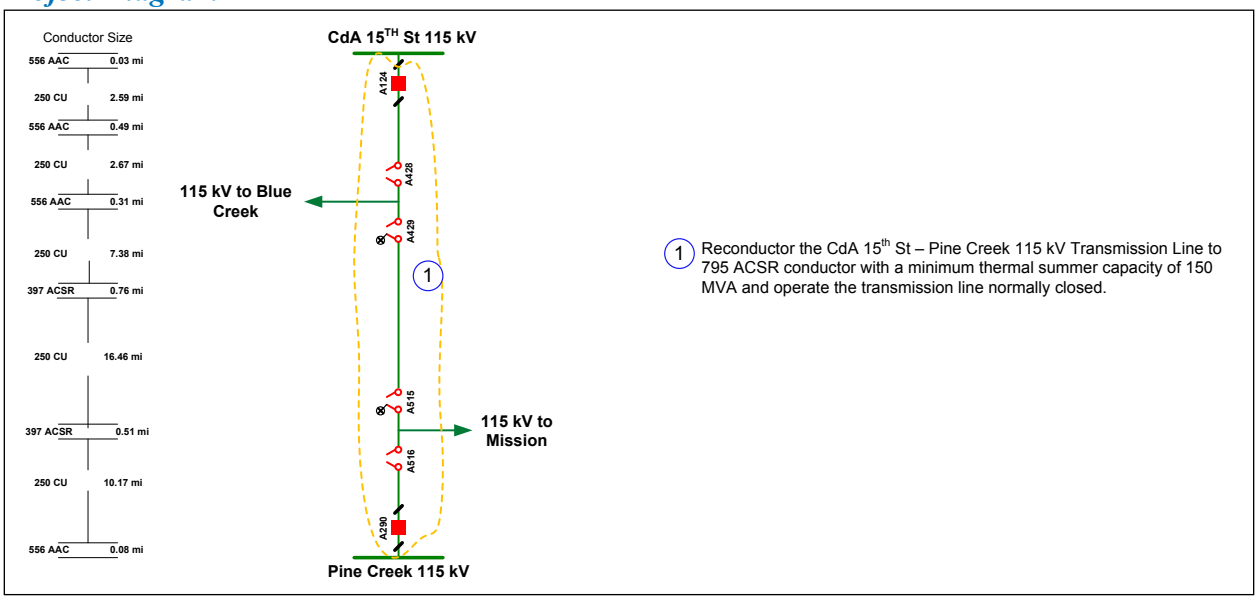
	15HS	19HS	24HS	34HS
DALTON A (48093)				0.9473
HAYDEN (48148)				0.9458
HERN (48155) -> RAMSEY (48349) CKT 1			103.6 %	113.1 %
HUETTER (48159) -> HERN (48155) CKT 1		100.3 %	104.5 %	114.0 %
RATHDRMW (48355) -> HUETTER (48159) CKT 1	106.3 %	109.7 %	114.3 %	124.8 %
BUS: Rathdrum East 115 kV				
BLUECRK (48045)				0.9494
DALTON A (48093)				0.9431
HAYDEN (48148)				0.9416
HERN (48155) -> RAMSEY (48349) CKT 1	101.1 %	104.5 %	108.9 %	119.0 %
HUETTER (48159) -> HERN (48155) CKT 1	101.9 %	105.3 %	109.8 %	119.9 %
RATHDRMW (48355) -> HUETTER (48159) CKT 1	111.1 %	114.8 %	119.7 %	130.8 %
P6				
N-1: Appleway - Rathdrum 115 kV + N-1: Coeur d'Alene 15th St - Rathdrum 115 kV				
HERN (48155) -> RAMSEY (48349) CKT 1				100.8 %
HUETTER (48159) -> HERN (48155) CKT 1				101.6 %
RATHDRMW (48355) -> HUETTER (48159) CKT 1		100.6 %	104.1 %	112.0 %
N-1: Appleway - Rathdrum 115 kV + N-1: Ramsey - Rathdrum #1 115 kV				
DALTON A (48093) -> CDA (48067) CKT 1				101.6 %
HAYDEN (48148) -> DALTON A (48093) CKT 1				104.2 %
RATHDRME (48356) -> HAYDEN (48148) CKT 1		102.6 %	106.9 %	116.3 %
N-1: Boulder - Lancaster 230 kV + N-1: Rathdrum #2 230/115 kV				
RATHDRUM (48357) -> RATHDRMW (48355) CKT 1				105.6 %
N-1: Pine Street - Rathdrum 115 kV (PNST-HOO) + N-1: Rathdrum #2 230/115 kV				
RATHDRUM (48357) -> RATHDRMW (48355) CKT 1				102.5 %
N-1: Rathdrum #1 230/115 kV + N-1: Rathdrum #2 230/115 kV				
BOULDERE (48522) -> MOAB (47511) CKT 1				106.4 %
MOAB (47511) -> PLEASANT (48319) CKT 1				102.1 %
OTIS (48311) -> EASTFARM (48117) CKT 1				105.2 %
POST FLS (48329) -> PRAIRIEB (40855) CKT 1				104.1 %

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Coeur d'Alene Reinforcement Feasibility Study

Project Diagram



4.3.3 Need Further Analysis

The following sections describe system deficiencies assuming completion of the planned projects as described above.

Pine Creek Transformer Replacement

Project Scope/Description

The existing Pine Creek 230/115 kV #1 Autotransformer consists of a nominal 125 MVA, 230/115 kV transformer and a 115/115 kV voltage regulating transformer. The Substation Engineering Group has identified the need to replace these devices with a single 125 MVA autotransformer. The new transformer will be specified to match the Avista's present standard configuration. Thermal overload of the transformer was observed with the outage of the Benewah – Pine Creek 230 kV Transmission Line and Pine Creek #2 230/115 kV Transformer following the completion of the Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild project.

The N-1-1 outage of the Benewah – Pine Creek 230 kV Transmission Line and the Pine Creek #2 230/115 kV Transformer causes an overload of the Pine Creek #1 230/115 kV Transformer in the 2034 heavy summer scenario (see Figure III-9). The planned project to rebuild the Coeur d'Alene – Pine Creek 115 kV Transmission Line and operating it normally closed contributes significantly to the issue. Replacement of the Pine Creek #1 230/115 kV Transformer has been identified by Substation Engineering. The replacement transformer will have sufficient thermal capacity in the twenty year planning horizon with a nominal rating of125 MVA.

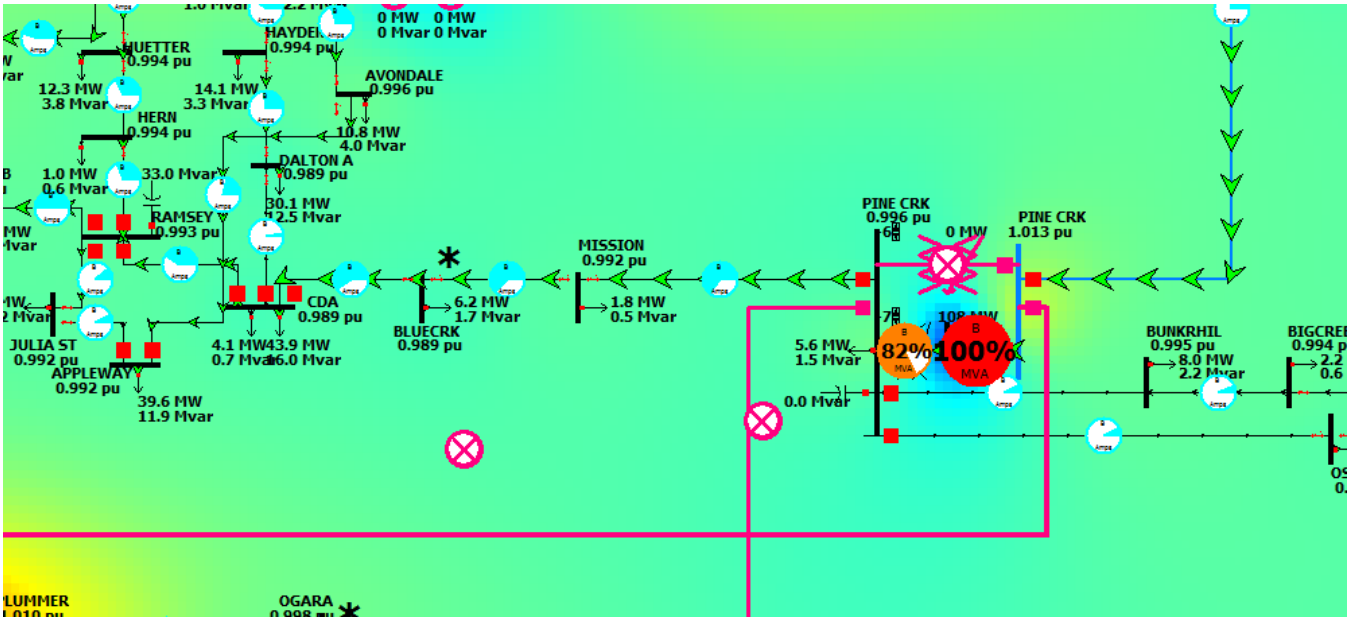


FIGURE III-9: N-1: BENEWAH - PINE CREEK 230 KV + N-1: PINE CREEK #2 230/115 KV IN 34HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2034 heavy summer.

Performance Criteria Violations

	34HSPROJECTS
P6	
N-1: Benewah - Pine Creek 230 kV + N-1: Pine Creek #2 230/115 kV	
PINE CRK (48317) -> PINECRKX (48316) CKT 1	**100.3 %**

4.3.4 New Proposals

Sandpoint Reinforcement

The outage of both the Libby and Cabinet transformers will cause low voltage violations in the heavy winter scenario. The remaining source to the local area is the Albeni Falls – Sand Creek 115 kV Transmission Line which is incapable of providing sufficient reactive power support even with the presence of shunt capacitors at Sand Creek, Bonners Ferry, and Sand Point stations. A reinforcement project needs to be developed to mitigate the observed low voltages. The project may include the construction of a new 115 kV transmission line to Sand Creek Station from Rathdrum or Albeni Falls stations.

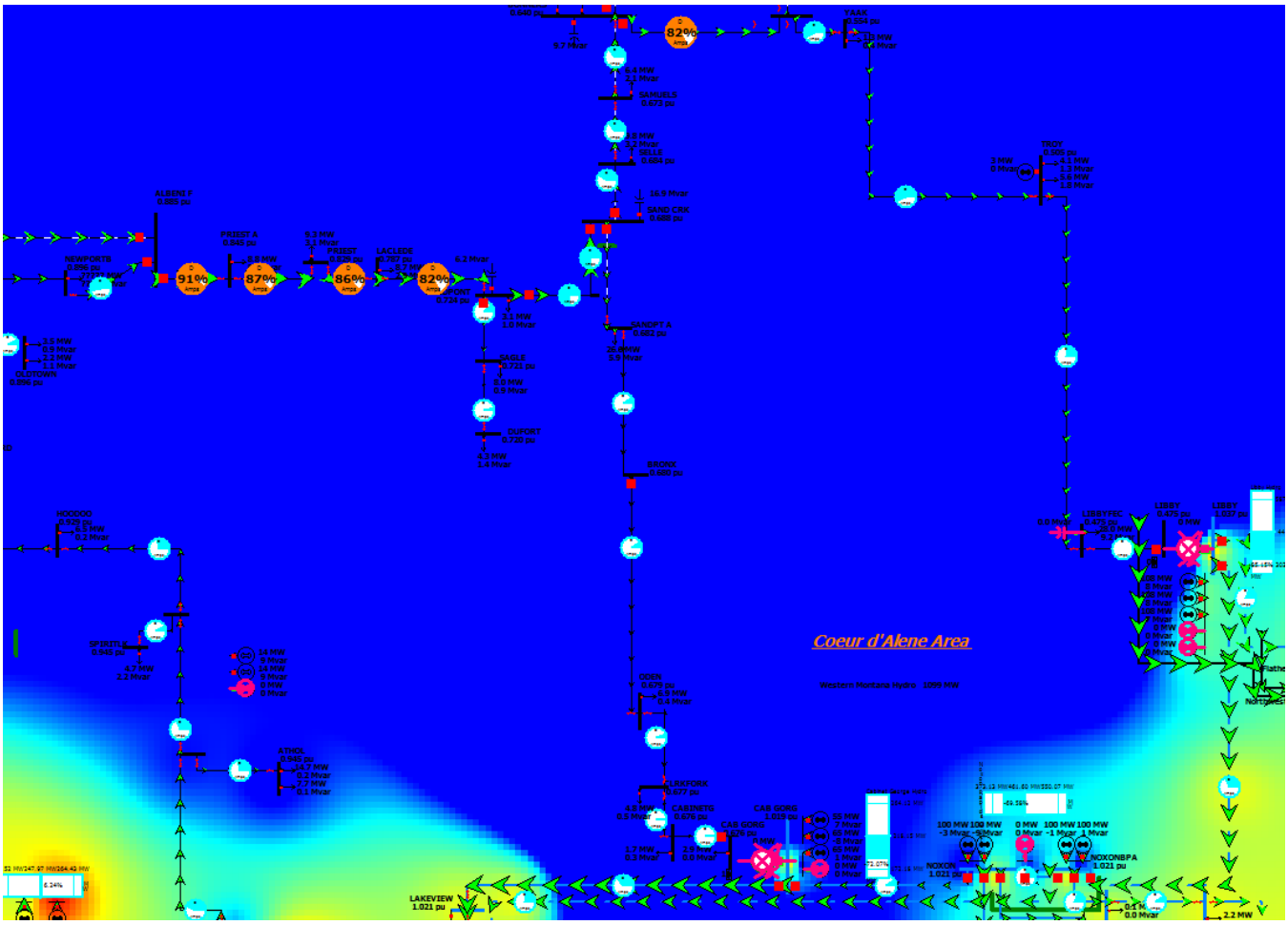


FIGURE III-10: N-1: CABINET GORGE 230/115 KV + N-1: LIBBY 230/115 KV IN 24HW

St. Maries Capacitor Bank

Low voltage occurs at the St. Maries Station for several outages in the heavy summer and heavy winter scenarios. The ability to regulate voltage at Benewah Station is affected by outages related to Hatwai causing additional power flow on the 230 kV system. The heavy load at St. Maries Station leads to noteworthy voltage drop along the Benewah – Pine Creek 115 kV Transmission Line. The installation of a capacitor bank at St. Maries or Ogara station will mitigate the low voltage issue.

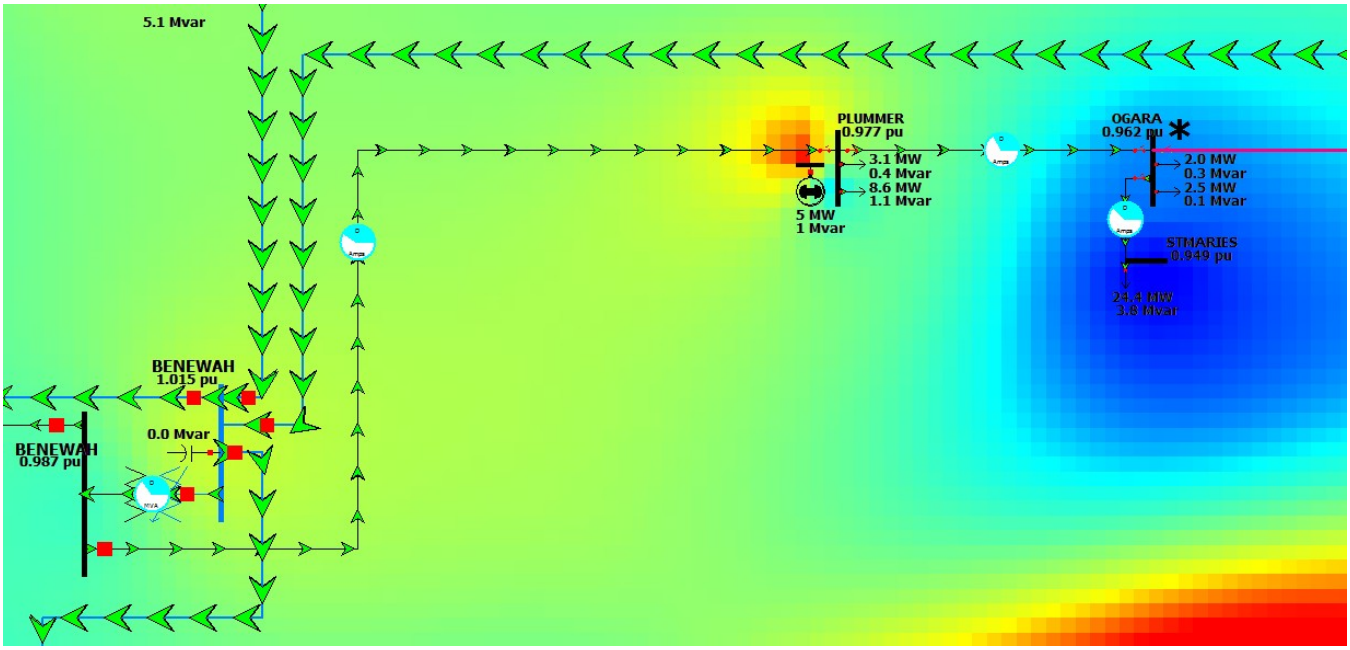


FIGURE III-11: N-1: HATWAI 500/230 KV IN 24HW

Cabinet LTC

A bus outage or breaker failure at Sand Creek Station causing the Bronx – Sand Creek 115 kV Transmission Line to be open at Sand Creek Station results in greater than 5% voltage deviation at Sand Point Station. Automating the load tap changer on the Cabinet 230/115 kV Transformer will reduce the voltage deviation at Sand Point Station.

Rathdrum 115 kV Bus Reconfiguration

The tie breaker failure on the Rathdrum 115 kV bus causes the Otis Orchards – Post Falls 115 kV Transmission Line to exceed its applicable facility rating beginning in 2034. The completion of the Coeur d'Alene – Pine Creek 115 kV Transmission Line rebuild project significantly improves the performance of the System in the Coeur d'Alene area and defers the need to reconfigure the 115 kV buses at Rathdrum Station. Reconfiguration of the buses to eliminate the loss of all 115 kV transmission lines at the station for a single breaker failure will mitigate the observed System deficiencies. Double bus, double breaker or breaker and a half configuration are potential bus configurations to carry forward.

4.4 Single System Project (non-corrective action plans)

4.4.1 Noxon Rapids 230 kV Switchyard Rebuild

The existing Noxon Rapids 230 kV Switchyard has been identified to be in need of a rebuild due to the present age and condition of the equipment included in the station. The existing bus work is constructed as strain bus and configured as a single bus with a tie breaker separating the East and West buses. Presently the station is the interconnection point of the Noxon Rapids Hydro Electric Dam and a significant asset in the reliable operation of the Western Montana Hydro (defined as the combination of Noxon Rapids, Cabinet Gorge, Hungry Horse and Libby generation) Complex. An unplanned outage caused by equipment failure or other means causes curtailment of the local generation facilities. Due to the significance of the station, a complete rebuild will require detailed coordination with Avista's resource department and neighboring utilities, primarily the BPA.

High voltage issues at Noxon and Cabinet stations has been identified and the construction of two steps of 50 MVAr reactor banks are being installed at the Noxon Station. Following the completion of the new reactor banks, high voltages are still observed during outages of the reactor banks subsequent to other outages in the area (see Figure III-12). The Noxon Station is planned for a complete green field rebuild. The rebuild will include reterminating the two reactor banks to separate buses eliminating the common point of failure for both reactor banks. A single bank of 50 MVAr is sufficient for maintaining the voltage within applicable facility ratings.

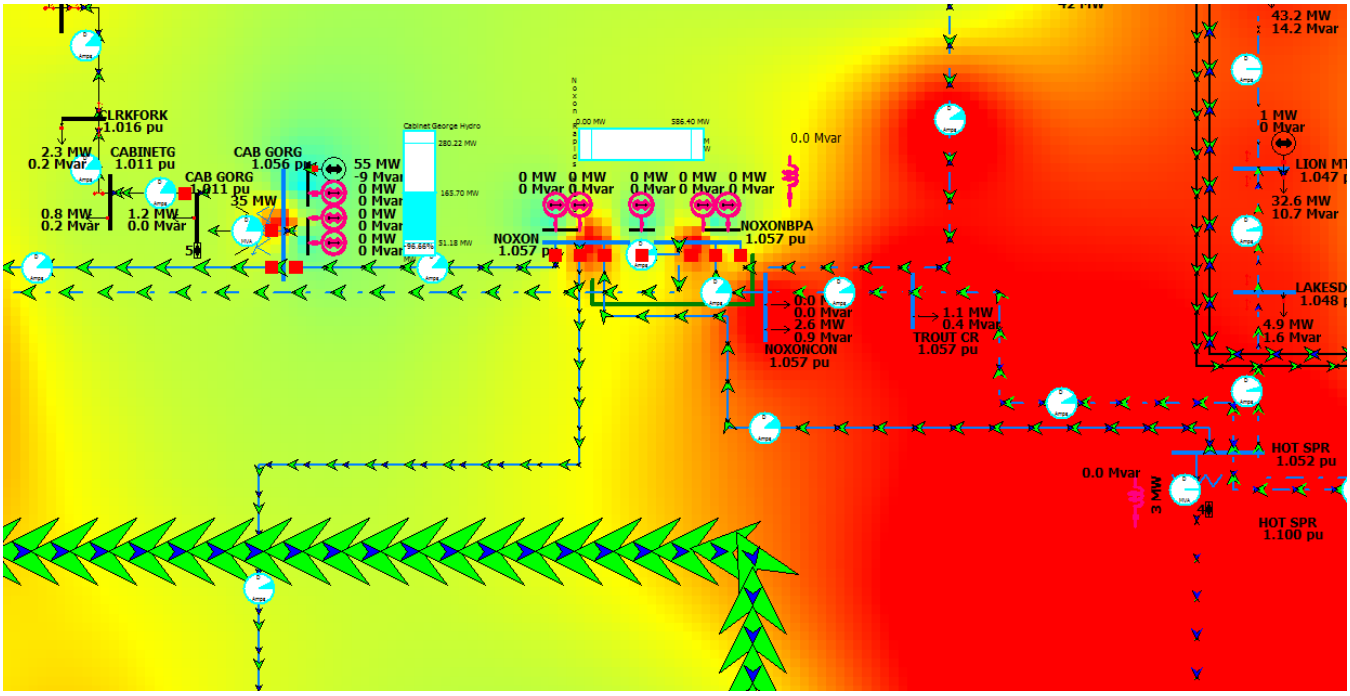
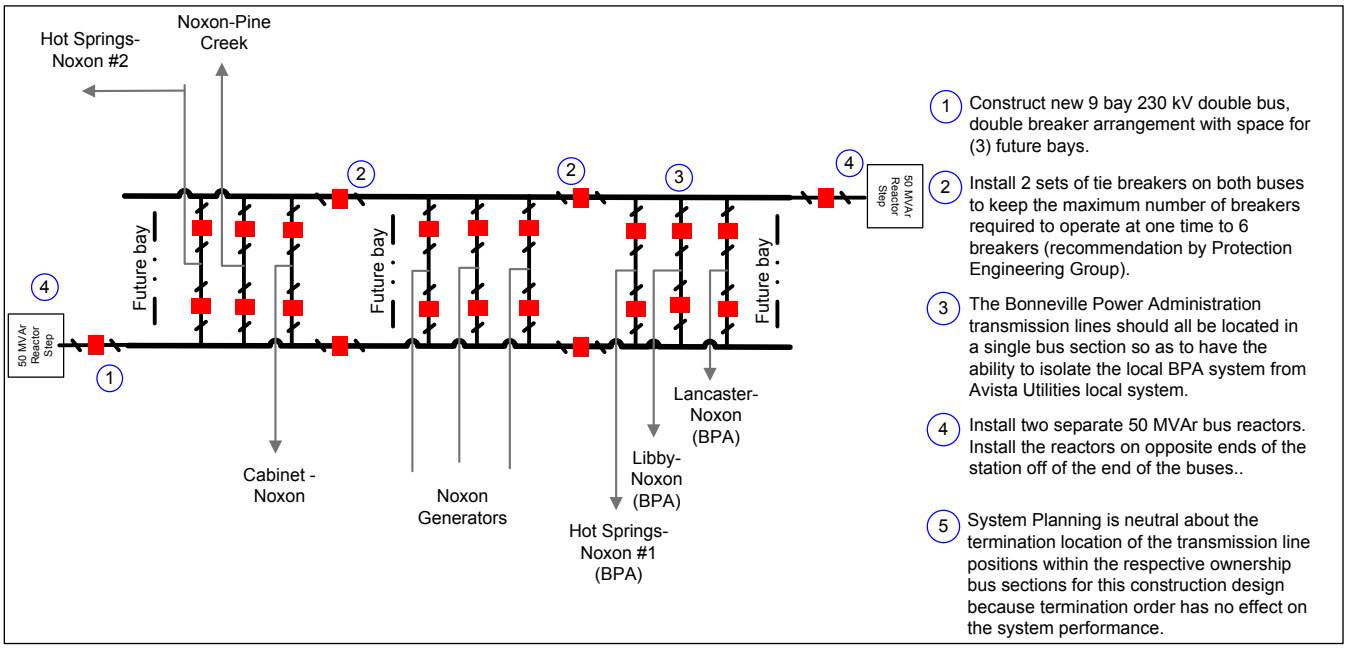


FIGURE III-12: N-1: HOT SPRINGS 500 KV SWITCHED SHUNT + N-1: NOXON 230KV SWITCHED SHUNT IN 19LW



4.4.2 Big Creek Station Rebuild

The Big Creek Station is a wood substation and has been identified by the Substation Engineering Department to be rebuilt under the wood substation rebuild program. Construction should be planned in the five to ten year planning horizon. Coordination with other station projects or potential load increases may require the Big Creek Station rebuild to be pushed forward into the five year planning horizon. Projected load growth at the Sunshine Mine served from Big Creek Station may require adding 24 kV transformation and feeders to the station.

4.4.3 Burke – Pine Creek #3 & #4 Rebuild 115 kV Transmission Line Rebuild

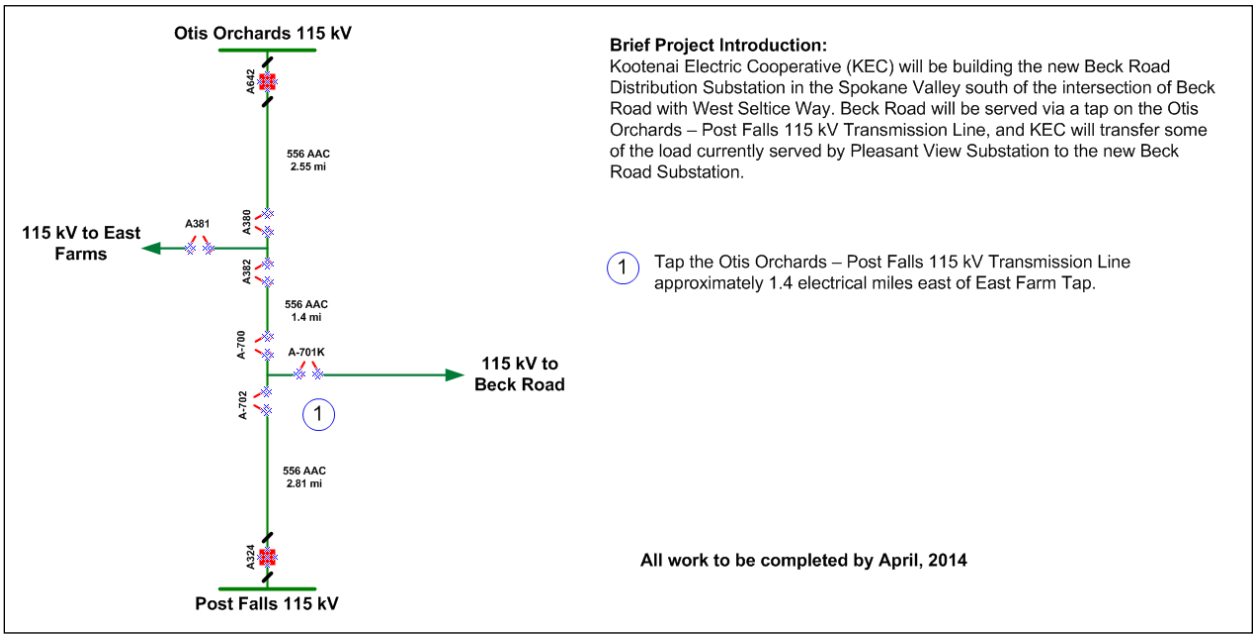
Reconstruction of the existing Burke – Pine Creek #3 & #4 115 kV Transmission Lines is in construction. The yet-to-be completed work has been broken in the following phases:

Reconstruct approximately (4) miles (8 miles total) of Avista 115kV transmission facilities on the Burke – Pine Creek #3 & #4 115 kV Transmission Lines between Big Creek Station and a point immediately east of the retired Bunker Hill Mine smelter. Years of smelter atmospheric discharge has caused considerable corrosion and weathering to these down-wind structures. Present conductors are 397 ACSR “Ibis” and 250 19-strand copper designs. New conductor will be a 795 ACSR “Drake” capable of 150 MVA at 40C.

Reconstruct approximately (5-6) miles of Avista 115kV transmission facilities on the Burke – Pine Creek #4 115 kV Transmission Line between Wallace Station and Burke Station. Onerous access makes the existing route very difficult to maintain the line originally constructed in 1941. Present conductor is a 250 19-strand copper design. New conductor will be a 795 ACSR “Drake” capable of 150 MVA at 40C.

4.4.4 Beck Road Station

The BPA entered into a Network Integration Transmission Service System Impact and Facilities Study Agreement with Avista. Avista and BPA are parties to the Network Integration Transmission Service Agreement (NITSA) for service to the loads of Kootenai Electric Cooperative, Inc. under Avista's Open Access Transmission Tariff. BPA is requesting a new Point of Delivery (POD) under the NITSA for service to a proposed Beck Road Station located 1.4 miles east of Avista's East Farms 115 kV Tap in the Spokane Valley. The BPA has given a projected initial operating date of April 1, 2014. The System Impact and Facilities Study Agreement requests that Avista study the project with the POD 1.4 electrical miles east of the East Farms Tap on the Otis Orchards – Post Falls 115 kV Transmission Line. The study work indicated that the 115 kV interconnection configuration performed adequately and has no adverse impacts on the local Transmission System.



4.4.5 Carlin Bay Station

Forecasted load growth along the east side of Coeur d'Alene Lake is expected to cause the total load to exceed the capability of the existing 13.2 kV distribution system in the area. A new substation named Carlin Bay Station has been proposed and property was purchased in 2010. Preliminary proposals include connecting the new substation to Avista's Transmission System by a 13 mile radial 115 kV transmission line to the existing O'Gara Station. Rebuilding the existing O'Gara Station to be a switching station is recommended to mitigate the reliability impact to the area by reducing the transmission line exposure distances.

4.4.6 Bronx Station

The addition of distribution facilities to the existing Bronx Station will help support load growth in the surrounding area. Distribution capacity at Bronx Station and transferring load to the Bronx Station will relieve loading on Sandpoint and Oden Station distribution facilities, allowing

extra capacity to support load growth in Dover. The expansion of Bronx Station may be coordinated with the rebuild of the Bronx – Cabinet Gorge 230 kV Switchyard and Bronx – Sand Creek 115 kV Transmission Lines.

4.4.7 Cabinet Gorge Switching Station

A new 230 kV switching station located along the transmission line right of way south of Cabinet Gorge has been proposed. The station would interconnect the Lancaster – Noxon 230 kV Transmission Line with the Cabinet – Rathdrum and Cabinet – Noxon 230 kV transmission lines. Completion of the project may reduce generation capacity restrictions during certain outage conditions.

4.4.8 Noxon – Pine Creek #2 230 kV Transmission Line

The existing Noxon – Pine Creek 230 kV Transmission Line is constructed as a double circuit transmission line 60% of the total length from Noxon Station. During the initial construction of the transmission line, the double circuit was intended to be completed all the way to Pine Creek Station to provide sufficient transmission capacity to serve the mining load in the Silver Valley. The mining load requirements diminished and the unconstructed portion of the transmission line was finished as a single circuit to meet the performance requirements at the time. The completion of the double circuit would provide two 230 kV transmission line from Noxon to Pine Creek with the intention of increasing the transfer capability from the Clark Fork complex.

Other alternatives are under consideration. The preferred project will be determined based on defining the desired performance under a given set of scenarios.

4.4.9 St. Maries SCADA Upgrade/Add Feeder

The Saint Maries Station is due for a full SCADA install within 2 years. Additionally, another feeder out of the station has been debated for some time. The minor rebuild associated with a SCADA install may be a good time to complete this.

4.4.10 Priest River Station

Current plans call for replacement of the 4S40 breaker. Priest River Station station is due for a condition rebuild in the 5-10 year timeframe. This is one of few stations that still has bus regulation, it should be changed to standard feeder regulation. The capacitor bank is in disrepair and needs replaced. It is also a wood sub that needs modernizing to steel.

4.4.11 Sandpoint, Sagle, and Oden Grid Modernization

The Sandpoint Grid Modernization project will include SCADA and equipment upgrades at the Sandpoint, Sagle, and Oden stations. This was initially slated as a pilot smart grid installation before the Smart Grid Investment Grants enabled the Spokane and Pullman installations, and so is a natural progression. This project should leave these stations in good shape for many years.

4.4.12 Benewah – Pine Creek 230 kV Transmission Line Rebuild

The age and condition of the Benewah – Pine Creek 230 kV Transmission Line has reached a trigger within the Avista Asset Management process, and this line will be rebuilt to current standards. Capacity change requirements are still under evaluation.

4.4.13 Cabinet – Noxon 230 kV Transmission Line Rebuild

The age and condition of the Cabinet – Noxon 230 kV Transmission Line has reached a trigger within the Avista Asset Management process, and this line will be rebuilt to current standards. The rebuild will include reconductoring the transmission line with 1590 ACSS conductor.

4.5 Steady State Study Results

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS	Corrective Action Plan
P2				
BF: A624 Rathdrum East & West 115 kV				
AVONDALE (48019)		0.9483		
CDA (48067)		0.947		
DALTON A (48093)	0.9474	0.9401		No project required. Manage dispatch of Ramsey capacitor bank.
HAYDEN (48148)	0.9462	0.9388		
HERN (48155)		5.0 %		
HUETTER (48159)		5.1 %		
BF: B1337 Sand Creek 115 kV, Albeni Falls-Sand Creek				
SANDPT A (48377)		5.1 %	5.2 %	
BF: B1338 Sand Creek 115 kV, Albeni Falls-Bonners Ferry				
SANDPT A (48377)	5.0 %	5.2 %	5.4 %	Cabinet Gorge 230/115 kV Transformer automatic LTC control
BUS: Sand Creek 115 kV				
SANDPT A (48377)		5.1 %	5.2 %	
N-1: Bronx - Sand Creek 115 kV Open @ SCR				
SANDPT A (48377)			5.0 %	
P6				
N-1: Albeni Falls - Sand Creek 115 kV + N-1: Cabinet Gorge 230/115 kV				
BRONX (48047)		1.0565		
CAB GORG (48057)		1.0558		No project required. Manage dispatch of Sand Creek capacitor bank.
CABINETG (48065)		1.0558		
CLRKFORK (48077)		1.056		
ODEN (48293)		1.0561		
SANDPT A (48377)		1.0567		
N-1: Bell - Coulee #6 500 kV + N-1: Dworshak - Hatwai 500 kV				
STMARIES (48417)	0.9457			
N-1: Bell - Coulee #6 500 kV + N-1: Dworshak - Taft 500 kV				St. Maries Capacitor Bank
STMARIES (48417)	0.9483			
N-1: Benewah - Boulder 230 kV + N-1: Hatwai 500/230 kV				
STMARIES (48417)			0.947	
N-1: Benewah - Pine Creek 230 kV + N-1: Pine Creek #2 230/115 kV				Pine Creek #1 230/115 kV
PINE CRK (48317) -> PINECRKX (48316) CKT 1			100.3 %	Transformer Replacement
N-1: Benewah 230kV Switched Shunt + N-1: Dworshak - Hatwai 500 kV				
STMARIES (48417)	0.9487		0.9495	St. Maries Capacitor Bank
N-1: Benewah 230kV Switched Shunt + N-1: Hatwai 500/230 kV				
STMARIES (48417)	0.9492	0.9475	0.9411	

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
P1			
N-1: Hatwai 500/230 kV			
STMARIES (48417)		0.9497	St. Maries Capacitor Bank
P2			
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer			
STMARIES (48417)		0.9491	
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai			
STMARIES (48417)		0.9489	St. Maries Capacitor Bank
BF: A388 Bell S2 & S3 230 kV			
STMARIES (48417)		0.9468	
BF: B1340 Sand Creek 115 kV, Bronx-Sand Creek			
BONNERS (40133)	6.3 %	0.9423	
MOYIE T (41239)	5.9 %	0.9401	
MOYIE TX (41240)	5.9 %	0.9362	
MT HALL (47194)	6.4 %	0.9427	Sandpoint Reinforcement
N BENCH (41241)	0.9478	0.9336	
SAMUELS (40927)	6.9 %	0.9392	
SELLE (40965)	7.1 %	0.9385	
SMITHFLS (41299)	6.4 %	0.9431	
YAAK (41169)		0.9487	

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	19HWPR OJECTS	24HWPR OJECTS	Mitigation
BUS: Hatwai 230 kV			
STMARIES (48417)		0.9479	St. Maries Capacitor Bank
P6			
N-1: Albeni Falls - Sand Creek 115 kV + N-1: Bronx - Cabinet 115 kV			
BRONX (48047)	1.0612		
SAMUELS (40927)	1.0578		Manage dispatch of capacitor banks at Sand Creek
SAND CRK (40929)	1.0639		
SANDPT A (48377)	1.0611		
SELLE (40965)	1.0625		
N-1: Albeni Falls - Sand Creek 115 kV + N-1: Cabinet Gorge 230/115 kV			
BONNERS (40133)	0.8802		
BRONX (48047)	0.8875		
CAB GORG (48057)	0.885		
CABINETG (48065)	0.885		
CLRKFORK (48077)	0.8854		
LIBBYFEC (47278)	0.9339		
MOYIE T (41239)	0.8792		
MOYIE TX (41240)	0.8752		
MT HALL (47194)	0.8806		
N BENCH (41241)	0.8726		
ODEN (48293)	0.8867		
SAMUELS (40927)	0.888		
SAND CRK (40929)	0.8919		Sandpoint Reinforcement
SANDPT A (48377)	0.888		
SELLE (40965)	0.891		
SMITHFLS (41299)	0.8809		
TROY (41097)	0.9177		
YAAK (41169)	0.8941		
UNSOLVED		UNSOL	
N-1: Albeni Falls - Sand Creek 115 kV + N-1: Libby 230/115 kV			
BRONX (48047)	0.8173	0.7478	
CAB GORG (48057)	0.9347	0.9105	
CABINETG (48065)	0.9328	0.9079	
CLRKFORK (48077)	0.8937	0.8547	
ODEN (48293)	0.8366	0.7754	
SANDPT A (48377)	0.8044	0.7291	
N-1: Bell - Taft 500 kV + N-1: Dworshak - Hatwai 500 kV			
STMARIES (48417)	0.9471	0.9493	
N-1: Bell - Taft 500 kV + N-1: Dworshak - Taft 500 kV			
STMARIES (48417)	0.9472	0.9468	St. Maries Capacitor Bank
N-1: Benewah - Boulder 230 kV + N-1: Hatwai 500/230 kV			
OGARA (48297)		0.9467	
STMARIES (48417)	0.9475		
N-1: Bronx - Cabinet 115 kV + N-1: Libby 230/115 kV			
ALBENI F (40029)		0.9211	
BLANCHRD (48043)		0.9391	
BONNERS (40133)	0.8964	0.75	
BRONX (48047)	0.9113	0.7854	
DUFORT (47369)	0.9165	0.8093	
HOODOO (47505)		0.9497	
LACLEDE (40617)	0.9319	0.8533	
LIBBY (40655)	0.7841	0.5928	
LIBBYFEC (47278)	0.7839	0.5926	
MOYIE T (41239)	0.8715	0.7153	
MOYIE TX (41240)	0.8675	0.7101	Sandpoint Reinforcement
MT HALL (47194)	0.8968	0.7499	
N BENCH (41241)	0.8648	0.7067	
NEWPORTT (48258)		0.9285	
OLDTOWN (48298)		0.9282	
PRIEST (40857)	0.9449	0.8824	
SAMUELS (40927)	0.9087	0.7772	
SAND CRK (40929)	0.9146	0.7895	
SAND TP (40931)	0.9192	0.8115	
SANDPONT (40933)	0.9193	0.8127	
SANDPT A (48377)	0.9112	0.7854	
SELLE (40965)	0.9131	0.7866	

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	19HWPROJECTS	24HWPROJECTS	Mitigation
SMITHFLS (41299)	0.8972	0.7501	
TROY (41097)	0.8047	0.6217	
YAAK (41169)	0.8385	0.6686	
N-1: Bronx - Cabinet 115 kV + N-1: Sand Creek 115kV Switched Shunt			
N BENCH (41241)		0.9485	
N-1: Cabinet Gorge 230/115 kV + N-1: Libby 230/115 kV			
ALBENI F (40029)	0.9184	0.8864	
ATHOL (40067)		0.9451	
BLANCHRD (48043)	0.9381	0.9135	
BONNERS (40133)	0.7481	0.6418	
BRONX (48047)	0.7782	0.6824	
CAB GORG (48057)	0.7749	0.6779	
CABINETG (48065)	0.7749	0.6779	
CLRKFORK (48077)	0.7754	0.6786	
DUFORT (47369)	0.8031	0.7217	
HOODOO (47505)	0.9494	0.9293	
LACLEDE (40617)	0.8478	0.7882	
LIBBY (40655)	0.601	0.4772	
LIBBYFEC (47278)	0.6008	0.4771	
MOYIE T (41239)	0.7155	0.6047	
MOYIE TX (41240)	0.7105	0.5988	
MT HALL (47194)	0.748	0.6412	
N BENCH (41241)	0.7072	0.595	
NEWPORTT (48258)	0.9269	0.8979	
ODEN (48293)	0.7771	0.6809	
OLDTOWN (48298)	0.9266	0.8976	
PRIEST (40857)	0.8781	0.8308	
SACHEEN (40907)		0.9438	
SAMUELS (40927)	0.7727	0.6748	
SAND CRK (40929)	0.7839	0.6898	
SAND TP (40931)	0.8051	0.7236	
SANDPONT (40933)	0.8063	0.7256	
SANDPT A (48377)	0.7789	0.6835	
SELLE (40965)	0.7813	0.6864	
SMITHFLS (41299)	0.7483	0.6414	
SPIRITLK (48401)		0.945	
SPIRITLT (48403)		0.9455	
TROY (41097)	0.6279	0.5073	
YAAK (41169)	0.6718	0.5559	
N-1: Cabinet Gorge 230/115 kV + N-1: Sand Creek 115kV Switched Shunt			
BONNERS (40133)		0.9486	
BRONX (48047)		0.9489	
CAB GORG (48057)		0.9466	
CABINETG (48065)		0.9466	
CLRKFORK (48077)		0.947	
MOYIE T (41239)		0.9449	
MOYIE TX (41240)		0.941	
MT HALL (47194)		0.9491	
N BENCH (41241)	0.949	0.9384	
ODEN (48293)		0.9481	
SANDPT A (48377)		0.9493	
SMITHFLS (41299)		0.9494	
N-1: Dry Creek - Talbot 230 kV + N-1: Hatwai 500/230 kV			
STMARIES (48417)	0.9479		St. Maries Capacitor Bank
N-1: Dworshak - Hatwai 500 kV + N-1: Hatwai - Lower Granite 500 kV			
STMARIES (48417)		0.9489	
N-1: Libby 230/115 kV + N-1: Sand Creek 115kV Switched Shunt			
BRONX (48047)	0.938	0.9248	Sandpoint Reinforcement
ODEN (48293)	0.9442	0.9323	
SANDPT A (48377)	0.9338	0.9196	
SSEE			
N-2 (ROW): Bell - Taft 500 kV and Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Lancaster 230 kV			
STMARIES (48417)		0.9456	St. Maries Capacitor Bank
N-2 (ROW): Bell - Taft 500 kV and Cabinet - Rathdrum 230 kV and Lancaster - Noxon 230 kV			

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
STMARIES (48417)		0.9485	
SUB: Hatwai 500 & 230 (BPA)			
STMARIES (48417)		0.947	

	19LSPR OJECTS	19LWPR OJECTS	Mitigation
P1			
G-1: Libby Hydro Unit 1			
CAB GORG (48059)		1.0525	
N-1: Cabinet - Noxon 230 kV			Utilize Cabinet generator reactive capability
CAB GORG (48059)		1.0525	
N-1: Dworshak - Hatwai 500 kV			
CAB GORG (48059)		1.0521	
P2			
N-1: Cabinet - Rathdrum 230 kV Open @ RAT			Utilize Cabinet generator reactive capability
CAB GORG (48059)		1.0522	
LAKEVIEW (48179)		1.054	
P6			
N-1: Bell - Taft 500 kV + N-1: Dworshak - Hatwai 500 kV			
BUNKRHIL (48049)	0.9478		
CAB GORG (48057)	0.9418	0.9393	
CABINETG (48065)	0.9421	0.9397	
CLRKFORK (48077)	0.9481	0.9469	
NOXON (48281) -> CAB GORG (48059) CKT 1	113.0 %		
BIGCREEK (48041)	0.9467		
BURKE (48051)	0.9464		
LUCKY F (48215)	0.9428	0.949	
LUCKYFTP (48151)	0.9452		
OSBURN (48305)	0.9458		
WALLACE (48453)	0.946		
N-1: Bell - Taft 500 kV + N-1: Dworshak - Taft 500 kV			
CAB GORG (48057)	0.9481	0.9349	Redispatch generation after first N-1 per BPA DSO's
CABINETG (48065)	0.9484	0.9352	
CLRKFORK (48077)		0.9425	
NOXON (48281) -> CAB GORG (48059) CKT 1	111.5 %		
BIGCREEK (48041)		0.9491	
BURKE (48051)		0.9495	
LUCKY F (48215)	0.9489	0.9466	
LUCKYFTP (48151)		0.9483	
OSBURN (48305)		0.9485	
WALLACE (48453)		0.9489	
N-1: Dworshak - Taft 500 kV + N-1: Hot Springs - Noxon #1 230 kV			
RATTLE S (40867)		1.0512	
N-1: Dworshak - Taft 500 kV + N-1: Hot Springs - Noxon #2 230 kV			
RATTLE S (40867)		1.051	
N-1: Dworshak - Taft 500 kV + N-1: Noxon 230kV Switched Shunt			
CAB GORG (48059)		1.06	
LAKEVIEW (48179)		1.057	
NOXON (48281)		1.0597	
NOXONBPA (40787)		1.0597	
RATHDRUM (48357)		1.0526	
RATTLE S (40867)		1.0543	Noxon Station Rebuild – separate Noxon reactor banks from common outage point
DIXON MV (40348)		1.0549	
HOT SPR (40551)		1.0543	
N-1: Hatwai - Lower Granite 500 kV + N-1: Noxon 230kV Switched Shunt			
CAB GORG (48059)		1.055	
LAKEVIEW (48179)		1.0522	
NOXON (48281)		1.0545	
NOXONBPA (40787)		1.0545	
RATTLE S (40867)		1.0501	
N-1: Hot Springs - Noxon #2 230 kV + N-1: Hot Springs - Taft 500 kV			
CAB GORG (48059)		1.0521	Utilize Cabinet generator reactive capability
N-1: Hot Springs - Noxon #2 230 kV + N-1: Hot Springs 500/230 kV			
CAB GORG (48059)		1.0521	

	19LSPR OJECTS	19LWPR OJECTS	Mitigation
N-1: Hot Springs - Taft 500 kV + N-1: Noxon 230kV Switched Shunt			
CAB GORG (48059)		1.0551	
HUNGRY H (40557)		1.0504	
NOXON (48281)		1.0559	
NOXONBPA (40787)		1.0559	
HASKILL (40513)		1.0509	
HOT SPR (40551)		1.0544	
N-1: Hot Springs 500 kV Switched Shunt + N-1: Noxon 230kV Switched Shunt			
CAB GORG (48059)		1.0564	
LAKEVIEW (48179)		1.0528	Noxon Station Rebuild – separate
NOXON (48281)		1.0566	Noxon reactor banks from common
NOXONBPA (40787)		1.0566	outage point
HASKILL (40513)		1.0507	
HOT SPR (40551)		1.0523	
N-1: Hot Springs 500/230 kV + N-1: Noxon 230kV Switched Shunt			
CAB GORG (48059)		1.0551	
HUNGRY H (40557)		1.0504	
NOXON (48281)		1.0559	
NOXONBPA (40787)		1.0559	
HASKILL (40513)		1.0509	
HOT SPR (40551)		1.0544	
SSEE			
GEN: Libby Hydro - All Units			Utilize Cabinet generator reactive
CAB GORG (48059)		1.0525	capability
N-2 (ROW): Bell - Taft 500 kV and Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Lancaster 230 kV			
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	**113.6 %**		Acceptable risk for extreme event
PLEASANT (48319) -> MOAB (47511) CKT 1	**107.9 %**		
PRAIRIEB (40855) -> POST FLS (48329) CKT 1	**101.3 %**		

4.6 Spare Equipment Study

Facility rating violations from the Spare Equipment Study are provided in Table III-9.

4.6.1 Rathdrum Transformer Failure

Failure of a Rathdrum #1 or #2 230/115 kV transformer requiring complete replacement causes thermal overloads on local 115 kV transmission lines when a subsequent bus outage or breaker failure occurs. Similar issues occur when all transformers are in service and a Rathdrum tie breaker failure occurs. Loss of a Rathdrum transformer will also make existing issues in the Spokane area more severe.

The observed issues with loss of a Rathdrum transformer will be mitigated by completion of projects previously mentioned including the Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild and Bronx – Cabinet and Bronx – Sand Creek 115 kV Transmission Line rebuild projects. There is no need for acquiring a spare 230/115 kV transformer for the Coeur d'Alene area.

4.6.2 Cabinet Transformer Failure

Failure of the Cabinet 230/115 kV Transformer requiring complete replacement causes low voltages issues when subsequent outages related to Albeni Falls Station occur. The remaining system leaves only the Libby 230/115 kV Transformer to serve area.

Additional review of the BPA's capacitor functionality at Sand Creek and Bonners Ferry stations is required. A spare 230/115 kV transformer capable of replacing the Cabinet 230/115 kV Transformer will not adequately address the issue. A long term plan should be developed if BPA's capacitors are not sufficient to hold up the voltage in the area. The long term plan may include the construction of a new 115 kV transmission line in the area.

	CAB	PIN1	PIN2	RAT1	RAT2
P1					
N-1: Albeni Falls - Sand Creek 115 kV					
BRONX (48047)	1.0528				
SANDPT A (48377)	1.054				
N-1: Libby 230/115 kV					
BRONX (48047) -> SANDPT A (48377) CKT 1 at BRONX				102.0 %	103.0 %
CLRKFORK (48077) -> ODEN (48293) CKT 1 at CLRKFORK				109.6 %	110.6 %
ODEN (48293) -> BRONX (48047) CKT 1 at ODEN				101.6 %	102.7 %
P2					
BF: A388 Bell S2 & S3 230 kV					
WEST (48463) -> WEST (48461) CKT 1 at WEST					102.2 %
BF: A501 Rathdrum West 115 kV, Boulder-Rathdrum					
EASTFARM (48117) -> POST FLS (48329) CKT 1 at POST FLS					109.7 %
OTIS (48311) -> EASTFARM (48117) CKT 1 at EASTFARM					118.2 %
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at PRAIRIEB					127.4 %
BF: A502 Rathdrum West 115 kV, Ramsey-Rathdrum #1					
EASTFARM (48117) -> POST FLS (48329) CKT 1 at POST FLS					100.3 %
OTIS (48311) -> EASTFARM (48117) CKT 1 at EASTFARM					108.7 %
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at PRAIRIEB					115.5 %
BF: A505 Rathdrum East 115 kV, Coeur d'Alene 15th St-Rathdrum					
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at PRAIRIEB				101.2 %	
BF: A506 Rathdrum 115 kV, Pine Street-Rathdrum					
BOULDERE (48522) -> MOAB (47511) CKT 1 at MOAB				106.7 %	
EASTFARM (48117) -> POST FLS (48329) CKT 1 at POST FLS				108.8 %	

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	CAB	PIN1	PIN2	RAT1	RAT2
MOAB (47511) -> PLEASANT (48319) CKT 1 at PLEASANT				103.0 %	
OTIS (48311) -> EASTFARM (48117) CKT 1 at EASTFARM				117.2 %	
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at PRAIRIEB				126.7 %	
BF: A600 Beacon North & South 115 kV					
NORTHWES (48279) -> FRANCEDR (48127) CKT 1 at FRANCEDR				104.1 %	104.5 %
OTIS (48311) -> LIBTYLK (48185) CKT 1 at LIBTYLK				119.8 %	118.5 %
WEST (48463) -> WEST (48461) CKT 1 at WEST				140.2 %	140.9 %
WEST (48463) -> WEST (48461) CKT 2 at WEST				108.3 %	108.8 %
BF: A638 Rathdrum 115 kV, Appleway-Rathdrum					
BOULDERE (48522) -> MOAB (47511) CKT 1 at MOAB				101.9 %	
EASTFARM (48117) -> POST FLS (48329) CKT 1 at POST FLS				103.0 %	
OTIS (48311) -> EASTFARM (48117) CKT 1 at EASTFARM				111.3 %	
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at POST FLS				119.4 %	
BF: B960 Albeni Falls 115 kV, Albeni Falls-Sacheen					
BRONX (48047)	0.881				
CAB GORG (48057)	0.8765				
CABINETG (48065)	0.8765				
CLRKFORK (48077)	0.8768				
ODEN (48293)	0.878				
PRIEST A (48347)	0.877				
SAGLE (48376)	0.8863				
SANDPT A (48377)	0.8828				
BF: B964 Albeni Falls 115 kV, Albeni Falls-Pine Street					
BONNERS (40133)	0.8803				
BRONX (48047)	0.8819				
CAB GORG (48057)	0.8774				
CABINETG (48065)	0.8774				
CLRKFORK (48077)	0.8777				
DUFORT (47369)	0.8866				
LACLEDE (40617)	0.8816				
LIBBYFEC (47278)	0.9433				
MOYIE T (41239)	0.8822				
MOYIE TX (41240)	0.8792				
MT HALL (47194)	0.8806				
N BENCH (41241)	0.8776				
ODEN (48293)	0.8788				
PRIEST (40857)	0.8785				
PRIEST A (48347)	0.8779				
SAGLE (48376)	0.8872				
SAMUELS (40927)	0.8865				
SAND CRK (40929)	0.8897				
SAND TP (40931)	0.8885				
SANDPONT (40933)	0.8885				
SANDPT A (48377)	0.8837				
SELLE (40965)	0.889				
SMITHFLS (41299)	0.881				
TROY (41097)	0.927				
TROY (41097) -> YAAK (41169) CKT 1 at TROY	105.1 %				
YAAK (41169)	0.8998				
YAAK (41169) -> MOYIE T (41239) CKT 1 at YAAK	104.1 %				
BF: B967 Albeni Falls 115 kV, Albeni Falls-Sand Creek					
BRONX (48047)	1.0528				
SANDPT A (48377)	1.0541				
BF: R427 Beacon North & South 230 kV					
WEST (48463) -> WEST (48461) CKT 1 at WEST				107.2 %	107.9 %
BUS: Albeni Falls 115 kV					
BRONX (48047)	0.8818				
CAB GORG (48057)	0.8773				
CABINETG (48065)	0.8773				
CLRKFORK (48077)	0.8776				
ODEN (48293)	0.8788				
PRIEST A (48347)	0.8778				
SAGLE (48376)	0.8871				

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	CAB	PIN1	PIN2	RAT1	RAT2
SANDPT A (48377)	0.8836				
BUS: Rathdrum East 115 kV					
BOULDERE (48522) -> MOAB (47511) CKT 1 at MOAB				106.7 %	
EASTFARM (48117) -> POST FLS (48329) CKT 1 at POST FLS				108.8 %	
MOAB (47511) -> PLEASANT (48319) CKT 1 at PLEASANT				103.0 %	
OTIS (48311) -> EASTFARM (48117) CKT 1 at EASTFARM				117.2 %	
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at PRAIRIEB				126.7 %	
BUS: Rathdrum West 115 kV					
EASTFARM (48117) -> POST FLS (48329) CKT 1 at POST FLS					109.2 %
OTIS (48311) -> EASTFARM (48117) CKT 1 at EASTFARM					117.7 %
POST FLS (48329) -> PRAIRIEB (40855) CKT 1 at PRAIRIEB					126.8 %
N-1: Albeni Falls - Sand Creek 115 kV Open @ ALB					
BRONX (48047)	0.8867				
CAB GORG (48057)	0.8822				
CABINETG (48065)	0.8822				
CLRKFORK (48077)	0.8825				
ODEN (48293)	0.8837				
PRIEST A (48347)	0.8828				
SAGLE (48376)	0.892				
SANDPT A (48377)	0.8885				
N-1: Albeni Falls - Sand Creek 115 kV Open @ SCR					
BRONX (48047)	1.053				
SANDPT A (48377)	1.0543				
N-1: Bonner Ferry - Libby 115 kV Open @ LIB					
BRONX (48047) -> SANDPT A (48377) CKT 1 at BRONX				104.9 %	105.9 %
CLRKFORK (48077) -> ODEN (48293) CKT 1 at CLRKFORK				112.2 %	113.3 %
ODEN (48293) -> BRONX (48047) CKT 1 at ODEN				104.5 %	105.6 %

TABLE III-9: COEUR D'ALENE SPARE EQUIPMENT CONTINGENCY ANALYSIS RESULTS.

4.7 Voltage Stability Study

A Load Ramp PV Curve analysis was conducted while monitoring all buses in the Coeur d'Alene area. All loads within the Coeur d'Alene area were increased until voltage collapse occurred. All additional generation necessary to supply the increase in load came from a distribution of all generation in WECC except those within the Coeur d'Alene area.

The theoretical flow limit is 2015 MW for all lines in service condition. The critical bus under all lines in service condition is St. Maries Station. As load increases in the Coeur d'Alene area, the limiting contingency remains the tie breaker failure at Rathdrum Station with total area load of 575 MW (see Figure III-13). The critical bus under the Rathdrum tie breaker failure contingency is Hayden Station.

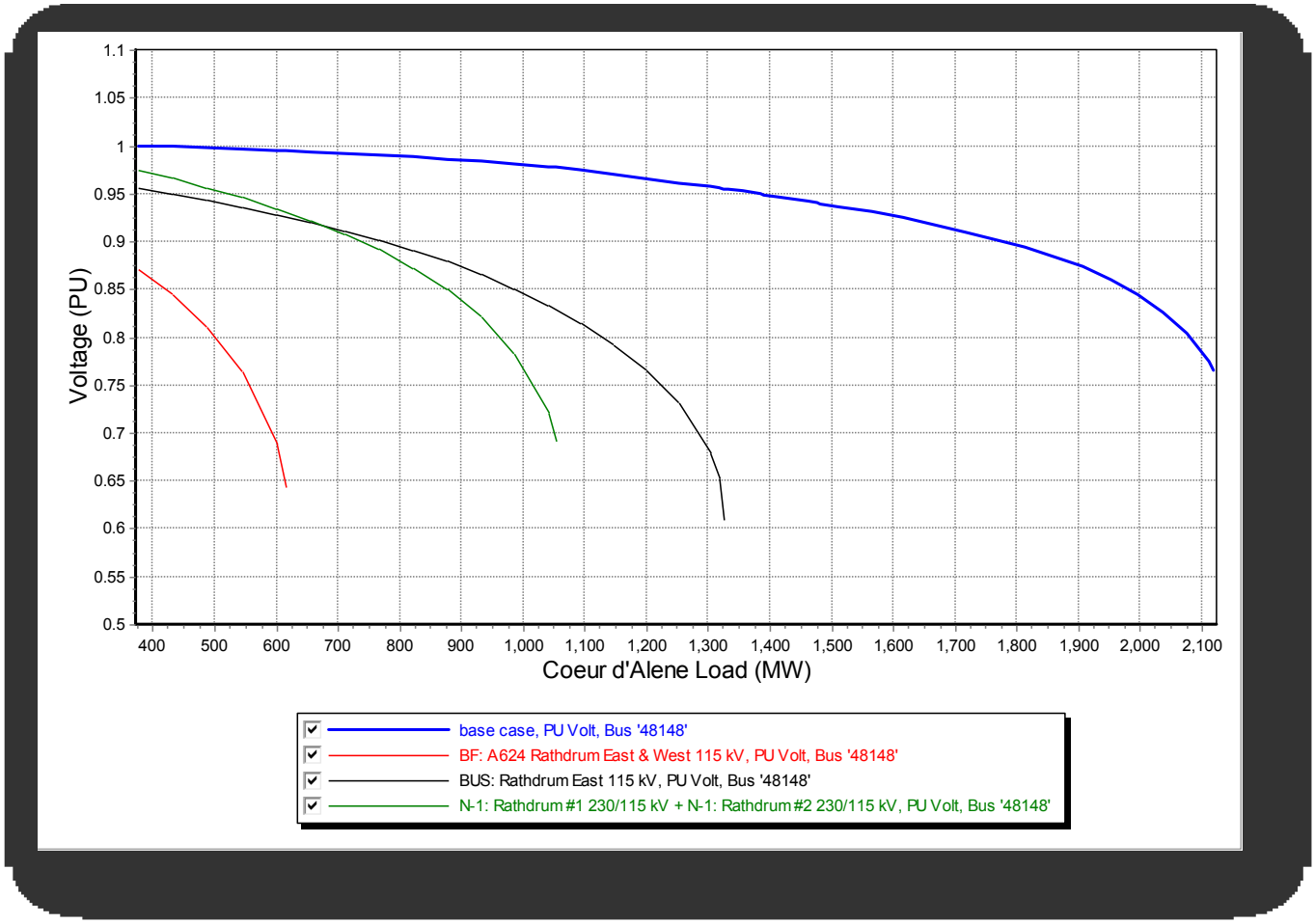


FIGURE III-13: COEUR D'ALENE LOAD RAMP PV CURVE RESULTS – EXISTING SYSTEM

The load ramp PV curve analysis was repeated with the assumption that all planned corrective action plans listed above are constructed. The limiting contingency remains the tie breaker failure at Rathdrum Station but with a total area load of 1040 MW, an increase of 470 MW prior to project construction.

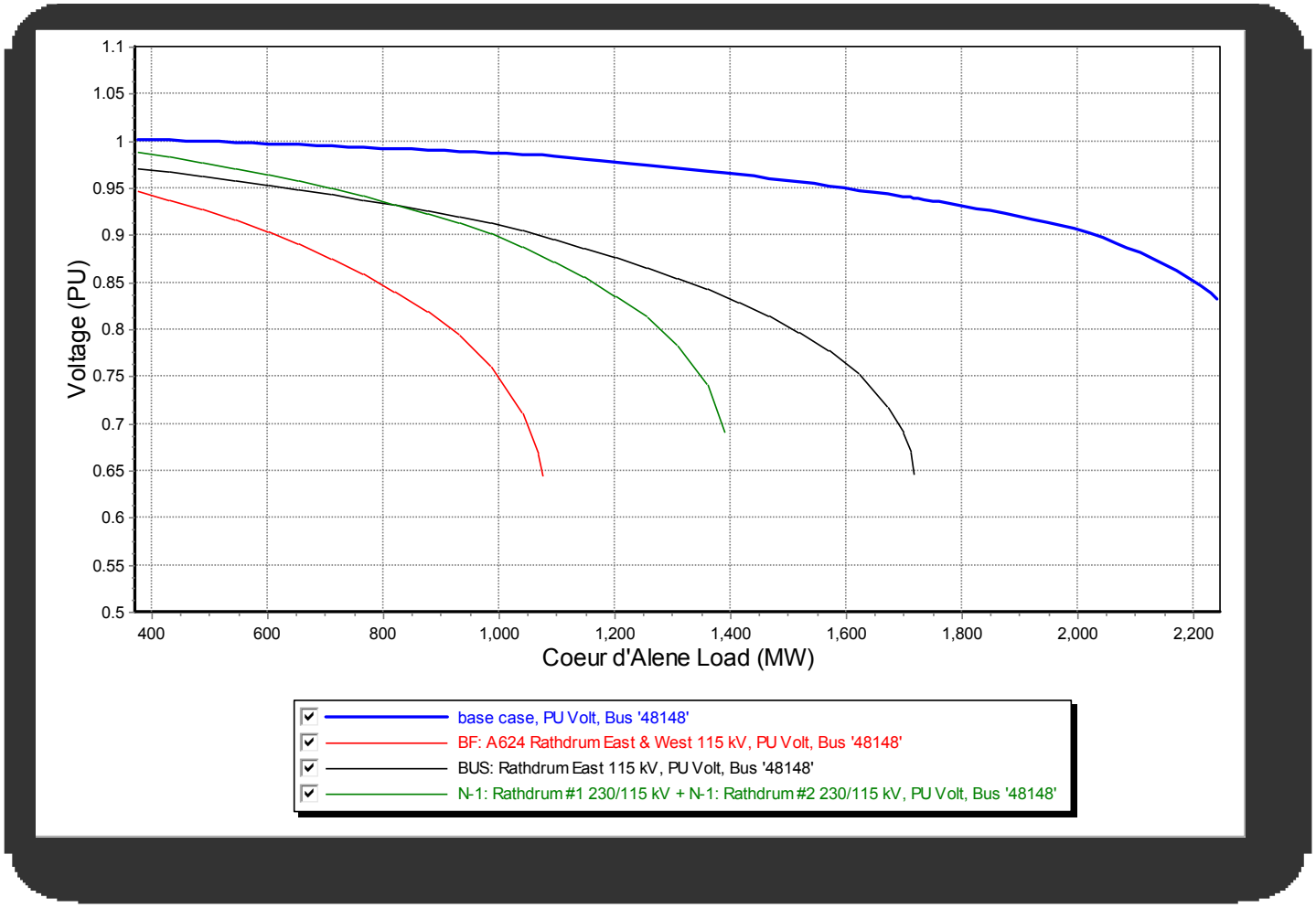


FIGURE III-14: COEUR D'ALENE LOAD RAMP PV CURVE RESULTS – PLANNED SYSTEM

4.8 Stability Study Results

Row Labels	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSP ROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSP ROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
SSEE							
BF: 4111 Dworshak-Taft, Hot Springs-Taft 3P (DWOR-TAFT @ TAFT)							
Out of Step Generator							
CABGOR12 14kV			OOS	2.1 s	OOS	2.2 s	
CABGOR34 14kV			OOS	2.1 s	OOS	2.2 s	
LIB 01 14kV	OOS	2.6 s	OOS	2.0 s	OOS	2.1 s	
LIB 02 14kV	OOS	2.6 s	OOS	2.0 s	OOS	2.1 s	
LIB 03 14kV	OOS	2.6 s	OOS	2.0 s	OOS	2.1 s	
LIB 04 14kV	OOS	2.6 s	OOS	2.0 s	OOS	2.1 s	
LIB 05 14kV	OOS	2.6 s	OOS	2.0 s	OOS	2.1 s	
NOXON 5 14kV			OOS	2.1 s	OOS	2.2 s	
NOXON12 14kV			OOS	2.0 s	OOS	2.1 s	
NOXON34 14kV			OOS	2.1 s	OOS	2.1 s	
TROY 115kV	OOS	2.7 s	OOS	2.1 s	OOS	2.1 s	
BF: R316 Noxon 230 kV, Libby - Noxon 230 kV 3P (LIBY-NRS @NRS)							
Out of Step Generator							
CABGOR12 14kV	OOS	1.7 s	OOS	1.7 s	OOS	1.7 s	
CABGOR34 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
NOXON 5 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
NOXON12 14kV	OOS	1.3 s	OOS	1.3 s	OOS	1.3 s	
BF: R333 Noxon 230 kV, Noxon - Pine Creek 230 kV 3P (NRS-PIN @NRS)							
Out of Step Generator							
NOXON34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: R334 Noxon 230 kV, Cabinet - Noxon 230 kV 3P (CAB-NRS @NRS)							**No criteria violation**
Out of Step Generator							
LIB 01 14kV	OOS	1.8 s	OOS	1.8 s	OOS	1.8 s	
LIB 02 14kV	OOS	1.8 s	OOS	1.8 s	OOS	1.8 s	
LIB 03 14kV	OOS	1.8 s	OOS	1.8 s	OOS	1.8 s	
LIB 04 14kV	OOS	1.8 s	OOS	1.8 s	OOS	1.8 s	
LIB 05 14kV	OOS	1.8 s	OOS	1.8 s	OOS	1.8 s	
NOXON34 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
TROY 115kV	OOS	4.6 s	OOS	4.6 s	OOS	4.6 s	
BF: R336 Noxon 230 kV, Lancaster - Noxon 230 kV 3P (LANC-NRS @NRS)							
Out of Step Generator							
CABGOR12 14kV	OOS	1.8 s	OOS	1.9 s	OOS	1.9 s	
CABGOR34 14kV	OOS	1.7 s	OOS	1.8 s	OOS	1.8 s	
NOXON 5 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.5 s	
NOXON12 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
BF: R337 Noxon 230 kV, Hot Springs - Noxon #1 230 kV 3P (HOTS-NRS #1 @NRS)							
Out of Step Generator							
CABGOR12 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
CABGOR34 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
LIB 01 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
LIB 02 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
NOXON 5 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
NOXON12 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
TROY 115kV	OOS	1.7 s	OOS	1.7 s	OOS	1.7 s	

Same results for heavy winter scenario.

Row Labels	15LS Max of Voltage Dip or Frequency	Max of Duration or Time	19LSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
P4					
BF: R336 Noxon 230 kV, Lancaster - Noxon 230 kV SLG (LANC-NRS @NRS)					
Out of Step Generator					
HUNGHR12 14kV	OOS	2.2 s	OOS	2.2 s	
LIB 01 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 02 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 03 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 04 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 05 14kV	OOS	2.0 s	OOS	2.0 s	
TROY 115kV	OOS	2.0 s	OOS	2.0 s	
WECC Category C Voltage Dip Any Bus					
BONNERS 115kV	-52.2 %		-50.9 %		
BONSAM11 115kV	-51.9 %		-50.7 %		
BONSAM12 115kV	-40.0 %		-38.6 %		
BRONX 115kV	-31.9 %		-30.9 %		
COL FALL 115kV	-72.0 %		-72.0 %		
COL FALL E 230kV	-77.2 %		-77.2 %		
COL FALL W 230kV	-77.2 %		-77.1 %		
CONKELLY 230kV	-79.1 %		-79.0 %		
DUFORT 115kV	-31.3 %		-30.0 %		
ELMO 115kV	-31.5 %		-31.4 %		
EUREKA T 115kV	-72.8 %		-72.8 %		
FLATHEAD 230kV	-64.7 %		-64.6 %		
HASKILL 230kV	-86.9 %		-87.0 %		
HUNGHR12 13.8kV	-98.8 %		-97.9 %		
HUNGHR34 13.8kV	-78.6 %		-78.6 %		
HUNGRY H 230kV	-78.6 %		-78.6 %		
KALISPEL 115kV	-60.3 %		-60.3 %		**BPA issue. Will be mitigated by Noxon Station Rebuild**
LAKESD F 230kV	-48.3 %		-48.3 %		
LIB 01 13.8kV	-34.6 %		-34.7 %		
LIB 02 13.8kV	-34.4 %		-34.5 %		
LIB 03 13.8kV	-34.4 %		-34.5 %		
LIB 04 13.8kV	-34.3 %		-34.4 %		
LIB 05 13.8kV	-31.7 %		-31.7 %		
LIB 06 13.8kV	-47.3 %		-47.4 %		
LIB PH1 230kV	-45.1 %		-45.3 %		
LIB PH2 230kV	-44.9 %		-45.0 %		
LIB TX1 100kV	-49.7 %		-49.8 %		
LIB TX2 100kV	-49.6 %		-49.7 %		
LIB TX3 100kV	-47.3 %		-47.4 %		
LIBBY 115kV	-58.8 %		-59.1 %		
LIBBY 230kV	-45.8 %		-45.9 %		
LIBBYFEC 115kV	-77.2 %		-77.7 %		
LION MTN 230kV	-52.8 %		-52.8 %		
MOYIE T 115kV	-61.5 %		-60.4 %		
MOYIE TX 115kV	-61.3 %		-60.2 %		
MT HALL 115kV	-52.2 %		-50.9 %		
N BENCH 115kV	-61.4 %		-60.2 %		
ODEN 115kV	-30.1 %		-30.3 %		
SAMSEL11 115kV	-39.9 %		-38.5 %		
SAMSEL12 115kV	-36.4 %		-34.9 %		
SAMUELS 115kV	-40.0 %		-38.5 %		
SAND CRK 115kV	-35.3 %		-33.8 %		
SAND TP 115kV	-31.7 %		-30.4 %		
SANDPONT 115kV	-31.3 %		-30.0 %		
SANDPT A 115kV	-32.4 %		-30.7 %		
SANSAN11 115kV	-33.2 %		-31.4 %		

125 YEARS OF SERVICE 1889–2014 AVISTA

Row Labels	15LS Max of Voltage Dip or Frequency	Max of Duration or Time	19LSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
SANSEL11 115kV	-35.5 %		-33.9 %		
SANSEL12 115kV	-36.3 %		-34.7 %		
SELLE 115kV	-36.3 %		-34.8 %		
SMITHFLS 115kV	-52.2 %		-50.9 %		
SMITHFLS 13.8kV	-52.2 %		-50.9 %		
STILLWTR 115kV	-72.3 %		-72.3 %		
TREGO 115kV	-72.7 %		-72.7 %		
TROY 115kV	-99.3 %		-98.5 %		
TRUMB CR 230kV	-85.4 %		-85.4 %		
YAAK 115kV	-79.8 %		-78.9 %		
SSEE					
BF: 4111 Dworshak-Taft, Hot Springs-Taft 3P (DWOR-TAFT @ TAFT)					
Out of Step Generator					
HUNGHR12 14kV	OOS	1.9 s	OOS	1.9 s	
LIB 01 14kV	OOS	1.8 s	OOS	1.8 s	
LIB 02 14kV	OOS	1.8 s	OOS	1.8 s	
LIB 03 14kV	OOS	1.8 s	OOS	1.8 s	
LIB 04 14kV	OOS	1.8 s	OOS	1.8 s	
LIB 05 14kV	OOS	1.8 s	OOS	1.8 s	
LION MTN 230kV	OOS	2.0 s	OOS	2.1 s	
TROY 115kV	OOS	1.9 s	OOS	1.9 s	
BF: 4119 Bell-Taft, Garrison-Taft #1 3P (BELL-TAFT @ TAFT)					
Out of Step Generator					
HUNGHR12 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 01 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 02 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 03 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 04 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 05 14kV	OOS	2.0 s	OOS	2.0 s	
LION MTN 230kV	OOS	2.0 s	OOS	2.1 s	
TROY 115kV	OOS	2.0 s	OOS	2.1 s	
BF: R334 Noxon 230 kV, Cabinet - Noxon 230 kV 3P (CAB-NRS @NRS)					
Out of Step Generator					
HUNGHR12 14kV	OOS	2.1 s	OOS	2.1 s	**Criteria not violated**
LIB 01 14kV	OOS	1.8 s	OOS	1.7 s	
LIB 02 14kV	OOS	1.8 s	OOS	1.7 s	
LIB 03 14kV	OOS	1.8 s	OOS	1.7 s	
LIB 04 14kV	OOS	1.8 s	OOS	1.7 s	
LIB 05 14kV	OOS	1.7 s	OOS	1.7 s	
TROY 115kV	OOS	4.7 s	OOS	4.8 s	
BF: R336 Noxon 230 kV, Lancaster - Noxon 230 kV 3P (LANC-NRS @NRS)					
Out of Step Generator					
HUNGHR12 14kV	OOS	1.7 s	OOS	1.7 s	
LIB 01 14kV	OOS	1.5 s	OOS	1.5 s	
LIB 02 14kV	OOS	1.5 s	OOS	1.5 s	
LIB 03 14kV	OOS	1.5 s	OOS	1.5 s	
LIB 04 14kV	OOS	1.5 s	OOS	1.5 s	
LIB 05 14kV	OOS	1.5 s	OOS	1.5 s	
TROY 115kV	OOS	1.6 s	OOS	1.6 s	
BF: R337 Noxon 230 kV, Hot Springs - Noxon #1 230 kV 3P (HOTS-NRS #1 @NRS)					
Out of Step Generator					
HUNGHR12 14kV	OOS	2.0 s	OOS	2.0 s	
LIB 01 14kV	OOS	1.5 s	OOS	1.5 s	
LIB 02 14kV	OOS	1.5 s	OOS	1.5 s	
TROY 115kV	OOS	5.9 s	OOS	6.0 s	

5 LEWISTON/CLARKSTON AREA

5.1 Executive Summary

The Lewiston/Clarkston area transmission system performs substantially better than other areas but performance issues are present in the near term and long term planning horizons. The primary issue is the loss of two 230 kV transmission lines in the area. The remaining 115 kV system is inadequate to transfer power from Hatwai and/or Dry Creek stations to Lolo Station.

Constructing a new 230 kV transmission line between Hatwai and Lolo stations will improve the transmission system performance in the near and long term planning horizon. The addition of shunt reactors will also enhance the operational flexibility to maintain adequate voltage levels.

A list of the corrective action plans proposed for the Lewiston/Clarkston area is provided in Table III-10.

	Year Problem Starts	Construction Start	Construction End	Consequence	Probability Factor	Priority	Cost Estimate
3-Needs Further Analysis							
North Lewiston Reactors	Present	2015	2016	200	0.7500	150.0000	$4,900,000
4-New Proposal							
Hatwai - Lolo #2 230 KV Transmission Line	Present	2017	2019	850	0.0094	7.9688	$8,025,000
Lolo Transformer Replacement	Present			14	0.0094	0.1313	$1,000,000
South Lewiston Station Rebuild	2030	2015	2016	100	0.0006	0.0586	$1,400,000

TABLE III-10: LEWISTON/CLARKSTON CORRECTIVE ACTION PLANS

Additional projects not categorized as corrective action plans are listed in Table III-11.

	Construction Start	Construction End	Cost Estimate
1-Completed			
10th & Stewart Station Rebuild			
Lewiston Mill Road Station			
North Lewiston Distribution Station Relocation			
2-Planned			
Clearwater Station Upgrade	2015	2016	$1,000,000
Grangeville Station Rebuild	2018	2019	$2,025,000
Kamiah Wood Station Rebuild	2017	2018	$1,300,000
Kooskia Transformer Replacement			
Pound Land Station Rebuild	2017	2018	$1,300,000
3-Needs Further Analysis			
Wheatland Station			$0

TABLE III-11: LEWISTON/CLARKSTON FURTHER SINGLE SYSTEM PROJECTS

5.2 System Description

The Avista Lewiston/Clarkston area is located primarily in the Asotin County in the state of Washington and the Clearwater, Idaho, Lewis and Nez Perce Counties in the state of Idaho. The geographic features, and therefore the characterization of the transmission system, throughout the Lewiston/Clarkston area vary greatly. The majority of the load served in the area can be categorized as rural, low density load with the exception of one large industrial customer. The transmission system consists of several major components: a 500 kV source at the BPA's Hatwai Station, a 230 kV backbone system, and the underlying 115 kV transmission lines which serve the local loads.

5.2.1 Area Transmission

Transmission Lines

The main 230 kV transmission lines in the Lewiston/Clarkston area are:

- Dry Creek – Lolo
- Dry Creek – North Lewiston
- Hatwai – Lolo
- Hatwai – North Lewiston

Transmission Sources

The main transmission sources that feed the load in the Lewiston/Clarkston area are:

- Dry Creek – Talbot (AVA/PAC)
- Dworshak 13.8/115 kV Transformer, 150 MVA (USBR)
- Hatwai 500/230 kV Transformer, 1,250 MVA (BPA)
- Hatwai – Moscow (AVA)
- Lolo – Oxbow (AVA/IPCO)
- North Lewiston – Shawnee (AVA)

Transmission Paths

The Western Electricity Coordinating Council (WECC) transfer path Idaho to Northwest (Path 14) borders the southern edge of the Lewiston/Clarkston area. Avista owns the following transmission facilities within the path

- Lolo – Oxbow 230 kV Transmission Line

The BPA, Idaho Power, and PacifiCorp own the remaining transmission facilities which

comprise the Idaho to Northwest Path.

5.2.2 Area Generation

Non-Avista owned local generation facilities within the Lewiston/Clarkston area include the following:

◘ Dworshak HED	Units 1 & 2 @ 103 MW	Army Corps of Engineers
	Unit 3 @ 252 MW	Army Corps of Engineers
◘ Clearwater ST	Unit 1 @ 33.3 MW (black liquor)	Clearwater Paper Corp
	Unit 2 @ 50.0 MW (black liquor)	Clearwater Paper Corp

There are no active Generation Interconnection Requests within the Big Bend area (as of October 2014).

There are also numerous small hydro generators in the area; Idaho Water Resources with a 2.5 MW & 0.5 MW unit on an Ahsahka 24kV feeder, Jim Ford Hydro with three 0.4 MW units on the Weippe 13 kV feeder 1289 and John Day Creek Hydro with two 0.5 MW units on an Idaho County Light & Power REA feeder at East Grangeville.

5.3 Corrective Action Plans

5.3.1 Completed

North Lewiston Distribution Station Relocation

The distribution load at North Lewiston Station was previously connected to the South Lewiston Tap. A project was completed to relocate the distribution facilities to be within the North Lewiston Station property and electrically connected directly to the 115 kV bus.

Construction was completed in 2013.

Clearwater Station Upgrade

Several components of the Clearwater Station have been replaced due to their condition. The project included the addition of a 115 kV bus sectionalizing breaker and associated air switches on the section of bus between the two power transformers for better operational flexibility and restoration. The protective relays and associated communication system were upgraded to improve reliability of service.

Construction was completed in 2014.

Lewiston Mill Road Station

A new distribution station is planned to be constructed on the southern edge of the Clearwater Paper facility property. The station will integrate into the Clearwater – Lolo #2 115 kV Transmission Line. Two distribution feeders will be constructed to serve the Idaho Forest Group facility. An additional distribution feeder will be constructed to serve other Avista customers.

Construction is planned to be completed in 2014.

5.3.2 Planned

There are no Corrective Action Plans planned for the Lewiston/Clarkston area.

5.3.3 Need Further Analysis

The following sections describe system deficiencies assuming completion of the planned projects as described above.

230 kV Voltage Control

There is an ongoing issue with high voltage on the 230 kV transmission system in the Lewiston/Clarkston area. The high voltage problem is persistent most months of the year (the exception is heavy summer loading months) and the high voltage peaks during the overnight hours. The high voltage condition is a result of the expansion of Avista's 230 kV transmission network. Although there are many benefits to a large networked transmission system, one negative outcome is that long, lightly loaded transmission lines produce large amounts of line charging current (leading reactive MVAr), increasing system voltage. Presently, there is no practical way to correct the high voltage issue with the existing 230 kV transmission system beyond taking lines out of service. A plan has been developed to install two 50 MVAr switchable reactors at one of the 230 kV stations in the area.

5.3.4 New Proposals

Hatwai – Lolo #2 230 kV Transmission Line

Project Scope/Description

A second 230 kV transmission line from Hatwai to Lolo to create a Hatwai – Lolo #2 230 kV Transmission Line has been proposed. Presently, the outage of the Hatwai – Lolo 230 kV Transmission Line followed by a second 230 kV transmission line outage in the Lewiston/Clarkston area requires the back tripping of the Lolo – Oxbow 230 kV Transmission Line. The back tripping scheme is insufficient for relieving the thermal overload on the Clearwater – North Lewiston 115 kV Transmission Line.

The loss of both the Hatwai – Lolo and Dry Creek – North Lewiston 230 kV transmission lines causes thermal overloads on the Clearwater – North Lewiston and Dry Creek – North Lewiston 115 kV transmission lines (see Figure III-15). There is an existing operational scheme to have the Lolo – Oxbow 230 kV Transmission Line trip when a second 230 kV transmission line is tripped in the Lewiston/Clarkston area. The back tripping scheme is insufficient for relieving the thermal overload on the Clearwater – North Lewiston 115 kV Transmission Line. The construction of a second Hatwai – Lolo 230 kV transmission line will mitigate the observed performance issues.

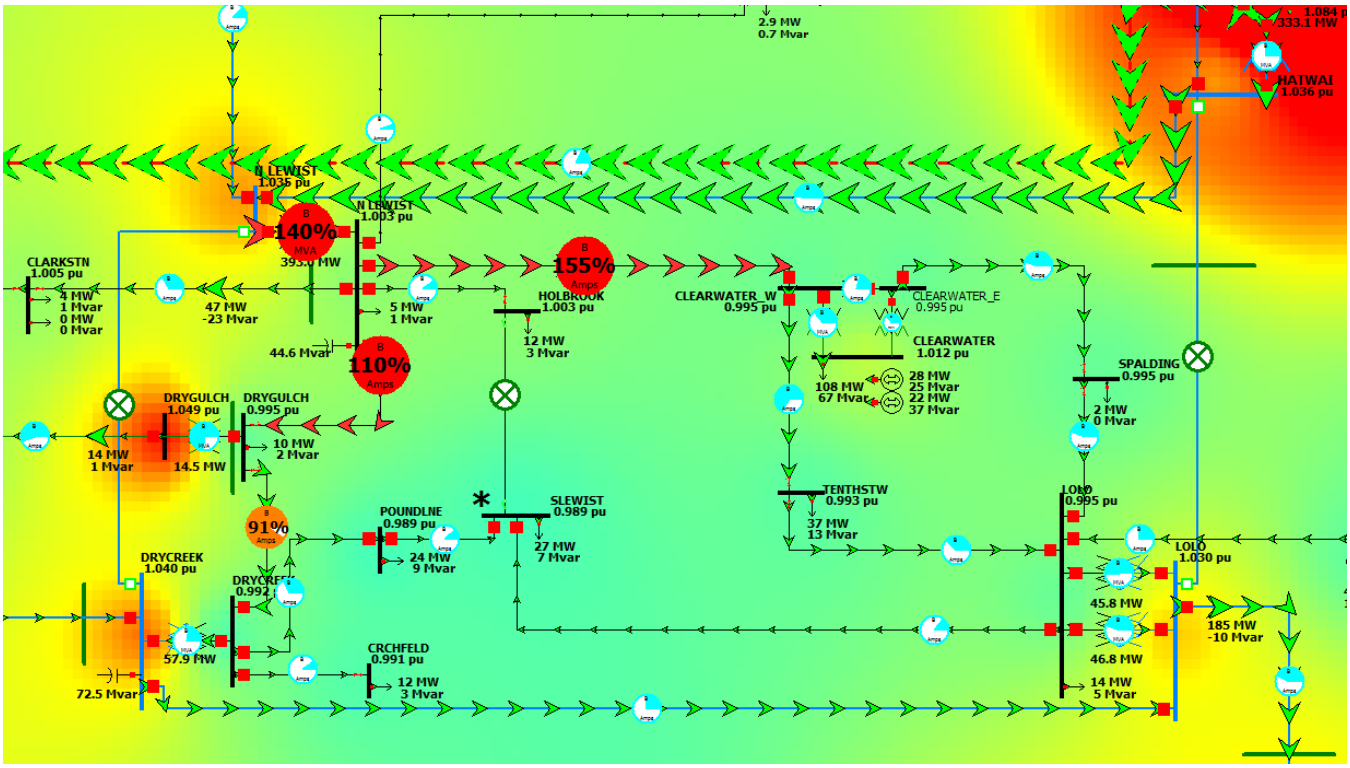


FIGURE III-15: N-1: DRY CREEK - NORTH LEWISTON 230 KV + N-1: HATWAI - LOLO 230 KV IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 heavy summer.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P6				
N-1: Dry Creek - Lolo 230 kV + N-1: Hatwai - Lolo 230 kV				
DRYCREEK (48510) -> POUNDLNE (48343) CKT 1				**103.4 %**
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	**159.9 %**	**156.5 %**	**161.2 %**	**162.7 %**
N-1: Dry Creek - North Lewiston 230 kV + N-1: Hatwai - Lolo 230 kV				
DRYGULCH (48113) -> DRYCREEK (48510) CKT 1	**105.4 %**			
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	**165.1 %**	**147.6 %**	**155.5 %**	**157.5 %**
N LEWIST (48253) -> DRYGULCH (48113) CKT 1	**123.7 %**	**102.3 %**	**110.7 %**	**111.0 %**
N LEWIST (48255) -> N LEWIST (48253) CKT 1	**146.6 %**	**132.4 %**	**141.2 %**	**142.4 %**
N-1: Dry Creek - Pound Lane 115 kV + N-1: Hatwai - Lolo 230 kV				
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1				**103.3 %**
N-1: Hatwai - Lolo 230 kV + N-1: North Lewiston 230/115 kV				
N LEWIST (48255) -> DRYCREEK (48512) CKT 1	**102.8 %**			

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

Lolo Transformer Replacement

Project Scope/Description

The Lolo #1 & #2 230/115 kV transformers are proposed to be replaced with 125 MVA minimum nominal MVA capacity. Lolo #1 230/115 kV Transformer overloads for an outage of both the Dry Creek and North Lewiston 230/115 kV transformers. The Lolo transformers have been identified by Asset Management for replaced due to age and condition.

An outage of both the Dry Creek and North Lewiston 230/115 kV transformers will overload the Lolo #1 230/115 kV Transformer (see Figure III-16). Replacing the existing Lolo transformers with 125 MVA or larger nominally rated transformers will mitigate the observed performance issues. The Lolo transformers have also been identified by Asset Management for replacement.

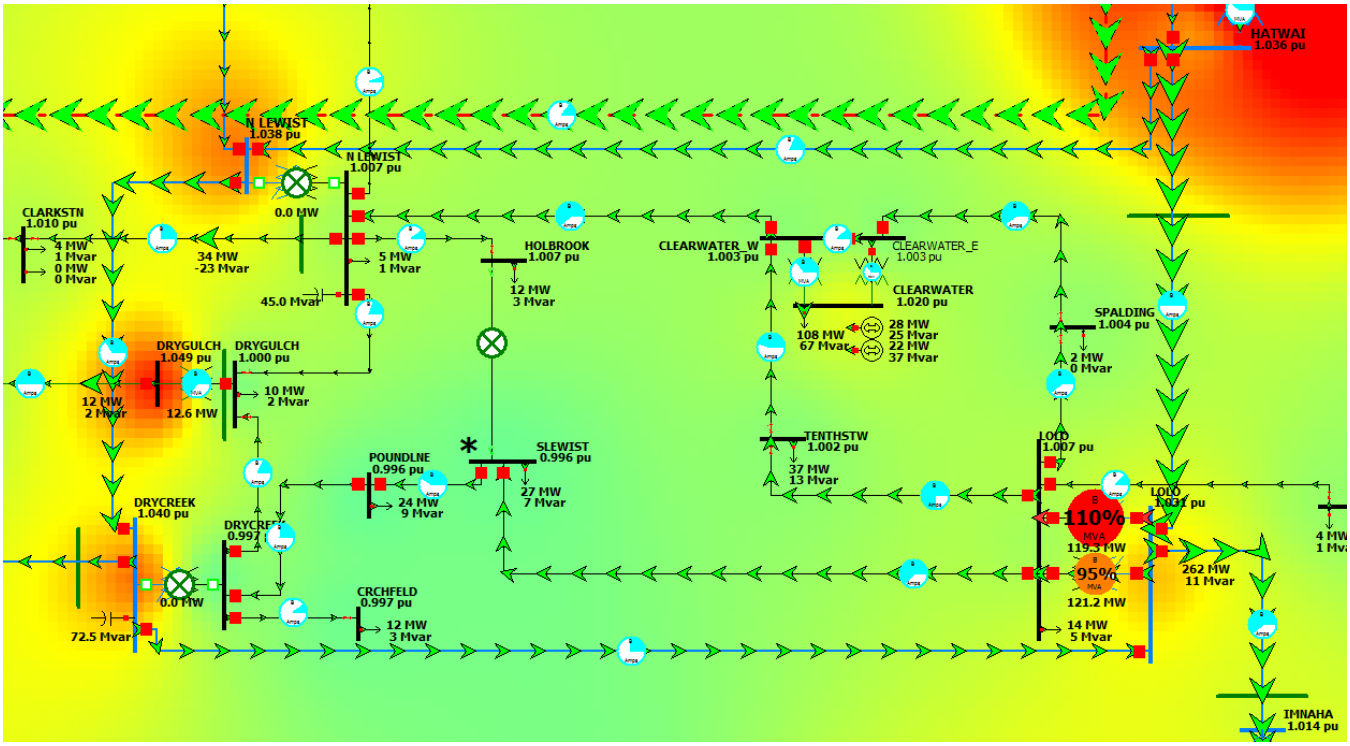


FIGURE III-16: N-1: DRY CREEK 230/115 KV + N-1: NORTH LEWISTON 230/115 KV IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2019 heavy summer.

Performance Criteria Violations

	19HS	24HS	34HS
P6			
N-1: Dry Creek 230/115 kV + N-1: North Lewiston 230/115 kV			
LOLO (48197) -> LOLO (48195) CKT 1	**104.8 %**	**110.2 %**	**115.5 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

South Lewiston Station

Reconstruction of the South Lewiston Station is planned to address equipment aging and condtion. The South Lewiston 115/13.8 kV Transformer is one of three remaining high loss transformers on Avista's system. Additional property to the north is being investigated for a complete rebuild of the station. An analysis of the future distribution capacity requirements has not been completed. Expansion of the South Lewiston Station may provide for deferral of expansion at the Holbrook Station. The existing station site is not a good location between the river and Snake River Drive.

The addition of circuit breakers at South Lewiston Station will allow the transmission system in

the Lewiston/Clarkston area to be more tightly networked. The present South Lewiston Tap would be capable of operating normally closed creating a North Lewiston – South Lewiston 115 kV Transmission Line. Full scope of the project needs to be evaluated. The primary benefit of adding circuit breakers to South Lewiston Station is increased operational flexibility during planned or forced transmission outages.

5.4 Single System Projects (non-corrective action plans)

5.4.1 10th & Stewart Station Rebuild

Several facilities within the 10th & Stewart Station are desired to be replaced. 10th & Stewart #1 115/13.8 kV Transformer and the associated 115 kV circuit switcher will be replaced. Additional plans include replacing the feeder breakers and upgrading the SCADA. The station will be near physical space capacity with two 30 MVA transformers and five feeders. Adequate space will remain for an additional 13 kV feeder.

The station rebuild is intended to not impede the future addition of 115 kV circuit breakers to the station. Load growth in the area south of the 10th & Stewart Station may drive the need for a new distribution station intregrated into the Clearwater – Lolo #2 115 kV Transmission Line. The addition of circuit breaker at 10th & Stewart Station will reduce the exposure of three stations connected to the same transmission line.

5.4.2 Grangeville Station Rebuild

The Grangeville Station was expanded in 2011 to install a 115 kV capacitor bank. The new yard allows for expansion of the station. There are plans to replace the 115 kV fuses with a circuit switcher, which requires relaying and a panelhouse. The planned work lends itself to a staged rebuild. There are presently four transformers in the station – two 115/13 kV (20 and 9.37 MVA) and two 13/34 kV (2.5 MVA each) – that could be consolidated and standardized in the rebuilt station. Further analysis of the benefits to adding circuit breakers allowing for operating the Nez Perce – Grangeville #1 & #2 115 kV transmission lines closed should be considered.

5.4.3 Pound Lane Station Rebuild

The Pound Lane Station is planned to be rebuilt due to condition of the station.

5.4.4 Kamiah Wood Station Rebuild

The Kamiah Station is presently a wood station. The station is one of the top three stations planned for rebuild in the next five years. Investigation of expansion possibilities or full scope of the rebuild has not been conducted.

5.4.5 Wheatland Station

A new distribution station located in the eastern area of Lewiston has been proposed. The new station has been named Wheatland Station. Integration with the Transmission System has not been determined.

5.4.6 Kooskia Transformer Replacement

The transformer at Kooskia Station is one of the top three lossiest transformers on our system, it is scheduled for replacement in the 2014-2015 timeframe. A circuit switcher may be included in the replacement as well.

5.5 Steady State Study Results

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS	Mitigation
P3				
G-1: Marengo Wind Unit 1 + N-1: Hatwai - Lower Granite 500 kV				
N LEWIST (48255)	1.0524			
P6				
N-1: Dry Creek - Lolo 230 kV + N-1: Hatwai - Lolo 230 kV				
DRYCREEK (48510) -> POUNDLNE (48343) CKT 1			103.4 %	
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	156.4 %	161.0 %	162.6 %	
N-1: Dry Creek - North Lewiston 230 kV + N-1: Hatwai - Lolo 230 kV				
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	147.4 %	155.2 %	157.2 %	Hatwai – Lolo #2 230 kV Transmission Line
N LEWIST (48253) -> DRYGULCH (48113) CKT 1	102.1 %	110.4 %	110.7 %	
N LEWIST (48255) -> N LEWIST (48253) CKT 1	132.1 %	140.9 %	142.2 %	
N-1: Dry Creek - Pound Lane 115 kV + N-1: Hatwai - Lolo 230 kV				
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1			103.2 %	
N-1: Dry Creek 230/115 kV + N-1: North Lewiston 230/115 kV				
LOLO (48197) -> LOLO (48195) CKT 1	104.8 %	110.1 %	115.4 %	Lolo Transformer Replacement
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV				
AHSAHKA (40023) -> OROFINO (48303) CKT 1	152.0 %	154.8 %	158.5 %	
COTTNWDT (48087)	0.861	0.8554	0.8414	
COTTNWOD (48089)	0.8597	0.854	0.8399	
CRAIGMNT (48091)	0.8934	0.8895	0.8801	
DWORSHAK (40367)	0.8325	0.8281	0.8146	
EGRANTAP (48119)	0.8631	0.857	0.8421	
EGRANVIL (40383)	0.8629	0.8569	0.8419	
GRANGVIL (48141)	0.8634	0.8574	0.8425	Shawnee #2 230/115 kV Transformer (addressed in Palouse Area)
JAYPE (48167)	0.7882	0.7821	0.7662	
KAMIAH (48171)	0.8549	0.8497	0.8365	
KOOSKIA (48177)	0.8537	0.8484	0.835	
NEZPERCE (48261)	0.8593	0.8542	0.8416	
OROFINO (48303)	0.7965	0.7907	0.7755	
OROFINO (48303) -> JULIAETT (48169) CKT 1	184.0 %	186.7 %	190.7 %	
SWEETWTR (48423)			0.9491	
WEIPPE (48459)	0.7886	0.7826	0.7667	
WICKES (48465)	0.8631	0.8572	0.8423	

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
P6			
N-1: Dworshak - Orofino 115 kV + N-1: Hatwai 500/230 kV			
JAYPE (48167)		0.9412	
KAMIAH (48171)		0.9495	Redispatch Nez Perce capacitor bank
KOOSKIA (48177)		0.9479	
WEIPPE (48459)		0.9421	
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV			
AHSAHKA (40023) -> OROFINO (48303) CKT 1	113.9 %	124.8 %	
COTTNWDT (48087)	0.8015	0.8107	
COTTNWOD (48089)	0.799	0.8081	
CRAIGMNT (48091)	0.8523	0.8607	
DWORSHAK (40367)	0.7818	0.7965	
EGRANTAP (48119)	0.7989	0.8077	Shawnee #2 230/115 kV Transformer (addressed in Palouse Area)
EGRANVIL (40383)	0.7987	0.8075	
GRANGVIL (48141)	0.7995	0.8084	
JAYPE (48167)	0.7239	0.7359	
KAMIAH (48171)	0.8007	0.8102	
KOOSKIA (48177)	0.7989	0.8083	
NEZPERCE (48261)	0.8071	0.8169	
OROFINO (48303)	0.74	0.752	

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
OROFINO (48303) -> JULIAETT (48169) CKT 1	134.5 %	138.0 %	
SWEETWTR (48423)	0.9361	0.9407	
WEIPPE (48459)	0.7252	0.7372	
WICKES (48465)	0.7995	0.8084	
N-1: Dworshak - Orofino 115 kV + N-1: Moscow 230 - Orofino 115 kV			
COTTNWOD (48089)	0.9489		
JAYPE (48167)	0.9338		
KAMIAH (48171)	0.9468		
KOOSKIA (48177)	0.9452		
OROFINO (48303)	0.9451		
WEIPPE (48459)	0.9346		
N-1: Dworshak - Orofino 115 kV + N-1: Moscow 230/115 kV			Redispatch Nez Perce capacitor bank
JAYPE (48167)	0.9385		
KOOSKIA (48177)	0.9497		
OROFINO (48303)	0.9498		
WEIPPE (48459)	0.9394		
N-1: Dworshak - Orofino 115 kV + N-1: Lolo - Nez Perce 115 kV			
JAYPE (48167)		0.9489	
WEIPPE (48459)		0.9498	

	19LSPR OJECTS	19LWPR OJECTS	Mitigation
P6			
N-1: Dworshak - Taft 500 kV + N-1: Hatwai - Lower Granite 500 kV			
DRYCREEK (48512)	1.0544		
HATWAI (40519)	1.0576	1.0526	North Lewiston Reactor
LOLO (48197)	1.0542		
N LEWIST (48255)	1.057		

5.6 Spare Equipment Study

Facility rating violations from the Spare Equipment Study are provided in Table III-12.

5.6.1 Dry Creek Transformer Failure

Failure of the Dry Creek 230/115 kV Transformer requiring complete replacement causes thermal overload of the Lolo #1 230/115 kV Transformer when a subsequent outage of the North Lewiston 230/115 kV Transformer occurs.

The observed issues with the loss of the Dry Creek 230/115 kV Transformer will be mitigated by replacing the existing Lolo transformers with 125 MVA or larger nominally rated transformers. The Lolo transformers have also been identified by Asset Management for replacement.

5.6.2 North Lewiston Transformer Failure

Failure of the North Lewiston 230/115 kV Transformer requiring complete replacement causes thermal overloads on the Dry Creek – North Lewiston 115 kV Transmission Line when a subsequent bus outage or breaker failure occurs at Lolo Station.

Modification of the Lolo 115 kV bus to prevent loss of both Lolo transformers for a bus outage will mitigate the observed issues.

5.6.3 Hatwai Transformer

Failure of the Hatwai 500/230 kV Transformer requiring complete replacement causes thermal overloads on the Benewah – Boulder 230 kV Transmission Line when a subsequent outage takes the Benewah – Pine Creek 230 kV Transmission Line out of service.

The BPA is capable of restoring the Hatwai 500/230 kV Transformer in less than one year with the ability to energize a spare single phase transformer located at Hatwai Station. Establishing a second north-south path from the Spokane area will mitigate the observed issues. A Garden Springs – Thornton 230 kV Transmission Line is proposed as an alternative for further evaluation.

	DCR	DWOR	HAT	NLW
P1				
N-1: Benewah - Pine Creek 230 kV				
BOULDER (48524) -> BENEWAH (48037) CKT 1 at BOULDER			108.5 %	
N-1: Dry Creek 230/115 kV				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				104.8 %
N-1: North Lewiston 230/115 kV				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO	104.8 %			
P2				
BF: A261 Lolo 115 kV, Lolo-Poundlane				
DRYCREEK (48510) -> DRYGULCH (48113) CKT 1 at DRYCREEK				140.9 %
DRYGULCH (48113) -> N LEWIST (48253) CKT 1 at DRYGULCH				122.6 %
BF: A263 Lolo 115 kV, Clearwater-Lolo #1				
DRYCREEK (48510) -> DRYGULCH (48113) CKT 1 at DRYCREEK				137.8 %
DRYGULCH (48113) -> N LEWIST (48253) CKT 1 at DRYGULCH				119.8 %

	DCR	DWOR	HAT	NLW
BF: A265 Lolo 115 kV, Lolo-Nez Perce				
DRYCREEK (48510) -> DRYGULCH (48113) CKT 1 at DRYCREEK				**139.5 %**
DRYGULCH (48113) -> N LEWIST (48253) CKT 1 at DRYGULCH				**121.5 %**
BF: A445 Lolo 115 kV, Clearwater-Lolo #2				
DRYCREEK (48510) -> DRYGULCH (48113) CKT 1 at DRYCREEK				**115.1 %**
BF: R387 Lolo-Oxbow, Lolo #2 230/115 Transformer				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				**102.4 %**
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer				
BOULDER (48524) -> BENEWAH (48037) CKT 1 at BOULDER			**102.6 %**	
BF: R615 Dry Creek 230 kV Switched Shunt, Dry Creek 230/115 Transformer				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				**104.3 %**
BF: R617 Dry Creek-North Lewiston, Dry Creek 230/115 Transformer				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				**103.1 %**
BF: R621 Dry Creek-Talbot, Dry Creek 230/115 Transformer				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				**106.8 %**
BF: R625 Dry Creek-Lolo, Dry Creek 230/115 Transformer				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				**102.2 %**
BUS: Dry Creek 115 kV				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO				**100.1 %**
BUS: Lolo 115 kV				
DRYCREEK (48510) -> DRYGULCH (48113) CKT 1 at DRYCREEK				**139.4 %**
DRYGULCH (48113) -> N LEWIST (48253) CKT 1 at DRYGULCH				**121.5 %**
BUS: North Lewiston 230 kV				
LOLO (48197) -> LOLO (48195) CKT 1 at LOLO	**102.4 %**			
BUS: Pine Creek 230 kV				
BOULDER (48524) -> BENEWAH (48037) CKT 1 at BOULDER			**108.8 %**	

TABLE III-12: LEWISTON/CLARKSTON SPARE EQUIPMENT CONTINGENCY ANALYSIS RESULTS.

5.7 Voltage Stability Study

A Load Ramp PV Curve analysis was conducted while monitoring all buses in the Lewiston/Clarkston area. All loads within the Lewiston/Clarkston area were increased until voltage collapse occurred. All additional generation necessary to supply the increase in load came from a distribution of all generation in WECC except those within the Lewiston/Clarkston area.

The theoretical flow limit is 1235 MW for all lines in service condition. The critical bus under all lines in service condition is East Grangeville Station. As load increases in the Lewiston/Clarkston area, the limiting contingency is the A343 breaker failure at Orofino Station with total area load of 750 MW (see Figure III-17). The N-1-1 outage of the Hatwai 500/230 kV Transformer and Benewah – Boulder 230 kV Transmission Line has a more limiting total area load of 712 MW.

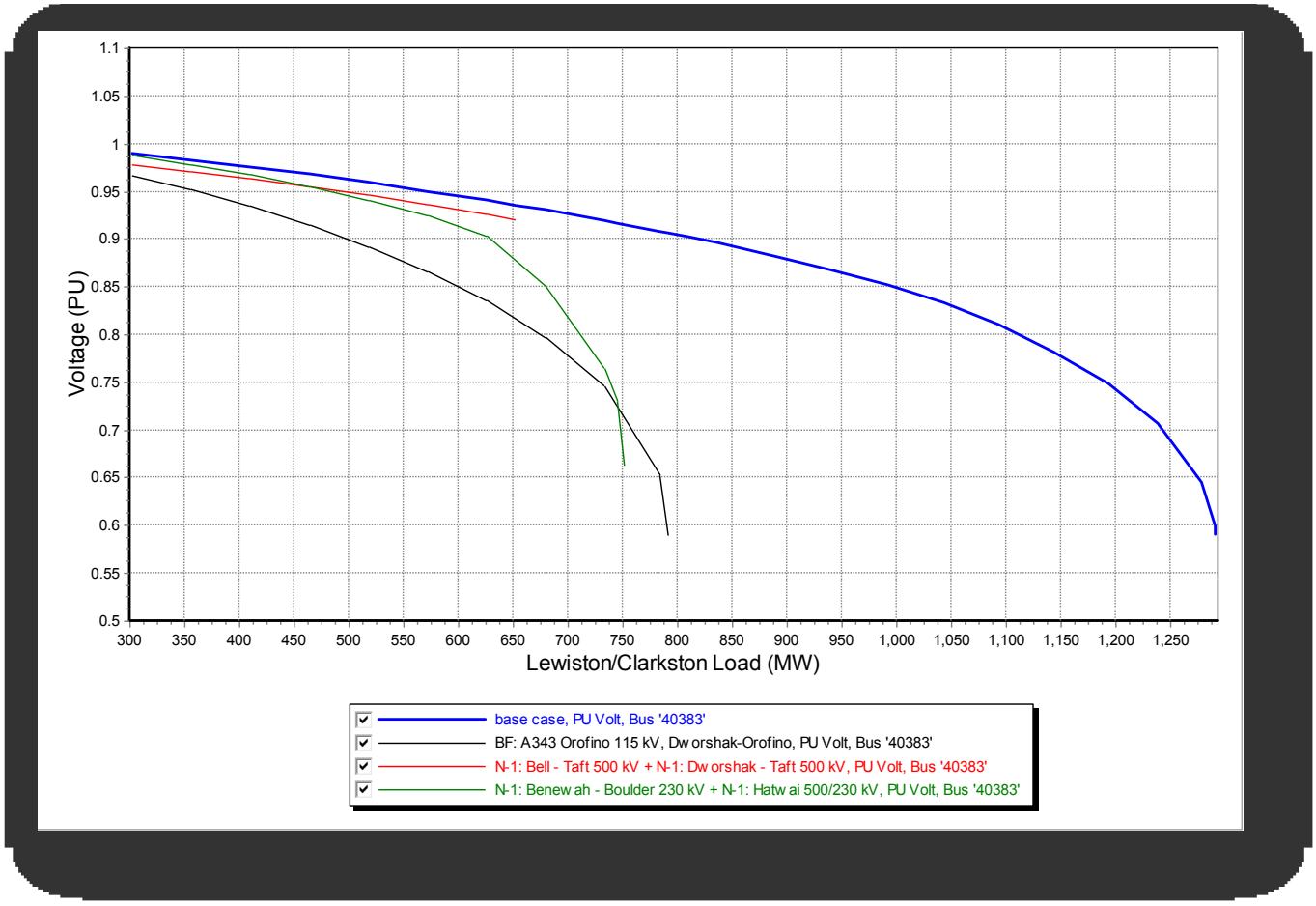


FIGURE III-17: LEWISTON/CLARKSTON LOAD RAMP PV CURVE RESULTS – EXISTING SYSTEM

The load ramp PV curve analysis was repeated with the assumption that all planned corrective action plans listed above are constructed. The performance of the area transmission system is not improved as no projects are planned for construction which impact how the Lewiston/Clarkston transmission system functions.

5.8 Stability Study Results

Row Labels	15HW Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
P4			
BF: A217 Clearwater West 115 kV, Clearwater - North Lewiston 115 kV 3P (CLW-NLW @NLW)			
Out of Step Generator			
CWGEN3 12kV	OOS	**1.7 s**	**?? – need to verify models**
WECC Category C Voltage Dip Any Bus			
CLEARWATER 34.5kV	**-32.4 %**		
CWGEN3 12kV	**-44.4 %**		

6 PALOUSE

6.1 Executive Summary

The Palouse area transmission system demonstrated only one performance issue in the near term and long term planning horizons. The outage of both the Moscow and Shawnee 230/115 kV transformers potentially causes localized voltage collapse depending on the season and scenario. The issue exists in the present stat of the system and worsens with time.

The addition of a third transformer near Pullman or Moscow will conceptually mitigate the issues causes by the loss of two transformers. There is some existing operational flexibility to reduce the potential thermal and voltage violations but at the cost of consequential load loss following the second outage. Other solutions are still under investigation.

A list of the corrective action plans proposed for the Palouse area is provided in Table III-13.

	Year Problem Starts	Construction Start	Construction End	Consequence	Probability Factor	Priority	Cost Estimate
1-Completed							
Moscow 230 Station Rebuild						0.0100	
4-New Proposal							
Shawnee #2 230/115 kV Transformer	Present			1430	0.0750	107.2500	$2,500,000

TABLE III-13: PALOUSE CORRECTIVE ACTION PLANS

Additional projects not categorized as corrective action plans are listed in Table III-14.

	Construction Start	Construction End	Cost Estimate
2-Planned			
Benewah - Moscow 230 kV Transmission Line Rebuild Diamond Station Minor Rebuild Moscow City 115 SCADA/Minor Rebuild North Moscow Transformation Potlatch Transformer Replacement Tekoa SCADA Upgrade/Minor Rebuild	2015 2018	2017 2019	$24,178,800 $1,800,000
3-Needs Further Analysis			
Deary - Potlatch 115 kV Transmission Line Tamarack Station	 2018	 2019	 $3,075,000

TABLE III-14: PALOUSE FURTHER SINGLE SYSTEM PROJECTS

6.2 System Description

The Avista Palouse area is located primarily in Spokane and Whitman counties in Washington and Latah County in Idaho. The majority of the load served in the area can be categorized as rural, low density load with the exception of the cities of Pullman, WA and Moscow, ID. The transmission system consists of a 230 kV backbone system and underlying 115 kV transmission lines that serve the local loads. The 230 kV transmission lines provide sources for the local area and North and South transfers across Avista's system.

The 115 kV transmission system in the Palouse area is primarily operated with normally open points referred to as "star points". A star point is used to minimize power flow to mitigate overloads on the 115 kV system in the event of an outage on the overlying 230 kV transmission system, as well as reducing overall system losses in the area. Operating in a "star" configuration also reduces exposure to loads served by long transmission lines. In the Palouse area, star points switches can be operated open or closed based on outages, specific flow conditions, or due to operational constraints.

6.2.1 Area Transmission

Transmission Lines

The main 230 kV transmission lines in the Lewiston/Clarkston area are:

- Benewah – Thornton
- Shawnee-Thornton
- Benewah – Moscow
- Benewah – Pine Creek
- Benewah – Boulder
- Hatwai – Moscow
- North Lewiston – Shawnee 230 kV transmission lines

Transmission Sources

The main transmission sources that feed the load in the Lewiston/Clarkston area are:

- Benewah
- Shawnee
- Moscow Stations

6.2.2 Area Generation

Non-Avista owned local generation facilities within the Palouse area include the following:

- Palouse Wind

Avista signed a Power Purchase Agreement for First Wind's Palouse Wind Project in June 2011. The Palouse Wind Project (Project #17) is interconnected with Avista's Transmission System at the Thornton Station, and it provides Avista with approximately 40 average megawatts of renewable energy, or as much as 105 megawatts of nameplate wind capacity, under a 30-year power purchase agreement. Delivery began at the end of 2012. The energy qualifies under Washington State's Energy Independence Act (RCW 19.285) to meet Avista's Washington State-mandated renewable portfolio standard (RPS) requirements.

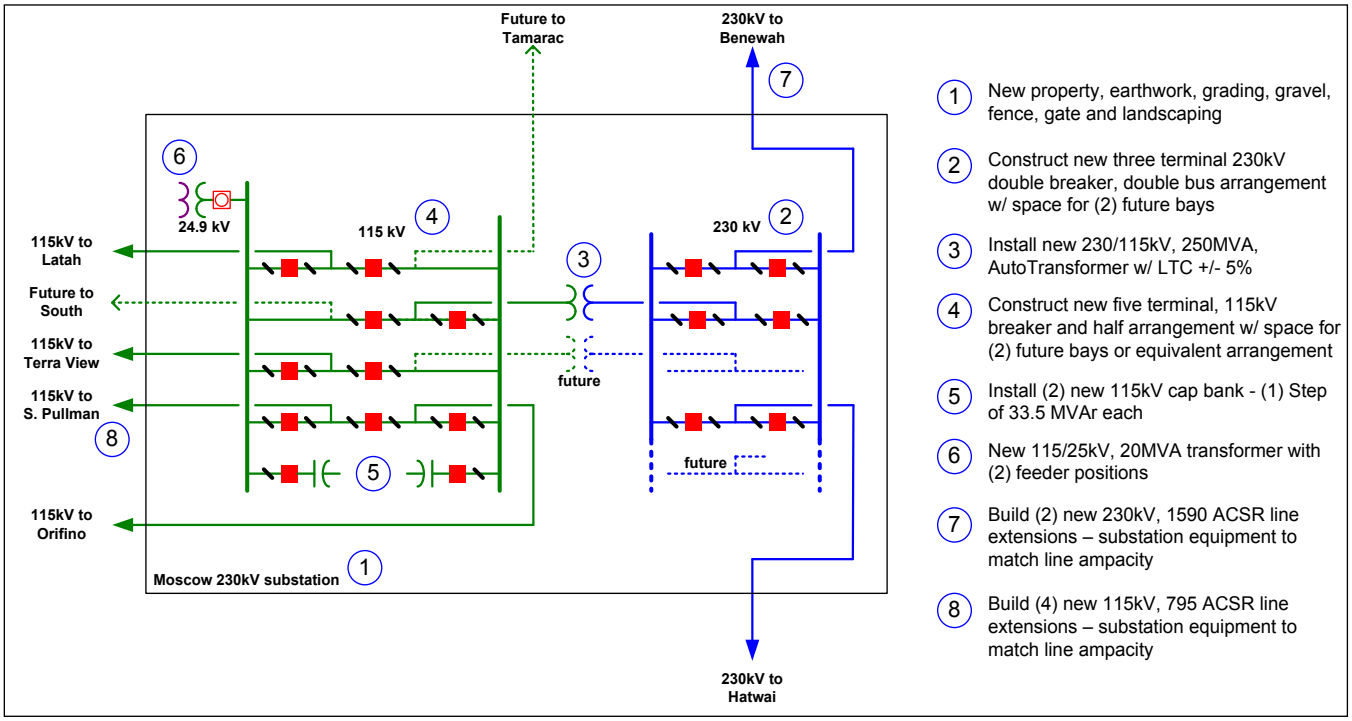
There are no active Generation Interconnection Requests within the Palouse area (as of October 2014).

6.3 Corrective Actions Plans

6.3.1 Completed

Moscow 230 Station Rebuild

The Moscow 230 Station has been completely rebuilt including the replacement of the 230/115 kV autotransformer with a 250 MVA nominal capacity transformer. The replacement of the transformer was identified for mitigating thermal overloads do to outages in the area including the outage of the Shawnee 230/115 kV Transformer. The Substation Engineering Department identified several issues with the station warranting a green field rebuild. The new station consists of double bus, double breaker 230 kV facility and breaker and a half 115 kV facility. The installation of two steps of 33.5 MVAr capacitor banks will be completed by the end of 2014.



6.3.2 Planned

There are no Corrective Action Plans planned for the Palouse area.

6.3.3 Need Further Analysis

The following sections describe system deficiencies assuming completion of the planned projects as described above.

230 kV Capacitor Automatic Switching

Project Scope/Description

A project has been proposed to implement automatic insertion of existing shunt capacitor banks at Benewah and Dry Creek Stations when voltage at the respective 230 kV busses drops below the present operating limit of 232.3 kV or rises above the present operating limit of 242 kV. Present automatic capacitor bank switching occurs when voltage drops below 228 kV. The lower voltage level of 228 kV allows for system operators to manually perform the appropriate mitigating actions. Allowing for tighter automatic control will prevent exceeding applicable facility ratings for various contingencies on the System.

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P1				
N-1: Libby - Noxon 230 kV				
BENEWAH (48037)			1.0521	
P2				
BF: A1588 Libby 230 kV, Conkelley-Libby				
BENEWAH (48037)	1.0536	1.0524	1.0554	1.0528
PALOUSE_WIND (48863)	1.0524		1.0534	
THORNTON (48432)	1.0524		1.0535	
BF: R318 Noxon East & West 230 kV				
BENEWAH (48037)	1.0559	1.0546	1.0559	1.0536
PALOUSE_WIND (48863)	1.0548	1.0536	1.0546	1.0525
THORNTON (48432)	1.0549	1.0536	1.0547	1.0525
BF: R468 Benewah-Boulder, Benewah 230/115 Transformer				
BENEWAH (48037)	1.0532		1.0542	1.0529
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer				
BENEWAH (48037)	1.0544	1.0541	1.0559	1.0545
PALOUSE_WIND (48863)			1.0525	
THORNTON (48432)			1.0525	
BUS: Conkelley East 230 kV				
BENEWAH (48037)			1.0522	
BUS: Libby 230 kV				
BENEWAH (48037)	1.0542	1.0533	1.056	1.0535
PALOUSE_WIND (48863)	1.0528		1.054	
THORNTON (48432)	1.0528		1.054	
P3	1.0542	1.053	1.054	1.0531
P6	1.0601	1.0604	1.0574	1.0602
P7				
N-2 (STR): Conkelley - Libby 230 kV & Libby - Noxon 230 kV				
BENEWAH (48037)	1.0536	1.0524	1.0554	1.0528
PALOUSE_WIND (48863)	1.0524		1.0534	
THORNTON (48432)	1.0524		1.0534	

6.3.4 New Proposals

Shawnee #2 230/115 kV Transformer

Project Scope/Description

The outage of both the Moscow and Shawnee 230/115 kV transformers causes potential voltage collapse in the Palouse area if there are no mitigating actions taken following the outage of the first transformer (see Figure III-18). System deficiencies are observed in all scenarios studied including light loading scenarios. The addition of a second 230/115 kV transformer at Shawnee Station will mitigate the observed deficiencies. Shawnee station is conceptually preferred over adding a second transformer at Moscow Station as it will mitigate the outage of the Shawnee transformer and Moscow – Terre View 115 kV Transmission Line.

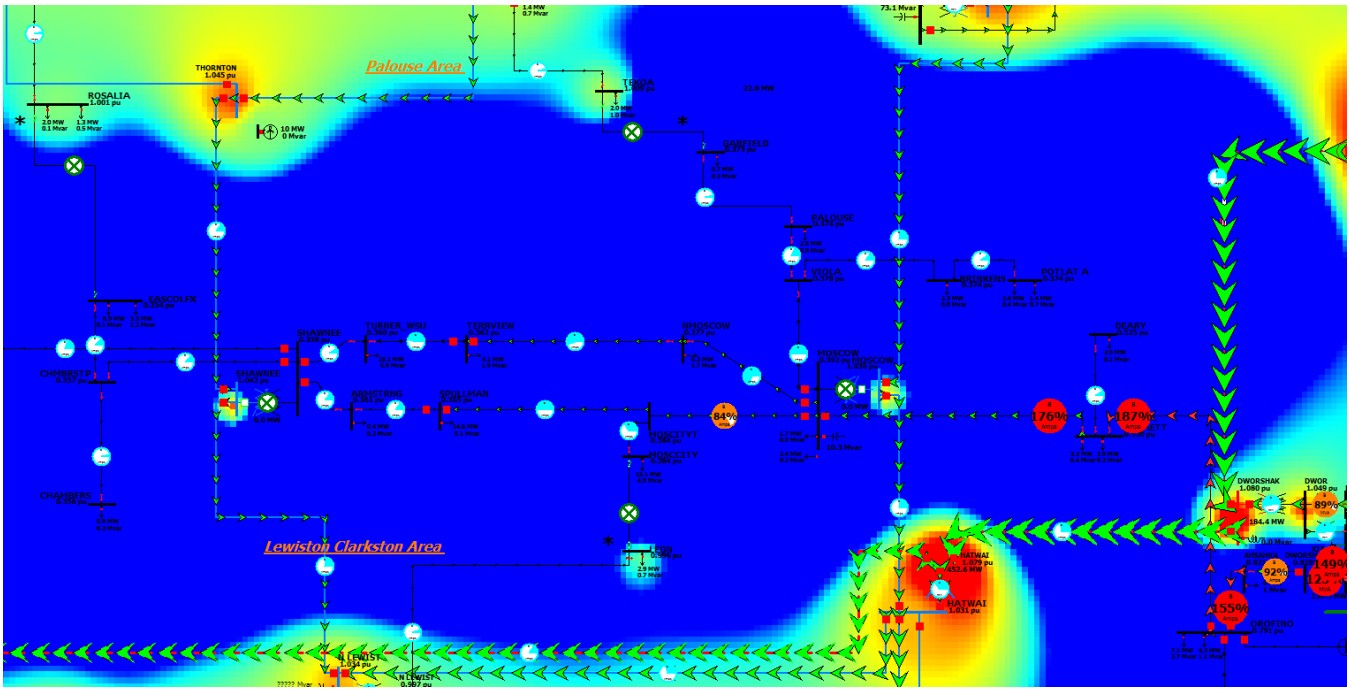


FIGURE III-18: N-1-1: MOSCOW 230/115 AND SHAWNEE 230/115 IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 heavy summer.

Performance Criteria Violations

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
P6			
N-1: Hatwai - Moscow 230 230 kV + N-1: Shawnee 230/115 kV			
DIAMOND (48109)			0.95
EWAN (48121)			0.9457
N-1: Hatwai 500/230 kV + N-1: Shawnee 230/115 kV			
EWAN (48121)			0.9487
N-1: Moscow 230 - South Pullman 115 kV (M23-SPU) + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.9482	0.9467	0.9366
CHAMBERS (47503)			0.941

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
CHMBRSTP (48073)			0.9413
DIAMOND (48109)	0.9478	0.9463	0.9362
EASCOLFX (48115)		0.9495	0.9397
EWAN (48121)	0.944	0.9424	0.9318
SHAWNEE (48383)			0.9425
SPULLMAN (48413)	0.9416	0.9398	0.929
N-1: Moscow 230 - Terre View 115 kV (M23-NMO) + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)		0.9494	0.9393
CHAMBERS (47503)	0.9396	0.9378	0.9264
CHMBRSTP (48073)	0.9399	0.9381	0.9267
DIAMOND (48109)	0.9354	0.9333	0.9215
EASCOLFX (48115)	0.9385	0.9366	0.9251
EWAN (48121)	0.9315	0.9293	0.917
MOSCOW (48247) -> MOSCITYT (48245) CKT 1			**108.0 %**
SHAWNEE (48383)	0.941	0.9392	0.928
TERRVIEW (48430)	0.9287	0.9265	0.9139
TURNER_WSU (48291)	0.9292	0.9269	0.9144
N-1: Moscow 230 - Terre View 115 kV (TVW-NMO) + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.9485	0.947	0.9366
CHAMBERS (47503)	0.9374	0.9353	0.9236
CHMBRSTP (48073)	0.9377	0.9357	0.924
DIAMOND (48109)	0.9331	0.9309	0.9187
EASCOLFX (48115)	0.9362	0.9341	0.9223
EWAN (48121)	0.9292	0.9268	0.9142
MOSCOW (48247) -> MOSCITYT (48245) CKT 1			**108.3 %**
SHAWNEE (48383)	0.9387	0.9368	0.9252
TERRVIEW (48430)	0.9265	0.924	0.9111
TURNER_WSU (48291)	0.9269	0.9244	0.9116
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV			
AHSAHKA (40023)	0.826	0.8213	0.8075
AHSAHKA (40023) -> OROFINO (48303) CKT 1	**152.0 %**	**154.8 %**	**158.5 %**
ARMSTRNG (47501)	0.3805	0.3612	0.3232
BRINKENS (40149)	0.3934	0.3745	0.3373
CHAMBERS (47503)	0.3754	0.356	0.318
CHMBRSTP (48073)	0.376	0.3565	0.3185
COTTNWDT (48087)	0.861	0.8554	0.8414
COTTNWOD (48089)	0.8597	0.854	0.8399
CRAIGMNT (48091)	0.8934	0.8895	0.8801
DEARY (48101)	0.5387	0.5248	0.496
DIAMOND (48109)	0.3683	0.3489	0.3109
DWORSHAK (40367)	0.8325	0.8281	0.8146
EASCOLFX (48115)	0.3739	0.3544	0.3164
EGRANTAP (48119)	0.8631	0.857	0.8421
EGRANVIL (40383)	0.8629	0.8569	0.8419
EWAN (48121)	0.3627	0.3432	0.3052
GARFIELD (48133)	0.3921	0.3731	0.3359
GRANGVIL (48141)	0.8634	0.8574	0.8425
JAYPE (48167)	0.7882	0.7821	0.7662
JULIAETT (48169)	0.5435	0.5298	0.5015
JULIAETT (48169) -> MOSCOW (48247) CKT 1	**173.8 %**	**176.1 %**	**179.1 %**
KAMIAH (48171)	0.8549	0.8497	0.8365
KOOSKIA (48177)	0.8537	0.8484	0.835
MOSCCITY (48243)	0.403	0.3839	0.3466
MOSCITYT (48245)	0.4033	0.3843	0.3469
MOSCOW (48247)	0.4113	0.3924	0.3553
NEZPERCE (48261)	0.8593	0.8542	0.8416
NMOSCOW (48273)	0.3957	0.3766	0.339
OROFINO (48303)	0.7965	0.7907	0.7755
OROFINO (48303) -> JULIAETT (48169) CKT 1	**184.0 %**	**186.7 %**	**190.7 %**
PALOUSE (48313)	0.3933	0.3744	0.3372
POTLAT A (48341)	0.393	0.374	0.3369
SHAWNEE (48383)	0.3777	0.3583	0.3203
SPULLMAN (48413)	0.3846	0.3653	0.3274
SWEETWTR (48423)			0.9491
TERRVIEW (48430)	0.3815	0.3622	0.3243
TURNER_WSU (48291)	0.3793	0.36	0.322
VIOLA (48445)	0.3966	0.3777	0.3405

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
WEIPPE (48459)	0.7886	0.7826	0.7667
WICKES (48465)	0.8631	0.8572	0.8423

Garden Springs – Thornton 230 kV Transmission Line

Project Scope/Description

In heavy summer conditions, loss of both the Benewah – Pine Creek 230 kV Transmission Line and Hatwai 500/230 kV Transformer causes the Benewah – Boulder 230 kV Transmission Line to exceed its applicable facility ratings (see Figure III-19). The Benewah – Boulder 230 kV Transmission Line is the only remaining facility connecting Avista's northern System to its southern load. Construction of an alternate path from north to south will mitigate the observed system deficiencies. Conceptually, a 230 kV transmission line from Garden Springs to Thornton will improve System performance. The timing and coordination of how Garden Springs Station will be integrated into other stations in Spokane will significantly impact how the Garden Springs – Thornton 230 kV Transmission Line will function.

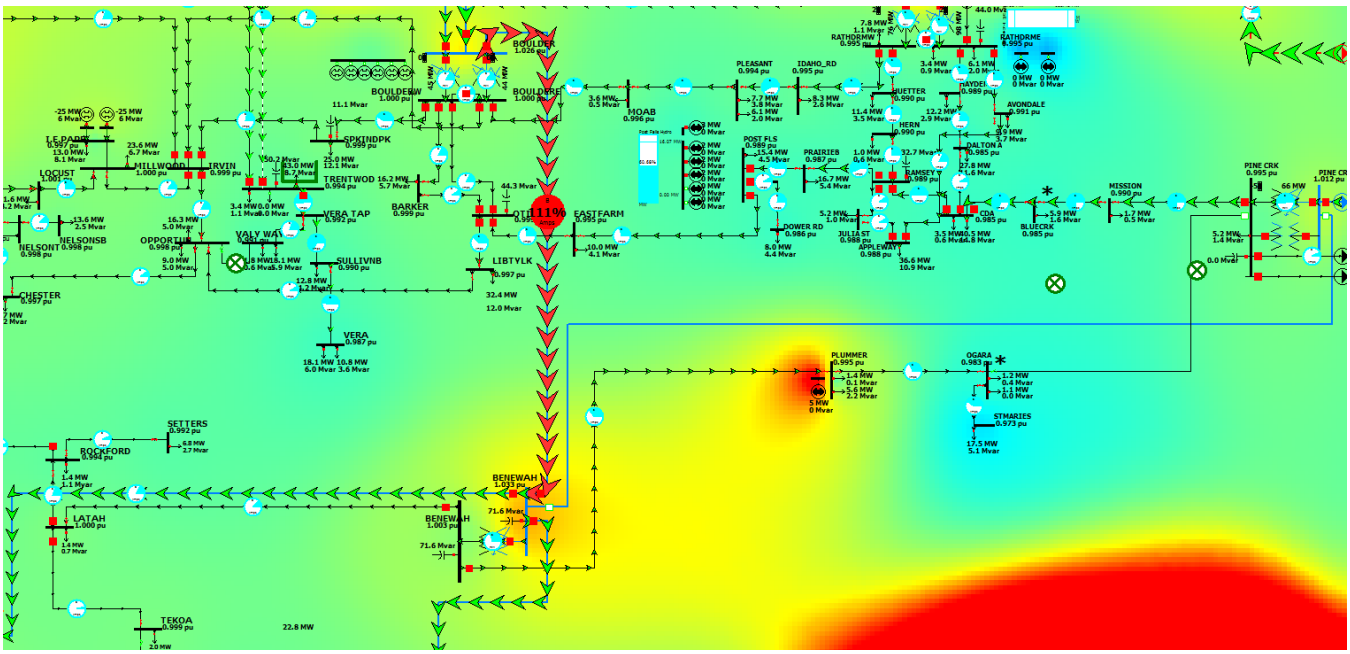


FIGURE III-19: N-1-1: BENEWAH – PINE CREEK 230 KV AND HATWAI 500/230 IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 heavy summer.

Performance Criteria Violations

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
P6			
N-1: Benewah - Pine Creek 230 kV + N-1: Dworshak - Hatwai 500 kV			
BOULDER (48524) -> BENEWAH (48037) CKT 1	**104.7 %**		
N-1: Benewah - Pine Creek 230 kV + N-1: Dworshak - Taft 500 kV			
BOULDER (48524) -> BENEWAH (48037) CKT 1	**100.2 %**		
N-1: Benewah - Pine Creek 230 kV + N-1: Hatwai 500/230 kV			
BOULDER (48524) -> BENEWAH (48037) CKT 1	**109.9 %**	**110.9 %**	**112.6 %**

6.4 Single System Projects

6.4.1 North Moscow Transformation

It has been proposed to add an additional 20 MVA distribution transformer to the North Moscow Station. The additional transformer at North Moscow Station is needed within five years. The project was initially proposed based on a new large growth area off Highway 270 near the Idaho and Washington state line.

6.4.2 Tamarack Station

A new distribution station located in the northeastern outlying area of Moscow has been proposed. The new substation has been named Tamarack Station and is proposed to be connected to the Moscow 230 – Terre View 115 kV Transmission Line approximately 1.5 miles east of North Moscow Station. Tamarack Station is needed within five years depending on specific load growth in the area.

6.4.3 Diamond Station Minor Rebuild

Diamond is slated for a conditioned rebuild in 2014-2015. This will include replacement of the 115kV fuses and arrestors, replacement 25kV breakers, and regulator replacement for both feeders. It will also include SCADA installation.

6.4.4 Moscow City 115 SCADA/Minor Rebuild

The Moscow City Station needs some SCADA upgrades, and in conjunction it makes sense to replace some equipment approaching end of life. This may have to wait until construction of Tamarack Station is complete.

6.4.5 Potlatch Tranformer Replacement

The transformer at Potlatch is due for replacement in the 5-10 year timeframe.

6.4.6 Tekoa SCADA upgrade/Minor Rebuild

Tekoa Station needs new station regulators and breakers, and also needs SCADA installed. This should be looked at in the 5-10 year timeframe.

6.4.7 Benewah – Moscow 230 kV Transmission Line Rebuild

Reconstruction of the Benewah – Moscow 230 kV Transmission Line has multiple purposes. The project was initially developed from an asset management perspective based on the age and type of the structures. The Moscow Station Rebuild Project requires a new communication medium between Moscow and Benewah Stations. The rebuild of the Benewah – Moscow 230 kV Transmission Line will facilitate the addition of fiber optic wire between the two stations. The scope of the project does not include replacing the conductor.

6.4.8 Deary – Potlatch 115 kV Transmission Line

The Deary and Potlatch Stations are served by radial 115 kV transmission lines. The Potlatch tap is 10 miles long and also serves Clearwater Power's 69 kV system out of Brinkens Corner

Station. The Deary tap is over 20 miles long. Construction of a new 115 kV transmission line between Deary and Potlatch Stations would improve reliability of the stations. Further evaluation is necessary to determine the desired operation of the new transmission line. The new transmission line may be operated normally open with an automatic restoration scheme or new 115 kV switching stations need to be constructed along both the Latah – Moscow and Moscow – Orofino 115 kV Transmission Lines.

The project is presently being evaluated.

6.5 Steady State Study Results

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS	Mitigation
P6				
N-1: Benewah - Pine Creek 230 kV + N-1: Dworshak - Hatwai 500 kV				
BOULDER (48524) -> BENEWAH (48037) CKT 1	**104.7 %**			
N-1: Benewah - Pine Creek 230 kV + N-1: Dworshak - Taft 500 kV				Garden Springs – Thornton 230 kV Transmission Line
BOULDER (48524) -> BENEWAH (48037) CKT 1	**100.2 %**			
N-1: Benewah - Pine Creek 230 kV + N-1: Hatwai 500/230 kV				
BOULDER (48524) -> BENEWAH (48037) CKT 1	**109.9 %**	**110.9 %**	**112.6 %**	
N-1: Hatwai - Moscow 230 230 kV + N-1: Shawnee 230/115 kV				
DIAMOND (48109)			0.95	
EWAN (48121)			0.9457	Shawnee #2 230/115 kV Transformer
N-1: Hatwai 500/230 kV + N-1: Shawnee 230/115 kV				
EWAN (48121)			0.9487	
N-1: Moscow 115kV Switched Shunt + N-1: Moscow 230/115 kV				
BRINKENS (40149)			0.9486	
GARFIELD (48133)			0.9477	Manage dispatch of Moscow capacitors
PALOUSE (48313)			0.9485	
POTLAT A (48341)			0.9483	
N-1: Moscow 230 - South Pullman 115 kV (M23-SPU) + N-1: Shawnee 230/115 kV				
ARMSTRNG (47501)	0.9482	0.9467	0.9366	
CHAMBERS (47503)			0.941	
CHMBRSTP (48073)			0.9413	
DIAMOND (48109)	0.9478	0.9463	0.9362	
EASCOLFX (48115)		0.9495	0.9397	
EWAN (48121)	0.944	0.9424	0.9318	
SHAWNEE (48383)			0.9425	
SPULLMAN (48413)	0.9416	0.9398	0.929	
N-1: Moscow 230 - Terre View 115 kV (M23-NMO) + N-1: Shawnee 230/115 kV				
ARMSTRNG (47501)		0.9494	0.9393	
CHAMBERS (47503)	0.9396	0.9378	0.9264	
CHMBRSTP (48073)	0.9399	0.9381	0.9267	
DIAMOND (48109)	0.9354	0.9333	0.9215	
EASCOLFX (48115)	0.9385	0.9366	0.9251	
EWAN (48121)	0.9315	0.9293	0.917	
MOSCOW (48247) -> MOSCITYT (48245) CKT 1			**108.0 %**	
SHAWNEE (48383)	0.941	0.9392	0.928	
TERRVIEW (48430)	0.9287	0.9265	0.9139	
TURNER_WSU (48291)	0.9292	0.9269	0.9144	
N-1: Moscow 230 - Terre View 115 kV (TVW-NMO) + N-1: Shawnee 230/115 kV				
ARMSTRNG (47501)	0.9485	0.947	0.9366	Shawnee #2 230/115 kV Transformer
CHAMBERS (47503)	0.9374	0.9353	0.9236	
CHMBRSTP (48073)	0.9377	0.9357	0.924	
DIAMOND (48109)	0.9331	0.9309	0.9187	
EASCOLFX (48115)	0.9362	0.9341	0.9223	
EWAN (48121)	0.9292	0.9268	0.9142	
MOSCOW (48247) -> MOSCITYT (48245) CKT 1			**108.3 %**	
SHAWNEE (48383)	0.9387	0.9368	0.9252	
TERRVIEW (48430)	0.9265	0.924	0.9111	
TURNER_WSU (48291)	0.9269	0.9244	0.9116	
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV				
ARMSTRNG (47501)	0.3805	0.3612	0.3232	
BRINKENS (40149)	0.3934	0.3745	0.3373	
CHAMBERS (47503)	0.3754	0.356	0.318	
CHMBRSTP (48073)	0.376	0.3565	0.3185	
DEARY (48101)	0.5387	0.5248	0.496	
DIAMOND (48109)	0.3683	0.3489	0.3109	
EASCOLFX (48115)	0.3739	0.3544	0.3164	
EWAN (48121)	0.3627	0.3432	0.3052	
GARFIELD (48133)	0.3921	0.3731	0.3359	
JULIAETT (48169)	0.5435	0.5298	0.5015	
JULIAETT (48169) -> MOSCOW (48247) CKT 1	**173.8 %**	**176.1 %**	**179.1 %**	

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS	Mitigation
MOSCCITY (48243)	0.403	0.3839	0.3466	
MOSCITYT (48245)	0.4033	0.3843	0.3469	
MOSCOW (48247)	0.4113	0.3924	0.3553	
NMOSCOW (48273)	0.3957	0.3766	0.339	
OROFINO (48303) -> JULIAETT (48169) CKT 1	184.0 %	186.7 %	190.7 %	
PALOUSE (48313)	0.3933	0.3744	0.3372	
POTLAT A (48341)	0.393	0.374	0.3369	
SHAWNEE (48383)	0.3777	0.3583	0.3203	
SPULLMAN (48413)	0.3846	0.3653	0.3274	
TERRVIEW (48430)	0.3815	0.3622	0.3243	
TURNER_WSU (48291)	0.3793	0.36	0.322	
VIOLA (48445)	0.3966	0.3777	0.3405	

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
NA			
RES: N-1: Latah Jct - Moscow 230 115 kV Open @ M23			
BRINKENS (40149)	0.9482		Manage Benewah LTC settings
POTLAT A (48341)	0.9479		
P2			
BF: A845 Moscow-Terre View, Moscow 230/115 kV Transformer			
BRINKENS (40149)		0.9479	Manage dispatch of Moscow capacitors
GARFIELD (48133)		0.9465	
PALOUSE (48313)		0.9478	
POTLAT A (48341)		0.9477	
P6			
N-1: Hatwai - Moscow 230 230 kV + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.9377	0.9306	
BRINKENS (40149)	0.942	0.9355	
CHAMBERS (47503)	0.935	0.9278	
CHMBRSTP (48073)	0.9354	0.9282	
DIAMOND (48109)	0.9309	0.9234	
EASCOLFX (48115)	0.934	0.9268	
EWAN (48121)	0.9272	0.9194	
GARFIELD (48133)	0.9407	0.9341	
MOSCCITY (48243)		0.9447	
MOSCITYT (48245)		0.945	
NMOSCOW (48273)	0.9474	0.9409	
PALOUSE (48313)	0.9419	0.9354	
POTLAT A (48341)	0.9418	0.9353	
SHAWNEE (48383)	0.9364	0.9292	
SPULLMAN (48413)	0.9395	0.9325	
TERRVIEW (48430)	0.9387	0.9318	
TURNER_WSU (48291)	0.9371	0.9301	
VIOLA (48445)	0.9444	0.9379	Shawnee #2 230/115 kV Transformer
N-1: Hatwai 500/230 kV + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)		0.9473	
CHAMBERS (47503)		0.9446	
CHMBRSTP (48073)		0.945	
DIAMOND (48109)		0.9404	
EASCOLFX (48115)		0.9436	
EWAN (48121)		0.9365	
SHAWNEE (48383)		0.946	
SPULLMAN (48413)		0.9492	
TERRVIEW (48430)		0.9485	
TURNER_WSU (48291)		0.9468	
N-1: Moscow 230 - South Pullman 115 kV (M23-SPU) + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.936	0.9296	
CHAMBERS (47503)	0.9402	0.934	
CHMBRSTP (48073)	0.9407	0.9344	
DIAMOND (48109)	0.9362	0.9297	
EASCOLFX (48115)	0.9393	0.933	
EWAN (48121)	0.9325	0.9258	
SHAWNEE (48383)	0.9416	0.9355	

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
SPULLMAN (48413)	0.9289	0.9221	
TURNER_WSU (48291)		0.948	
N-1: Moscow 230 - Terre View 115 kV (M23-NMO) + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.9377	0.9313	
CHAMBERS (47503)	0.9271	0.9201	
CHMBRSTP (48073)	0.9275	0.9205	
DIAMOND (48109)	0.923	0.9157	
EASCOLFX (48115)	0.9261	0.9191	
EWAN (48121)	0.9192	0.9117	
SHAWNEE (48383)	0.9285	0.9216	
SPULLMAN (48413)		0.9448	
TERRVIEW (48430)	0.9172	0.9098	
TURNER_WSU (48291)	0.9173	0.9099	
N-1: Moscow 230 - Terre View 115 kV (TVW-NMO) + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.936	0.9295	
CHAMBERS (47503)	0.9253	0.9182	
CHMBRSTP (48073)	0.9257	0.9186	
DIAMOND (48109)	0.9212	0.9138	
EASCOLFX (48115)	0.9244	0.9172	
EWAN (48121)	0.9174	0.9097	
SHAWNEE (48383)	0.9267	0.9197	
SPULLMAN (48413)	0.9488	0.943	
TERRVIEW (48430)	0.9154	0.9078	
TURNER_WSU (48291)	0.9156	0.908	
N-1: Moscow 230/115 kV + N-1: Shawnee - Thornton 230 kV			
BRINKENS (40149)	0.9431	0.9364	
GARFIELD (48133)	0.9417	0.935	Manage dispatch of Moscow capacitors
PALOUSE (48313)	0.9429	0.9362	
POTLAT A (48341)	0.9428	0.9361	
VIOLA (48445)	0.9454	0.9388	
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)	0.2838	0.2791	
BRINKENS (40149)	0.2908	0.2867	
CHAMBERS (47503)	0.2798	0.275	
CHMBRSTP (48073)	0.2804	0.2756	
DEARY (48101)	0.4452	0.447	
DIAMOND (48109)	0.2741	0.2691	
EASCOLFX (48115)	0.2788	0.2739	
EWAN (48121)	0.2695	0.2644	
GARFIELD (48133)	0.2891	0.2848	
JULIAETT (48169)	0.4537	0.4559	
JULIAETT (48169) -> MOSCOW (48247) CKT 1	130.1 %	133.4 %	Shawnee #2 230/115 kV Transformer
MOSCCITY (48243)	0.3028	0.2987	
MOSCITYT (48245)	0.3031	0.299	
MOSCOW (48247)	0.3103	0.3064	
NMOSCOW (48273)	0.2973	0.2931	
OROFINO (48303) -> JULIAETT (48169) CKT 1	134.5 %	138.0 %	
PALOUSE (48313)	0.2907	0.2865	
POTLAT A (48341)	0.2905	0.2864	
SHAWNEE (48383)	0.2818	0.277	
SPULLMAN (48413)	0.2868	0.2822	
TERRVIEW (48430)	0.2856	0.281	
TURNER_WSU (48291)	0.2835	0.2788	
VIOLA (48445)	0.2939	0.2898	
N-1: Moscow 230/115 kV + N-1: North Lewiston - Shawnee 230 kV			
BRINKENS (40149)	0.9365		
GARFIELD (48133)	0.9351		
MOSCCITY (48243)	0.9497		
MOSCITYT (48245)	0.9499		
PALOUSE (48313)	0.9363		Manage dispatch of Moscow capacitors
POTLAT A (48341)	0.9362		
VIOLA (48445)	0.9388		
N-1: Dworshak - Orofino 115 kV + N-1: Moscow 230/115 kV			
BRINKENS (40149)	0.9358		
DEARY (48101)	0.9436		
GARFIELD (48133)	0.9344		

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
JULIAETT (48169)	0.9486		
PALOUSE (48313)	0.9357		
POTLAT A (48341)	0.9355		
VIOLA (48445)	0.9381		
N-1: Hatwai 500/230 kV + N-1: Moscow 230/115 kV			
BRINKENS (40149)		0.9382	
GARFIELD (48133)		0.9368	
PALOUSE (48313)		0.9381	
POTLAT A (48341)		0.938	
VIOLA (48445)		0.9406	
N-1: Moscow 230 - Orofino 115 kV + N-1: Moscow 230/115 kV			
BRINKENS (40149)	0.9436	0.9379	
GARFIELD (48133)	0.9422	0.9365	
PALOUSE (48313)	0.9434	0.9378	
POTLAT A (48341)	0.9433	0.9377	
VIOLA (48445)	0.9459	0.9403	
N-1: Moscow 230 - Terre View 115 kV (TVW-NMO) + N-1: Moscow 230/115 kV			
BRINKENS (40149)	0.9459	0.9404	
GARFIELD (48133)	0.9446	0.939	
PALOUSE (48313)	0.9458	0.9403	
POTLAT A (48341)	0.9457	0.9402	
VIOLA (48445)	0.9483	0.9428	
N-1: Moscow 230/115 kV + N-1: Shawnee - Terre View 115 kV (TVW-TUR)			
BRINKENS (40149)		0.9464	
GARFIELD (48133)	0.95	0.9449	
PALOUSE (48313)		0.9462	
POTLAT A (48341)		0.9461	
VIOLA (48445)		0.9487	
N-1: Benewah - Thornton 230 kV + N-1: Moscow 230/115 kV			
BRINKENS (40149)		0.9493	
GARFIELD (48133)		0.9479	
PALOUSE (48313)		0.9492	
POTLAT A (48341)		0.9491	
N-1: Dworshak - Taft 500 kV + N-1: Moscow 230/115 kV			
BRINKENS (40149)		0.9489	
GARFIELD (48133)		0.9475	
PALOUSE (48313)		0.9488	
POTLAT A (48341)		0.9487	
N-1: Moscow 230 - Terre View 115 kV (M23-NMO) + N-1: Moscow 230/115 kV			
BRINKENS (40149)		0.9479	
GARFIELD (48133)		0.9465	
PALOUSE (48313)		0.9478	
POTLAT A (48341)		0.9477	
N-1: Moscow 230/115 kV + N-1: Nez Perce - Orofino 115 kV			
GARFIELD (48133)		0.9497	

	19LSPR OJECTS	19LWPR OJECTS	Mitigation
P6			
N-1: Dworshak - Taft 500 kV + N-1: Hatwai - Lower Granite 500 kV			
SHAWNEE (48385)	1.0527		
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV			
ARMSTRNG (47501)		0.94	
BRINKENS (40149)		0.9416	
CHAMBERS (47503)		0.939	
CHMBRSTP (48073)		0.9392	
DIAMOND (48109)		0.9375	Shawnee #2 230/115 kV Transformer
EASCOLFX (48115)		0.9385	
EWAN (48121)		0.9357	
GARFIELD (48133)		0.9411	
MOSCCITY (48243)		0.9459	
MOSCITYT (48245)		0.9461	
MOSCOW (48247)		0.9485	
NMOSCOW (48273)		0.9443	

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	19LSPR OJECTS	19LWPR OJECTS	Mitigation
PALOUSE (48313)		0.9417	
POTLAT A (48341)		0.9415	
SHAWNEE (48383)		0.9396	
SPULLMAN (48413)		0.9406	
TERRVIEW (48430)		0.9403	
TURNER_WSU (48291)		0.9395	
VIOLA (48445)		0.9428	

6.6 Spare Equipment Study

Facility rating violations from the Spare Equipment Study are provided in Table III-15.

6.6.1 Shawnee and Moscow Transformer Failure

Failure of either the Moscow 230/115 kV Transformer or Shawnee 230/115 kV Transformer requiring complete replacement causes thermal overloads on the Moscow – Orofino 115 kV Transmission Line and low voltage issues in the local area with a subsequent outage of the remaining transformer. Subsequent outages of either the Moscow – South Pullman or Moscow – Terre View 115 kV transmission lines with a failure of the Shawnee 230/115 kV Transformer also causes low voltages near the Shawnee Station.

The addition of a second transformer at Shawnee Station will mitigate the performance issues related to a transformer failure at Shawnee or Moscow Stations. There is some operational flexibility with the existing system to radialize the system or close normally open transmission lines to address the performance issues.

	M23	SHN
P1		
N-1: Hatwai - Lower Granite 500 kV		
PALOUSE_WIND (48863)		1.0532
SHAWNEE (48385)		1.0536
THORNTON (48432)		1.0532
N-1: Moscow 230 - South Pullman 115 kV (M23-SPU)		
ARMSTRNG (47501)		0.9481
DIAMOND (48109)		0.9477
EWAN (48121)		0.944
SPULLMAN (48413)		0.9415
N-1: Moscow 230 - Terre View 115 kV (M23-NMO)		
CHAMBERS (47503)		0.9396
CHMBRSTP (48073)		0.9399
DIAMOND (48109)		0.9353
EASCOLFX (48115)		0.9384
EWAN (48121)		0.9315
SHAWNEE (48383)		0.941
TERRVIEW (48430)		0.9287
TURNER_WSU (48291)		0.9291
N-1: Moscow 230 - Terre View 115 kV (TVW-NMO)		
ARMSTRNG (47501)		0.9484
CHAMBERS (47503)		0.9373
CHMBRSTP (48073)		0.9376
DIAMOND (48109)		0.933
EASCOLFX (48115)		0.9361
EWAN (48121)		0.9292
SHAWNEE (48383)		0.9387
TERRVIEW (48430)		0.9264
TURNER_WSU (48291)		0.9268
N-1: Moscow 230/115 kV		
AHSAHKA (40023)		0.826
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO		151.9 %
ARMSTRNG (47501)		0.3806
BRINKENS (40149)		0.3934
CHAMBERS (47503)		0.3755
CHMBRSTP (48073)		0.376
COTTNWDT (48087)		0.861
COTTNWOD (48089)		0.8597
CRAIGMNT (48091)		0.8934
DEARY (48101)		0.5387

	M23	SHN
DIAMOND (48109)		0.3684
DWORSHAK (40367)		0.8326
EASCOLFX (48115)		0.3739
EGRANTAP (48119)		0.8631
EGRANVIL (40383)		0.863
EWAN (48121)		0.3627
GARFIELD (48133)		0.3921
GRANGVIL (48141)		0.8634
JAYPE (48167)		0.7882
JULIAETT (48169)		0.5435
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW		173.8 %
KAMIAH (48171)		0.855
KOOSKIA (48177)		0.8537
MOSCCITY (48243)		0.403
MOSCITYT (48245)		0.4034
MOSCOW (48247)		0.4113
NEZPERCE (48261)		0.8593
NMOSCOW (48273)		0.3958
OROFINO (48303)		0.7965
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT		184.0 %
PALOUSE (48313)		0.3934
POTLAT A (48341)		0.393
SHAWNEE (48383)		0.3777
SPULLMAN (48413)		0.3847
TERRVIEW (48430)		0.3816
TURNER_WSU (48291)		0.3794
VIOLA (48445)		0.3966
WEIPPE (48459)		0.7886
WICKES (48465)		0.8632
N-1: North Lewiston - Shawnee 230 kV		
SHAWNEE (48385)		1.052
N-1: Shawnee - Terre View 115 kV (SHN-TUR)		
TERRVIEW (48430)	0.9493	
TURNER_WSU (48291)	0.9479	
N-1: Shawnee 230/115 kV		
AHSAHKA (40023)	0.826	
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO	151.9 %	
ARMSTRNG (47501)	0.3806	
BRINKENS (40149)	0.3934	
CHAMBERS (47503)	0.3754	
CHMBRSTP (48073)	0.376	
COTTNWDT (48087)	0.861	
COTTNWOD (48089)	0.8597	
CRAIGMNT (48091)	0.8934	
DEARY (48101)	0.5387	
DIAMOND (48109)	0.3683	
DWORSHAK (40367)	0.8325	
EASCOLFX (48115)	0.3739	
EGRANTAP (48119)	0.863	
EGRANVIL (40383)	0.8629	
EWAN (48121)	0.3627	
GARFIELD (48133)	0.3921	
GRANGVIL (48141)	0.8634	
JAYPE (48167)	0.7882	
JULIAETT (48169)	0.5435	
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW	173.8 %	
KAMIAH (48171)	0.8549	
KOOSKIA (48177)	0.8537	
MOSCCITY (48243)	0.403	
MOSCITYT (48245)	0.4033	
MOSCOW (48247)	0.4113	
NEZPERCE (48261)	0.8593	
NMOSCOW (48273)	0.3957	

	M23	SHN
OROFINO (48303)	0.7965	
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT	184.0 %	
PALOUSE (48313)	0.3933	
POTLAT A (48341)	0.393	
SHAWNEE (48383)	0.3777	
SPULLMAN (48413)	0.3846	
TERRVIEW (48430)	0.3816	
TURNER_WSU (48291)	0.3793	
VIOLA (48445)	0.3966	
WEIPPE (48459)	0.7886	
WICKES (48465)	0.8631	
P2		
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer		
EWAN (48121)		0.9488
MOSCOW (48249)		1.0064
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai		
EWAN (48121)		0.9484
MOSCOW (48249)		1.006
BF: 4710 Hatwai-Lower Granite, Hatwai 500/230 kV Transformer		
EWAN (48121)		0.9494
MOSCOW (48249)		1.0071
BF: A1588 Libby 230 kV, Conkelley-Libby		
PALOUSE_WIND (48863)		1.0533
THORNTON (48432)		1.0534
BF: A632 Shawnee 115 kV, Shawnee-Terre View		
AHSAHKA (40023)	0.8545	
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO	148.3 %	
ARMSTRNG (47501)	0.4771	
BRINKENS (40149)	0.4793	
COTTNWDT (48087)	0.8856	
COTTNWOD (48089)	0.8843	
CRAIGMNT (48091)	0.9118	
DEARY (48101)	0.6038	
DWORSHAK (40367)	0.8603	
EGRANTAP (48119)	0.888	
EGRANVIL (40383)	0.8879	
GARFIELD (48133)	0.4779	
GRANGVIL (48141)	0.8884	
JAYPE (48167)	0.8203	
JULIAETT (48169)	0.6084	
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW	163.6 %	
KAMIAH (48171)	0.8791	
KOOSKIA (48177)	0.8779	
MOSCCITY (48243)	0.4911	
MOSCITYT (48245)	0.4915	
MOSCOW (48247)	0.4982	
NEZPERCE (48261)	0.8833	
NMOSCOW (48273)	0.4832	
OROFINO (48303)	0.8281	
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT	174.0 %	
PALOUSE (48313)	0.4793	
POTLAT A (48341)	0.4789	
SPULLMAN (48413)	0.4774	
TERRVIEW (48430)	0.4694	
TURNER_WSU (48291)	0.4673	
VIOLA (48445)	0.4827	
WEIPPE (48459)	0.8207	
WICKES (48465)	0.8881	
BF: A634 Shawnee 115 kV, Shawnee-South Pullman		
AHSAHKA (40023)	0.8566	
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO	148.0 %	
BRINKENS (40149)	0.4852	
COTTNWDT (48087)	0.8873	

	M23	SHN
COTTNWOD (48089)	0.8861	
CRAIGMNT (48091)	0.9131	
DEARY (48101)	0.6083	
DWORSHAK (40367)	0.8623	
EGRANTAP (48119)	0.8898	
EGRANVIL (40383)	0.8897	
GARFIELD (48133)	0.4838	
GRANGVIL (48141)	0.8901	
JAYPE (48167)	0.8226	
JULIAETT (48169)	0.6129	
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW	**162.8 %**	
KAMIAH (48171)	0.8808	
KOOSKIA (48177)	0.8796	
MOSCCITY (48243)	0.4971	
MOSCITYT (48245)	0.4975	
MOSCOW (48247)	0.5041	
NEZPERCE (48261)	0.885	
NMOSCOW (48273)	0.489	
OROFINO (48303)	0.8304	
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT	**173.2 %**	
PALOUSE (48313)	0.4851	
POTLAT A (48341)	0.4847	
SPULLMAN (48413)	0.4837	
TERRVIEW (48430)	0.4753	
TURNER_WSU (48291)	0.4732	
VIOLA (48445)	0.4886	
WEIPPE (48459)	0.823	
WICKES (48465)	0.8899	
BF: A845 Moscow-Terre View, Moscow 230/115 kV Transformer		
AHSAHKA (40023)		0.8555
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO		**143.4 %**
ARMSTRNG (47501)		0.3974
BRINKENS (40149)		0.4621
CHAMBERS (47503)		0.3796
CHMBRSTP (48073)		0.3802
COTTNWDT (48087)		0.8867
COTTNWOD (48089)		0.8854
CRAIGMNT (48091)		0.9128
DEARY (48101)		0.5993
DIAMOND (48109)		0.3725
DWORSHAK (40367)		0.8613
EASCOLFX (48115)		0.3781
EGRANTAP (48119)		0.8891
EGRANVIL (40383)		0.889
EWAN (48121)		0.3668
GARFIELD (48133)		0.4607
GRANGVIL (48141)		0.8895
JAYPE (48167)		0.8213
JULIAETT (48169)		0.6039
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW		**158.4 %**
KAMIAH (48171)		0.8802
KOOSKIA (48177)		0.879
MOSCCITY (48243)		0.4647
MOSCITYT (48245)		0.4651
MOSCITYT (48245) -> SPULLMAN (48413) CKT 1 at SPULLMAN		**104.2 %**
MOSCOW (48247)		0.4809
MOSCOW (48247) -> MOSCITYT (48245) CKT 1 at MOSCITYT		**137.8 %**
NEZPERCE (48261)		0.8843
OROFINO (48303)		0.8291
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT		**168.4 %**
PALOUSE (48313)		0.462
POTLAT A (48341)		0.4616
SHAWNEE (48383)		0.3819

	M23	SHN
SPULLMAN (48413)		0.4192
TERRVIEW (48430)		0.3646
TURNER_WSU (48291)		0.3652
VIOLA (48445)		0.4654
WEIPPE (48459)		0.8216
WICKES (48465)		0.8892
BF: R318 Noxon East & West 230 kV		
SHAWNEE (48385)		1.0546
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer		
PALOUSE_WIND (48863)		1.0533
THORNTON (48432)		1.0533
BUS: Hatwai 230 kV		
EWAN (48121)		0.9499
MOSCOW (48249)		1.0061
BUS: Libby 230 kV		
PALOUSE_WIND (48863)		1.0542
SHAWNEE (48385)		1.0528
THORNTON (48432)		1.0542
BUS: Shawnee 115 kV		
AHSAHKA (40023)	0.8545	
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO	**148.3 %**	
ARMSTRNG (47501)	0.4771	
BRINKENS (40149)	0.4793	
COTTNWDT (48087)	0.8856	
COTTNWOD (48089)	0.8843	
CRAIGMNT (48091)	0.9118	
DEARY (48101)	0.6038	
DWORSHAK (40367)	0.8603	
EGRANTAP (48119)	0.888	
EGRANVIL (40383)	0.8879	
GARFIELD (48133)	0.4779	
GRANGVIL (48141)	0.8884	
JAYPE (48167)	0.8203	
JULIAETT (48169)	0.6084	
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW	**163.6 %**	
KAMIAH (48171)	0.8791	
KOOSKIA (48177)	0.8779	
MOSCCITY (48243)	0.4911	
MOSCITYT (48245)	0.4915	
MOSCOW (48247)	0.4982	
NEZPERCE (48261)	0.8833	
NMOSCOW (48273)	0.4832	
OROFINO (48303)	0.8281	
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT	**174.0 %**	
PALOUSE (48313)	0.4793	
POTLAT A (48341)	0.4789	
SPULLMAN (48413)	0.4774	
TERRVIEW (48430)	0.4694	
TURNER_WSU (48291)	0.4673	
VIOLA (48445)	0.4827	
WEIPPE (48459)	0.8207	
WICKES (48465)	0.8881	
BUS: Shawnee 230 kV		
AHSAHKA (40023)	0.8237	
AHSAHKA (40023) -> OROFINO (48303) CKT 1 at OROFINO	**152.9 %**	
ARMSTRNG (47501)	0.3788	
BRINKENS (40149)	0.3916	
CHAMBERS (47503)	0.3737	
CHMBRSTP (48073)	0.3742	
COTTNWDT (48087)	0.8584	
COTTNWOD (48089)	0.8571	
CRAIGMNT (48091)	0.8908	
DEARY (48101)	0.5367	

	M23	SHN
DIAMOND (48109)	0.3666	
DWORSHAK (40367)	0.8302	
EASCOLFX (48115)	0.3721	
EGRANTAP (48119)	0.8604	
EGRANVIL (40383)	0.8603	
EWAN (48121)	0.361	
GARFIELD (48133)	0.3903	
GRANGVIL (48141)	0.8607	
JAYPE (48167)	0.7858	
JULIAETT (48169)	0.5415	
JULIAETT (48169) -> MOSCOW (48247) CKT 1 at MOSCOW	173.4 %	
KAMIAH (48171)	0.8524	
KOOSKIA (48177)	0.8511	
MOSCCITY (48243)	0.4012	
MOSCITYT (48245)	0.4015	
MOSCOW (48247)	0.4095	
NEZPERCE (48261)	0.8567	
NMOSCOW (48273)	0.3939	
OROFINO (48303)	0.7942	
OROFINO (48303) -> JULIAETT (48169) CKT 1 at JULIAETT	183.6 %	
PALOUSE (48313)	0.3915	
POTLAT A (48341)	0.3912	
SHAWNEE (48383)	0.3759	
SPULLMAN (48413)	0.3828	
TERRVIEW (48430)	0.3798	
TURNER_WSU (48291)	0.3776	
VIOLA (48445)	0.3948	
WEIPPE (48459)	0.7862	
WICKES (48465)	0.8605	
BUS: Terre View 115 kV		
DIAMOND (48109)		0.9464
EASCOLFX (48115)		0.9494
EWAN (48121)		0.9426
TURNER_WSU (48291)		0.943
N-1: Moscow 230 - South Pullman 115 kV Open @ M23		
ARMSTRNG (47501)		0.9101
CHAMBERS (47503)		0.9188
CHMBRSTP (48073)		0.9192
DIAMOND (48109)		0.9144
EASCOLFX (48115)		0.9177
EWAN (48121)		0.9105
MOSCCITY (48243)		0.8895
MOSCITYT (48245)		0.8897
MOSCOW (48247) -> NMOSCOW (48273) CKT 1 at NMOSCOW		108.6 %
SHAWNEE (48383)		0.9203
SPULLMAN (48413)		0.8974
TERRVIEW (48430)		0.9447
TURNER_WSU (48291)		0.9401
N-1: Moscow 230 - South Pullman 115 kV Open @ SPU		
ARMSTRNG (47501)		0.9437
CHAMBERS (47503)		0.9475
CHMBRSTP (48073)		0.9478
DIAMOND (48109)		0.9433
EASCOLFX (48115)		0.9464
EWAN (48121)		0.9395
SHAWNEE (48383)		0.9488
SPULLMAN (48413)		0.937
N-1: Moscow 230 - Terre View 115 kV Open @ M23		
ARMSTRNG (47501)		0.9377
CHAMBERS (47503)		0.9243
CHMBRSTP (48073)		0.9246
DIAMOND (48109)		0.9199
EASCOLFX (48115)		0.9231

	M23	SHN
EWAN (48121)		0.916
MOSCOW (48247) -> MOSCITYT (48245) CKT 1 at MOSCITYT		106.1 %
NMOSCOW (48273)		0.9077
SHAWNEE (48383)		0.9257
TERRVIEW (48430)		0.9099
TURNER_WSU (48291)		0.9108
N-1: Shawnee - Terre View 115 kV Open @ TVW		
CHAMBERS (47503)		0.9483
CHMBRSTP (48073)		0.9486
DIAMOND (48109)		0.9441
EASCOLFX (48115)		0.9472
EWAN (48121)		0.9403
SHAWNEE (48383)		0.9496
TURNER_WSU (48291)		0.9407

TABLE III-15: PALOUSE SPARE EQUIPMENT CONTINGENCY ANALYSIS RESULTS.

6.7 Voltage Stability Study

A Load Ramp PV Curve analysis was conducted while monitoring all buses in the Palouse area. All loads within the Palouse area were increased until voltage collapse occurred. All additional generation necessary to supply the increase in load came from a distribution of all generation in WECC except those within the Palouse area.

The theoretical flow limit is 1250 MW for all lines in service condition. The critical bus under all lines in service condition is Garfield Station. The limiting contingency is the loss of both the Shawnee and Moscow 230/115 kV transformers with total area load of 105 MW. Figure III-20 shows the results of the Load Ramp PV Curve analysis but the two transformer contingency is not represented on the plot because the nose point for the outage is less than the existing load level of 168 MW represent in the model.

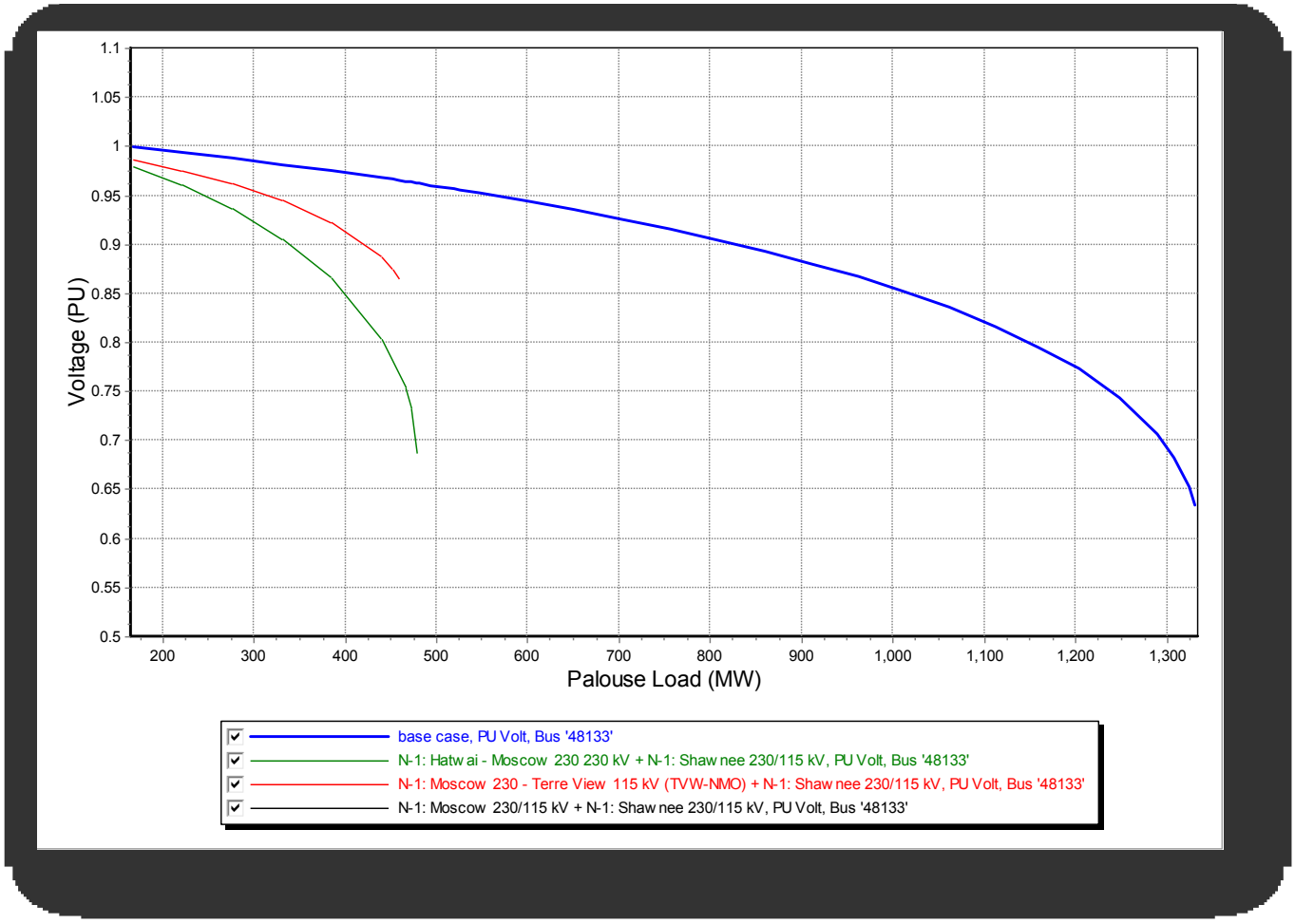


FIGURE III-20: PALOUSE LOAD RAMP PV CURVE RESULTS – EXISTING SYSTEM

The load ramp PV curve analysis was repeated with the assumption that all planned corrective action plans listed above are constructed. The performance of the area transmission system is not improved as no projects are planned for construction which impact how the Palouse transmission system functions.

6.8 Stability Study Results

No system deficiencies were found.

7 SPOKANE

7.1 Executive Summary

The Spokane area transmission system demonstrated performance issues in the near term and long term planning horizons. Several performance issues exist in the present state of the system and worsen with time. The most severe performance issue in the Spokane area is caused by the tie breaker failure of A600 at Beacon Station. The area's dependence on the Beacon Station leaves the system with a single point of failure causing several thermal overload violations.

Integrating new 230 kV facilities at the existing Ninth & Central Station will conceptually mitigate the observed performance issues for the breaker failure at Beacon Station. Additional 230 kV infrastructure, including the proposed Garden Springs Station and 230 kV transmission lines connecting Garden Springs to Ninth & Central, Westside, and Thornton, will provide greatly improved transmission system performance in the near and long term planning horizon. Constructing a new 230 kV transmission line from the Rathdrum area to Westside station will make Westside a stronger source to the area and increase the ability to transfer generation in the Rathdrum area to load.

Several station rebuilds are planned in the Spokane area due to age and condition. Metro and Sunset station rebuilds are examples of the more notable projects. Coordination with BPA and further analysis is underway to mitigate the issues observed for loss of BPA's Bell #6 230/115 kV Transformer and an outage of an Avista transmission line between Bell and Beacon.

A list of the corrective action plans proposed for the Spokane area is provided in Table III-16.

	Year Problem Starts	Construction Start	Construction End	Consequence	Probability Factor	Priority	Cost Estimate
2-Planned							
Garden Springs 115 kV Station Integration	Present	2017	2019	100	0.1250	12.5000	$8,200,000
Spokane Valley Transmission Reinforcement	Present	2015	2016	210	0.7500	157.5000	$8,890,000
Westside Transformer Replacement	Present	2015	2016	110	0.0125	1.3750	$1,750,000
Ninth & Central - Sunset 115 kV Transmission Line Rebuild	2023	2015	2016	50	0.0010	0.0521	$925,000
3-Needs Further Analysis							
Garden Springs 230 kV Station Integration	2032			200	0.0007	0.1389	$15,000,000
Nine Mile - Westside Protection Upgrade	Present			52	0.5000	26.0000	$200,000
Bell Second Transformer	Present			1710	0.0750	128.2500	$0
4-New Proposal							
Beacon - Francis & Cedar 115 kV Transmission Line Reconductor	2032			22	0.0005	0.0115	$1,500,000
Beacon 230 kV Capacitor	Present			200	0.1250	25.0000	$1,500,000
Garden Springs - Ninth & Central 230 kV Transmission Line	2034			200	0.0063	1.2500	$30,000,000
Garden Springs - Thornton 230 kV Transmission Line	Present			600	0.0094	5.6250	$30,000,000
Ninth & Central 230 kV Integration	Present			750	0.0750	56.2500	$15,000,000
Rathdrum - Westside 230 kV Transmission Line	2034			200	0.0005	0.0938	$30,000,000
Silver Lake Switching Station	2032			24	0.0005	0.0125	$4,000,000

TABLE III-16: SPOKANE CORRECTIVE ACTION PLANS

Additional projects not categorized as corrective action plans are listed in Table III-17.

	Construction Start	Construction End	Cost Estimate
2-Planned			
Chester Station Rebuild	2017	2018	$1,460,000
Deer Park Partial Rebuild	2015	2015	$750,000
Downtown West Station	2016	2018	$2,275,000
Greenacres/Otis Orchards Stations	2015	2015	$1,375,000
Hallett & White - Silver Lake 115 kV Transmission Line Rebuild	2017	2018	$2,025,000
Irvin Distribution	2016	2017	$1,875,000
Metro Station Rebuild	2016	2019	$13,150,000
Ninth & Central Station Upgrade	2015	2017	$2,950,000
Northwest Station Rebuild	2016	2017	$1,675,000
Ross Park Station Rebuild	2015	2017	$6,000,000
Southeast Capacity Increase	2016	2016	$450,000
Sunset Station Rebuild	2017	2019	$3,775,000
3-Needs Further Analysis			
Beacon - Bell - Francis & Cedar - Waikiki Reconfiguration	2016	2017	$2,025,000
Beacon Station Rebuild			
College and Walnut Consolidation/Rebuild			
Downtown East Station			
Hallett & White Capacitor Bank			
Hawthorne Station			
Hillyard Station			
Westside Station Rebuild			

TABLE III-17: SPOKANE FURTHER SINGLE SYSTEM PROJECTS

7.2 System Description

The Avista Spokane area is located primarily in Spokane and Stevens Counties in Washington State. The majority of the load served in the area can be categorized as urban, high density load with the exception of the outlying areas including the edge of the West Plains and the Deer Park/Chewelah Valley. The transmission system consists of several major elements: a 500 kV source at the BPA's Glenn H. Bell (Bell) Station, a 230 kV backbone system which provides sources to the area from generation resources from the East and West as well as capacity for energy transfers across Avista's System, and the underlying 115 kV transmission lines which serve the local loads.

7.2.1 Area Transmission

Transmission Lines

The main 230 kV transmission lines in the Lewiston/Clarkston area are:

- Beacon – Rathdrum
- Boulder Rathdrum
- Beacon – Bell 4 & 5 230 kV transmission lines

In general the remaining sources are connected to the Spokane area through the BPA Transmission System.

Transmission Sources

The main transmission sources that feed the load in the Lewiston/Clarkston area are:

- Hydro generation resources located in Northern Idaho and Western Montana
- Natural gas fired turbines just to the East in Northern Idaho
- hydro generation resources located to the North and West from the Pend Oreille and Columbia Rivers
- local hydro generation resources on the Spokane River
- Bell 500/230 kV Transformer

7.2.2 Area Generation

Non-Avista owned local generation facilities within the Spokane area include the following:

Upriver HED	Units 1& 2 @ 5.8 MW & Unit 3-5 @ 2 MW	City of Spokane
Waste to Energy Systems	Unit 1 @ 22.4 MW	Wheelabrator Environmental

There are no active Generation Interconnection Requests within the Spokane area (as of October 2014).

7.3 Corrective Action Plans

7.3.1 Completed

No Corrective Action Plans have recently been completed in the Spokane area.

7.3.2 Planned

Westside Transformer Replacement

Project Scope/Description

The replacement of the existing Westside #1 & #2 230/115 kV Transformers with new 250 MVA nominal capacity transformers is Transmission Planning's preferred mitigating project to address exceedance of the transformers existing applicable facility ratings. In addition to replacing the transformers, it may be prudent for Substation Engineering to determine appropriate investments to reduce risks associated with older equipment within the Westside Station. Further modifications to the Westside Station to meet system performance requirements will be addressed in the appropriate project report such as the Western Spokane Long Term Expansion Plan

Completion of the project will mitigate the performance issues within the ten year planning horizon.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 Heavy Summer.

The project is scheduled to be completed by the end of 2016.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
WEST (48463) -> WEST (48461) CKT 1				
P1				
N-1: Westside #2 230/115 kV				**111.5 %**
P2				
BF: A388 Bell S2 & S3 230 kV	**101.8 %**	**101.5 %**	**108.7 %**	**122.4 %**
P3				
G-1: Kettle Falls Thermal Unit 1 + N-1: Westside #2 230/115 kV				**113.5 %**
G-1: Lancaster Thermal Unit 1 + N-1: Westside #2 230/115 kV			**101.3 %**	**116.0 %**
G-1: Lancaster Thermal Unit 2 + N-1: Westside #2 230/115 kV				**113.7 %**
G-1: Little Falls Hydro Unit 1 + N-1: Westside #2 230/115 kV				**113.2 %**
G-1: Little Falls Hydro Unit 2 + N-1: Westside #2 230/115 kV				**113.2 %**
G-1: Little Falls Hydro Unit 3 + N-1: Westside #2 230/115 kV				**113.2 %**
G-1: Little Falls Hydro Unit 4 + N-1: Westside #2 230/115 kV				**113.2 %**
G-1: Long Lake Hydro Unit 1 + N-1: Westside #2 230/115 kV			**101.5 %**	**116.0 %**
G-1: Long Lake Hydro Unit 2 + N-1: Westside #2 230/115 kV			**101.5 %**	**116.0 %**
G-1: Long Lake Hydro Unit 3 + N-1: Westside #2 230/115 kV			**101.5 %**	**116.0 %**
G-1: Long Lake Hydro Unit 4 + N-1: Westside #2 230/115 kV			**101.5 %**	**116.0 %**
G-1: Monroe Street Hydro Unit 1 + N-1: Westside #2 230/115 kV				**113.6 %**
G-1: Nine Mile Hydro Unit 3 + N-1: Westside #2 230/115 kV				**113.6 %**
G-1: Post Street Hydro Unit 1 + N-1: Westside #2 230/115 kV				**113.3 %**
G-1: Spokane Waste to Energy Thermal Unit 1 + N-1: Westside #2 230/115 kV			**101.4 %**	**116.0 %**
P6				
N-1: 3TM Bell - Boundary #3 230 kV + N-1: Westside #2 230/115 kV			**102.6 %**	**117.8 %**
N-1: 3TM Boundary - Box Canyon - Colville BPA 115 kV + N-1: Westside #2 230/115 kV				**113.8 %**
N-1: Addy - Devils Gap 115 kV + N-1: Westside #2 230/115 kV			**100.8 %**	**115.7 %**
N-1: Addy #3 230/115 kV + N-1: Westside #2 230/115 kV			**103.8 %**	**119.0 %**
N-1: Beacon - Bell #4 230 kV + N-1: Beacon - Bell #5 230 kV				**107.1 %**
N-1: Beacon - Bell #4 230 kV + N-1: Bell #6 230/115 kV				**100.8 %**
N-1: Beacon - Bell #4 230 kV + N-1: Westside #2 230/115 kV			**103.1 %**	**118.7 %**
N-1: Beacon - Bell #5 230 kV + N-1: Bell #6 230/115 kV				**101.2 %**
N-1: Beacon - Bell #5 230 kV + N-1: Westside #2 230/115 kV			**103.4 %**	**119.0 %**
N-1: Beacon - Francis & Cedar 115 kV + N-1: Westside #2 230/115 kV			**100.3 %**	**115.3 %**

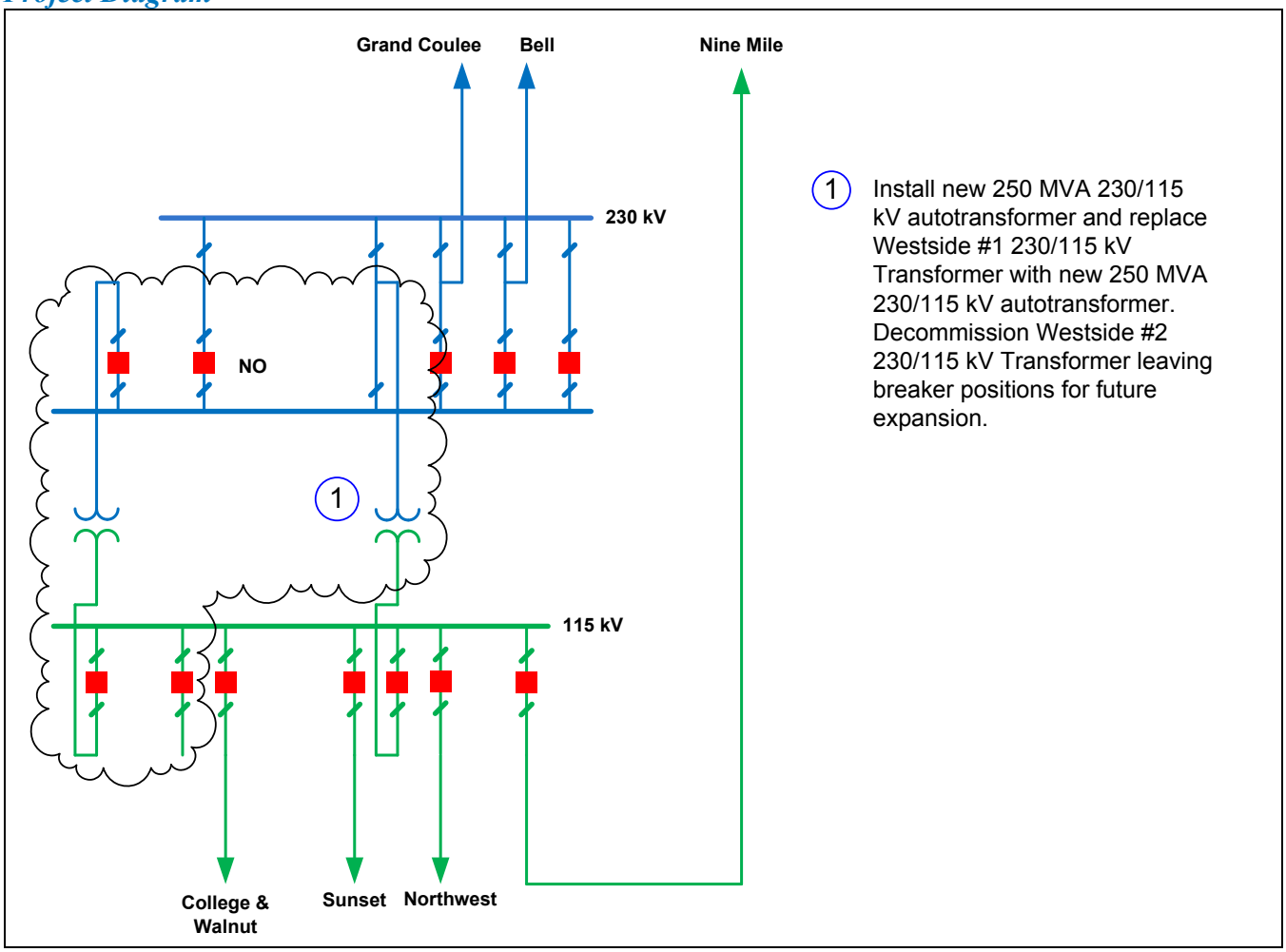
	15HS	19HS	24HS	34HS
N-1: Beacon - Ninth & Central #1 115 kV + N-1: Westside #2 230/115 kV				114.8 %
N-1: Beacon - Ninth & Central #2 115 kV + N-1: Westside #2 230/115 kV				114.8 %
N-1: Beacon - Ross Park 115 kV + N-1: Beacon #1 230/115 kV				102.8 %
N-1: Beacon - Ross Park 115 kV + N-1: Beacon #2 230/115 kV				102.8 %
N-1: Beacon - Ross Park 115 kV + N-1: Bell #6 230/115 kV				104.0 %
N-1: Beacon - Ross Park 115 kV + N-1: Westside #2 230/115 kV	109.1 %	108.6 %	117.4 %	134.7 %
N-1: Beacon #1 230/115 kV + N-1: Westside #2 230/115 kV	108.4 %	107.4 %	116.0 %	132.4 %
N-1: Beacon #2 230/115 kV + N-1: Westside #2 230/115 kV	108.3 %	107.3 %	115.8 %	132.2 %
N-1: Bell - Lancaster 230 kV + N-1: Bell #6 230/115 kV				101.8 %
N-1: Bell - Lancaster 230 kV + N-1: Westside #2 230/115 kV	101.7 %	100.3 %	107.6 %	122.7 %
N-1: Bell - Northeast 115 kV + N-1: Westside #2 230/115 kV			103.4 %	118.9 %
N-1: Bell #6 230/115 kV + N-1: Westside #2 230/115 kV	110.6 %	109.6 %	118.2 %	134.4 %
N-1: Benewah - Pine Creek 230 kV + N-1: Westside #2 230/115 kV				113.5 %
N-1: Boulder - Lancaster 230 kV + N-1: Westside #2 230/115 kV			102.1 %	116.8 %
N-1: Boulder #1 230/115 kV + N-1: Westside #2 230/115 kV				114.7 %
N-1: Boulder #2 230/115 kV + N-1: Westside #2 230/115 kV				114.6 %
N-1: Boundary 230/115 kV + N-1: Westside #2 230/115 kV				112.7 %
N-1: Cabinet - Rathdrum 230 kV + N-1: Westside #2 230/115 kV			100.4 %	115.0 %
N-1: College & Walnut - Post Street 115 kV + N-1: Westside #2 230/115 kV				113.5 %
N-1: Conkelley - Libby 230 kV + N-1: Westside #2 230/115 kV				114.1 %
N-1: Devils Gap - Nine Mile 115 kV + N-1: Westside #2 230/115 kV	100.1 %		106.7 %	121.0 %
N-1: Hatwai 500/230 kV + N-1: Westside #2 230/115 kV			104.6 %	119.6 %
N-1: Lancaster - Noxon 230 kV + N-1: Westside #2 230/115 kV			102.2 %	116.8 %
N-1: Lancaster - Rathdrum 230 kV + N-1: Westside #2 230/115 kV				112.8 %
N-1: Libby - Noxon 230 kV + N-1: Westside #2 230/115 kV			101.2 %	115.7 %
N-1: Metro - Post Street 115 kV + N-1: Westside #2 230/115 kV				113.3 %
N-1: Nine Mile - Westside 115 kV + N-1: Westside #2 230/115 kV			104.3 %	118.2 %
N-1: Ninth & Central - Third & Hatch 115 kV + N-1: Westside #2 230/115 kV				114.6 %
N-1: Noxon - Pine Creek 230 kV + N-1: Westside #2 230/115 kV				112.7 %
N-1: Pine Street - Rathdrum 115 kV (PNST-HOO) + N-1: Westside #2 230/115 kV				112.7 %
N-1: Post Street - Third & Hatch 115 kV + N-1: Westside #2 230/115 kV			104.7 %	121.1 %
N-1: Rathdrum #2 230/115 kV + N-1: Westside #2 230/115 kV				113.0 %
N-1: Ross Park - Third & Hatch 115 kV + N-1: Westside #2 230/115 kV			101.3 %	116.4 %
N-1: Third & Hatch 115kV Switched Shunt + N-1: Westside #2 230/115 kV				113.3 %
WEST (48463) -> WEST (48461) CKT 2				
P6				
N-1: Beacon - Ross Park 115 kV + N-1: Westside #1 230/115 kV				108.7 %
N-1: Beacon #1 230/115 kV + N-1: Westside #1 230/115 kV				106.6 %
N-1: Beacon #2 230/115 kV + N-1: Westside #1 230/115 kV				106.5 %
N-1: Bell #6 230/115 kV + N-1: Westside #1 230/115 kV				108.3 %

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Westside Transformer Replacement

Project Diagram



Spokane Valley Transmission Reinforcement

Project Scope/Description

The Spokane Valley Transmission Reinforcement project consists of constructing a new Irvin Station with six 115 kV terminals, a new 115 kV transmission line from Irvin Station to the Inland Empire Paper facility, rebuild of Irvin – Opportunity 115 kV Transmission Line, upgrade of the Opportunity Station with the addition of 3 new 115 kV breakers, and reconductor the Beacon – Irvin section of Beacon – Boulder #2 115 kV Transmission Line. The Irvin Station will be constructed with a breaker and a half bus configuration, 33.5 MVAr switched capacitor bank, and provisions for distribution facilities. Reconstruction of the Millwood Station served from the Beacon – Boulder #2 115 kV Transmission Line was completed in 2013 with accommodations for providing backup service to the Inland Empire Paper facility once the new transmission line from Irvin Station is completed.

Timeline

The project is scheduled to be completed by the end of 2016.

Performance Criteria Violations

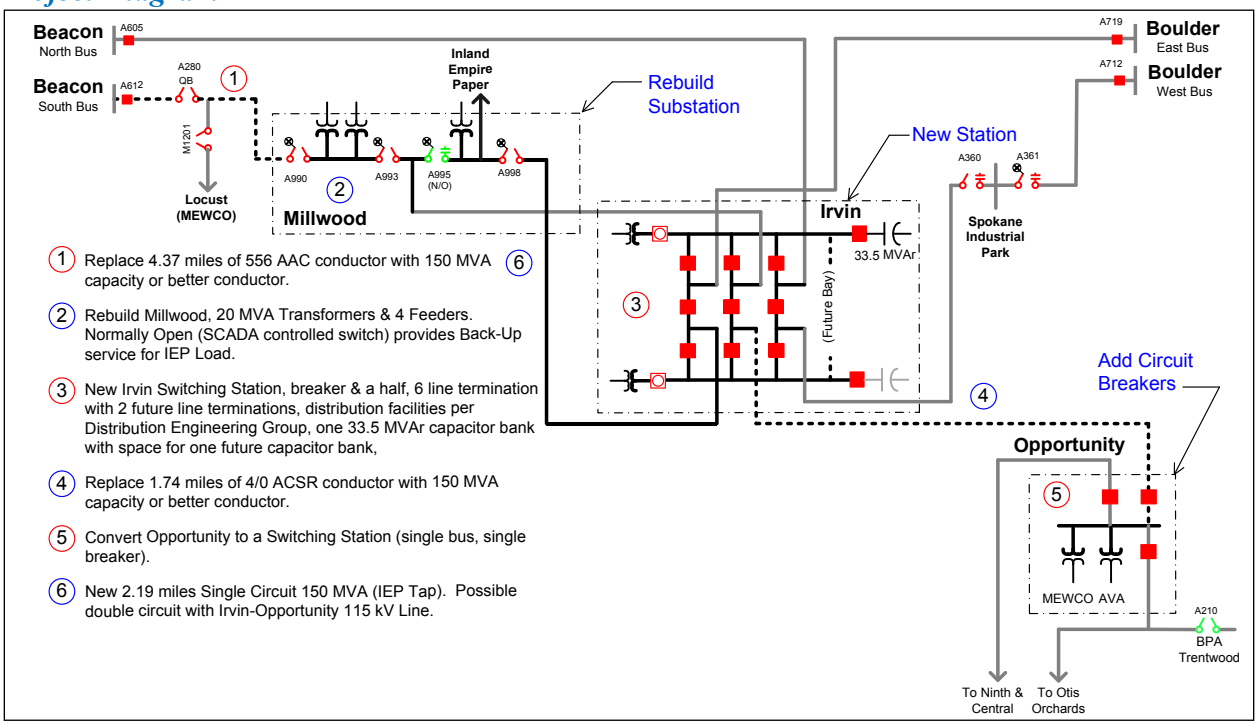
Previous planning assessments stated there were several single contingency outages causing thermal overloads and low voltages in the Spokane Valley area. Specific issues were the opening of one terminal on the Beacon – Boulder #2 or Ninth & Central – Otis Orchards 115 kV transmission lines. Increased load growth and increased demand requirements of Inland Empire Paper contributed towards the observed issues.

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- The Irvin Project – Final
- SP-2009-03 – Summary – Irvin (Spokane Valley Transmission Reinforcement) Project
- Irvin Substation Project

Project Diagram



Ninth & Central – Sunset 115 kV Transmission Line Rebuild

Performance Criteria Violations

During N-1-1 outages, the Ninth & Central – Sunset 115 kV Transmission Line exceeds its applicable facility rating. The existing Ninth & Central – Sunset 115 kV Transmission Line is constructed of 795 kcmil and 250 CU conductor. The 250 CU will be replaced with 795 AAC conductor with a minimum thermal capacity rating of 150 MVA at 40C.

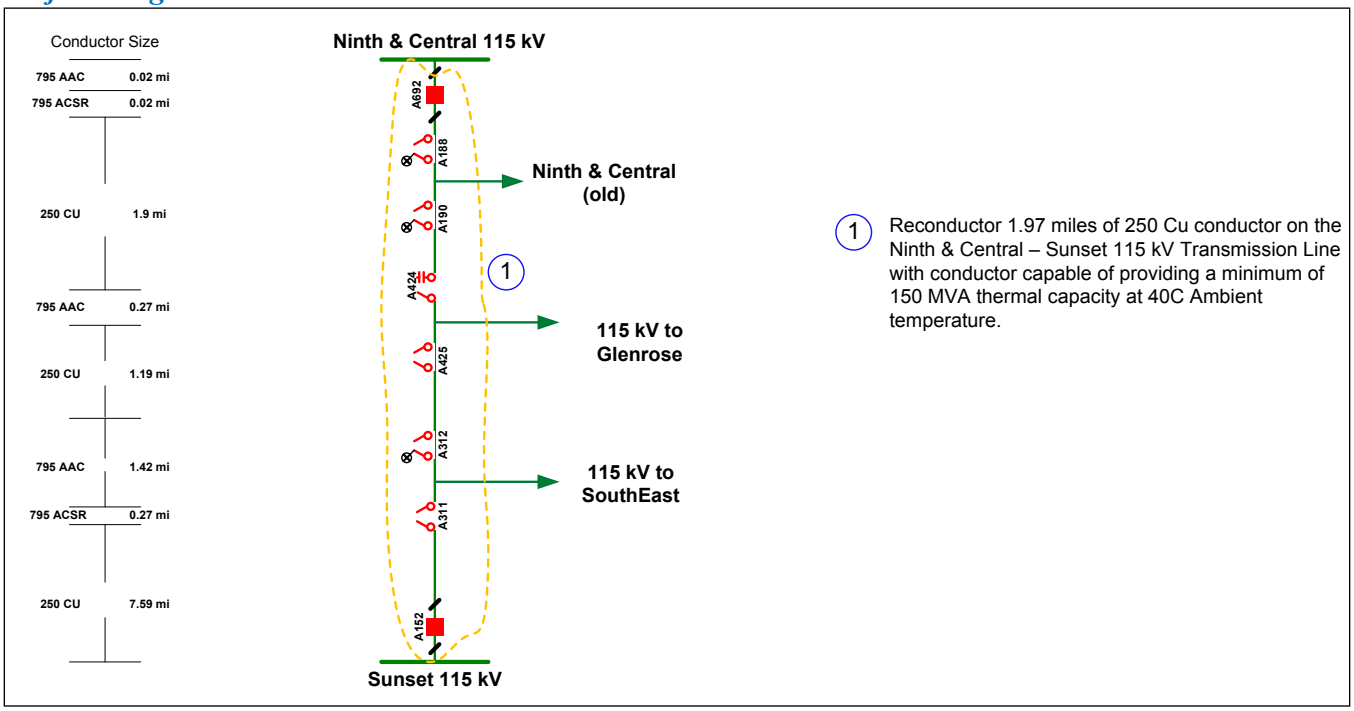
Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing all 2024 conditions studied. Operational studies have shown performance issues with the Ninth & Central – Sunset 115 kV Transmission Line during studies conducted in 2014. Sensitivity to load forecast and operating condition of the Waste to Energy plant impact the timeline.

Performance Criteria Violations

Row Labels	24HS	34HS
P6		
N-1: Airway Heights - Devils Gap 115 kV + N-1: Metro - Post Street 115 kV		
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1	**101.3 %**	**113.5 %**
N-1: Bell - Westside 230 kV + N-1: Metro - Post Street 115 kV		
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1		**101.3 %**
N-1: Metro - Post Street 115 kV + N-1: Sunset - Westside 115 kV		
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1		**111.2 %**
N-1: Metro - Post Street 115 kV + N-1: Westside #2 230/115 kV		
WEST (48463) -> WEST (48461) CKT 1		**113.3 %**

Project Diagram



7.3.3 Need Further Analysis

The following sections describe system deficiencies assuming completion of the planned projects as described above.

Garden Springs Station Integration

Project Scope/Description

The Garden Springs Station is a proposed 230/115 kV station located on the southwest edge of Spokane. The existing Spokane area transmission system is constrained by limited 230/115 kV transformation. A new 250 MVA 230/115 kV transformer at the Garden Springs Station and replacing the existing Westside #1 & #2 230/115 kV Transformers with 250 MVA nominally rated transformers has been shown to significantly improve the performance of the transmission system in the Spokane area.

The integration of the Garden Springs Station will require the construction of new 230 kV transmission lines to connect the new substation to existing 230 kV infrastructure in the area. Full build out will include two separate 230 kV transmission lines terminated at Garden Springs Station. Construction phasing will likely facilitate the ability to construct only one 230 kV transmission line initially and the second will be constructed as needed to continue meeting load service reliability issues. Several options for integrating the Garden Springs Station have been presented and evaluated. The preferred options to be further assessed include a 230 kV transmission line from Garden Springs to Westside or a new station located adjacent to the BPA Bell – Coulee transmission corridor.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2034 heavy summer.

Schedule coordination with the Ninth & Central 230 kV Integration project is necessary to determine the impacts of the projects. Several issues previously identified to be mitigated by the Garden Springs 230 kV Integration project will be mitigated by the Ninth & Central 230 kV Integration project.

Performance Criteria Violations

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
P2			
BF: A688 Ninth & Central North & South 115 kV			
ROSSPARK (48371) -> THIRHACH (48431) CKT 1			**104.5 %**
P6			
N-1: Airway Heights - Devils Gap 115 kV + N-1: Northwest - Westside 115 kV			
WEST (48461) -> SPKWASTE (48409) CKT 1			**100.0 %**
N-1: College & Walnut - Westside 115 kV + N-1: Northwest - Westside 115 kV			
WEST (48461) -> SPKWASTE (48409) CKT 1			**104.2 %**
N-1: Metro - Post Street 115 kV + N-1: Garden Springs - Westside 115 kV			
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1			**106.8 %**
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1	**104.2 %**	**112.1 %**	**127.8 %**
N-1: Metro - Sunset 115 kV + N-1: Garden Springs - Westside 115 kV			
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1		**101.2 %**	**115.8 %**
N-1: Northwest - Westside 115 kV + N-1: Garden Springs - Westside 115 kV			
WEST (48461) -> FTWRIGHT (48129) CKT 1			**103.9 %**
N-1: Post Street - Third & Hatch 115 kV + N-1: Garden Springs - Westside 115 kV			

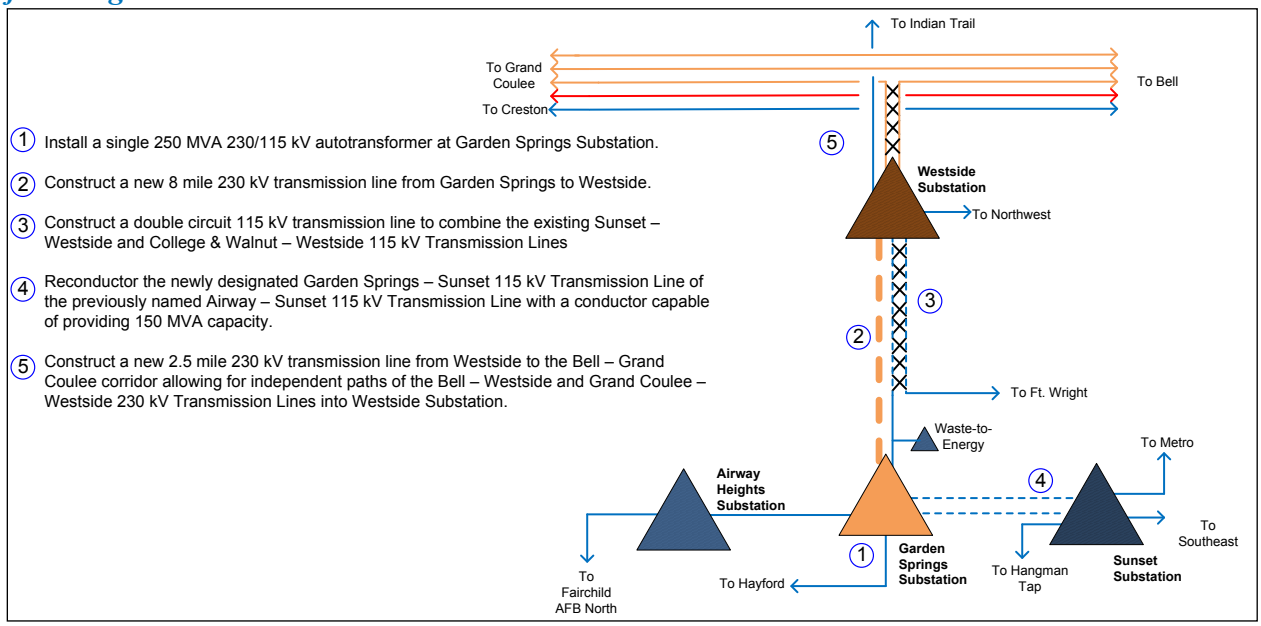
	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1			101.5 %

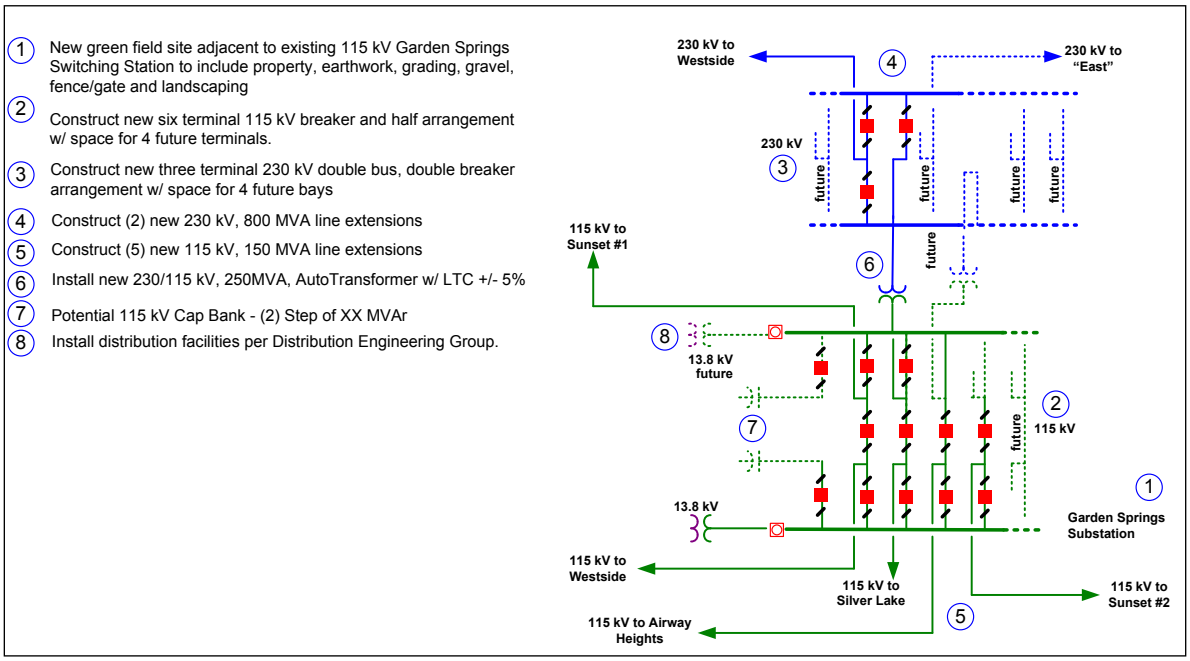
Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Garden Springs Integration Project Feasibility Study

Project Diagram





Nine Mile – Westside Protection Upgrade

Project Scope/Description

Implementation of a high speed, communication aided tripping scheme on the Nine Mile – Westside 115 kV Transmission Line is necessary to improve stability performance of the Nine Mile units. A new communication path is required between Nine Mile and Westside Stations. Upgrades and setting changes to relays at each station are also required to implement Avista's standard permissive overreaching transfer trip scheme.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in requirement R4.1.1 of TPL-001-4 in scenarios representing 2015 heavy summer.

System performance following the completion of the Nine Mile generator rebuild project has not been assessed.

Performance Criteria Violations

	15HS Max of Voltage Dip or Frequency	15HS Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	19HSPROJECTS Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	24HSPROJECTS Max of Duration or Time
P1						
N-1: Nine Mile - Westside 115 kV 3P @ WES						
Out of Step Generator						
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus						
NINEMI34 13.8kV	-36.9 %		-30.7 %		-35.1 %	

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

Project Diagram

Bell 230/115 kV Transformation

Project Scope/Description

The BPA Bell Station presently consists of a single 250 MVA 230/115 kV transformer. During outages of the transformer, the transmission system is susceptible to local voltage collapse for subsequent outages between Beacon and Bell stations. The addition of a second 230/115 kV transformer has been identified as a potential mitigating project. Coordination with BPA is necessary to ensure they are aware of the issues Avista has observed with the transmission system performance. Evaluation of the additional loading of 115 kV transmission lines from the Bell Station needs to be conducted.

Timeline

System performance analysis indicates an inability of the System to meet the performance

requirements in Table 1 of TPL-001-4 in scenarios representing all 2015 conditions studied.

Performance Criteria Violations

	15HS	19HS	24HS	34HS
P6				
N-1: Beacon - Bell #1 115 kV + N-1: Bell #6 230/115 kV				
BEACON N (48023) -> NORTHEAS (48277) CKT 1	**127.4 %**	**126.1 %**	**136.9 %**	**141.2 %**
NORTHEAS (48277) -> WAIKIKIT (48449) CKT 1	**102.4 %**		**109.1 %**	**111.0 %**
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV				
BEACON S (48029) -> BELL BPA (40087) CKT 1	**163.4 %**	**161.7 %**	**175.7 %**	**181.3 %**
N-1: Bell - Northeast 115 kV + N-1: Bell #6 230/115 kV				
BEACON S (48029) -> BELL BPA (40087) CKT 1	**112.1 %**	**107.4 %**	**118.0 %**	**118.0 %**

	15HW	19HW	24HW
P6			
N-1: Beacon - Bell #1 115 kV + N-1: Bell #6 230/115 kV			
BEACON N (48023) -> NORTHEAS (48277) CKT 1	**112.3 %**	**116.5 %**	**123.6 %**
NORTHEAS (48277) -> WAIKIKIT (48449) CKT 1			**103.8 %**
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV			
BEACON S (48029) -> BELL BPA (40087) CKT 1	**145.4 %**	**150.9 %**	**160.2 %**
N-1: Bell - Northeast 115 kV + N-1: Bell #6 230/115 kV			
BEACON S (48029) -> BELL BPA (40087) CKT 1	**110.4 %**	**114.1 %**	**121.6 %**

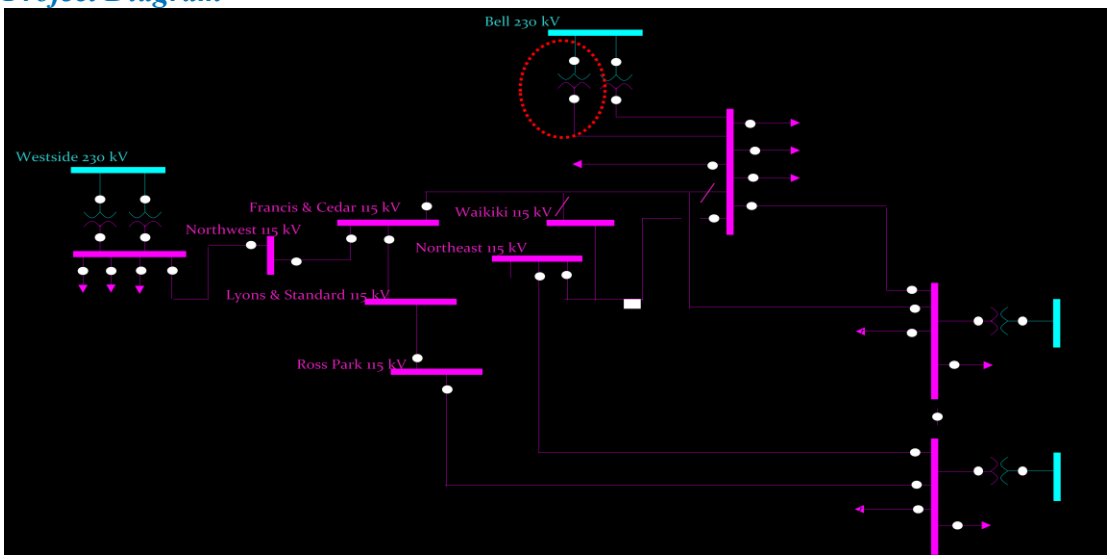
	15LS	19LS	15LW	19LW
P6				
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV				
BEACON S (48029) -> BELL BPA (40087) CKT 1	**111.4 %**	**114.0 %**	**111.4 %**	**111.4 %**

Study Report Reference(s)

Further details related to the project can be referenced in the following documents:

- Bell 115 kV Interconnection Study Report

Project Diagram



7.3.4 New Proposals

Ninth & Central 230 kV Integration

Project Scope/Description

An addition of 230 kV facilities at Ninth & Central Station has been proposed to reduce the dependence on Beacon Station. The scope of the project includes the installation of two 250 MVA 230/115 kV autotransformers, a 230 kV bus configured as double bus, double breaker with provisions for three transmission line terminals, and the construction of two 230 kV transmission lines from the north into the station. Looping either Beacon – Bell #4 or #5 230 kV transmission line into Ninth & Central Station is the preferred transmission integration. The ability to convert either of the existing Beacon – Ninth & Central #1 and #2 115 kV transmission lines to 230 kV is under evaluation.

Bus outages and tie breaker failures at Beacon Station cause the applicable facility ratings to be exceeded on area 115 kV transmission lines and the Westside #1 & #2 230/115 kV transformers. The most severe outage is the 115 kV bus tie breaker failure causing the Northwest – Westside and Ninth & Central – Otis Orchards 115 kV transmission lines to exceed their applicable facility ratings (see Figure III-21).

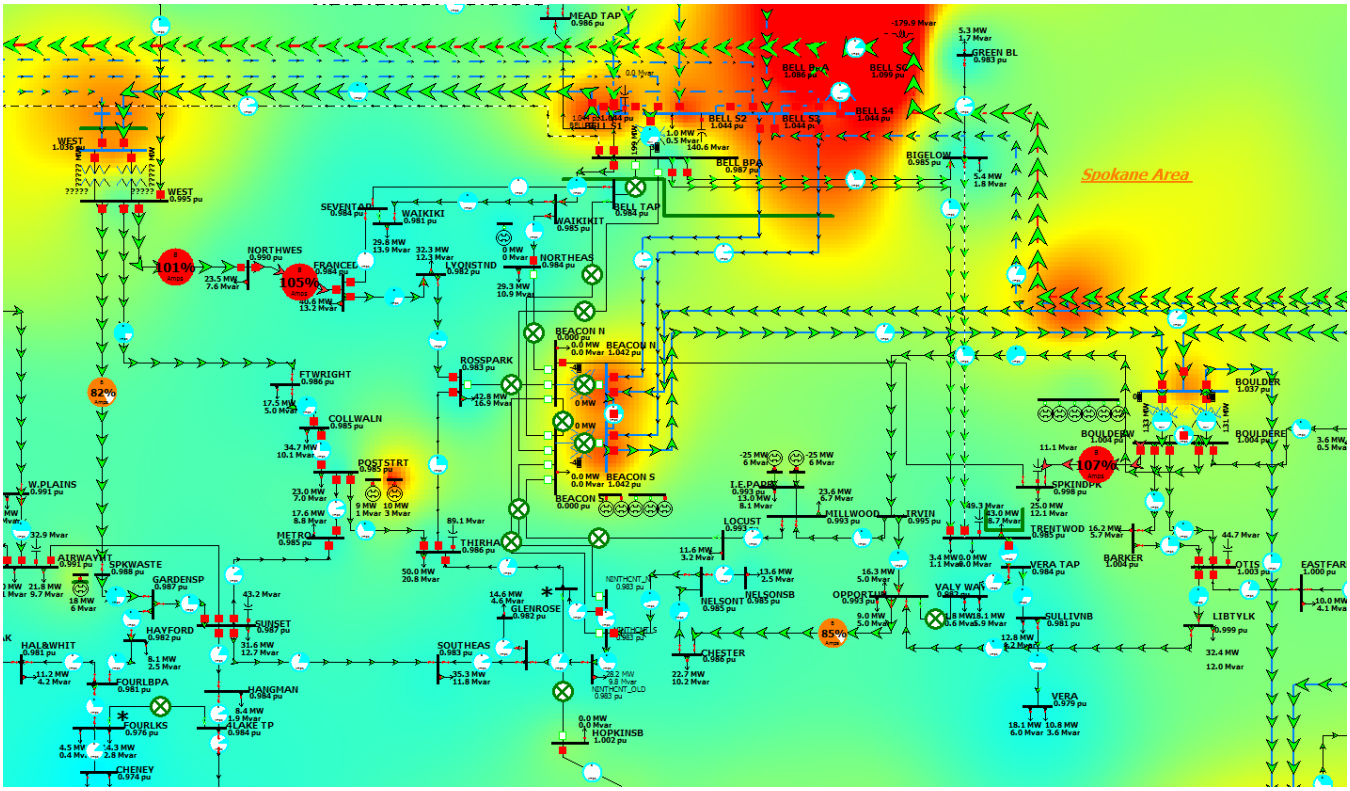


FIGURE III-21: BEACON 115 KV TBF IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2015 heavy summer.

Performance Criteria Violations

	19HSPROJECTS	24HSPROJECTS	34HSPROJECTS
P2			
BF: A600 Beacon North & South 115 kV			
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	**100.5 %**	**106.5 %**	**112.7 %**
NORTHWES (48279) -> FRANCEDR (48127) CKT 1	**100.4 %**	**104.6 %**	**115.8 %**
WEST (48461) -> NORTHWES (48279) CKT 1		**100.6 %**	**111.0 %**
BF: R427 Beacon North & South 230 kV			
BOULDERW (48520) -> SPKINDPK (48405) CKT 1		**100.2 %**	**103.1 %**
P6			
N-1: Addy #3 230/115 kV + N-1: Bell #6 230/115 kV			
BEACON S (48029) -> BELL BPA (40087) CKT 1			**101.6 %**
N-1: Beacon #1 230/115 kV + N-1: Beacon #2 230/115 kV			
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	**100.1 %**	**107.4 %**	**112.5 %**
N-1: Beacon #1 230/115 kV + N-1: Bell #6 230/115 kV			
BEACON S (48031) -> BEACON S (48029) CKT 1	**102.2 %**	**110.4 %**	**118.1 %**
N-1: Beacon #1 230/115 kV + N-1: Boulder - Irvin #2 115 kV			
BOULDERW (48520) -> SPKINDPK (48405) CKT 1			**100.1 %**
N-1: Beacon #2 230/115 kV + N-1: Bell #6 230/115 kV			
BEACON N (48025) -> BEACON N (48023) CKT 1	**104.5 %**	**112.8 %**	**120.6 %**
N-1: Beacon #2 230/115 kV + N-1: Boulder - Irvin #2 115 kV			
BOULDERW (48520) -> SPKINDPK (48405) CKT 1			**100.3 %**
N-1: Boulder - Irvin #2 115 kV + N-1: Opportunity - Otis Orchards 115 kV			
BOULDERW (48520) -> SPKINDPK (48405) CKT 1			**100.9 %**

Rathdrum – Westside 230 kV Transmission Line

Project Scope/Description

An outage of the Bell – Westside 230 kV Transmission Line leaves Westside Station as a comparatively weak 230 kV source to the Spokane area leaving the System susceptible to performance deficiencies during a second outage. The most notable outage combination is the Bell – Westside 230 kV Transmission Line and Beacon – Ross Park 115 kV Transmission Line (see Figure III-22). Other proposed projects will impact the System performance during the outage shown. For example, the proposed Ninth & Central 230 kV Integration will increase flows from Ninth & Central on the Ninth & Central – Third & Hatch 115 kV Transmission Line.

Constructing a new 230 kV transmission line from Rathdrum to Westside will improve the strength of Westside Station as a source to the Spokane area. Additional benefits are gained from the proposed transmission line including increased capacity from the Rathdrum area to the west. Increased capacity will improve the ability to reliability operate local generation.

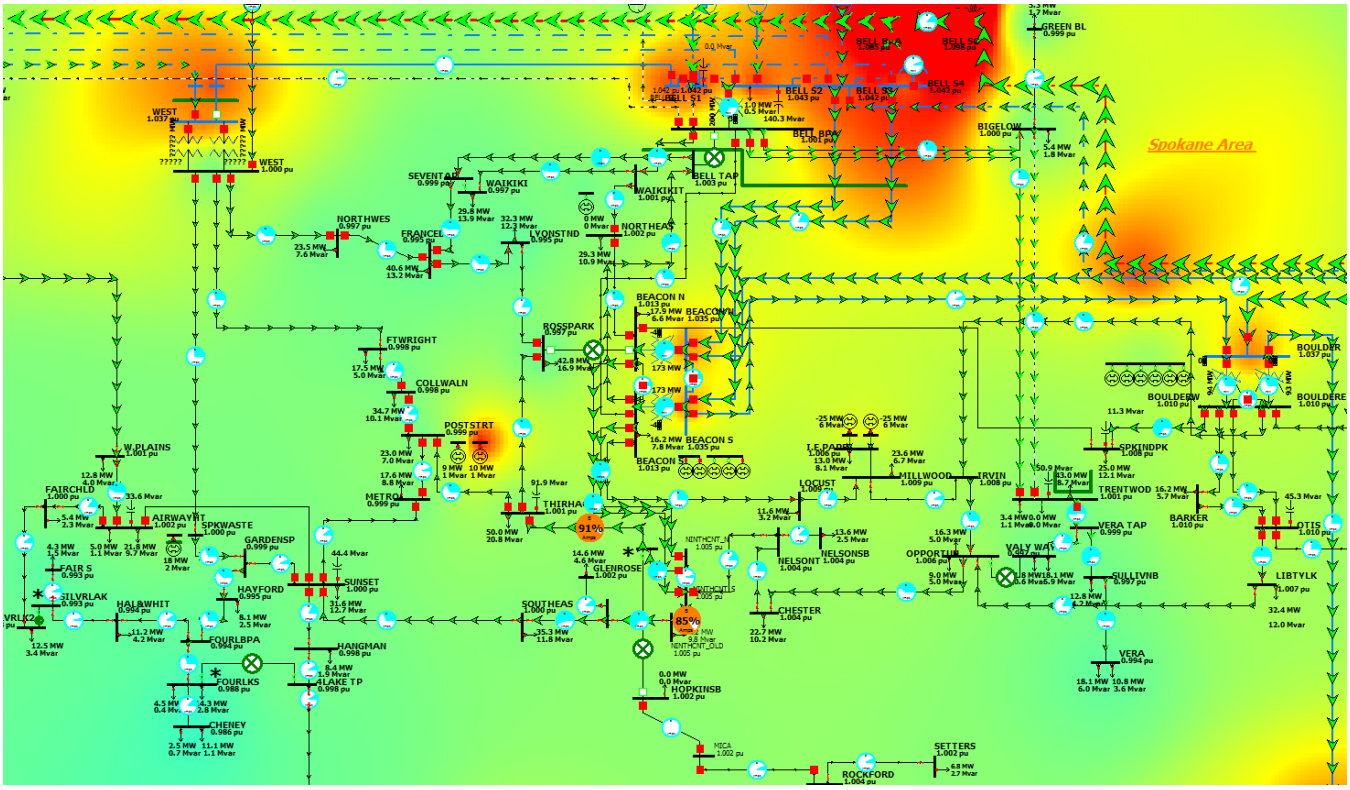


FIGURE III-22: N-1-1: BEACON – ROSS PARK 115 KV AND BELL – WESTSIDE 230 KV IN 24HS

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing 2024 heavy summer.

Performance Criteria Violations

	24HSPROJECTS	34HSPROJECTS
P6		
N-1: Beacon - Ross Park 115 kV + N-1: Bell - Westside 230 kV		
LATAH_TAP (48182) -> THIRHACH (48431) CKT 1		**100.6 %**
N-1: Beacon #1 230/115 kV + N-1: Bell - Westside 230 kV		
BEACON S (48031) -> BEACON S (48029) CKT 1		**107.3 %**
N-1: Beacon #2 230/115 kV + N-1: Bell - Westside 230 kV		
BEACON N (48025) -> BEACON N (48023) CKT 1	**101.5 %**	**109.7 %**

Garden Springs – Ninth & Central 230 kV Transmission Line

Construction of a new Garden Springs – Ninth & Central 230 kV Transmission Line will add operational flexibility primarily for the operation of the proposed Garden Springs Station. Construction of 230 kV facilities at both Garden Springs and Ninth & Central need to be completed ahead of the Garden Springs – Ninth & Central 230 kV Transmission. How Garden Springs and Ninth & Central is integrated into the system will impact the need and/or requirements of a Garden Springs – Ninth & Central 230 kV Transmission Line.

Silver Lake Switching Station

The area in the West Plains, including Airway Heights, the Spokane International Airport, and Fairchild Air Force Base, is served primarily by a long radial tap, South Fairchild Tap, and the Airway Height Station. Load growth in the West Plains is expected to be relatively high compared to other areas within Avista's service territory. As studied in the steady state contingency analysis, the transmission system in the area performs adequately as most of the load is lost through consequential load loss during contingency events. Further analysis is necessary to determine if the transmission system is providing adequate reliability and has sufficient operational flexibility.

The reconstruction of Silver Lake Station to include circuit breakers would allow the South Fairchild Tap to be operated normally closed to Airway Heights Station. The construction of Garden Springs Station is assumed to be completed. The additional breakers at Silver Lake will provide increased operational flexibility. Other alternatives need to be evaluated including the construction of a new transmission line in the area to provide redundancy during outages conditions.

Beacon Capacitor Bank

Voltage control within the Spokane area is limited to shunt capacitors located on 115 kV buses and LTC's on autotransformers. The 115 kV voltage can be maintained within its system operating limits. The 230 kV voltage will approach 230 kV during certain outages primarily related to loss of shunt capacitors at Bell Station. The installation of shunt capacitors at Beacon Station will improve the ability to maintain the 230 kV voltage in the area within 236 and 242 kV. Further analysis is necessary to determine the sizing, number of steps, and optimal location of the capacitors.

Beacon – Francis & Cedar 115 kV Transmission Line Reconductor

An outage of both the Francis & Cedar – Ross Park and Northwest – Westside 115 kV transmission lines leaves the Beacon – Francis & Cedar 115 kV Transmission Line serve Northwest and Francis & Cedar stations. The conductor on portion of the Beacon – Francis & Cedar 115 kV Transmission Line does not have adequate thermal capacity. Reconductor of the section between the Bell tap and Waikiki tap with 150 MVA capacity conductor will mitigate the observed thermal overloads. Further analysis is required to determine the impacts of other proposed projects including interconnecting the Beacon – Francis & Cedar 115 kV transmission line into Bell Station.

	34HSPROJECTS
P6	
N-1: Francis & Cedar - Ross Park 115 kV + N-1: Northwest - Westside 115 kV	
BELL TAP (48033) -> SEVENTAP (48381) CKT 1	**104.1 %**

7.4 Single System Projects (non-corrective action plans)

7.4.1 Ross Park Station Rebuild

The Ross Park Station is being evaluated for relocation to accommodate a proposal to reroute North Center St. which would run directly through the existing station property. The relocation of the station would required green field construction and should be evaluated for required bus configuration. Ross Park Station presently has two distribution transformers and three 115 kV transmission lines terminated onto a single 115 kV bus.

7.4.2 Sunset Station Rebuild

A complete rebuild of Sunset Station is required. Sunset Station is a major station serving the south Spokane area and is reaching the end of its useful life. The oldest 115 kV circuit breaker on the system resides at Sunset Station. The AC and DC service power and control circuit problems make adding or replacing equipment very difficult and expensive. Increased capacity for transformer 2 and a new feeder will be required in the near future per Distribution Planning. It is not prudent to rebuild the operating station in place. The plan is to build a new station to current design and construction standards adjacent to the existing station on property Avista already owns.

7.4.3 Chester Station Rebuild

The Chester Station is planned to be rebuilt.

7.4.4 Metro Station Rebuild

The Metro Station is planned to be rebuilt to address a number of concerns related to existing condition of equipment in the station. Additional drivers of the project include the expansion of the Steam Plant facility located adjacent to the station. Due to the location of Metro Station in downtown Spokane, several conceptual alternatives have been discussed for relocation of the station.

The 115 kV transmission lines in the downtown Spokane area are underground cables. The cables are oil cooled and have exhibited leaks in the past. The Metro Station rebuild and potential relocation may facilitate an opportunity to replace the existing 115 kV cables.

7.4.5 Northwest Station Rebuild

The Northwest Station is planned to be rebuilt.

7.4.6 Hillyard Station

A new substation located in Hillyard (northeast portion of Spokane) has been identified by the Distribution Planning Department to provide relief to the distribution facilities of Beacon, Northeast, and Ross Park Stations. This substation will also support future development along the Spokane North-South Freeway corridor. The new substation is proposed to be interconnected to the transmission system by tapping and eventually looping in the Beacon – Bell #1 115 kV Transmission Line.

7.4.7 Downtown West Station

To relieve distribution capacity constraints west of the downtown Spokane area, it has been proposed by the Distribution Planning Department to construct a new substation located on the western edge of downtown. The new substation has temporarily been named Downtown West Station and would potentially be interconnected to the Metro – Sunset 115 kV Transmission Line. The addition of this substation will offload existing facilities at the College & Walnut Station and provide necessary backup capacity to the Sunset Station.

7.4.8 Hawthorne Station

A future station has been identified to support load growth and reliability for the potential development of the former Kaiser Mead property. The area surrounding the Kaiser Mead property has a large potential for load growth and the existing distribution facilities in the area will be inadequate to continue to feed the load. The new substation is proposed to be located adjacent to the old Kaiser facility which would allow for the ability to supply sufficient and reliable power to potential industrial customers as well as pick up additional load growth and offload existing facilities. The new substation has been named the Hawthorne Station. The desired interconnection to the transmission system has not been finalized at this time as there is potential to use the Hawthorne Station as a means of reinforcing the transmission system to the north of Spokane. An adequate interconnection option which would allow the Hawthorne Station to become energized is tapping the existing Beacon – Bell #1 115 kV Transmission Line.

7.4.9 Greenacres / Otis Orchards Stations

A new substation located in the southeast region of the Spokane Valley Area has been identified by the Distribution Planning Department to offload existing distribution facilities at Liberty Lake and Barker Rd. Stations. The construction of this substation, presently called Greenacres Station, has been selected as a means of deferring the addition of distribution facilities at Otis Orchards Station.

The existing Otis Orchards Station has also been identified as the preferred location for adding distribution 115/13.8 kV transformation to support Otis Orchards. Discussion and study results are provided in *Otis Orchards 115/13kV Project* written by Jill Ham in 2009.

7.4.10 Irvin Distribution

The addition of distribution facilities at the new Irvin Station will improve the backup capabilities for surrounding distribution stations. The initial project is scoped to add a single 115/13.2 kV transformer with two or three feeders.

7.4.11 Downtown East Station

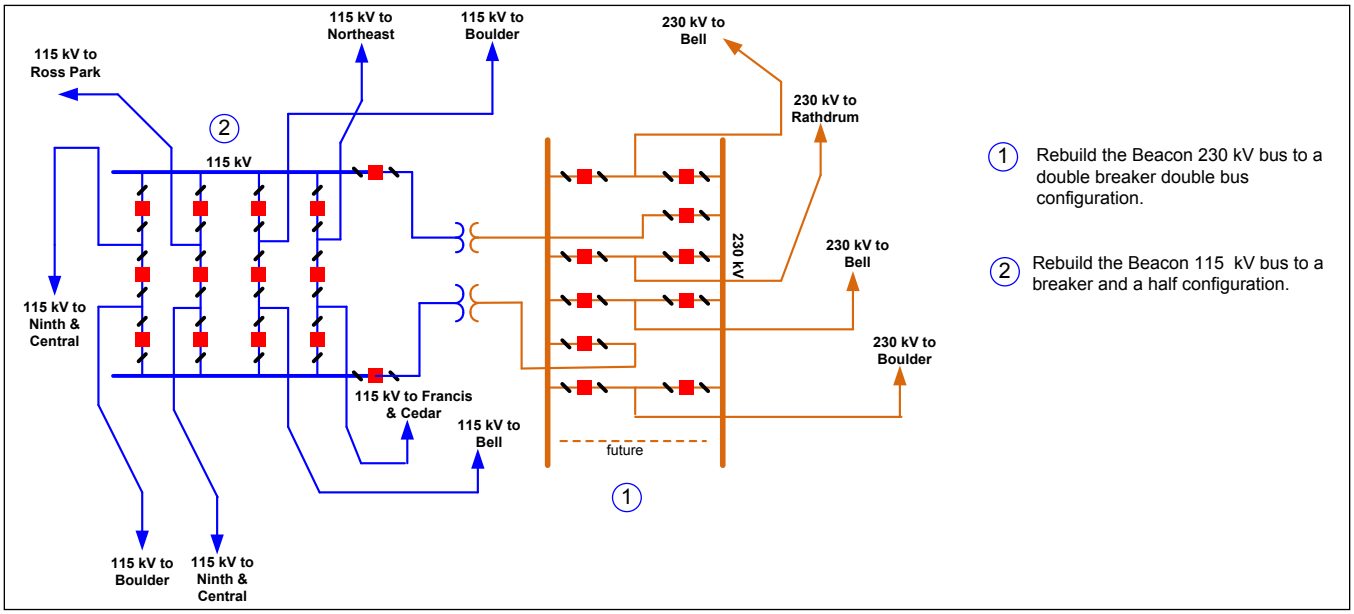
A new distribution station has been proposed on the eastern edge of the downtown Spokane area. The new station has been named Downtown East Station. Integration with the Transmission System has not been determined.

7.4.12 Beacon – Bell – Francis & Cedar – Waikiki Reconfiguration

The existing Beacon – Francist & Cedar 115 kV Transmission Line passes near BPA's Bell Station. A project has been proposed to loop the transmission line into Bell Station to increase the 115 kV ties between Beacon and Bell. Moving the existing Waikiki tap off of the Bell – Northeast 115 kV Transmission Line could be accommodated with Waikiki Station directly connected to the new Bell – Francis & Cedar 115 kV Transmission Line. Further evaluation to the impacts of 230/115 kV transformer loading is warranted. A new interconnection at Bell Station will require a Line and Load Request to be submitted to BPA.

7.4.13 Beacon Station Rebuild

The Beacon Station is integral to the transmission system performance in the Spokane area. Presently the bus configurations at both the 115 kV and 230 kV levels contain a single point of failure at the bus tie breakers. A internal breaker failure or failure of a tie breaker to operate during a fault condition will result in the loss of either all 115 kV or 230 kV facilities at the station. Reconfiguration of the 230 kV bus to a double breaker, double bus has been proposed. The 115 kV bus is desired to be configured as either breaker and a half or double bus, double breaker depending on constructability constraints. Coordination of the Beacon Station Rebuild project with other 230 kV related projects in the Spokane area is necessary. Constrcution of the Ninth & Central 230 kV Integration project may deffer the need to execute the Beacon Station Rebuild project and may be necessary to facilitate the outage requirements during construction.



7.4.14 Hallett & White Capacitor Bank

The addition of a single 30 MVAr switchable capacitor bank at Hallett & White Station has been proposed. The capacitor bank will support voltage in the surrounding area and improve performance during contingency scenarios including outages on the existing Sunset – Westside 115 kV Transmission Line.

7.4.15 Hallett & White – Silver Lake 115 kV Transmission Line Rebuild

A rebuild of the Hallett & White to Silver Lake segment of the South Fairchild Tap 115 kV Transmission Line is proposed. The transmission line will be rebuilt with 795 ACSR conductor with minimum thermal capacity of 150 MVA at 40C. Other segments of the South Fairchild Tap 115 kV Transmission Line have been reconstructed in recent years.

7.4.16 Deer Park Partial Rebuild

Since acquiring the 13kV portion of the Deer Park station from BPA, some upgrades are needed to bring it in line with AVA standards. Scheduled for 2014 are a panelhouse, SCADA, and upgraded metering. Eventually we will need to replace the transformer with an Avista standard unit.

7.4.17 College and Walnut Consolidation/Rebuild

Yard expansion at Collge & Walnut Station is currently underway. Land was acquired in 2011 east of the current footprint, this will allow for the station and regulator yards to be in the same place. Due to proximity to Kendall Yards, the new site will be walled off with a concrete fence, but will allow for future upgrades as needed.

7.4.18 Westside Station Rebuild

The Westside Station has been identified for partial or complete rebuild to address potential equipment issues and/or improve reliability of the transmission system. Reconfiguration of the 230 kV bus from main/aux to double bus, double breaker will prevent a bus outage from taking both transformers and 230 kV transmission lines serving the station out of service. The existing 115 kV bus is a single bus and is proposed to be reconstructed as a breaker and a half. The 115 kV transmission lines connected to Westside Station are the primary source to supply customer demand on the western side of Spokane. A 115 kV bus outage at Westside Station jeopardizes the reliability of service to the area. The execution of the Westside Station Rebuild project will be initiated as necessary to meet desired performance requirements and Asset Management analysis.

7.4.19 Ninth & Central Station Upgrade

Moving the Ninth & Central load off of the Ninth & Central – Sunset 115 kV Transmission Line onto the 115 kV buses has been identified as a mitigation project for a tie breaker failure at Ninth & Central Station. The existing station layout is configured for two 30 MVA 115/13 kV transformers and six distribution feeders. Each transformer would be connected to separate 115 kV buses and a distribution bus tie would be installed. The existing distribution station would be removed entirely. In addition, the Eighth & Fancher – Latah Junction 115 kV Transmission Line would be moved into Ninth & Central with its own 115 kV breaker bay.

7.4.20 Southeast Capacity Increase

Increase distribution capacity is required local to the existing Southeast Station. The scope of adding capacity is under evaluation. Alternatives considered include increasing the capacity of a transformer at Southeast Station to accommodate the addition of a new feeder and construction of a new distribution station southeast of Southeast Station.

7.5 Steady State Study Results

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS	
P2				
BF: A600 Beacon North & South 115 kV				
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	100.5 %	106.5 %	112.7 %	Ninth & Central 230 kV Integration
NORTHWES (48279) -> FRANCEDR (48127) CKT 1	100.4 %	104.6 %	115.8 %	
WEST (48461) -> NORTHWES (48279) CKT 1		100.6 %	111.0 %	
BF: A624 Rathdrum East & West 115 kV				Rathdrum 115 kV bus reconfiguration
OTIS (48311) -> EASTFARM (48117) CKT 1			100.5 %	
BF: A688 Ninth & Central North & South 115 kV				Garden Springs 230 kV Intgration
ROSSPARK (48371) -> THIRHACH (48431) CKT 1			104.5 %	
BF: R427 Beacon North & South 230 kV				Ninth & Central 230 kV Integration
BOULDERW (48520) -> SPKINDPK (48405) CKT 1		100.2 %	103.1 %	
P6				
N-1: Addy #3 230/115 kV + N-1: Bell #6 230/115 kV				Bell #10 230/115 kV Transformer
BEACON S (48029) -> BELL BPA (40087) CKT 1			101.6 %	
N-1: Airway Heights - Devils Gap 115 kV + N-1: Northwest - Westside 115 kV				Garden Springs 230 kV Integration
WEST (48461) -> SPKWASTE (48409) CKT 1			100.0 %	
N-1: Airway Heights 115kV Switched Shunt + N-1: Airway Heights - Garden Springs 115 kV				Silver Lake Switching Station
SILVRLK2 (48388)			0.9473	
N-1: Beacon - Bell #1 115 kV + N-1: Bell #6 230/115 kV				
BEACON N (48023) -> NORTHEAS (48277) CKT 1	127.6 %	138.4 %	142.8 %	
NORTHEAS (48277) -> WAIKIKIT (48449) CKT 1	101.3 %	110.7 %	112.7 %	Bell #10 230/115 kV Transformer
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV				
BEACON S (48029) -> BELL BPA (40087) CKT 1	163.7 %	177.7 %	183.4 %	
N-1: Beacon - Ross Park 115 kV + N-1: Bell - Westside 230 kV				Rathdrum – Westside 230 kV Transmission Line
LATAH_TAP (48182) -> THIRHACH (48431) CKT 1			100.6 %	
N-1: Beacon #1 230/115 kV + N-1: Beacon #2 230/115 kV				
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	100.1 %	107.4 %	112.5 %	
N-1: Beacon #1 230/115 kV + N-1: Bell - Westside 230 kV				
BEACON S (48031) -> BEACON S (48029) CKT 1			107.3 %	
N-1: Beacon #1 230/115 kV + N-1: Bell #6 230/115 kV				
BEACON S (48031) -> BEACON S (48029) CKT 1	102.2 %	110.4 %	118.1 %	
N-1: Beacon #1 230/115 kV + N-1: Boulder - Irvin #2 115 kV				Ninth & Central 230 kV Integration
BOULDERW (48520) -> SPKINDPK (48405) CKT 1			100.1 %	
N-1: Beacon #2 230/115 kV + N-1: Bell - Westside 230 kV				
BEACON N (48025) -> BEACON N (48023) CKT 1		101.5 %	109.7 %	
N-1: Beacon #2 230/115 kV + N-1: Bell #6 230/115 kV				
BEACON N (48025) -> BEACON N (48023) CKT 1	104.5 %	112.8 %	120.6 %	
N-1: Beacon #2 230/115 kV + N-1: Boulder - Irvin #2 115 kV				
BOULDERW (48520) -> SPKINDPK (48405) CKT 1			100.3 %	
N-1: Bell - Northeast 115 kV + N-1: Bell #6 230/115 kV				Bell #10 230/115 kV Transformer
BEACON S (48029) -> BELL BPA (40087) CKT 1	109.5 %	120.2 %	120.2 %	
N-1: Benewah - Pine Creek 230 kV + N-1: Dworshak - Hatwai 500 kV				
BOULDER (48524) -> BENEWAH (48037) CKT 1	104.7 %			
N-1: Benewah - Pine Creek 230 kV + N-1: Dworshak - Taft 500 kV				Garden Springs – Thornton 230 kV Transmission Line
BOULDER (48524) -> BENEWAH (48037) CKT 1	100.2 %			
N-1: Benewah - Pine Creek 230 kV + N-1: Hatwai 500/230 kV				
BOULDER (48524) -> BENEWAH (48037) CKT 1	109.9 %	110.9 %	112.6 %	
N-1: Boulder - Irvin #2 115 kV + N-1: Opportunity - Otis Orchards 115 kV				Ninth & Central 230 kV Integration
BOULDERW (48520) -> SPKINDPK (48405) CKT 1			100.9 %	
N-1: College & Walnut - Westside 115 kV + N-1: Northwest - Westside 115 kV				Garden Springs 230 kV Integration
WEST (48461) -> SPKWASTE (48409) CKT 1			104.2 %	
N-1: Francis & Cedar - Ross Park 115 kV + N-1: Northwest - Westside 115 kV				Beacon – Francis & Cedar 115 kV Transmission Line Reconductor
BELL TAP (48033) -> SEVENTAP (48381) CKT 1			104.1 %	
N-1: Metro - Post Street 115 kV + N-1: Garden Springs - Westside 115 kV				
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1			106.8 %	
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1	104.2 %	112.1 %	127.8 %	Garden Springs 230 kV Integration
N-1: Metro - Sunset 115 kV + N-1: Garden Springs - Westside 115 kV				
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1		101.2 %	115.8 %	
N-1: Northwest - Westside 115 kV + N-1: Garden Springs - Westside 115 kV				

	19HSPR OJECTS	24HSPR OJECTS	34HSPR OJECTS	
WEST (48461) -> FTWRIGHT (48129) CKT 1			103.9 %	
N-1: Post Street - Third & Hatch 115 kV + N-1: Garden Springs - Westside 115 kV				
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1			101.5 %	
SSEE				
SUB: Beacon 230 & 115 (AVA)				
BOULDERW (48520) -> SPKINDPK (48405) CKT 1		102.7 %	107.5 %	Ninth & Central 230 kV Integration
NORTHWES (48279) -> FRANCEDR (48127) CKT 1	103.3 %	107.5 %	119.6 %	
WEST (48461) -> NORTHWES (48279) CKT 1		102.9 %	114.1 %	
SUB: Bell 500, 230 & 115 (BPA)				
CHENEY (40215)			0.9493	
NORTHEAS (48277)	5.0 %			Acceptable risk for extreme event
WAIKIKI (48447)	0.947	0.9481	0.9487	
WAIKIKIT (48449)	5.0 %			

	19HWPR OJECTS	24HWPR OJECTS	Mitigation
P2			
BF: A600 Beacon North & South 115 kV			Ninth & Central 230 kV Integration
WEST (48461) -> NORTHWES (48279) CKT 1		100.4 %	
P6			
N-1: Beacon - Bell #1 115 kV + N-1: Bell #6 230/115 kV			
BEACON N (48023) -> NORTHEAS (48277) CKT 1	117.6 %	124.8 %	
NORTHEAS (48277) -> WAIKIKIT (48449) CKT 1		105.0 %	
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV			Bell #10 230/115 kV Transformer
BEACON S (48029) -> BELL BPA (40087) CKT 1	152.3 %	161.8 %	
N-1: Bell - Northeast 115 kV + N-1: Bell #6 230/115 kV			
BEACON S (48029) -> BELL BPA (40087) CKT 1	115.6 %	123.2 %	
N-1: Metro - Post Street 115 kV + N-1: Garden Springs - Westside 115 kV			
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1		102.2 %	Garden Springs 230 kV Integration
NINTHCNT_S (48272) -> NINTHCNT_OLD (48270) CKT 1		102.5 %	
SSEE			
SUB: Beacon 230 & 115 (AVA)			Ninth & Central 230 kV Integration
WEST (48461) -> NORTHWES (48279) CKT 1		104.0 %	

	19LSPR OJECTS	19LWPR OJECTS	
P6			
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV			Bell #10 230/115 kV Transformer
BEACON S (48029) -> BELL BPA (40087) CKT 1	115.3 %	112.2 %	
SSEE			
N-2 (ROW): Bell - Taft 500 kV and Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Lancaster 230 kV			Acceptable risk for extreme event
MOAB (47511) -> BOULDERE (48522) CKT 1	106.3 %		
PLEASANT (48319) -> MOAB (47511) CKT 1	107.9 %		

7.6 Spare Equipment Study

Facility rating violations from the Spare Equipment Study are provided in Table III-18.

7.6.1 Beacon Transformer Failure

Failure of a Beacon #1 or #2 230/115 kV transformer requiring complete replacement causes thermal overloads on the remaining Beacon transformer and several local 115 kV transmission lines when a subsequent transformer outage, bus outage, or breaker failure occurs.

Execution of previously identified projects will contribute towards mitigating the thermal overloads observed for a Beacon #1 or #2 230/115 kV transformer failure. The projects include Garden Springs Station Integration, Westside Transformer Replacement, and Spokane Valley Transmission Reinforcement. In addition the installation of a 250 MVA, 230/115 kV transformer at Ninth & Central Station and looping either the Beacon – Bell #4 or #5 230 kV transmission lines into Ninth & Central Station will be required to mitigate the overload issues caused by Beacon #1 or #2 230/115 kV transformer failures. The addition of a 230/115 kV transformer at Ninth & Central Station increases the transformation capacity in the Spokane area and mitigates the Beacon #1 or #2 230/115 kV Transformer failures.

7.6.2 Boulder Transformer Failure

Failure of a Boulder #1 or #2 230/115 kV transformer requiring complete replacement does not introduce any new transmission system performance issues. Issues present prior to a Boulder transformer outage related to bus outages or breaker failures at Beacon and Bell stations are made slightly worse.

7.6.3 Westside Transformer Failure

Failure of the Westside #2 230/115 kV transformer requiring complete replacement causes thermal overloads on the Westside #1 230/115 kV Transformer with subsequent outages of another 230/115 kV transformer in the Spokane area.

Execution of previously identified projects will mitigate the thermal overloads observed for a Westside #1 or #2 230/115 kV transformer failure. The projects include Garden Springs Station Integration, Westside Transformer Replacement, and Spokane Valley Transmission Reinforcement Project.

7.6.4 Bell Transformer Failure

The Bell #6 230/115 kV Transformer is owned and operated by the BPA. An analysis of the transmission system performance during a Bell transformer failure is included in the Spokane Planning Assessment to establish a point of record for communication and coordination with the BPA. The BPA has an established transformer replacement program where a cold spare transformer could be installed to replace a failed transformer in less than a 12 month timeframe.

Failure of Bell #6 230/115 kV Transformer requiring complete replacement will cause several thermal overload issues for various subsequent outages in the Spokane area. The worst

subsequent outage is the 115 kV tie breaker failure at Beacon Station causing voltage collapse at the stations connected radial to Bell Station.

	BEA1	BEA2	BELL	BLD1	BLD2	WES1	WES2
P1							
N-1: Beacon - Bell #1 115 kV							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			126.1 %				
N-1: Beacon - Northeast 115 kV							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			161.7 %				
N-1: Beacon - Ross Park 115 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							108.6 %
N-1: Beacon #1 230/115 kV							
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S			113.3 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST		101.9 %					107.4 %
N-1: Beacon #2 230/115 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N			115.7 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST	101.9 %						107.2 %
N-1: Bell - Lancaster 230 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							100.3 %
N-1: Bell - Northeast 115 kV							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BEACON S			107.4 %				
N-1: Bell - Westside 230 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		100.1 %					
N-1: Bell #6 230/115 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		115.7 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	113.2 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST							109.6 %
N-1: Westside #2 230/115 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST	107.4 %	107.2 %	109.5 %				
P2							
BF: A1182 Bell-Lancaster, Lancaster Generator #1 & #2							
WEST (48463) -> WEST (48461) CKT 1 at WEST							100.3 %
BF: A1558 Bell-Lancaster, Lancaster-Rathdrum							
WEST (48463) -> WEST (48461) CKT 1 at WEST							100.3 %
BF: A248 Northeast 115 kV, Bell-Northeast							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BEACON S			108.7 %				
BF: A370 Bell S1 & S2 230 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		113.1 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	110.7 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST							110.7 %
BF: A388 Bell S2 & S3 230 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		112.2 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	110.4 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST	119.8 %	120.1 %		104.0 %	104.0 %		149.0 %
WEST (48463) -> WEST (48461) CKT 2 at WEST						120.4 %	
BF: A410 Westside 115 kV, Sunset-Westside							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		106.4 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	104.2 %						
BF: A413 Westside 115 kV, Ninemile-Westside							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		110.7 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	108.3 %						
BF: A470 Westside 115 kV, College & Walnut-Westside							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		109.1 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	106.8 %						
BF: A521 Devils Gap East 115 kV, Addy-Devils Gap							
WEST (48463) -> WEST (48461) CKT 1 at WEST							121.6 %
BF: A526 Devils Gap East 115 kV, Airway Heights-Devils Gap							
WEST (48463) -> WEST (48461) CKT 1 at WEST							119.4 %
BF: A540 Devil's Gap East & West 115 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							121.9 %

	BEA1	BEA2	BELL	BLD1	BLD2	WES1	WES2
BF: A572 Bell S3 230 kV, Bell-Boundary #3							
WEST (48463) -> WEST (48461) CKT 1 at WEST			101.0 %				115.7 %
BF: A600 Beacon North & South 115 kV							
NORTHWES (48279) -> FRANCEDR (48127) CKT 1 at FRANCEDR				106.9 %	106.8 %		
OPPORTUN (48299) -> CHESTER (48069) CKT 1 at CHESTER						102.2 %	
OTIS (48311) -> LIBTYLK (48185) CKT 1 at LIBTYLK				111.4 %	111.7 %	150.8 %	146.8 %
			UNSOLVED				
Unsolved							
WEST (48461) -> NORTHWES (48279) CKT 1 at NORTHWES				101.9 %	101.8 %		
WEST (48463) -> WEST (48461) CKT 1 at WEST				144.9 %	144.8 %		232.5 %
WEST (48463) -> WEST (48461) CKT 2 at WEST				111.9 %	111.8 %	191.4 %	
BF: A604 Beacon North 115 kV, Beacon-Boulder #1							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			156.5 %				
BEACON S (48029) -> NINTHCNT_N (48271) CKT 2 at NINTHCNT_N						105.5 %	103.7 %
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S			106.7 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST		114.7 %	102.7 %				129.9 %
WEST (48463) -> WEST (48461) CKT 2 at WEST						105.2 %	
BF: A612 Beacon South 115 kV, Beacon-Boulder #2							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			123.3 %				
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N			105.4 %				
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1 at WAIKIKIT	104.2 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST	101.0 %						104.6 %
BF: A688 Ninth & Central North & South 115 kV							
ROSSPARK (48371) -> THIRHACH (48431) CKT 1 at ROSSPARK						111.0 %	109.4 %
WEST (48463) -> WEST (48461) CKT 1 at WEST							106.0 %
BF: A717 Boulder East & West 115 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		114.8 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	112.4 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST							104.1 %
BF: B1137 Addy 115 kV, Addy-Devils Gap							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			101.3 %				
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			112.9 %				
BF: B1145 Addy 115 kV, Addy-Kettle Falls							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			101.3 %				
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			112.9 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST							102.2 %
BF: B354 Bell 115 kV, Bell-Coulee							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		100.8 %					
BF: R318 Noxon East & West 230 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							100.1 %
BF: R427 Beacon North & South 230 kV							
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1 at WAIKIKIT				101.0 %	100.9 %	108.3 %	106.7 %
BELL S2 (40088) -> BELL BPA (40087) CKT 1 at BELL S2						102.8 %	101.7 %
BOULDERE (48522) -> IRVIN (48165) CKT 1 at IRVIN			107.1 %				
IRVIN (48165) -> MILLWOOD (48237) CKT 1 at MILLWOOD			107.1 %				
NORTHWES (48279) -> FRANCEDR (48127) CKT 1 at FRANCEDR			129.0 %				
OTIS (48311) -> LIBTYLK (48185) CKT 1 at LIBTYLK			102.8 %				
VERA (41115)			0.9479				
WEST (48461) -> NORTHWES (48279) CKT 1 at NORTHWES			119.8 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST			165.9 %	110.5 %	110.4 %		158.8 %
WEST (48463) -> WEST (48461) CKT 2 at WEST			128.2 %			128.5 %	
BUS: Addy 115 kV							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			101.1 %				
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			112.7 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST							102.3 %
BUS: Beacon North 115 kV							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			155.7 %				
BEACON S (48029) -> NINTHCNT_N (48271) CKT 2 at NINTHCNT_N						106.1 %	104.4 %
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S			107.6 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST		115.9 %	103.8 %				131.4 %
WEST (48463) -> WEST (48461) CKT 2 at WEST						106.3 %	
BUS: Beacon North 230 kV							

	BEA1	BEA2	BELL	BLD1	BLD2	WES1	WES2
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S			103.9 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST		101.2 %	100.3 %				111.6 %
BUS: Beacon South 115 kV							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			120.9 %				
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N			109.1 %				
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1 at WAIKIKIT	112.5 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST	106.1 %						110.4 %
BUS: Beacon South 230 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N			116.1 %				
WEST (48463) -> WEST (48461) CKT 1 at WEST	107.3 %		100.8 %				112.1 %
BUS: Bell 115 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		100.8 %					
BUS: Bell S2 230 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		113.1 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	110.7 %						
WEST (48463) -> WEST (48461) CKT 1 at WEST							107.4 %
BUS: Bell S3 230 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST			101.0 %				115.7 %
BUS: Boulder West 115 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		100.4 %					
BUS: Devils Gap East 115 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							121.9 %
BUS: Long Lake 115 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							107.8 %
BUS: Nine Mile 115 kV							
WEST (48463) -> WEST (48461) CKT 1 at WEST							101.9 %
BUS: Northeast 115 kV							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			135.2 %				
BUS: Westside 115 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		111.6 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	109.2 %						
BUS: Westside 230 kV							
BEACON N (48025) -> BEACON N (48023) CKT 1 at BEACON N		108.6 %					
BEACON S (48031) -> BEACON S (48029) CKT 1 at BEACON S	106.3 %						
N-1: Addy - Bell 115 kV Open @ ADD							
BEACON N (48023) -> NORTHEAS (48277) CKT 1 at NORTHEAS			101.4 %				
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			113.0 %				
N-1: Bell - Northeast 115 kV Open @ BEL							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BEACON S			107.2 %				
N-1: Bell - Northeast 115 kV Open @ NE							
BEACON S (48029) -> BELL BPA (40087) CKT 1 at BELL BPA			133.9 %				
N-1: Nine Mile - Westside 115 kV Open @ NMS							
WEST (48463) -> WEST (48461) CKT 1 at WEST							101.0 %

TABLE III-18: SPOKANE SPARE EQUIPMENT CONTINGENCY ANALYSIS RESULTS.

7.7 Voltage Stability Study

A Load Ramp PV Curve analysis was conducted while monitoring all buses in the Spokane area. All loads within the Spokane area were increased until voltage collapse occurred. All additional generation necessary to supply the increase in load came from a distribution of all generation in WECC except those within the Spokane area.

The theoretical flow limit is 2660 MW for all lines in service condition. The critical bus under all lines in service condition is Cheney Station. The limiting contingency is the A600 115 kV tie breaker failure at Beacon Station with total area load of 1567 MW (see Figure III-23).

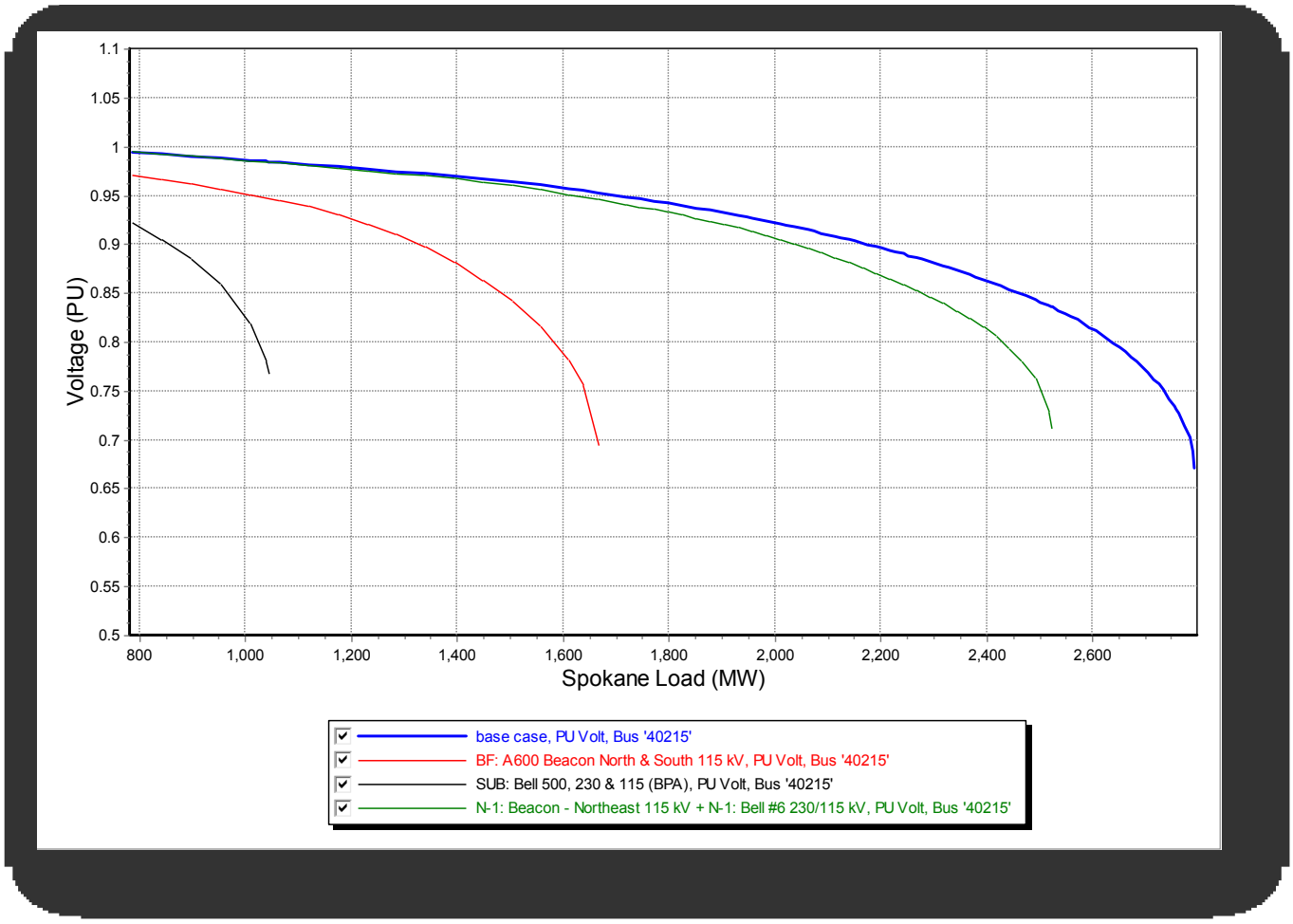


FIGURE III-23: SPOKANE LOAD RAMP PV CURVE RESULTS – EXISTING SYSTEM

The load ramp PV curve analysis was repeated with the assumption that all planned corrective action plans listed above are constructed. The limiting contingency remains the tie breaker failure at Beacon Station but with a total area load of 1995 MW, an increase of 428 MW prior to project construction.

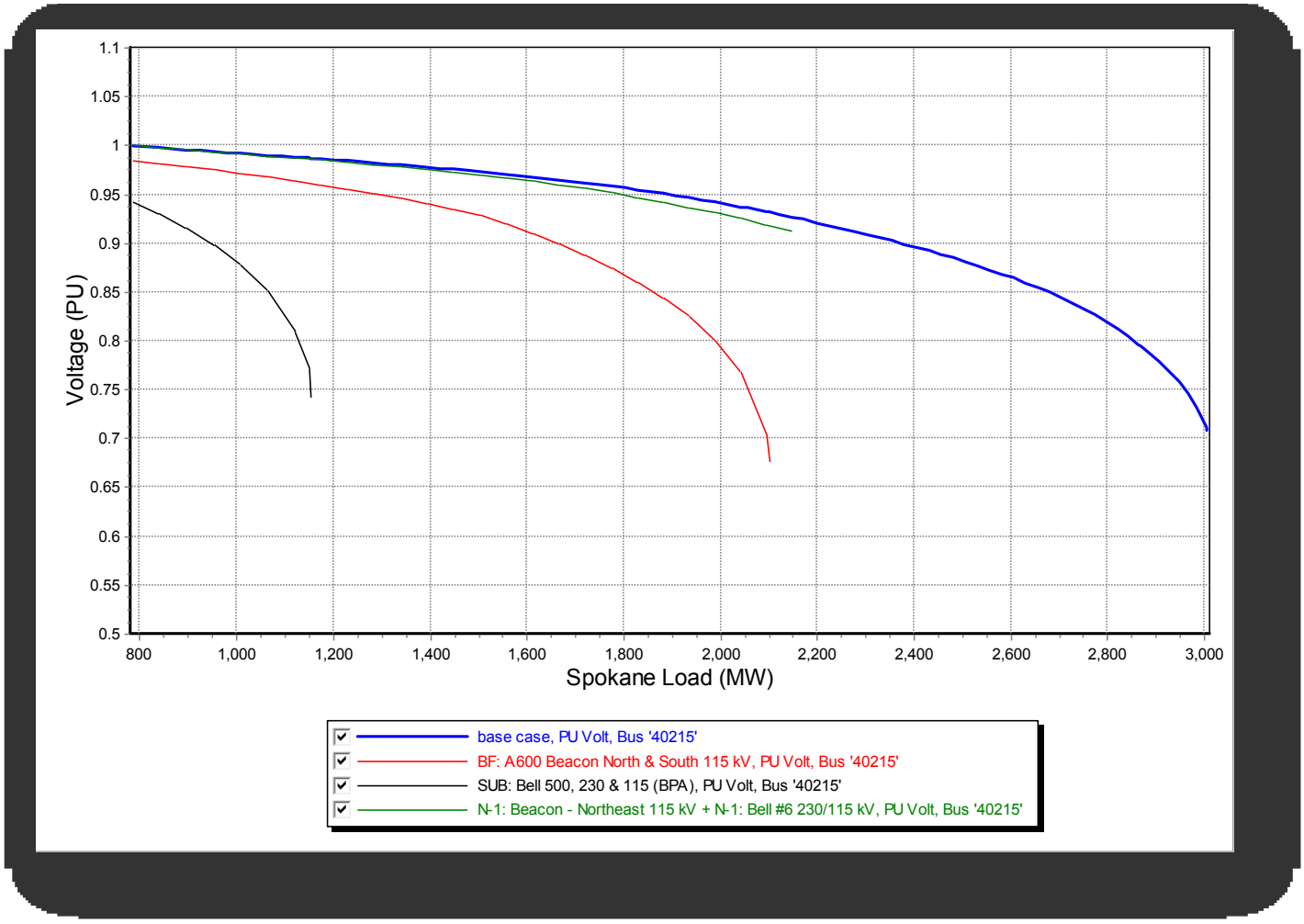


FIGURE III-24: SPOKANE LOAD RAMP PV CURVE RESULTS – PLANNED SYSTEM

7.8 Stability Study Results

	15HS Max of Voltage Dip or Frequency	15HS Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	19HSPROJECTS Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	24HSPROJECTS Max of Duration or Time	Mitigation
P1							
N-1: Bell - Taft 500 kV 3P @ Bell							
WECC Category B Voltage Dip Non-Load Bus							**Verify motor models**
IEP-A 13.8kV			-30.6 %		-30.1 %		
IEP-B 13.8kV			-30.7 %		-30.2 %		
N-1: Garden Springs - Westside 115 kV 3P @ GDN							
Out of Step Generator							
SPKWASTE 14kV			OOS	1.4 s	OOS	1.4 s	
WECC Category B Voltage Dip Non-Load Bus							
SPKWASTE 115kV			-99.9 %		-99.9 %		**Verify generator island protection and model accordingly**
SPKWASTE 13.8kV			-88.0 %		-88.6 %		
N-1: Garden Springs - Westside 115 kV 3P @ WES							
Out of Step Generator							
SPKWASTE 14kV			OOS	1.5 s	OOS	1.5 s	
WECC Category B Voltage Dip Non-Load Bus							
SPKWASTE 115kV			-99.2 %		-99.2 %		
SPKWASTE 13.8kV			-87.3 %		-87.9 %		
N-1: Metro - Sunset 115 kV 3P @ MTR							
Out of Step Generator							
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s	OOS	2.2 s	**Metro – Sunset POTT scheme**
WECC Category B Voltage Dip Non-Load Bus							
SPKWASTE 13.8kV	-32.8 %		-30.6 %		-31.3 %		
N-1: Nine Mile - Westside 115 kV 3P @ WES							
Out of Step Generator							
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	**Nine Mile – Westside POTT scheme**
WECC Category B Voltage Dip Non-Load Bus							
NINEMI34 13.8kV	-36.9 %		-30.7 %		-35.1 %		
P4							
BF: A433 Post Street 115 kV, College & Walnut - Post Street 115 kV SLG (C&W-PST @PST)							**Verify generator island protection and model accordingly**
Out of Step Generator							
MONROEA 14kV	OOS	1.4 s	OOS	1.4 s	OOS	1.4 s	
BF: R420 Beacon 230 kV, Beacon - Bell #5 230 kV 3P (BEA-BEL 5 @BEA)							
WECC Category C Voltage Dip Any Bus							
IEP-A 13.8kV	-41.4 %		-40.1 %		-39.5 %		
IEP-B 13.8kV	-41.5 %		-40.2 %		-39.6 %		
BF: R430 Beacon 230 kV, Beacon - Bell #4 230 kV 3P (BEA-BEL 4 @BEA)							
WECC Category C Voltage Dip Any Bus							**Verify motor models**
IEP-A 13.8kV	-41.8 %		-40.6 %		-40.1 %		
IEP-B 13.8kV	-41.9 %		-40.7 %		-40.2 %		
BF: R433 Beacon 230 kV, Beacon - Boulder 230 kV 3P (BEA-BLD @BEA)							
WECC Category C Voltage Dip Any Bus							
IEP-A 13.8kV	-35.0 %		-33.5 %		-33.1 %		
IEP-B 13.8kV	-35.0 %		-33.6 %		-33.1 %		
P5							
PSF: Post Street 115 kV SLG							
Out of Step Generator							
MONROEA 14kV	OOS	1.7 s	OOS	1.7 s	OOS	1.7 s	
WECC Category C Frequency							
POSTSTRT 115kV	1.0 Hz	7.5	1.7 Hz	999.0 ~	1.6 Hz	999.0 ~	**Verify generator island protection and model accordingly**
WECC Category C Voltage Dip Any Bus							
MONROEA 13.8kV	-98.0 %		-98.0 %		-98.0 %		
POSTSTRT 115kV	-99.8 %		-99.8 %		-99.8 %		
POSTSTRT 13.8kV	-98.9 %		-98.9 %		-98.9 %		
POSTSTRT 4.16kV	-99.1 %		-99.1 %		-99.1 %		
WECC Category C Voltage Dip Any Bus Duration							
POSTSTRT 115kV	-99.8 %	INF	-99.8 %	INF	-99.8 %	INF	
P7							
N-2: College & Walnut - Westside 115 kV and Garden Springs - Westside 115 kV 3P							**Verify generator island protection and**
Out of Step Generator							

	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
SPKWASTE 14kV			OOS	1.5 s	OOS	1.5 s	model accordingly
WECC Category C Voltage Dip Any Bus							
SPKWASTE 115kV			-99.2 %		-99.2 %		
SPKWASTE 13.8kV			-87.3 %		-87.9 %		
SSEE							
BF: A412 Westside 115 kV, Northwest - Westside 115 kV 3P (NW-WES @WES)							
Out of Step Generator							
NINEMI34 14kV			OOS	1.3 s			
BF: A413 Westside 115 kV, Nine Mile - Westside 115 kV 3P (NMS-WES @WES)							
Out of Step Generator							
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
BF: A605 Beacon 115 kV, Beacon - Ross Park 115 kV 3P (BEA-ROS @BEA)							
Out of Step Generator							
IEP-A 14kV	OOS	1.9 s					
IEP-B 14kV	OOS	1.9 s					
BF: A611 Beacon 115 kV, Beacon - Ninth & Central #2 115 kV 3P (BEA-9CE #2 @BEA)							
Out of Step Generator							
IEP-A 14kV	OOS	2.0 s					
IEP-B 14kV	OOS	2.0 s					
N-2: Airway Heights - Garden Springs 115 kV and Garden Springs - Westside 115 kV 3P							
Out of Step Generator							
SPKWASTE 14kV			OOS	1.4 s	OOS	1.4 s	
WECC Category C Voltage Dip Any Bus							
SPKWASTE 115kV			-99.9 %		-99.9 %		
SPKWASTE 13.8kV			-88.0 %		-88.6 %		
N-2: Bell - Westside 230 kV and Coulee - Westside 230 kV and Ninemile - Westside 115 kV 3P							
Out of Step Generator							
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
PSF: Beacon North 115 kV 3P							
Out of Step Generator							
IEP-A 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
IEP-B 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
MONROEA 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
NINEMI34 14kV			OOS	1.5 s			
SPKWASTE 14kV	OOS	1.8 s	OOS	1.8 s			
PSF: Beacon South 115 kV 3P							
Out of Step Generator							
IEP-A 14kV			OOS	1.5 s	OOS	1.5 s	
IEP-B 14kV			OOS	1.5 s	OOS	1.5 s	
MONROEA 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
PSF: Boulder West 115 kV 3P							
Out of Step Generator							
IEP-A 14kV			OOS	1.5 s	OOS	1.5 s	
IEP-B 14kV			OOS	1.5 s	OOS	1.5 s	
PSF: College & Walnut 115 kV 3P							
Out of Step Generator							
MONROEA 14kV	OOS	2.2 s	OOS	2.2 s	OOS	2.2 s	
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s			
PSF: Metro 115 kV 3P							
Out of Step Generator							
MONROEA 14kV	OOS	2.2 s	OOS	2.2 s	OOS	2.2 s	
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s	OOS	2.2 s	
PSF: Ninth & Central North 115 kV 3P							
Out of Step Generator							
IEP-A 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
IEP-B 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
PSF: Ninth & Central South 115 kV 3P							
Out of Step Generator							
IEP-A 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
IEP-B 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
PSF: Northwest 115 kV 3P							
Out of Step Generator							

	15HS Max of Voltage Dip or Frequency	Max of Duration or Time	19HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	Mitigation
NINEMI34 14kV			OOS	1.5 s			
PSF: Otis Orchards 115 kV 3P							
Out of Step Generator							
IEP-A 14kV	OOS	1.8 s	OOS	1.6 s	OOS	1.6 s	
IEP-B 14kV	OOS	1.8 s	OOS	1.6 s	OOS	1.6 s	
PSF: Post Street 115 kV 3P							
Out of Step Generator							
MONROEA 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
SPKWASTE 14kV			OOS	2.2 s			
PSF: Ross Park 115 kV 3P							
Out of Step Generator							
IEP-A 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
IEP-B 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s	
MONROEA 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
PSF: Sunset 115 kV 3P							
Out of Step Generator							
MONROEA 14kV			OOS	1.5 s	OOS	1.5 s	
SPKWASTE 14kV			OOS	1.5 s	OOS	1.5 s	
PSF: Third & Hatch 115 kV 3P							
Out of Step Generator							
IEP-A 14kV	OOS	1.7 s	OOS	1.7 s	OOS	1.8 s	
IEP-B 14kV	OOS	1.7 s	OOS	1.7 s	OOS	1.8 s	
MONROEA 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
PSF: Westside 115 kV 3P							
Out of Step Generator							
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s	
(blank)							
N-2: Bell - Westside 230 kV and Coulee - Westside 230 kV and Ninemile - Westside 115 kV 2LG							
Out of Step Generator							
NINEMI34 14kV			OOS	1.5 s			

Same issues observed in all other scenarios studied.

7.9 Long Term Transmission Plan

The existing transmission system in the Spokane area consists primarily of 115 kV transmission lines serving local load from a few 230 kV stations located in the northern portions of the area. The transmission projects necessary to fix transmission performance issues in the ten year planning horizon as mentioned in previous sections begin to expand the 230 kV transmission system with the construction of Garden Springs Station and adding 230 kV facilities to the existing Ninth & Central Station.

Beyond the ten year planning horizon, a conceptual future transmission system expansion plan has been formed. Figure I-12 shows a preliminary topographical view of the long term transmission plan. The plan illustrates the concept of geographically placed 230 kV stations relative to projected growth areas and tying the stations together. The resulting network of 230 kV transmission lines allows for sufficient operational flexibility to have scheduled outages during all conditions and not have applicable facility ratings exceeded by subsequent outages.

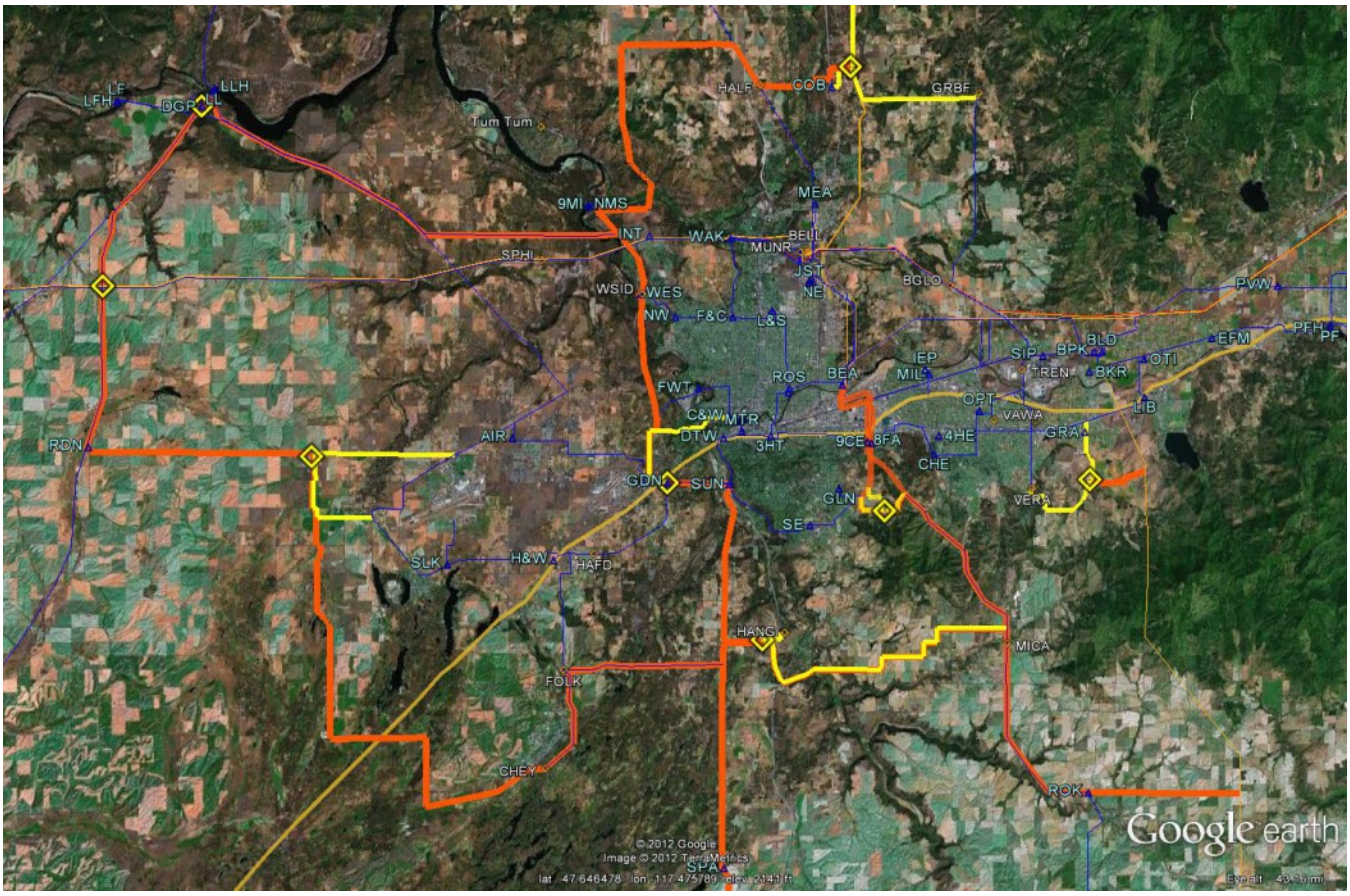


FIGURE I-12: SPOKANE AREA LONG TERM COMCEPTUAL TRANSMISSION PLAN

Each phase of the long term explanation plan will be evaluated and coordinated with appropriate stakeholders. The actual constructed facilities will differ from the proposed plan but should uphold the underlining concept.

Figure III-25 shows a potential layout of executing certain projects of the long term transmission plan in the Spokane area. The timing shown for each project is provided for illustrative purposes. A more complete long term plan is underdevelopment and will be provided in subsequent planning assessments.

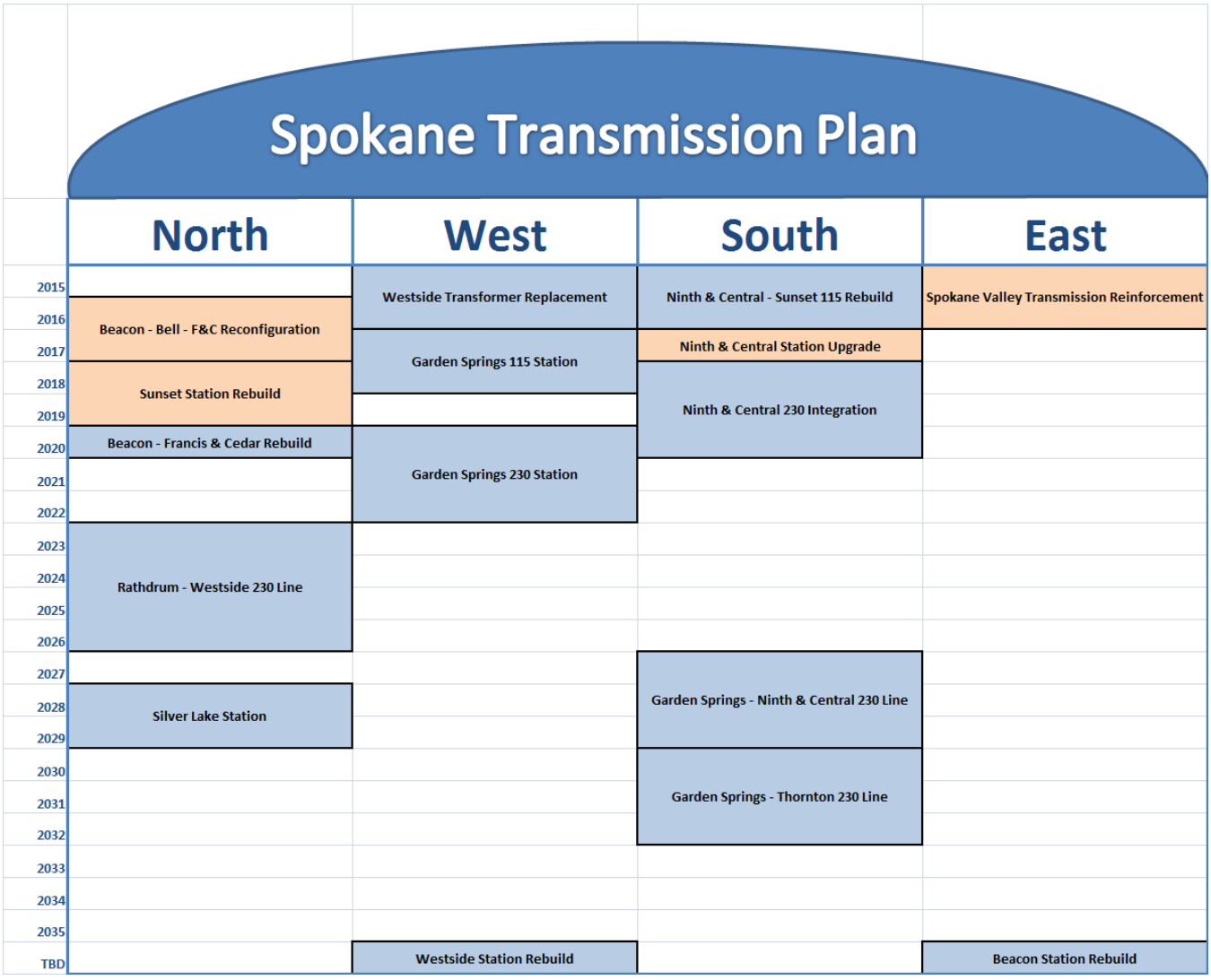


FIGURE III-25: EXAMPLE OF SPOKANE TRANSMISSION PLAN COORDINATION.

8 SENSITIVITY ANALYSIS

The sensitivity analysis in the 2014 Avista's Transmission Planning Reliability Assessment varies one or more defined conditions in TPL-001-4 R2.1.4. The first condition studied is a change in dispatch. The scenarios considered are 2015, 2019, 2024 and 2034 for low hydro summer peak conditions with no projects, expected projects with corresponding in service dates of new or modified Transmission facilities, and conceptual projects with corresponding in service dates of new or modified Transmission facilities.

Other scenarios studied are expected heavy transfers with no projects (year 1), expected projects with corresponding in service dates of new or modified Transmission facilities (a 5 year outlook) and conceptual projects with corresponding in service dates of new or modified Transmission facilities (a 10-20 year outlook). Expected transfers include studies for all three paths affected by Avista's Transmission System.

Assumptions for cases are included in Appendix A. Assumptions include basecase, load levels, generation dispatch, and projects modeled.

8.1 Heavy Summer Low Hydro

Heavy Summer with Low Local Hydro Generation is a typical summer peak scenario where the Avista Balancing Authority Area load is near peak and the local hydro generation has a low output. This scenario plays a dual role, in that it represents both Avista's heavy summer loading scenario along with the sensitivity of significant transfers into Avista Balancing Authority Area to supplement the low hydro generation dispatch. This scenario is limited by the summer thermal limits on various elements of the Transmission System, which helps to define where the System is near capacity.

Steady State Results

The steady state assessment results for the Heavy Summer Low Hydro scenario identified a need of a new project in addition to the Summer and Winter Peak assessments. Potential violations were mitigated with future expected or conceptual projects, existing operating procedures prepared by either Avista or BPA, or recommended system adjustments after the first contingency. A new longer term projects was identified as needed per this study.

There were no P1 violations that have not already been addressed with prior expected or conceptual projects. Through analysis it was identified that existing projects in the Expansion Plan were sufficient.

The performance issues in the Heavy Summer Low Hydro study in Avista's Transmission System identified in this year's assessment, are various P2 and P6 category potential violations. The N-1 outage of the Beacon – Bell No. 5 230 kV Line in addition any other line out at Bell connecting to Avista overloads the Beacon – Bell No. 1 115 kV Line or Bell – Northeast 115 kV Line. Overloads also occurred on the Bell – Northeast 115 kV Line for the P2 outages of Bell S3 or Beacon North and South. The overloads are exasperated if the Bell 230/115 #10 Transformer project is in service as seen below. Reinforcing this area helps transfer more

power through the BPA transmission system and Avista's transmission system however the existing copper conductors are identified as potential bottlenecks.

Proposed Projects (projects need further analysis)

Beacon – Bell & Bell – Northeast 115 kV Reconductor

Project Description

The Beacon – Bell No. 1 115 kV Transmission Line presently consists of 795 ACSR, 556 AAC, 556 ACSR and 250 CU conductor. Reconductor 4.4 miles of the 250 CU portion of the transmission line to at least a rating of 205 MVA (795 ACSS).

The Bell – Northeast 115 kV Transmission Line presently consists of 556 ACSR conductor. Reconductor 0.7 miles of the 556 ACSR portion of the transmission line to at least a rating of 205 MVA (795 ACSS).

Timeline

System performance analysis indicates the System meets the performance requirements in Table 1 of TPL-001-4 in scenarios representing the 2015-2024 bascecase scenarios, without Projects implemented. The reconductoring of these lines should be complete by 2024 if the Bell Transformer is in service by then. If the Transformer is not in service the need for this project is not identified until the 2034 scenario.

Performance Criteria Violations

Row Labels	24HSLHPROJECTSCONCEPTUAL	34HSLHPROJECTS	34HSLHPROJECTSCONCEPTUAL
Reconductor Beacon - Bell No. 1 115 kV Line			
P6			
N-1: Beacon - Bell #5 230 kV + N-1: Bell - Ninth & Central 230 kV			
BELL BPA (40087) -> BEACON S (48029) CKT 1	103.5		
N-1: Beacon - Bell #5 230 kV + N-1: Bell - Northeast 115 kV			
BELL BPA (40087) -> BEACON S (48029) CKT 1	105.8		103.8
Reconductor Bell - Northeast 115 kV Line			
P2			
BF: A572 Bell S3 230 kV, Bell-Boundary #3			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			100.7
BF: R427 Beacon North & South 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			109.6
BUS: Bell S3 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			100.7
P6			
N-1: Beacon - Bell #1 115 kV + N-1: Beacon - Bell #5 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1	101.9		104.8
N-1: Beacon - Bell #4 230 kV + N-1: Beacon - Bell #5 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1		104.3	
N-1: Beacon - Bell #5 230 kV + N-1: Bell - Lancaster 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			102.8
N-1: Beacon - Bell #5 230 kV + N-1: Bell - Ninth & Central 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1	121.9		120.9
N-1: Beacon - Bell #5 230 kV + N-1: Bell - Westside 230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			105
N-1: Beacon - Bell #5 230 kV + N-1: Hatwai 500/230 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			103.1
N-1: Beacon #1 230/115 kV + N-1: Beacon #2 230/115 kV			
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			100.1

Assessment Table

The Assessment table includes a summary of the contingencies with largest potential violations sorted by projects. To review a complete table with projects, operator actions and/or system adjustments refer to Appendix B

Row Labels	19HSLHPROJECTS	24HSLHPROJECTS	34HSLHPROJECTS	Additional Violations
Adjust North Lewiston and Noxon Reactors				
P6				
N-1: Benewah - Thornton 230 kV + N-1: Shawnee 230/115 kV				
PALOUSE_WIND (48863)		1.0532		
THORNTON (48432)		1.0531		
Beacon - Francis & Cedar 115 kV Transmission Line Reconductor				
P6				
N-1: Beacon - Ross Park 115 kV + N-1: Northwest - Westside 115 kV				1 other P6 violation
BELL TAP (48033) -> SEVENTAP (48381) CKT 1			**104.7 %**	
Bell #10 230/115 kV Transformer				
P6				
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV				8 other P6 violations
BEACON S (48029) -> BELL BPA (40087) CKT 1	**157.8 %**	**172.2 %**	**178.3 %**	
Benton - Othello 115 kV Transmission Line Rebuild/Lind - Warden 115 kV Transmission Line Rebuild/Saddle Mountain Long Term Study				
P1				
N-1: Lind 115kV Switched Shunt				
RITZVILL (48365)	0.948			
P2				
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden				
DELIGHT (47025)			0.9461	
LIND (48187)			0.9484	
MARENGO (48221)			0.9453	
RALSTONB (47073)			0.9458	1 other P2 violation
RITZVILL (48365)	0.9484		0.9361	
ROXBORO (48375)			0.9463	
WARDEN A (48455)			0.9493	
WASHTUNA (48457)			0.9458	
P6				
N-1: Benton - Othello SS 115 kV (BENT-SOT) + N-1: Sand Dunes - Warden #2 115 kV				
BASS JCT (46130) -> RUFF TP (46085) CKT 1	**118.0 %**			
DELIGHT (47025)	0.9059	0.9285	0.9031	
LEE&REYN (48308)	0.9143	0.9213	0.8998	
LIND (48187)	0.9077	0.9304	0.9056	
MARENGO (48221)	0.9052	0.9278	0.9023	
OTHELLO (48307)	0.9142	0.9212	0.8997	
OTHELOSS (48309)	0.9169	0.924	0.9026	
RALSTONB (47073)	0.9056	0.9282	0.9028	
RITZVILL (48365)	0.8965	0.919	0.8926	
ROXBORO (48375)	0.9047	0.9275	0.905	
RUFF TP (46085) -> SCHRAG T (46091) CKT 1	**105.1 %**	**108.0 %**	**116.4 %**	25 other P6 violations
SCHRAG (40955)	0.9481		0.9433	
SCHRAG T (46091)			0.9493	
SCHRAG T (46091) -> WARDEN T (46117) CKT 1	**100.2 %**	**102.8 %**	**111.4 %**	
SOTHELLO (48391)	0.9118	0.9187	0.8966	
SOTHELOT (48393)	0.9157	0.9227	0.9011	
WARDEN A (48455)	0.9221	0.9295	0.9094	
WARDEN G (46115)	0.9226	0.93	0.9107	
WARDEN T (46117)	0.9232	0.9306	0.9113	
WARDEN T (46117) -> WARDEN A (48455) CKT 1	**108.1 %**	**110.6 %**	**121.9 %**	
WASHTUNA (48457)	0.9055	0.9282	0.9027	
WHEEL TI (46119) -> BASS JCT (46130) CKT 1	**122.3 %**			
WHEEL TP (46121) -> WHEEL TI (46119) CKT 1		**100.5 %**	**107.6 %**	
Cabinet - Bronx - Sand Creek 115 kV Transmission Line Rebuild and Sandpoint Reinforcement Project				
P6				

Row Labels	19HSLHPROJECTS	24HSLHPROJECTS	34HSLHPROJECTS	Additional Violations
N-1: Columbia Falls - Flathead 230 kV + N-1: Libby - Noxon 230 kV				
BRONX (48047)	0.8958	0.8882	0.8861	
CLRKFORK (48077)	0.9374	0.9353	0.9336	
ODEN (48293)	0.9073	0.9012	0.8992	1 other P6 violation
SANDPT A (48377)	0.8873	0.8787	0.8765	
SAGLE (48376)	0.9025	0.8951	0.8927	
PRIEST A (48347)		0.9493	0.9462	
Close switch to restore load				
NA				
RES: N-1: Grangeville - Nez Perce #2 115 kV Open @ NEZ				
KAMIAH (48171)			0.9452	
KOOSKIA (48177)			0.9475	
Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild and Rathdrum 115 kV Bus Reconfiguration and Rathdrum - Westside 230 kV Line				
P2				
BF: A624 Rathdrum East & West 115 kV				
APPLEWAY (48013)		0.9495		
AVONDALE (48019)		0.9476		
CDA (48067)		0.9466		
DALTON A (48093)	0.9459	0.9397		
EASTFARM (48117) -> POST FLS (48329) CKT 1		**102.2 %**	**107.9 %**	
HAYDEN (48148)	0.9447	0.9383		
HUETTER (48159)		0.9497		
OTIS (48311) -> EASTFARM (48117) CKT 1	**105.2 %**	**111.2 %**	**117.5 %**	
POST FLS (48329) -> PRAIRIEB (40855) CKT 1	**101.8 %**	**107.5 %**	**112.8 %**	
Devils Gap - Stratford 115 kV Line Rebuild and close switch if needed for restoration				
NA				
RES: BUS: Stratford 115 kV				
DAVENPRT (48099)			**5.1 %**	
HARRNGTN (48147)	**5.7 %**	**5.8 %**	0.9471	
IRBY (40577)	0.9474	0.937	0.9114	
ODESSA (48295)	**8.1 %**	0.9449	0.9201	
WILSNCKT (48471)	0.9431	0.9325	0.9065	
WILSONCK (46129)	0.9429	0.9324	0.9063	
Devils Gap - Stratford 115 kV Line Rebuild, Odessa Reactive Support and close switch if needed for restoration				
NA				
RES: N-1: Devils Gap - Stratford 115 kV Open @ STR				
DAVENPRT (48099)			**5.1 %**	
HARRNGTN (48147)	**5.7 %**	**5.7 %**	0.9472	
IRBY (40577)	0.9473	0.9371	0.9115	
ODESSA (48295)	**8.1 %**	0.945	0.9201	
WILSNCKT (48471)	0.943	0.9325	0.9065	
WILSONCK (46129)	0.9429	0.9324	0.9064	
Garden Springs 230 kV Integration				
P2				
BF: A688 Ninth & Central North & South 115 kV				
ROSSPARK (48371) -> THIRHACH (48431) CKT 1		**113.5 %**	**125.3 %**	
P6				
N-1: Francis & Cedar - Northwest 115 kV + N-1: Garden Springs - Westside 115 kV				1 other P6 violation
WEST (48461) -> FTWRIGHT (48129) CKT 1		**100.1 %**	**109.5 %**	
Hatwai - Lolo No. 2 230 kV Line				
P6				
N-1: Dry Creek - Lolo 230 kV + N-1: Hatwai - Lolo 230 kV				
DRYCREEK (48510) -> POUNDLNE (48343) CKT 1			**100.9 %**	2 other P6 violation
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	**149.1 %**	**155.0 %**	**156.3 %**	
Lind - Warden 115 kV Line Rebuild and Close switch to restore load				
NA				
RES: N-1: Lind - Warden 115 kV Open @ WAR				
DELIGHT (47025)		0.9461	0.9322	
LIND (48187)		0.9479	0.9344	
MARENGO (48221)			**5.1 %**	
RALSTONB (47073)		**5.4 %**	0.9468	
RITZVILL (48365)		**5.2 %**	0.9379	
ROXBORO (48375)	0.9389	0.928	0.9124	

125 YEARS OF SERVICE 1889–2014 AVISTA

Row Labels	19HSLHPROJECTS	24HSLHPROJECTS	34HSLHPROJECTS	Additional Violations
WASHTUNA (48457)		0.9457	0.9317	
Lolo Transformer Replacement				
P6				
N-1: Dry Creek 230/115 kV + N-1: North Lewiston 230/115 kV				
LOLO (48197) -> LOLO (48195) CKT 1	103.1 %	108.5 %	113.8 %	
Ninth & Central - Sunset 115 kV Transmission Line Reconductor				
P6				
N-1: Metro - Post Street 115 kV + N-1: Garden Springs - Westside 115 kV				2 other P6 violation
NINTHCNT_OLD (48270) -> GLENTAP (48139) CKT 1	111.1 %	118.4 %	132.8 %	
Ninth & Central 230 kV Integration				
P2				
BF: R427 Beacon North & South 230 kV				
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1	105.1 %	111.4 %	123.6 %	
BELL S2 (40088) -> BELL BPA (40087) CKT 1	101.2 %	108.5 %	116.1 %	3 other P2 violation
NORTHWES (48279) -> FRANCEDR (48127) CKT 1	102.0 %	100.8 %	110.1 %	
WEST (48461) -> NORTHWES (48279) CKT 1			106.6 %	
WEST (48461) -> SPKWASTE (48409) CKT 1			104.3 %	
P3				
G-1: Spokane Waste to Energy Thermal Unit 1 + N-1: Beacon #2 230/115 kV				
BEACON N (48025) -> BEACON N (48023) CKT 1			102.0 %	
P6				
N-1: Beacon #2 230/115 kV + N-1: Bell #6 230/115 kV				55 other P6 violations
BEACON N (48025) -> BEACON N (48023) CKT 1	116.2 %	125.0 %	133.6 %	
North Lewiston and Noxon Reactor				
SSEE				
SUB: Bell 500, 230 & 115 (BPA)				
BENEWAH (48037)		1.0548		
PALOUSE_WIND (48863)		1.0526		
THORNTON (48432)		1.0525		
Noxon Reactor				
P3				
G-1: Libby Hydro Unit 1 + N-1: Ninth & Central - Sunset 115 kV				12 other P3 violations
CAB GORG (48059)		1.0524		
P6				
N-1: Cabinet - Rathdrum 230 kV + N-1: Hot Springs 500 kV Switched Shunt				
CAB GORG (48059)		1.0541	1.0545	56 other P6 violations
NOXONCON (48289)		1.0511	1.0506	
TROUT CR (41091)		1.0521	1.0517	
SSEE				
N-2 (ROW and ADJ): Cabinet - Noxon 230 kV and Lancaster - Noxon 230 kV				
CAB GORG (48059)			1.0523	
Noxon Reactors				
P6				
N-1: Beacon #1 230/115 kV + N-1: Hot Springs 500 kV Switched Shunt				
CAB GORG (48059)			1.0521	3 other P6 violations
NOXONCON (48289)			1.0506	
TROUT CR (41091)			1.0516	
Rathdrum - Westside 230 kV Line				
P6				
N-1: Beacon #2 230/115 kV + N-1: Bell - Westside 230 kV				5 other P6 violations
BEACON N (48025) -> BEACON N (48023) CKT 1			119.6 %	
Reconductor Bell - Northeast 115 kV Line				
P6				
N-1: Beacon - Bell #4 230 kV + N-1: Beacon - Bell #5 230 kV				
BELL BPA (40087) -> WAIKIKIT (48449) CKT 1			104.3 %	
Sandpoint Reinforcment Project				
P2				
BF: R318 Noxon East & West 230 kV				
TROY (41097) -> YAAK (41169) CKT 1	105.2 %	105.5 %	107.6 %	1 other P2 violation
YAAK (41169) -> MOYIE T (41239) CKT 1	104.3 %	104.5 %	106.6 %	
Shawnee No. 2 230/115 kV Transformer				
P6				
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV				9 other P6 violations
AHSAHKA (40023)	0.8219	0.8163	0.8027	
AHSAHKA (40023) -> OROFINO (48303) CKT 1	150.3 %	153.2 %	156.8 %	

Row Labels	19HSLHPROJECTS	24HSLHPROJECTS	34HSLHPROJECTS	Additional Violations
COTTNWDT (48087)	0.8581	0.8515	0.8378	
COTTNWOD (48089)	0.8567	0.8501	0.8363	
CRAIGMNT (48091)	0.8912	0.8863	0.8774	
DWORSHAK (40367)	0.8284	0.823	0.8097	
EGRANTAP (48119)	0.8601	0.853	0.8384	
EGRANVIL (40383)	0.86	0.8529	0.8383	
GRANGVIL (48141)	0.8604	0.8534	0.8389	
JAYPE (48167)	0.7843	0.7774	0.7617	
JULIAETT (48169) -> MOSCOW (48247) CKT 1	173.2 %	175.3 %	178.2 %	
KAMIAH (48171)	0.8521	0.8458	0.833	
KOOSKIA (48177)	0.8508	0.8445	0.8315	
NEZPERCE (48261)	0.8564	0.8504	0.8382	
OROFINO (48303)	0.7927	0.7861	0.7711	
OROFINO (48303) -> JULIAETT (48169) CKT 1	183.4 %	185.9 %	189.8 %	
SWEETWTR (48423)			0.9477	
WEIPPE (48459)	0.7847	0.7778	0.7622	
WICKES (48465)	0.8602	0.8532	0.8387	
Shawnee No. 2 230/115 kV XFMR				
P6				
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV				
ARMSTRNG (47501)	0.3777	0.3579	0.3206	
BRINKENS (40149)	0.3905	0.3711	0.3347	
CHAMBERS (47503)	0.3726	0.3528	0.3154	
CHMBRSTP (48073)	0.3731	0.3533	0.3159	
DEARY (48101)	0.5354	0.521	0.4927	
DIAMOND (48109)	0.3655	0.3457	0.3083	
EASCOLFX (48115)	0.371	0.3512	0.3138	
EWAN (48121)	0.3599	0.34	0.3027	
GARFIELD (48133)	0.3891	0.3698	0.3332	
JULIAETT (48169)	0.5402	0.526	0.4982	
MOSCCITY (48243)	0.4	0.3806	0.3438	
MOSCITYT (48245)	0.4004	0.381	0.3442	
MOSCOW (48247)	0.4083	0.389	0.3526	
NMOSCOW (48273)	0.3928	0.3733	0.3363	
PALOUSE (48313)	0.3904	0.3711	0.3345	
POTLAT A (48341)	0.39	0.3707	0.3343	
SHAWNEE (48383)	0.3748	0.355	0.3177	
SPULLMAN (48413)	0.3817	0.362	0.3248	
TERRVIEW (48430)	0.3787	0.359	0.3217	
TURNER_WSU (48291)	0.3765	0.3567	0.3194	
VIOLA (48445)	0.3936	0.3743	0.3378	
Silver Lake Switching Station and Garden Springs 230 kV Integration				
P6				
N-1: Airway Heights 115kV Switched Shunt + N-1: Airway Heights - Garden Springs 115 kV				
AIRWAYHT (48009)	0.9412	0.9308	0.917	
FAIRCHLD (40397)	0.94	0.9295	0.9156	
SILVRLK2 (48388)	0.9371	0.9264	0.9121	
W.PLAINS (47513)	0.9442	0.9339	0.9204	
Spokane Valley Reinforcment Project and 230 kV Integration				
P2				
BUS: Westside 115 kV				3 other P2 Violations
ROSSPARK (48371) -> THIRHACH (48431) CKT 1			108.5 %	
P5				
PSF: Westside 115 kV				
ROSSPARK (48371) -> THIRHACH (48431) CKT 1			107.8 %	
P6				
N-1: College & Walnut - Westside 115 kV + N-1: Northwest - Westside 115 kV				
WEST (48461) -> SPKWASTE (48409) CKT 1	108.5 %	111.4 %	122.9 %	16 other P6 violations
SPKWASTE (48409) -> GARDENSP (48131) CKT 1			107.2 %	
SSEE				
N-2: College & Walnut - Westside 115 kV and Garden Springs - Westside 115 kV				1 other SSEE violation
ROSSPARK (48371) -> THIRHACH (48431) CKT 1	106.8 %	110.9 %	121.0 %	
Spokane Valley Reinforcment Project and Ninth and Central 230 kV Integration				
P2				

Row Labels	19HSLHPROJECTS	24HSLHPROJECTS	34HSLHPROJECTS	Additional Violations
BF: A688 Ninth & Central North & South 115 kV				
WEST (48461) -> SPKWASTE (48409) CKT 1			105.6 %	
P6				
N-1: Beacon - Ninth & Central #1 115 kV + N-1: Beacon - Ross Park 115 kV				4 other P6 violations
BEACON S (48029) -> NINTHCNT_N (48271) CKT 2		104.4 %	114.9 %	
Spokane Valley Reinforcment Project and Ninth and Central 230 kV Integration and Garden Springs 230 kV				
NA				
RES: N-2 (ROW): Bell - Westside 230 kV and Coulee - Westside 230 kV and Ninemile - Westside 115 kV				
THIRHACH (48431) -> POSTSTRT (48339) CKT 1		103.1 %	115.7 %	
P2				
BF: A413 Westside 115 kV, Ninemile-Westside				6 other P2 violations
THIRHACH (48431) -> POSTSTRT (48339) CKT 1	101.5 %	108.3 %	122.3 %	
P5				
PSF: Ninth & Central South 115 kV				2 other P5 violations
IRVIN (48165) -> OPPORTUN (48299) CKT 1	119.5 %	124.4 %	135.4 %	
OPPORTUN (48299) -> CHESTER (48069) CKT 1		103.5 %	112.7 %	
P6				
N-1: Northwest - Westside 115 kV + N-1: Garden Springs - Westside 115 kV				4 other P6 violations
WEST (48461) -> FTWRIGHT (48129) CKT 1	104.7 %	106.7 %	117.0 %	
FTWRIGHT (48129) -> COLLWALN (48081) CKT 1			102.1 %	
P7				
N-2 (STR): Bell - Westside 230 kV & Coulee - Westside 230 kV				
THIRHACH (48431) -> POSTSTRT (48339) CKT 1		102.9 %	115.8 %	
St Maries Reactive Support or 230 kV Integration				
P6				
N-1: Benewah - Boulder 230 kV + N-1: Hatwai 500/230 kV				14 other P6 violations
OGARA (48297)			0.9467	
STMARIES (48417)	0.9469	0.9456	0.935	
St. Maries Reactive Support				
P3				
G-1: Clearwater Unit 1 + N-1: Hatwai 500/230 kV				3 other P3 violations
STMARIES (48417)			0.9474	
Westside Transformer Replacement				
P1				
N-1: Beacon #2 230/115 kV				
BEACON N (48025) -> BEACON N (48023) CKT 1			100.6 %	
P6				
N-1: Westside #2 230/115 kV + N-1: WESTSIDE #3 230/115 kV				13 other P6 violations
WEST (48463) -> WEST (48461) CKT 1	138.5 %			
Westside Transformer Replacement and Spokane Valley Reinforcment Project				
P2				
BF: A388 Bell S2 & S3 230 kV				
WEST (48461) -> SPKWASTE (48409) CKT 1			102.2 %	

Extreme Events

No extreme event simulated yielded results with more adverse effects than those already described in the previous sections.

Stability Study Results

All corrective action plans have been identified in previous sections.

Row Labels	15HSLH Max of Voltage Dip or Frequency	Max of Duration or Time	19HSLHPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time	24HSLHPROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
Addy - Kettle Falls POTT scheme						
P1						
N-1: Addy - Kettle Falls 115 kV 3P @ ADD						
Out of Step Generator						
KETTLEAV 14kV	OOS	1.6 s	OOS	1.6 s	OOS	1.6 s
WECC Category B Frequency						
KETTLEAV 13.8kV			59.1 Hz	7.0 ~	59.2 Hz	7.5 ~
WECC Category B Voltage Dip Load Bus						
COOK M T 115kV	-29.1 %		-26.8 %		-28.0 %	
KETTLEAV 115kV	-28.1 %		-26.9 %		-26.9 %	
KETTLEAV 13.8kV	-64.7 %		-63.6 %		-62.9 %	
REPUBLIC 115kV	-29.3 %				-28.1 %	
WECC Category B Voltage Dip Load Bus Duration						
KETTLEAV 13.8kV	-64.7 %	INF	-63.6 %	INF	-62.9 %	INF
Spokane WTE disconnected from System by fault clearing action						
P1						
N-1: Garden Springs - Westside 115 kV 3P @ GDN						
Out of Step Generator						
SPKWASTE 14kV			OOS	1.4 s	OOS	1.4 s
WECC Category B Voltage Dip Non-Load Bus						
SPKWASTE 115kV			-99.9 %		-99.9 %	
SPKWASTE 13.8kV			-88.2 %		-88.7 %	
N-1: Garden Springs - Westside 115 kV 3P @ WES						
Out of Step Generator						
SPKWASTE 14kV			OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus						
SPKWASTE 115kV			-99.2 %		-99.2 %	
SPKWASTE 13.8kV			-87.5 %		-88.0 %	
P7						
N-2: College & Walnut - Westside 115 kV and Garden Springs - Westside 115 kV 3P						
Out of Step Generator						
SPKWASTE 14kV			OOS	1.5 s	OOS	1.5 s
WECC Category C Voltage Dip Any Bus						
SPKWASTE 115kV			-99.2 %		-99.2 %	
SPKWASTE 13.8kV			-87.5 %		-88.0 %	
IEP motor modeling and protection settings						
P4						
BF: R420 Beacon 230 kV, Beacon - Bell #5 230 kV 3P (BEA-BEL 5 @BEA)						
Out of Step Generator						
IEP-A 14kV	OOS	2.0 s				
IEP-B 14kV	OOS	2.0 s				
WECC Category C Voltage Dip Any Bus						
IEP-A 13.8kV	-39.6 %		-38.0 %		-37.7 %	
IEP-B 13.8kV	-39.7 %		-38.1 %		-37.8 %	
BF: R430 Beacon 230 kV, Beacon - Bell #4 230 kV 3P (BEA-BEL 4 @BEA)						
Out of Step Generator						
IEP-A 14kV	OOS	1.9 s				
IEP-B 14kV	OOS	1.9 s				
WECC Category C Voltage Dip Any Bus						
IEP-A 13.8kV	-39.8 %		-38.4 %		-38.2 %	
IEP-B 13.8kV	-39.9 %		-38.4 %		-38.2 %	
BF: R433 Beacon 230 kV, Beacon - Boulder 230 kV 3P (BEA-BLD @BEA)						
WECC Category C Voltage Dip Any Bus						
IEP-A 13.8kV	-34.4 %		-32.6 %		-32.4 %	
IEP-B 13.8kV	-34.5 %		-32.7 %		-32.5 %	

Row Labels	15HSLH Max of Voltage Dip or Frequency	15HSLH Max of Duration or Time	19HSLHPROJECTS Max of Voltage Dip or Frequency	19HSLHPROJECTS Max of Duration or Time	24HSLHPROJECTS Max of Voltage Dip or Frequency	24HSLHPROJECTS Max of Duration or Time
Metro - Sunset POTT scheme						
P1						
N-1: Metro - Sunset 115 kV 3P @ MTR						
Out of Step Generator						
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s	OOS	2.2 s
WECC Category B Voltage Dip Non-Load Bus						
SPKWASTE 13.8kV	-32.0 %		-49.4 %		-30.9 %	
Nine Mile - Westside POTT scheme						
P1						
N-1: Nine Mile - Westside 115 kV 3P @ WES						
Out of Step Generator						
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus						
NINEMI34 13.8kV	-33.6 %		-30.1 %		-31.7 %	
Ninemile - Westside POTT scheme						
(blank)						
N-2: Bell - Westside 230 kV and Coulee - Westside 230 kV and Ninemile - Westside 115 kV 2LG						
Out of Step Generator						
NINEMI34 14kV			OOS	1.5 s		

8.2 Expected Transfers

8.2.1 Path 6 – West of Hatwai

The Western Electricity Coordinating Council (WECC) transfer path West of Hatwai (Path 6) consists of the sum of flows of 10 lines/transformers with 6 connected with the Avista Transmission system. The Transfer limit of this line is 4277 MW in the East to West direction. The system conditions which result in high West of Hatwai flows include high Western Montana hydro generation, high Colstrip generation, high Boundary generation and light loads. These conditions may most likely occur in the late spring or early summer during off-peak hours. Avista's allocated amount on this path is 600 MW.

Steady State Results

The steady state assessment results identified power transport issues and high voltages. High voltages were mitigated with insertion of future reactive support at Noxon and North Lewiston 230 kV substations and utilizing existing reactive devices within Avista's Transmission System. Potential violations were mitigated with future expected or conceptual projects, existing operating procedures prepared by either Avista or BPA, recommended system adjustments after the first contingency and new longer term project proposals.

The most severe performance issues in the WOH study in Avista's Transmission System were various P1 category potential violations. The N-1 outage of the Burke – Pine Creek No.3 115 kV Line overloads the Burke – Pine Creek No. 4 115 kV Line. Overloads also occurred on the Burke - Pine Creek No.3 115 kV Line for the outage of the Burke – Pine Creek No. 4 115 kV Line. The overloads are exasperated once the Coeur d'Alene– Pine Creek 115 kV Line Rebuild project is complete. Reinforcing this area helps transfer more power through the Coeur d'Alene area to the west however the existing copper conductors are identified as potential bottlenecks.

Other projects such as the Rathdrum – Westside project will help transfer power in an efficient manner from one end of the system to the other, and alleviate the power flow through the 115 kV system. However there are a handful of contingencies this project does not completely mitigate. In addition to this project a potential project may be to reconductor portions of the Boulder – Rathdrum 115 kV line which overloads for the loss of P6 contingencies of Boulder – Lancaster 230 kV Line with various other N-1's. This 115 kV line overloads due to through flow. However the long term 230 kV projects and reinforcing the existing copper conductors of the transmission lines will mitigate future potential violations in the 115 kV transmission system.

Proposed Projects (projects need further analysis)

Burke – Pine Creek 115 kV Reconductor

Project Description

The Burke – Pine Creek No. 3 115 kV Transmission Line presently consists of 795 ACSR, 556 AAC, 556 ACSR, 397 ACSR and 250 CU conductor. Reconductoring 22.5 miles of

transmission line to match the 795 ACSR highest rating of the line was assessed.

The Burke – Pine Creek No. 4 115 kV Transmission Line presently consists of 556 AAC and 250 CU conductor. Reconductoring the 23.1 mile transmission line to all 795 ACSR was assessed.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing the 2019 WOH bascecase scenario, defined as year 1. However in the interim period, operational actions may be performed during WOH high transfer levels defined above a certain threshold to disable automatic sectionalizing scheme to meet system performance requirements.

Performance Criteria Violations

Row Labels	19WOH	19WOHCONPROJECTS	19WOHPROJECTS
P1			
Reconductor Burke - Pine Creek No.4 115 kV Line			
N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)			
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1		110.30	109.40
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1		106.40	105.50
BURKE (48051) -> BIGCREEK (48041) CKT 1	101.20	112.20	111.30
Reconductor Burke - Pine Creek No.3 115 kV Line			
N-1: Burke - Pine Creek #4 115 kV (BUR-BIG)			
BURKE (48051) -> LUCKYFTP (48151) CKT 1		110.00	109.20
N-1: Burke - Pine Creek #4 115 kV (PIN-BIG)			
BURKE (48051) -> LUCKYFTP (48151) CKT 1		109.40	108.60

Boulder – Rathdrum 115 kV Reconductor

Project Description

The Boulder – Rathdrum 115 kV Transmission Line presently consists of 795 AAC, 556 AAC, 397 ACSR and 250 CU conductor. Reconductoring 9.1 miles of the 250 Cu transmission line to 795 AAC to match the highest rating of the line was assessed.

This project should be completed after the installation of the Rathdrum – Westside 230 kV Line. Currently, Rathdrum – Westside 230 kV Line is to be completed by 2034.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing the 2019 WOH basecase scenario, defined as year 1. However in the interim period, operational actions may be performed after the first N-1 occurs to reduce generation at Rathdrum in preparation for the next outage to meet system performance requirements.

Performance Criteria Violations

Row Labels	19WOH	19WOHCONPROJECTS	19WOHPROJECTS
Reconductor Boulder - Rathdrum 115 kV Line			
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1			
P6			
N-1: Beacon - Rathdrum 230 kV + N-1: Boulder - Lancaster 230 kV	140.50	111.10	150.00
N-1: Benewah - Pine Creek 230 kV + N-1: Boulder - Lancaster 230 kV	115.10	103.40	128.20
N-1: Boulder - Lancaster 230 kV + N-1: Otis Orchards - Post Falls 115 kV	119.90	104.90	131.60
N-1: Boulder - Lancaster 230 kV + N-1: Post Falls - Ramsey 115 kV	123.50	107.60	134.50

Row Labels	19WOH	19WOHCONPROJECTS	19WOHPROJECTS
N-1: Boulder - Lancaster 230 kV + N-1: Rathdrum - Westside 230 kV		106.70	
MOAB (47511) -> BOULDERE (48522) CKT 1			
P6			
N-1: Beacon - Rathdrum 230 kV + N-1: Boulder - Lancaster 230 kV	129.70	100.30	139.10
PLEASANT (48319) -> MOAB (47511) CKT 1			
P6			
N-1: Beacon - Rathdrum 230 kV + N-1: Boulder - Lancaster 230 kV	132.70	103.30	142.20
N-1: Boulder - Lancaster 230 kV + N-1: Post Falls - Ramsey 115 kV	115.70	100.10	127.00

Beacon – Boulder #1 115 kV Reconductor

Project Description

Once the Spokane Valley Reinforcement Project is implemented the Beacon – Boulder No. 1 115 KV Line overloads. The overloads are alleviated with the Ninth and Central 230 kV Integration project however there are a few P6 and P7 contingencies with potential violations. Reconductoring the 1.82 miles of 556 AAC conductor with 795 AAC will mitigate any potential future violations.

This project should be completed before the installation of the Spokane Valley Reinforcement Project. Currently, the Spokane Valley Reinforcement Project is scheduled to be completed by 2016.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing the 2019 WOH Projects and Conceptual Projects basecase scenario. However in the interim period, operational actions may be performed after the first N-1 occurs to reduce generation at Rathdrum, Boulder and/or Lancaster in preparation for the next outage to meet system performance requirements.

Performance Criteria Violations

Max of Result Row Labels	Column Labels 19WOHCONPROJECTS	19WOHPROJECTS
Reconductor Beacon - Boulder No.1 115 kV Line		
NA		
RES: N-2 (ROW): Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #1 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	101.00	127.40
P6		
N-1: Beacon - Boulder 230 kV + N-1: Beacon - Rathdrum 230 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	101.00	127.80
N-1: Beacon - Boulder 230 kV + N-1: Boulder - Irvin #2 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	107.80	128.90
N-1: Beacon - Boulder 230 kV + N-1: Opportunity - Otis Orchards 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	100.30	119.90
N-1: Boulder - Irvin #2 115 kV + N-1: Opportunity - Otis Orchards 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	109.40	132.30
N-1: Boulder - Irvin #2 115 kV + N-1: Rathdrum - Westside 230 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	100.20	
P7		
N-2 (STR and ADJ): Beacon - Boulder 230 kV & Beacon - Boulder #2 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	104.70	123.20
N-2 (STR): Beacon - Boulder 230 kV & Beacon - Rathdrum 230 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	101.00	127.80
N-2: Beacon - Boulder 230 kV & Boulder - Irvin #2 115 kV		

Max of Result Row Labels	Column Labels 19WOHCONPROJECTS	19WOHPROJECTS
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	107.80	128.90

Assessment Table

The Assessment table includes a summary of the contingencies with largest potential violations sorted by projects. To review a complete table with projects, operator actions and/or system adjustments refer to Appendix B.

Max of Result Row Labels	Column Labels 19WOHPROJECTS	Additional Violations
Bell No. 10 230/115 kV XFMR		
P6		
N-1: Bell - Northeast 115 kV + N-1: Bell #6 230/115 kV		
BEACON S (48029) -> BELL BPA (40087) CKT 1	106.20	
Chelan - Stratford 115 kV Transmission Line Rebuild		
P1		
N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.80	
P2		
N-1: Larson - Stratford 115 kV Open @ STR		4 other P2 violations
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.80	
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	124.10	
Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild and Rathdrum 115 kV Bus Reconfiguration		
NA		
RES: N-2 (STR): Boulder - Lancaster 230 kV & Boulder - Rathdrum 115 kV		
PRAIRIEB (40855) -> POST FLS (48329) CKT 1	116.50	
RAMSEY (48349) -> PRAIRIEB (40855) CKT 1	101.60	
P6		
N-1: Beacon - Rathdrum 230 kV + N-1: Boulder - Lancaster 230 kV		
PRAIRIEB (40855) -> POST FLS (48329) CKT 1	128.40	4 other P6 violations
RAMSEY (48349) -> PRAIRIEB (40855) CKT 1	111.10	
P7		
N-2 (STR): Beacon - Rathdrum 230 kV & Boulder - Lancaster 230 kV		
PRAIRIEB (40855) -> POST FLS (48329) CKT 1	128.40	
RAMSEY (48349) -> PRAIRIEB (40855) CKT 1	111.10	
Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild and Rathdrum 115 kV Bus Reconfiguration and Rathdrum - Westside 230 kV Line		
P7		
N-2 (STR): Beacon - Rathdrum 230 kV & Lancaster - Rathdrum 230 kV		
EASTFARM (48117) -> OTIS (48311) CKT 1	102.60	
MOAB (47511) -> BOULDERE (48522) CKT 1	150.30	1 other P7 violation
POST FLS (48329) -> EASTFARM (48117) CKT 1	106.90	
PRAIRIEB (40855) -> POST FLS (48329) CKT 1	137.50	
RAMSEY (48349) -> PRAIRIEB (40855) CKT 1	118.00	
Ninth and Central 230 kV Integration		
NA		
RES: N-2 (ROW): Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #1 115 kV		
SPKINDPK (48405) -> IRVIN (48165) CKT 1	107.80	
P1		
N-1: Boulder - Irvin #2 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	104.00	
P2		
BF: R427 Beacon North & South 230 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	131.00	2 other P2 violations
SPKINDPK (48405) -> IRVIN (48165) CKT 1	110.10	

Max of Result Row Labels	Column Labels 19WOH PROJECTS	Additional Violations
P3		
G-1: Long Lake Hydro Unit 1 + N-1: Boulder - Irvin #2 115 kV		7 other P3 violations
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	105.00	
P6		
N-1: Beacon - Boulder 230 kV + N-1: Bell - Taft 500 kV		66 other P6 violations
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	124.30	
SPKINDPK (48405) -> IRVIN (48165) CKT 1	103.80	
P7		
N-2: Beacon - Boulder 230 kV & Boulder - Irvin #2 115 kV		3 other P7 violations
SPKINDPK (48405) -> IRVIN (48165) CKT 1	108.50	
Rathdrum - Westside 230 kV Line		
P1		
N-1: Boulder - Lancaster 230 kV		
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	108.60	
PLEASANT (48319) -> MOAB (47511) CKT 1	101.00	
P2		
BF: A1561 Boulder-Lancaster, Lancaster Generator #1 & #2		2 other P2 violations
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	108.60	
PLEASANT (48319) -> MOAB (47511) CKT 1	101.00	
P3		
G-1: Palouse Wind Unit 1 + N-1: Boulder - Lancaster 230 kV		1 other P3 violation
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	109.90	
PLEASANT (48319) -> MOAB (47511) CKT 1	102.30	
P6		
N-1: Beacon - Rathdrum 230 kV + N-1: Lancaster - Rathdrum 230 kV		22 other P6 violations
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	161.00	
MOAB (47511) -> BOULDERE (48522) CKT 1	150.30	
PLEASANT (48319) -> MOAB (47511) CKT 1	153.30	
RATHDRMW (48355) -> IDAHO_RD (48161) CKT 1	127.60	
P7		
N-2 (STR): Beacon - Rathdrum 230 kV & Lancaster - Rathdrum 230 kV		1 other P7 violation
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	161.00	
PLEASANT (48319) -> MOAB (47511) CKT 1	153.30	
RATHDRMW (48355) -> IDAHO_RD (48161) CKT 1	127.60	
Rathdrum - Westside 230 kV Line and Rathdrum 115 kV Bus Reconfiguration		
P6		
N-1: Bell - Taft 500 kV + N-1: Hatwai - Lower Granite 500 kV		
CAB GORG (48059) -> LAKEVIEW (48179) CKT 1	102.60	
LAKEVIEW (48179) -> RATHDRUM (48357) CKT 1	102.60	
Saddle Mountain		
P6		
N-1: Bell - Coulee #6 500 kV + N-1: Hatwai - Lower Granite 500 kV		1 other P6 violation
DRYCREEK (48512) -> WALA AVA (48451) CKT 1	110.10	
Sandcreek - Bronx - Cabinet Rebuild		
P6		
N-1: Columbia Falls - Conkelley 230 kV + N-1: Hot Springs - Noxon #2 230 kV		4 other P6 violations
COL FALL E (40248) -> COL FALL W (40249) CKT BS	102.40	
HUNGRY H (40557) -> COL FALL E (40248) CKT 1	102.40	
St. Maries Capacitor Bank		
P6		
N-1: Bell - Coulee #6 500 kV + N-1: Dworshak - Taft 500 kV		
HOPKINSB (47507)	0.95	
LATAH (48181)	0.95	
MICA (47509)	0.95	
OGARA (48297)	0.94	
PLUMMER (48323)	0.95	
ROCKFORD (48367)	0.95	
SETTERS (47376)	0.95	
STMARIES (48417)	0.93	

125 YEARS OF SERVICE 1889–2014 AVISTA

Max of Result Row Labels	Column Labels 19WOH PROJECTS	Additional Violations
TEKOA (48427)	0.95	
WILBUR (48467)	0.95	
Reconductor Boulder - Rathdrum 115 kV Line		
P6		
N-1: Beacon - Rathdrum 230 kV + N-1: Boulder - Lancaster 230 kV		
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	150.00	3 other P6 violations
MOAB (47511) -> BOULDERE (48522) CKT 1	139.10	
PLEASANT (48319) -> MOAB (47511) CKT 1	142.20	
Reconductor Beacon - Boulder No.1 115 kV Line		
NA		
RES: N-2 (ROW): Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #1 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	127.40	
P6		
N-1: Beacon - Boulder 230 kV + N-1: Beacon - Rathdrum 230 kV		3 other P6 violations
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	127.80	
P7		
N-2: Beacon - Boulder 230 kV & Boulder - Irvin #2 115 kV		2 other P7 violations
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	128.90	
Reconductor Burke - Pine Creek No.4 115 kV Line		
P1		
N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	109.40	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	105.50	
BURKE (48051) -> BIGCREEK (48041) CKT 1	111.30	
P2		
N-1: Burke - Pine Creek #3 115 kV Open @ BUR		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	109.40	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	105.50	
BURKE (48051) -> BIGCREEK (48041) CKT 1	111.30	
P3		
G-1: Rathdrum Thermal Unit 2 + N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)		17 other P3 violations
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	111.00	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	107.10	
BURKE (48051) -> BIGCREEK (48041) CKT 1	112.80	
P6		
N-1: Bell - Taft 500 kV + N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)		36 other P6 violations
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	136.50	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	132.80	
BURKE (48051) -> BIGCREEK (48041) CKT 1	138.40	
Reconductor Burke - Pine Creek No.3 115 kV Line		
P1		
N-1: Burke - Pine Creek #4 115 kV (BUR-BIG)		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	109.20	
N-1: Burke - Pine Creek #4 115 kV (PIN-BIG)		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	108.60	
P2		
N-1: Burke - Pine Creek #4 115 kV Open @ PIN		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	105.10	
P3		
G-1: Cabinet Gorge Hydro Unit 2 + N-1: Burke - Pine Creek #4 115 kV (BUR-BIG)		23 other P3 violations
BURKE (48051) -> LUCKYFTP (48151) CKT 1	110.30	
P6		
N-1: Burke - Pine Creek #4 115 kV (BUR-BIG) + N-1: Noxon - Pine Creek 230 kV		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	140.60	
LUCKYFTP (48151) -> WALLACE (48453) CKT 1	104.20	42 other P6 violations
OSBURN (48305) -> PINE CRK (48315) CKT 1	126.70	
WALLACE (48453) -> OSBURN (48305) CKT 1	122.30	
Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild in queue, inquire about larger conductor		
P6		4 other P6 violations
N-1: Benewah - Pine Creek 230 kV + N-1: Cabinet - Rathdrum 230 kV		

Max of Result	Column Labels	
Row Labels	19WOH PROJECTS	Additional Violations
BLUECRK (48045) -> CDA (48067) CKT 1	103.50	
MISSION (48239) -> BLUECRK (48045) CKT 1	105.80	
PINE CRK (48315) -> MISSION (48239) CKT 1	106.60	

Extreme Events

No extreme event simulated yielded results with more adverse effects than those already described in the previous sections.

Stability Study Results

Bell – Taft 500 kV Line Disturbance (BPA owned)

In the 2019 WOH scenario, WECC voltage dip criteria violations were observed for a three phase fault on the BPA owned Bell – Taft 500 kV Line at Bell. The voltage dips occur on the Industrial Empire Paper Co. 13.8 kV bus, these dips may occur due to incorrect modeling. Correspondence and coordination with the customer should be conducted before the Spokane Valley Reinforcement Project is in service.

Ninth and Central – Opportunity 115 kV Line Disturbance

WECC voltage dip criteria violations were observed for a three phase fault on the Ninth and Central – Opportunity 115 kV Line at Opportunity. The voltage dips occur on the Industrial Empire Paper Co. 13.8 kV bus, these dips may occur due to incorrect modeling. Correspondence and coordination with the customer should be conducted before the Spokane Valley Reinforcement Project is in service.

Metro - Sunset 115 kV Line Disturbance

The Spokane Waste Generator was observed going out of step for a three phase fault on the Metro - Sunset 115 kV Transmission Line with time delayed clearing by the Sunset terminal. The Zone 2 time delay on the Sunset terminal is set to 65 cycles. Transmission Planning will coordinate with System Protection to inquire why the time delay is set so long, and evaluate if a solution for a faster clearing time is feasible.

	19WOH		19WOHPROJECTS	
Row Labels	Max of Voltage Dip or Frequency	Max of Duration or Time	Max of Voltage Dip or Frequency	Max of Duration or Time
P1				
N-1: Bell - Taft 500 kV 3P @ Bell				
Correspond with Inland Empire Paper Co.				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV			-33.1 %	
IEP-B 13.8kV			-33.2 %	
N-1: Metro - Sunset 115 kV 3P @ MTR				
I see distance relays at both stations why is breaiker at sunset opening at 2.083 seconds for a 3 phase fault? Z2=65 cycles???				
Out of Step Generator				

Row Labels	19WOH Max of Voltage Dip or Frequency	19WOH Max of Duration or Time	19WOHPROJECTS Max of Voltage Dip or Frequency	19WOHPROJECTS Max of Duration or Time
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s
N-1: Ninth & Central - Opportunity 115 kV 3P @ OPT				
Correspond with Inland Empire Paper Co.				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV			-99.3 %	
IEP-B 13.8kV			-99.2 %	
SSEE				
BF: A50 Stratford 115 kV, Larson - Stratford 115 kV 3P (LAR-STR @LAR)				
Generator may not be modelled correctly				
Out of Step Generator				
HEADWORK 14kV	OOS	1.7 s	OOS	1.7 s

8.2.2 Path 8 – Montana to Northwest

The Western Electricity Coordinating Council (WECC) transfer path Montana to Northwest (Path 8) consists of metered tie lines between NorthWestern Energy (NWMT) and Bonneville Power Administration (BPA), plus the metered tie lines between NWMT and Avista Corp. (AVA).

The Transfer limit of this path is 2200 MW in the East to West direction and 1350 in the West to East direction. The system conditions for the 2200MW scenario include high Western Montana hydro generation, high Colstrip generation, and light loads. These conditions may most likely occur in the late spring or early summer during off-peak hours. The system conditions for the 1350MW scenario consist of a heavy spring scenario with heavy loading and low generation in Montana, Colstrip off, and heavy hydro generation in the west. Avista's allocated amount for flows east to west is 382MW.

Steady State Results for MT-NW 2200MW

The steady state assessment results for the MT-NW 2200 MW in the East to West direction scenario identified power transport issues and high voltages. High voltages were mitigated with insertion of future reactive support at Noxon and North Lewiston 230 kV substations and utilizing existing reactive devices within Avista's Transmission System. Potential violations were mitigated with future expected or conceptual projects, existing operating procedures prepared by either Avista or BPA, recommended system adjustments after the first contingency and new longer term project proposals.

The Western Montana Hydro generation is dispatched high in the MT-NW 2200 MW scenario. This triggers many P1 violations. The existing WMH – NT-NW nomogram may be utilized until a longer term project has been studied and vetted through the stakeholder process. P1 contingencies that were identified are: Benewah – Pine Creek 230 kV line, Bronx – Cabinet 115 kV Line, Bronx – Sand Creek 115 kV Line, and Cabinet – Noxon 230 kV line. The Cabinet – Bronx – Sandcreek 115 kV Line Rebuild Project and Sandpoint Reinforcement Project mentioned in previous chapters will help mitigate half of the potential violations identified and the other half of the potential violations will be addressed with a more comprehensive study on the Coeur d'Alene – Pine Creek 115 kV Line Rebuild. Alternatives to the existing project may consist of rebuilding to a larger conductor, building a second line, or reducing the path rating.

Proposed Projects (projects need further analysis)

Coeur d'Alene – Pine Creek 115 kV Transmission Line Study

Project Description

The Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild project presently consists of 556 AAC, 556 ACSR, 397 ACSR and 250 CU conductor. The original scope of work included reconductoring the entire 30 mile line with 795 ACSR conductor and operating the line closed.

It is recommended that this project be reviewed once again to determine if a larger conductor

with a rating greater than 250 MVA such as 1272 ACSR is feasible. Other alternatives may be superior such as building a 230 kV line from Pine Creek to Rathdrum or a second 115 kV line from Pine Creek to Coeur d'Alene. Alternatives will be assessed in a comprehensive study early next year (2015) and a decision be made soon after so that there will be no delay in the implementation of this project.

The Bonners Ferry – Libby 115 kV Line owned by BPA will overload for the Benewah – Pine Creek 230 kV Line outage. The exiting Cabinet – Bronx – Sand Creek 115 kV Line Rebuild Project will mitigate future potential violations.

Timeline

System performance analysis indicates an inability of the System to meet the performance requirements in Table 1 of TPL-001-4 in scenarios representing the 2019 MT-NW 2200 E to W scenario, defined as year 1. However in the interim period, operational actions may be performed during MT-NW 2200 E to W high transfer levels with WMH above a certain threshold to curtail generation to meet system performance requirements.

Performance Criteria Violations

Row Labels	19MTNW2200	19MTNW2200CONPROJECTS	19MTNW2200PROJECTS
N-1: Benewah - Pine Creek 230 kV			
potential violation identified after Coeur d'Alene - Pine Creek 115 kV line rebuild is complete and switch closed. Either evaluate using larger conductor for rebuild, build a second line, keep switch open, or reduce path rating			
P1			
BLUECRK (48045) -> CDA (48067) CKT 1		105.4	104.3
MISSION (48239) -> BLUECRK (48045) CKT 1		107.7	106.6
PINE CRK (48315) -> MISSION (48239) CKT 1		108.5	107.4
Redispatch generation at Noxon generating stations and correspond with BPA. Long Term: Cabinet - Bronx - Sandcreek 115 kV Line Rebuild Project			
P1			
TROY (41097) -> YAAK (41169) CKT 1	101.9		
YAAK (41169) -> MOYIE T (41239) CKT 1	101.3		

Assessment Table

The Assessment table includes a summary of the contingencies with largest potential violations sorted by projects. To review a complete table with projects, operator actions and/or system adjustments refer to Appendix B.

Row Labels	19MTNW2200PROJECTS	Additional Violations
Bell No. 10 230/115 kV XFMR		
P6		
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV		
BEACON S (48029) -> BELL BPA (40087) CKT 1	142.2	2 other P6 violations
Chelan - Stratford 115 kV Transmission Line Rebuild		
P1		
N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.7	
P2		
N-1: Larson - Stratford 115 kV Open @ STR		
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.7	4 other P2 violations
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		

Row Labels	19MTNW2200PROJECTS	Additional Violations
HEADWORK (48149) -> CHELAN (46805) CKT 1	124.1	
Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild and Rathdrum 115 kV Bus Reconfiguration		
SSEE		
N-2 (ROW): Bell - Taft 500 kV and Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Lancaster 230 kV		
POST FLS (48329) -> EASTFARM (48117) CKT 1	140.8	1 other SSEE violaltion
PRAIRIEB (40855) -> POST FLS (48329) CKT 1	181.1	
Ninth & Central 230 kV Integration		
P2		
BF: R427 Beacon North & South 230 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	106.6	
RATHDRUM (48357)	1.0052	
P6		
N-1: Bell - Taft 500 kV + N-1: Hatwai - Lower Granite 500 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	121.1	4 other P6 violations
P7		
N-2: Beacon - Boulder 230 kV & Boulder - Irvin #2 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	100.7	
potential violation identified after Courde alene - Pine Creek 115 kV line rebuild is complete and switch closed. Either evaluate using larger conductor for rebuild, build a second line, keep switch open, or reduce path rating		
P1		
N-1: Benewah - Pine Creek 230 kV		
BLUECRK (48045) -> CDA (48067) CKT 1	104.3	
MISSION (48239) -> BLUECRK (48045) CKT 1	106.6	
PINE CRK (48315) -> MISSION (48239) CKT 1	107.4	
P2		
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer		
BLUECRK (48045) -> CDA (48067) CKT 1	104	
MISSION (48239) -> BLUECRK (48045) CKT 1	106.3	
PINE CRK (48315) -> MISSION (48239) CKT 1	107.1	
P6		
N-1: Benewah - Pine Creek 230 kV + N-1: Cabinet Gorge 230/115 kV		
BLUECRK (48045) -> CDA (48067) CKT 1	106	
MISSION (48239) -> BLUECRK (48045) CKT 1	108.3	
PINE CRK (48315) -> MISSION (48239) CKT 1	109.1	
Rathdrum - Westside 230 kV Transmission Line		
P6		
N-1: Beacon - Rathdrum 230 kV + N-1: Lancaster - Rathdrum 230 kV		
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	111.2	
MOAB (47511) -> BOULDERE (48522) CKT 1	100.9	
PLEASANT (48319) -> MOAB (47511) CKT 1	103.8	
P7		
N-2 (STR): Beacon - Rathdrum 230 kV & Lancaster - Rathdrum 230 kV		
IDAHO_RD (48161) -> PLEASANT (48319) CKT 1	111.2	
MOAB (47511) -> BOULDERE (48522) CKT 1	100.9	
PLEASANT (48319) -> MOAB (47511) CKT 1	103.8	
Reconductor Burke - Pine Creek No. 3 115 kV Line		
P1		
N-1: Burke - Pine Creek #4 115 kV (BUR-BIG)		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	122.4	
OSBURN (48305) -> PINE CRK (48315) CKT 1	107.1	
WALLACE (48453) -> OSBURN (48305) CKT 1	104.1	
N-1: Burke - Pine Creek #4 115 kV (PIN-BIG)		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	121.8	
OSBURN (48305) -> PINE CRK (48315) CKT 1	106.5	
WALLACE (48453) -> OSBURN (48305) CKT 1	103.5	
P2		
BF: 4119 Bell-Taft, Garrison-Taft #1		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	103	
N-1: Burke - Pine Creek #4 115 kV Open @ PIN		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	118.3	
OSBURN (48305) -> PINE CRK (48315) CKT 1	102.8	
WALLACE (48453) -> OSBURN (48305) CKT 1	100.1	
P3		

Row Labels	19MTNW2200PROJECTS	Additional Violations
G-1: Noxon Rapids Hydro Unit 5 + N-1: Burke - Pine Creek #4 115 kV (PIN-BIG)		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	124.1	17 other P3 violations
OSBURN (48305) -> PINE CRK (48315) CKT 1	109.2	
WALLACE (48453) -> OSBURN (48305) CKT 1	106	
P6		
N-1: Bell - Taft 500 kV + N-1: Burke - Pine Creek #4 115 kV (BUR-BIG)		
BURKE (48051) -> LUCKYFTP (48151) CKT 1	151.3	
LUCKYFTP (48151) -> WALLACE (48453) CKT 1	113.2	34 other P6 violations
OSBURN (48305) -> PINE CRK (48315) CKT 1	138.4	
WALLACE (48453) -> OSBURN (48305) CKT 1	133.1	
Reconductor Burke - Pine Creek No.4 115 kV Line		
P1		
N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	123.5	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	119.7	
BURKE (48051) -> BIGCREEK (48041) CKT 1	125.4	
N-1: Burke - Pine Creek #3 115 kV (PIN-LKY)		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	110.3	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	106.6	
BURKE (48051) -> BIGCREEK (48041) CKT 1	112.2	
P2		
N-1: Burke - Pine Creek #3 115 kV Open @ BUR		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	123.5	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	119.7	
BURKE (48051) -> BIGCREEK (48041) CKT 1	125.4	
N-1: Burke - Pine Creek #3 115 kV Open @ PIN		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	105.1	
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	101.5	
BURKE (48051) -> BIGCREEK (48041) CKT 1	107	
P3		
G-1: Noxon Rapids Hydro Unit 1 + N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	125.6	15 other P3 violations
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	121.9	
BURKE (48051) -> BIGCREEK (48041) CKT 1	127.5	
P6		
N-1: Burke - Pine Creek #3 115 kV (BUR-LKY) + N-1: Noxon - Pine Creek 230 kV		
BIGCREEK (48041) -> BUNKRHIL (48049) CKT 1	157.5	26 other P6 violations
BUNKRHIL (48049) -> PINE CRK (48315) CKT 1	153.9	
BURKE (48051) -> BIGCREEK (48041) CKT 1	159.4	
Sandpoint Reinforcement Project		
P6		
N-1: Cabinet Gorge 230/115 kV + N-1: Sand Creek 115kV Switched Shunt		
BONNERS (40133)	0.9379	
LIBBYFEC (47278)	0.9457	
MOYIE T (41239)	0.935	
MOYIE TX (41240)	0.934	3 other P6 violations
MT HALL (47194)	0.9392	
N BENCH (41241)	0.9334	
SMITHFLS (41299)	0.9395	
TROY (41097)	0.9494	
YAAK (41169)	0.938	
Shawnee No.2 230/115 kV XFMR		
P6		
N-1: Hatwai - Moscow 230 230 kV + N-1: Moscow 230/115 kV		
MOSCOW (48249)	1.0559	

Extreme Events

No extreme event simulated yielded results with more adverse effects than those already described in the previous sections.

Stability Results

All corrective action plans have been identified in previous sections.

Row Labels	19MTNW2200 Max of Voltage Dip or Frequency	Max of Duration or Time	19MTNW2200PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
Correspond with Inland Empire Paper Co.				
P1				
N-1: Ninth & Central - Opportunity 115 kV 3P @ OPT				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV			-99.3 %	
IEP-B 13.8kV			-99.4 %	
P4				
BF: R452 Beacon - Boulder 230 kV 3P (BEA-BLD @BLD)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV			-30.6 %	
IEP-B 13.8kV			-30.7 %	
Violation exists for SLG fault as well. Avista will coordinate with Spokane waste for mitigation. Customer unit small enough does not impact neighbors.				
P1				
N-1: Garden Springs - Westside 115 kV 3P @ GDN				
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 115kV			-99.9 %	
SPKWASTE 13.8kV			-88.6 %	
N-1: Garden Springs - Westside 115 kV 3P @ WES				
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 115kV			-99.2 %	
SPKWASTE 13.8kV			-88.0 %	
SSEE				
N-2: Airway Heights - Garden Springs 115 kV and Garden Springs - Westside 115 kV 3P				
WECC Category C Voltage Dip Any Bus				
SPKWASTE 115kV			-99.9 %	
SPKWASTE 13.8kV			-88.6 %	
N-2: College & Walnut - Westside 115 kV and Garden Springs - Westside 115 kV 3P				
Out of Step Generator				
SPKWASTE 14kV			OOS	1.5 s
WECC Category C Voltage Dip Any Bus				
SPKWASTE 115kV			-99.2 %	
SPKWASTE 13.8kV			-88.0 %	
I see distance relays at both stations why is breaiker at sunset opening at 2.083 seconds for a 3 phase fault? Z2=65 cycles???				
P1				
N-1: Metro - Sunset 115 kV 3P @ MTR				
Out of Step Generator				
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 13.8kV			-47.8 %	
Implement high speed, com aided tripping scheme on the Nine Mile - Westside 115 kV Line. Reassess for new settings with the new Nine Mile Generator Rebuild Project				
P1				
N-1: Nine Mile - Westside 115 kV 3P @ WES				
Out of Step Generator				
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus				
NINEMI34 13.8kV	-35.9 %		-30.3 %	
Devils Gap Bus Reconfiguration Project				
P2				
BUS: Devils Gap East 115 kV SLG				
Out of Step Generator				
LITFAL12 4kV	OOS	1.4	OOS	1.4
LITFAL34 4kV	OOS	1.4	OOS	1.4
P4				
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @ADD)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9	OOS	1.9

Row Labels	19MTNW2200 Max of Voltage Dip or Frequency	Max of Duration or Time	19MTNW2200PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
LITFAL34 4kV	OOS	1.9	OOS	1.9
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV SLG (DGP-LL #1 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @NMS)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9	OOS	1.9
LITFAL34 4kV	OOS	1.9	OOS	1.9
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @AIR)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9	OOS	1.9
LITFAL34 4kV	OOS	1.9	OOS	1.9
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV SLG (DGP-LL #2 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
PSF: Devils Gap East 115 kV SLG				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9	OOS	1.9
LITFAL34 4kV	OOS	1.9	OOS	1.9
SSEE				
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV 3P (ADD-DGP @ADD)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9	OOS	1.9
LITFAL34 4kV	OOS	1.9	OOS	1.9
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV 3P (ADD-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV 3P (DGP-LL #1 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.3	OOS	1.3
LITFAL34 4kV	OOS	1.3	OOS	1.3
BF: A524 Devils Gap 115 kV, Devils Gap - Little Falls #1 115 kV 3P (DGP-LF #1 @DGP)				
Out of Step Generator				
LONGLKG1 4kV	OOS	1.4	OOS	1.4
LONGLKG2 4kV	OOS	1.4	OOS	1.4
LONGLKG3 4kV	OOS	1.4	OOS	1.4
LONGLKG4 4kV	OOS	1.5	OOS	1.5
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV 3P (DGP-NMS @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5	OOS	1.5
LITFAL34 4kV	OOS	1.5	OOS	1.5
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV 3P (DGP-NMS @NMS)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9	OOS	1.9
LITFAL34 4kV	OOS	1.9	OOS	1.9

Row Labels	19MTNW2200 Max of Voltage Dip or Frequency	19MTNW2200 Max of Duration or Time	19MTNW2200PROJECTS Max of Voltage Dip or Frequency	19MTNW2200PROJECTS Max of Duration or Time
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV 3P (AIR-DGP @AIR)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.9**	OOS	**1.9**
LITFAL34 4kV	OOS	**1.9**	OOS	**1.9**
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV 3P (AIR-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.5**	OOS	**1.5**
LITFAL34 4kV	OOS	**1.5**	OOS	**1.5**
BF: A538 Devils Gap 115 kV, Devils Gap - Little Falls #2 115 kV 3P (DGP-LF #2 @DGP)				
Out of Step Generator				
LONGLKG1 4kV	OOS	**1.4**	OOS	**1.4**
LONGLKG2 4kV	OOS	**1.4**	OOS	**1.4**
LONGLKG3 4kV	OOS	**1.4**	OOS	**1.4**
LONGLKG4 4kV	OOS	**1.5**	OOS	**1.5**
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV 3P (DGP-LL #2 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.3**	OOS	**1.3**
LITFAL34 4kV	OOS	**1.3**	OOS	**1.3**
BUS: Devils Gap East 115 kV 3P				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.3**	OOS	**1.3**
LITFAL34 4kV	OOS	**1.3**	OOS	**1.3**
PSF: Devils Gap East 115 kV 3P				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.9**	OOS	**1.9**
LITFAL34 4kV	OOS	**1.9**	OOS	**1.9**
PSF: Devils Gap West 115 kV 3P				
Out of Step Generator				
LONGLKG1 4kV	OOS	**1.5**	OOS	**1.5**
LONGLKG2 4kV	OOS	**1.5**	OOS	**1.5**
LONGLKG3 4kV	OOS	**1.5**	OOS	**1.5**
LONGLKG4 4kV	OOS	**1.5**	OOS	**1.5**

Steady State Results for MT-NW 1350MW

The steady state assessment results for the MT-NW 1350 MW in the West to East direction scenario identified power transport issues and high voltages. High voltages were mitigated with insertion of future reactive support at Noxon and North Lewiston 230 kV substations and utilizing existing reactive devices within Avista's Transmission System. Potential violations were mitigated with future expected or conceptual projects, existing operating procedures prepared by either Avista or BPA, recommended system adjustments after the first contingency. No new longer term project were identified as needed per this study.

There were no P1 violations. Through analysis it was identified that existing projects in the Expansion Plan were sufficient.

Assessment Table

The Assessment table includes a summary of the contingencies with largest potential violations sorted by projects. To review a complete table with projects, operator actions and/or system adjustments refer to Appendix B.

Row Labels	19MTNW1350PROJECTS	Additional Violations
Bell #10 230/115 kV Transformer		
P6		
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV		
BEACON S (48029) -> BELL BPA (40087) CKT 1	121.7	
N-1: Bell - Westside 230 kV + N-1: Bell #6 230/115 kV		
WEST (48463)	1.0569	
Chelan - Stratford 115 kV Transmission Line Rebuild		
P1		
N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.9	
P2		
N-1: Larson - Stratford 115 kV Open @ STR		
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.9	1 other P2 violation
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	122.6	
STRATFRD (48419) -> COULECTY (46021) CKT 1	103.3	
Garden Springs 230, Ninth and Central 230 and new Garden Springs - Ninth and Central 230 kV Line		
P6		
N-1: Devils Gap - Nine Mile 115 kV + N-1: Airway Heights - Garden Springs 115 kV		
AIRWAYHT (48009)	1.0884	
DEVILGPE (48103)	1.0637	
DEVILGPW (48105)	1.0637	
FAIRCHLD (40397)	1.0878	
FORD (48123)	1.0574	
GAFFNEY (40449)	1.0624	
LITTFALL (48193)	1.0636	
LONGLAKE (48201)	1.0639	
LONGLAKT (48203)	1.0627	
LONGLAKW (48199)	1.0638	
REARDAN (48363)	1.0628	
SILVRLK2 (48388)	1.0864	
SPRAGUE (48411)	1.0622	
W.PLAINS (47513)	1.0854	
N-1: Devils Gap - Nine Mile 115 kV + N-1: Flathead - Hot Springs 230 kV		
HUNGRY H (40557)	1.0528	
Shawnee #2 230/115 kV Transformer		
P3		
G-1: Lancaster Thermal Unit 1 + N-1: Shawnee 230/115 kV		8 other P3 violations

Row Labels	19MTNW1350PROJECTS	Additional Violations
PALOUSE_WIND (48863)	1.0542	
SHAWNEE (48385)	1.0536	
THORNTON (48432)	1.0541	
P6		
N-1: Benewah - Thornton 230 kV + N-1: Shawnee 230/115 kV		
PALOUSE_WIND (48863)	1.0547	
SHAWNEE (48385)	1.0532	
THORNTON (48432)	1.0547	
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV		
AHSAHKA (40023)	0.8738	
AHSAHKA (40023) -> OROFINO (48303) CKT 1	144.2	
ARMSTRNG (47501)	0.5555	
BRINKENS (40149)	0.561	
CHAMBERS (47503)	0.5522	
CHMBRSTP (48073)	0.5527	
COTTNWDT (48087)	0.9	
COTTNWOD (48089)	0.8985	
CRAIGMNT (48091)	0.9229	
DEARY (48101)	0.6537	
DIAMOND (48109)	0.5473	
DWORSHAK (40367)	0.879	
EASCOLFX (48115)	0.5512	
EGRANTAP (48119)	0.9023	
EGRANVIL (40383)	0.9022	
EWAN (48121)	0.5432	
GARFIELD (48133)	0.5594	18 other P6 violations
GRANGVIL (48141)	0.9027	
JAYPE (48167)	0.8413	
JULIAETT (48169)	0.6591	
JULIAETT (48169) -> MOSCOW (48247) CKT 1	163.3	
KAMIAH (48171)	0.8944	
KOOSKIA (48177)	0.8933	
MOSCCITY (48243)	0.5711	
MOSCITYT (48245)	0.5714	
MOSCOW (48247)	0.5772	
NEZPERCE (48261)	0.8982	
NMOSCOW (48273)	0.5668	
OROFINO (48303)	0.8497	
OROFINO (48303) -> JULIAETT (48169) CKT 1	174.3	
PALOUSE (48313)	0.5608	
POTLAT A (48341)	0.5607	
SHAWNEE (48383)	0.5539	
SPULLMAN (48413)	0.5578	
TERRVIEW (48430)	0.5569	
TURNER_WSU (48291)	0.5551	
VIOLA (48445)	0.5636	
WEIPPE (48459)	0.8419	
WICKES (48465)	0.9025	

Extreme Events

No extreme event simulated yielded results with more adverse effects than those already described in the previous sections.

Stability

All corrective action plans have been identified in previous sections.

Row Labels	19MTNW1350 Max of Voltage Dip or Frequency	19MTNW1350 Max of Duration or Time	19MTNW1350PROJECTS Max of Voltage Dip or Frequency	19MTNW1350PROJECTS Max of Duration or Time
UPDATE CONTINGENCY IN SS, Ask protection if we could have faster clearing for a breaker failure (16 cycles)				
P4				
BF: A217 Clearwater West 115 kV, Clearwater - North Lewiston 115 kV 3P (CLW-NLW @NLW)				
Out of Step Generator				
CWGEN3 12kV	OOS	1.7 s	OOS	1.7 s
WECC Category C Voltage Dip Any Bus				
CLEARWATER 34.5kV	-31.5 %		-31.5 %	
CWGEN3 12kV	-51.7 %		-51.4 %	
Correspond with Inland Empire Paper Co.				
P1				
N-1: Bell - Taft 500 kV 3P @ Bell				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV	-33.6 %		-32.6 %	
IEP-B 13.8kV	-33.7 %		-32.6 %	
N-1: Ninth & Central - Opportunity 115 kV 3P @ OPT				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV			-98.5 %	
IEP-B 13.8kV			-98.6 %	
P4				
BF: R420 Beacon 230 kV, Beacon - Bell #5 230 kV 3P (BEA-BEL 5 @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-36.0 %		-34.7 %	
IEP-B 13.8kV	-36.1 %		-34.8 %	
BF: R430 Beacon 230 kV, Beacon - Bell #4 230 kV 3P (BEA-BEL 4 @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-36.4 %		-35.2 %	
IEP-B 13.8kV	-36.5 %		-35.3 %	
BF: R433 Beacon 230 kV, Beacon - Boulder 230 kV 3P (BEA-BLD @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-30.2 %			
IEP-B 13.8kV	-30.2 %			
P7				
N-2: Beacon - Boulder 230 kV & Boulder - Irvin #2 115 kV 3P				
WECC Category C Voltage Dip Any Bus				
I.E.PAPR 115kV			-40.0 %	
Violation exists for SLG fault as well. Avista will coordinate with Spokane waste for mitigation. Customer unit small enough does not impact neighbors.				
P1				
N-1: Garden Springs - Westside 115 kV 3P @ GDN				
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 115kV			-99.9 %	
SPKWASTE 13.8kV			-89.0 %	
N-1: Garden Springs - Westside 115 kV 3P @ WES				
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 115kV			-99.2 %	
SPKWASTE 13.8kV			-88.3 %	
I see distance relays at both stations why is breaiker at sunset opening at 2.083 seconds for a 3 phase fault? Z2=65 cycles???				
P1				
N-1: Metro - Sunset 115 kV 3P @ MTR				
Out of Step Generator				
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 13.8kV	-30.1 %		-35.4 %	
Implement high speed, com aided tripping scheme on the Nine Mile - Westside 115 kV Line. Reassess for new settings with the new Nine Mile Generator Rebuild Project				
P1				
N-1: Nine Mile - Westside 115 kV 3P @ WES				

Row Labels	19MTNW1350 Max of Voltage Dip or Frequency	19MTNW1350 Max of Duration or Time	19MTNW1350PROJECTS Max of Voltage Dip or Frequency	19MTNW1350PROJECTS Max of Duration or Time
Out of Step Generator				
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus				
NINEMI34 13.8kV	-30.8 %		-31.9 %	
Assess a new governor for Monroe units				
P4				
BF: A433 Post Street 115 kV, College & Walnut - Post Street 115 kV SLG (C&W-PST @PST)				
Out of Step Generator				
MONROEA 14kV	OOS	1.4 s	OOS	1.4 s
Devils Gap Bus Reconfiguration Project				
P2				
BUS: Devils Gap East 115 kV SLG				
Out of Step Generator				
LITFAL12 4kV	OOS	1.4 s	OOS	1.4 s
LITFAL34 4kV	OOS	1.4 s	OOS	1.4 s
P4				
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @ADD)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV SLG (DGP-LL #1 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @NMS)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @AIR)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV SLG (DGP-LL #2 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
PSF: Devils Gap East 115 kV SLG				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s

8.2.3 Path 14 – Idaho to Northwest

The Western Electricity Coordinating Council transfer path, Idaho to Northwest (Path 14) is located Southwest Idaho and Eastern Oregon/Washington and Northern Idaho. The Transfer limit of this path is 2400 MW in the East to West direction and 1200 in the West to East direction. The system conditions for the 2400MW scenario consist of light load conditions, heavy eastern thermal resources, moderate to heavy hydro generation in Idaho, low Western Montana hydro generation, high Colstrip generation, low generation dispatched in Avista's system, and minimal hydro generation in the West. These conditions may most likely occur in the late spring or early summer during off-peak hours. The system conditions for the 1200MW scenario consist of a heavy summer scenario with heavy hydro generation in the Northwest, high Colstrip generation, moderate Nor-Cal hydro generation and moderate to low eastern thermal resources.

Steady State Results for ID-NW 2400MW

The steady state assessment results for the ID-NW 2400 MW in the East to West direction scenario identified power transport issues and high voltages. High voltages were mitigated with insertion of future reactive support at Noxon and North Lewiston 230 kV substations and utilizing existing reactive devices within Avista's Transmission System. Potential violations were mitigated with future expected or conceptual projects, existing operating procedures prepared by either Avista or BPA, recommended system adjustments after the first contingency. No new longer term projects were identified as needed per this study.

There were no P1 violations that have not already been addressed with prior expected or conceptual projects. Through analysis it was identified that existing projects in the Expansion Plan were sufficient.

Assessment Table

The Assessment table includes a summary of the contingencies with largest potential violations sorted by projects. To review a complete table with projects, operator actions and/or system adjustments refer to Appendix B.

	19IDNW2400PROJECTS
Bell No. 10 230/115 kV XFMR	
P6	
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV	
BEACON S (48029) -> BELL BPA (40087) CKT 1	119.7
Chelan - Stratford 115 kV Transmission Line Rebuild	
P1	
N-1: Larson - Stratford 115 kV	
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.8
P2	
BF: GB1410 Larson 115 kV, Larson-Sand Dunes-Warden	
HEADWORK (48149) -> CHELAN (46805) CKT 1	109
BF: GB1412 Larson 115 kV, Larson-Stratford	
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.7
BUS: Larson 115 kV	
HEADWORK (48149) -> CHELAN (46805) CKT 1	109
N-1: Larson - Stratford 115 kV Open @ LAR	
HEADWORK (48149) -> CHELAN (46805) CKT 1	109.1
N-1: Larson - Stratford 115 kV Open @ STR	
HEADWORK (48149) -> CHELAN (46805) CKT 1	112.8
P6	

	19IDNW2400PROJECTS
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV	
HEADWORK (48149) -> CHELAN (46805) CKT 1	124.2
Ninth and Central 230 kV Integration	
P6	
N-1: Bell - Taft 500 kV + N-1: Hatwai - Lower Granite 500 kV	
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	102.1
Ninth and Central 230 kV Integration and Garden Springs - Thornton 230 kV	
P6	
N-1: Bell - Taft 500 kV + N-1: Hatwai - Lower Granite 500 kV	
BENEWAH (48037) -> BOULDER (48524) CKT 1	105.6

Extreme Events

No extreme event simulated yielded results with more adverse effects than those already described in the previous sections.

Stability Results

All corrective action plans have been identified in previous sections.

Row Labels	19IDNW2400 Max of Voltage Dip or Frequency	Max of Duration or Time	19IDNW2400PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
Correspond with Inland Empire Paper Co.				
P1				
N-1: Ninth & Central - Opportunity 115 kV 3P @ OPT				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV			-99.4 %	
IEP-B 13.8kV			-99.4 %	
P4				
BF: R420 Beacon 230 kV, Beacon - Bell #5 230 kV 3P (BEA-BEL 5 @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-39.3 %		-38.2 %	
IEP-B 13.8kV	-39.4 %		-38.3 %	
BF: R430 Beacon 230 kV, Beacon - Bell #4 230 kV 3P (BEA-BEL 4 @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-39.6 %		-38.6 %	
IEP-B 13.8kV	-39.8 %		-38.7 %	
BF: R433 Beacon 230 kV, Beacon - Boulder 230 kV 3P (BEA-BLD @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-33.9 %		-32.6 %	
IEP-B 13.8kV	-33.9 %		-32.7 %	
Implement high speed, com aided tripping scheme on the Addy - Kettle Falls 115 kV Line				
P1				
N-1: Addy - Kettle Falls 115 kV 3P @ ADD				
Out of Step Generator				
KETTLEAV 14kV	OOS	1.7 s	OOS	1.7 s
WECC Category B Frequency				
KETTLEAV 13.8kV	59.3 Hz	8.5 ~	59.3 Hz	8.5 ~
WECC Category B Voltage Dip Load Bus				
COOK M T 115kV	-25.2 %		-25.4 %	
KETTLEAV 115kV	-25.3 %		-25.0 %	
KETTLEAV 13.8kV	-62.1 %		-62.1 %	
REPUBLIC 115kV	-25.3 %		-25.4 %	
WECC Category B Voltage Dip Load Bus Duration				
KETTLEAV 13.8kV	-62.1 %	INF	-62.1 %	INF
SSEE				
N-2: Airway Heights - Garden Springs 115 kV and Garden Springs - Westside 115 kV 3P				
WECC Category C Voltage Dip Any Bus				
SPKWASTE 115kV			-99.9 %	

Row Labels	19IDNW2400 Max of Voltage Dip or Frequency	Max of Duration or Time	19IDNW2400PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
SPKWASTE 13.8kV			-88.5 %	
N-2: College & Walnut - Westside 115 kV and Garden Springs - Westside 115 kV 3P				
Out of Step Generator				
SPKWASTE 14kV			OOS	1.5 s
WECC Category C Voltage Dip Any Bus				
SPKWASTE 115kV			-99.2 %	
SPKWASTE 13.8kV			-87.8 %	
I see distance relays at both stations why is breaiker at sunset opening at 2.083 seconds for a 3 phase fault? Z2=65 cycles???				
P1				
N-1: Metro - Sunset 115 kV 3P @ MTR				
Out of Step Generator				
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 13.8kV			-43.8 %	
Implement high speed, com aided tripping scheme on the Nine Mile - Westside 115 kV Line. Reassess for new settings with the new Nine Mile Generator Rebuild Project				
P1				
N-1: Nine Mile - Westside 115 kV 3P @ WES				
Out of Step Generator				
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus				
NINEMI34 13.8kV	-34.2 %		-32.4 %	

Steady State Results for ID-NW 1200MW

The steady state assessment results for the MT-NW 1200 MW in the West to East direction scenario identified no new issues in addition to the Summer and Winter Peak assessments. Potential violations were mitigated with future expected or conceptual projects, existing operating procedures prepared by either Avista or BPA, or recommended system adjustments after the first contingency. No new longer term projects were identified as needed per this study.

There were no P1 violations that have not already been addressed with prior expected or conceptual projects. Through analysis it was identified that existing projects in the Expansion Plan were sufficient.

Assessment Table

The Assessment table includes a summary of the contingencies with largest potential violations sorted by projects. To review a complete table with projects, operator actions and/or system adjustments refer to Appendix B.

	19IDNW1200PROJECTS	
Bell #10 230/115 kV Transformer		
P6		
N-1: Beacon - Northeast 115 kV + N-1: Bell #6 230/115 kV		
BEACON S (48029) -> BELL BPA (40087) CKT 1	162	4 other P6 violations
Benewah and Dry Creek 230 kV Capacitor switch at limits		
P6		
N-1: Benewah - Moscow 230 230 kV + N-1: Shawnee - Thornton 230 kV		
PALOUSE_WIND (48863)	1.0552	
THORNTON (48432)	1.0553	

	19IDNW1200PROJECTS	
Benton - Othello 115 kV Transmission Line Rebuild/Lind - Warden 115 kV Transmission Line Rebuild/Saddle Mountain Long Term Study		
P1		
N-1: Lind 115kV Switched Shunt		
RITZVILL (48365)	0.9467	
P2		
BUS: Sand Dunes 115 kV		
RITZVILL (48365)	0.9474	
P3		
G-1: Headworks Hydro Unit 1 + N-1: Sand Dunes - Warden #2 115 kV		
RITZVILL (48365)	0.9491	5 other P3 violations
P6		
N-1: Lind 115kV Switched Shunt + N-1: Sand Dunes - Warden #2 115 kV		
DELIGHT (47025)	0.9277	
LIND (48187)	0.9294	
MARENGO (48221)	0.9271	112 other P6 violations
RALSTONB (47073)	0.9274	
ROXBORO (48375)	0.9343	
WASHTUNA (48457)	0.9274	
Cabinet - Bronx - Sand Creek 115 kV Transmission Line Rebuild and Cabinet 230/115 kV Transformer automatic LTC		
P2		
BF: B1338 Sand Creek 115 kV, Albeni Falls-Bonners Ferry		
SANDPT A (48377)	5	
Chelan - Stratford 115 kV Transmission Line Rebuild		
P6		
N-1: Devils Gap - Stratford 115 kV (STR-WIL) + N-1: Larson - Stratford 115 kV		
HEADWORK (48149) -> CHELAN (46805) CKT 1	115.4	
STRATFRD (48419) -> COULECTY (46021) CKT 1	102.8	
Coeur d'Alene - Pine Creek 115 kV Transmission Line Rebuild and Rathdrum 115 kV Bus Reconfiguration		
P2		
BF: A624 Rathdrum East & West 115 kV		
DALTON A (48093)	0.9466	
HAYDEN (48148)	0.9454	
Garden Springs - Thornton 230 kV Transmission Line		
P6		
N-1: Benewah - Boulder 230 kV + N-1: Hatwai 500/230 kV		
PINE CRK (48317) -> BENEWAH (48037) CKT 1	112	2 other P6 violations
N-1: Benewah - Pine Creek 230 kV + N-1: Hatwai 500/230 kV		
BOULDER (48524) -> BENEWAH (48037) CKT 1	127.8	
Hatwai - Lolo No.2 230 kV Transmission Line		
P3		
G-1: Clearwater Unit 1 + N-1: Hatwai - Lolo 230 kV		
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	106.8	1 other P3 violation
P6		
N-1: Dry Creek - North Lewiston 230 kV + N-1: Hatwai - Lolo 230 kV		
N LEWIST (48253) -> CLEARWATER_W (48075) CKT 1	110.6	
N LEWIST (48255) -> N LEWIST (48253) CKT 1	111.7	3 other P6 violations
N-1: Hatwai - Lolo 230 kV + N-1: North Lewiston 230/115 kV		
N LEWIST (48255) -> DRYCREEK (48512) CKT 1	113	
P7		
N-2 (STR): Brownlee - Hells Canyon 230 kV & Lolo - Oxbow 230 kV		
MCNRY S1 (41351) -> ROUNDUP (40905) CKT 1	100.5	
Lolo Transformer Replacement		
P6		
N-1: Dry Creek 230/115 kV + N-1: North Lewiston 230/115 kV		
LOLO (48197) -> LOLO (48195) CKT 1	103.7	
Ninth & Central 230 kV Integration		
P2		
BF: A600 Beacon North & South 115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	101.1	
NORTHWES (48279) -> FRANCEDR (48127) CKT 1	100.6	
P6		
N-1: Beacon #1 230/115 kV + N-1: Beacon #2 230/115 kV		
BOULDERW (48520) -> SPKINDPK (48405) CKT 1	100.6	

	19IDNW1200PROJECTS	
SSEE		
SUB: Beacon 230 & 115 (AVA)		
NORTHWES (48279) -> FRANCEDR (48127) CKT 1	104.2	
Saddle Mountain Reinforcment Project		
P6		
N-1: Benton 230/115 kV + N-1: Othello SS - Warden #2 115 kV (WAR-L&R)		
WARDEN A (48455) -> OTHELOSS (48309) CKT 1	102.4	
N-1: Benton 230/115 kV + N-1: Sand Dunes - Warden #2 115 kV		
DELIGHT (47025)	0.9495	
MARENGO (48221)	0.9488	
RALSTONB (47073)	0.9492	
ROXBORO (48375)	0.9468	
WASHTUNA (48457)	0.9492	
Sandpoint Reinforcement Project		
P6		
N-1: Albeni Falls - Sand Creek 115 kV + N-1: Cabinet Gorge 230/115 kV		
SAND CRK (40929)	1.0509	
SELLE (40965)	1.0502	
Shawnee Transformer No.2 Addition Project		
P6		
N-1: Moscow 230/115 kV + N-1: Shawnee 230/115 kV		
AHSAHKA (40023)	0.8255	
AHSAHKA (40023) -> OROFINO (48303) CKT 1	153.4	
ARMSTRNG (47501)	0.3803	
BRINKENS (40149)	0.3932	
CHAMBERS (47503)	0.3752	
CHMBRSTP (48073)	0.3758	
COTTNWDT (48087)	0.8618	
COTTNWOD (48089)	0.8605	
CRAIGMNT (48091)	0.8947	
DEARY (48101)	0.5384	
DIAMOND (48109)	0.3681	
DWORSHAK (40367)	0.832	
EASCOLFX (48115)	0.3737	
EGRANTAP (48119)	0.8638	
EGRANVIL (40383)	0.8637	
EWAN (48121)	0.3625	
GARFIELD (48133)	0.3919	
GRANGVIL (48141)	0.8642	
JAYPE (48167)	0.7879	4 other P6 violations
JULIAETT (48169)	0.5432	
JULIAETT (48169) -> MOSCOW (48247) CKT 1	173.8	
KAMIAH (48171)	0.8557	
KOOSKIA (48177)	0.8545	
MOSCCITY (48243)	0.4028	
MOSCITYT (48245)	0.4031	
MOSCOW (48247)	0.4111	
NEZPERCE (48261)	0.86	
NMOSCOW (48273)	0.3955	
OROFINO (48303)	0.7962	
OROFINO (48303) -> JULIAETT (48169) CKT 1	183.9	
PALOUSE (48313)	0.3931	
POTLAT A (48341)	0.3928	
SHAWNEE (48383)	0.3775	
SPULLMAN (48413)	0.3844	
TERRVIEW (48430)	0.3813	
TURNER_WSU (48291)	0.3791	
VIOLA (48445)	0.3964	
WEIPPE (48459)	0.7883	
WICKES (48465)	0.8639	
St. Maries Capacitor Bank		
P2		
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer		
OGARA (48297)	0.9497	
P6		
N-1: Benewah 230kV Switched Shunt + N-1: Hatwai 500/230 kV		3 other P6 violations

	19IDNW1200PROJECTS	
OGARA (48297)	0.9434	
230 kV Integration or St. Maries Capacitor Bank		
P2		
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer		
STMARIES (48417)	0.939	2 other P2 violations
P3		
G-1: Dworshak Hydro Unit 1 + N-1: Hatwai 500/230 kV		
STMARIES (48417)	0.9438	7 other P3 violations
P6		
N-1: Bell - Taft 500 kV + N-1: Dworshak - Hatwai 500 kV		
STMARIES (48417)	0.9363	62 other P6 violations
SSEE		
SUB: Hatwai 500 & 230 (BPA)		
STMARIES (48417)	0.9454	

Extreme Events

No extreme event simulated yielded results with more adverse effects than those already described in the previous sections.

Stability Results

All corrective action plans have been identified in previous sections.

Row Labels	19IDNW1200 Max of Voltage Dip or Frequency	Max of Duration or Time	19IDNW1200PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
Correspond with Inland Empire Paper Co.				
P1				
N-1: Bell - Taft 500 kV 3P @ Bell				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV	-30.8 %		-30.6 %	
IEP-B 13.8kV	-30.9 %		-30.6 %	
N-1: Ninth & Central - Opportunity 115 kV 3P @ OPT				
WECC Category B Voltage Dip Non-Load Bus				
IEP-A 13.8kV			-98.3 %	
IEP-B 13.8kV			-98.4 %	
P4				
BF: R420 Beacon 230 kV, Beacon - Bell #5 230 kV 3P (BEA-BEL 5 @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-41.8 %		-40.3 %	
IEP-B 13.8kV	-41.9 %		-40.4 %	
BF: R430 Beacon 230 kV, Beacon - Bell #4 230 kV 3P (BEA-BEL 4 @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-42.2 %		-40.8 %	
IEP-B 13.8kV	-42.3 %		-40.9 %	
BF: R433 Beacon 230 kV, Beacon - Boulder 230 kV 3P (BEA-BLD @BEA)				
WECC Category C Voltage Dip Any Bus				
IEP-A 13.8kV	-35.3 %		-33.7 %	
IEP-B 13.8kV	-35.4 %		-33.8 %	
Implement high speed, com aided tripping scheme on the Addy - Kettle Falls 115 kV Line				
P1				
N-1: Addy - Kettle Falls 115 kV 3P @ ADD				
Out of Step Generator				
KETTLEAV 14kV	OOS	1.6 s	OOS	1.6 s
WECC Category B Voltage Dip Load Bus				
COOK M T 115kV	-26.5 %		-26.5 %	
KETTLEAV 115kV	-26.6 %		-26.6 %	
KETTLEAV 13.8kV	-63.6 %		-63.6 %	

Row Labels	19IDNW1200 Max of Voltage Dip or Frequency	Max of Duration or Time	19IDNW1200PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
WECC Category B Voltage Dip Load Bus Duration				
KETTLEAV 13.8kV	-63.6 %	INF	-63.6 %	INF
I see distance relays at both stations why is breaiker at sunset opening at 2.083 seconds for a 3 phase fault? Z2=65 cycles???				
P1				
N-1: Metro - Sunset 115 kV 3P @ MTR				
Out of Step Generator				
SPKWASTE 14kV	OOS	2.2 s	OOS	2.2 s
WECC Category B Voltage Dip Non-Load Bus				
SPKWASTE 13.8kV	-33.4 %		-31.4 %	
Implement high speed, com aided tripping scheme on the Nine Mile - Westside 115 kV Line. Reassess for new settings with the new Nine Mile Generator Rebuild Project				
P1				
N-1: Nine Mile - Westside 115 kV 3P @ WES				
Out of Step Generator				
NINEMI34 14kV	OOS	1.5 s	OOS	1.5 s
WECC Category B Voltage Dip Non-Load Bus				
NINEMI34 13.8kV	-36.8 %		-35.7 %	
Devils Gap Bus Reconfiguration Project				
P2				
BUS: Devils Gap East 115 kV SLG				
Out of Step Generator				
LITFAL12 4kV	OOS	1.4 s	OOS	1.4 s
LITFAL34 4kV	OOS	1.4 s	OOS	1.4 s
P4				
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @ADD)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV SLG (ADD-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV SLG (DGP-LL #1 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV SLG (DGP-NMS @NMS)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @AIR)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV SLG (AIR-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV SLG (DGP-LL #2 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	1.5 s	OOS	1.5 s
LITFAL34 4kV	OOS	1.5 s	OOS	1.5 s
PSF: Devils Gap East 115 kV SLG				
Out of Step Generator				
LITFAL12 4kV	OOS	1.9 s	OOS	1.9 s
LITFAL34 4kV	OOS	1.9 s	OOS	1.9 s
SSEE				

Row Labels	19IDNW1200 Max of Voltage Dip or Frequency	Max of Duration or Time	19IDNW1200PROJECTS Max of Voltage Dip or Frequency	Max of Duration or Time
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV 3P (ADD-DGP @ADD)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.9 s**	OOS	**1.9 s**
LITFAL34 4kV	OOS	**1.9 s**	OOS	**1.9 s**
BF: A521 Devils Gap 115 kV, Addy - Devils Gap 115 kV 3P (ADD-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.5 s**	OOS	**1.5 s**
LITFAL34 4kV	OOS	**1.5 s**	OOS	**1.5 s**
BF: A523 Devils Gap 115 kV, Devils Gap - Long Lake #1 115 kV 3P (DGP-LL #1 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.3 s**	OOS	**1.3 s**
LITFAL34 4kV	OOS	**1.3 s**	OOS	**1.3 s**
BF: A524 Devils Gap 115 kV, Devils Gap - Little Falls #1 115 kV 3P (DGP-LF #1 @DGP)				
Out of Step Generator				
LONGLKG1 4kV	OOS	**1.4 s**	OOS	**1.4 s**
LONGLKG2 4kV	OOS	**1.4 s**	OOS	**1.4 s**
LONGLKG3 4kV	OOS	**1.4 s**	OOS	**1.4 s**
LONGLKG4 4kV	OOS	**1.5 s**	OOS	**1.5 s**
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV 3P (DGP-NMS @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.5 s**	OOS	**1.5 s**
LITFAL34 4kV	OOS	**1.5 s**	OOS	**1.5 s**
BF: A525 Devils Gap 115 kV, Devils Gap - Nine Mile 115 kV 3P (DGP-NMS @NMS)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.9 s**	OOS	**1.9 s**
LITFAL34 4kV	OOS	**1.9 s**	OOS	**1.9 s**
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV 3P (AIR-DGP @AIR)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.9 s**	OOS	**1.9 s**
LITFAL34 4kV	OOS	**1.9 s**	OOS	**1.9 s**
BF: A526 Devils Gap 115 kV, Airway Heights - Devils Gap 115 kV 3P (AIR-DGP @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.5 s**	OOS	**1.5 s**
LITFAL34 4kV	OOS	**1.5 s**	OOS	**1.5 s**
BF: A538 Devils Gap 115 kV, Devils Gap - Little Falls #2 115 kV 3P (DGP-LF #2 @DGP)				
Out of Step Generator				
LONGLKG1 4kV	OOS	**1.4 s**	OOS	**1.4 s**
LONGLKG2 4kV	OOS	**1.4 s**	OOS	**1.4 s**
LONGLKG3 4kV	OOS	**1.4 s**	OOS	**1.5 s**
LONGLKG4 4kV	OOS	**1.5 s**	OOS	**1.6 s**
BF: A539 Devils Gap 115 kV, Devils Gap - Long Lake #2 115 kV 3P (DGP-LL #2 @DGP)				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.3 s**	OOS	**1.3 s**
LITFAL34 4kV	OOS	**1.3 s**	OOS	**1.3 s**
BUS: Devils Gap East 115 kV 3P				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.3 s**	OOS	**1.3 s**
LITFAL34 4kV	OOS	**1.3 s**	OOS	**1.3 s**
PSF: Devils Gap East 115 kV 3P				
Out of Step Generator				
LITFAL12 4kV	OOS	**1.9 s**	OOS	**1.9 s**
LITFAL34 4kV	OOS	**1.9 s**	OOS	**1.9 s**
PSF: Devils Gap West 115 kV 3P				
Out of Step Generator				
LONGLKG1 4kV	OOS	**1.5 s**	OOS	**1.5 s**
LONGLKG2 4kV	OOS	**1.5 s**	OOS	**1.5 s**
LONGLKG3 4kV	OOS	**1.5 s**	OOS	**1.5 s**
LONGLKG4 4kV	OOS	**1.5 s**	OOS	**1.5 s**

APPENDIX A - PLANNING CASES SUMMARY

2014 Planning Assessment

Planning Case Description

Avista's System Planning Group develops a set of base cases (Planning Cases) biannually to model its Transmission Planner and Planning Coordinator areas as well as the regional Transmission System. The Planning Case development process outlined in the internal document *TP-SPP-04 – Data Preparation for Steady State and Dynamic Studies* is used which includes using WECC approved base cases and applying steady state and dynamic data modifications as required to represent desired scenarios. The resulting Planning Cases represent a normal System condition (N-0). Planning Cases include the following:

- All existing facilities i.e. no planned transmission expansion project models. In past studies, inclusion of non-committed planned transmission models has incorrectly hidden potential reliability and load-service issues. Subsequently, a Corrective Action Plan was not developed as necessary (TPL-001-4, R1.1.1)
- Known outages of generation or Transmission Facilities with a duration of at least six months. Presently, Avista does not have planned outages outside the operations planning horizon. Long duration outages outside of Avista's Transmission Planner or Planning Coordinator areas are typically modeled in WECC approved base cases. (TPL-001-4, R1.1.2, R2.1.3)
- New planned Facilities and changes to existing Facilities. The Transmission System models are updated bi-annually to incorporate constructed projects and changes to existing Facilities. Planning Cases are developed to represent scenarios with and without planned Facilities and changes to existing Facilities; refer to table in Appendix A. (TPL-001-4, R1.1.3)
- Real and reactive Load forecasts. Load forecasts are developed annually and incorporated into the Planning Cases. (TPL-001-4, R1.1.4)
- Known commitments for Firm Transmission Service and Interchange. Developing sensitivity cases with WECC Rated Paths at their limits represents scenarios with all existing known commitments modeled. Future commitments exceeding the limits of WECC Rated Paths are not presently studied. (TPL-001-4, R1.1.5)

The following scenarios are developed to represent various seasonal conditions:

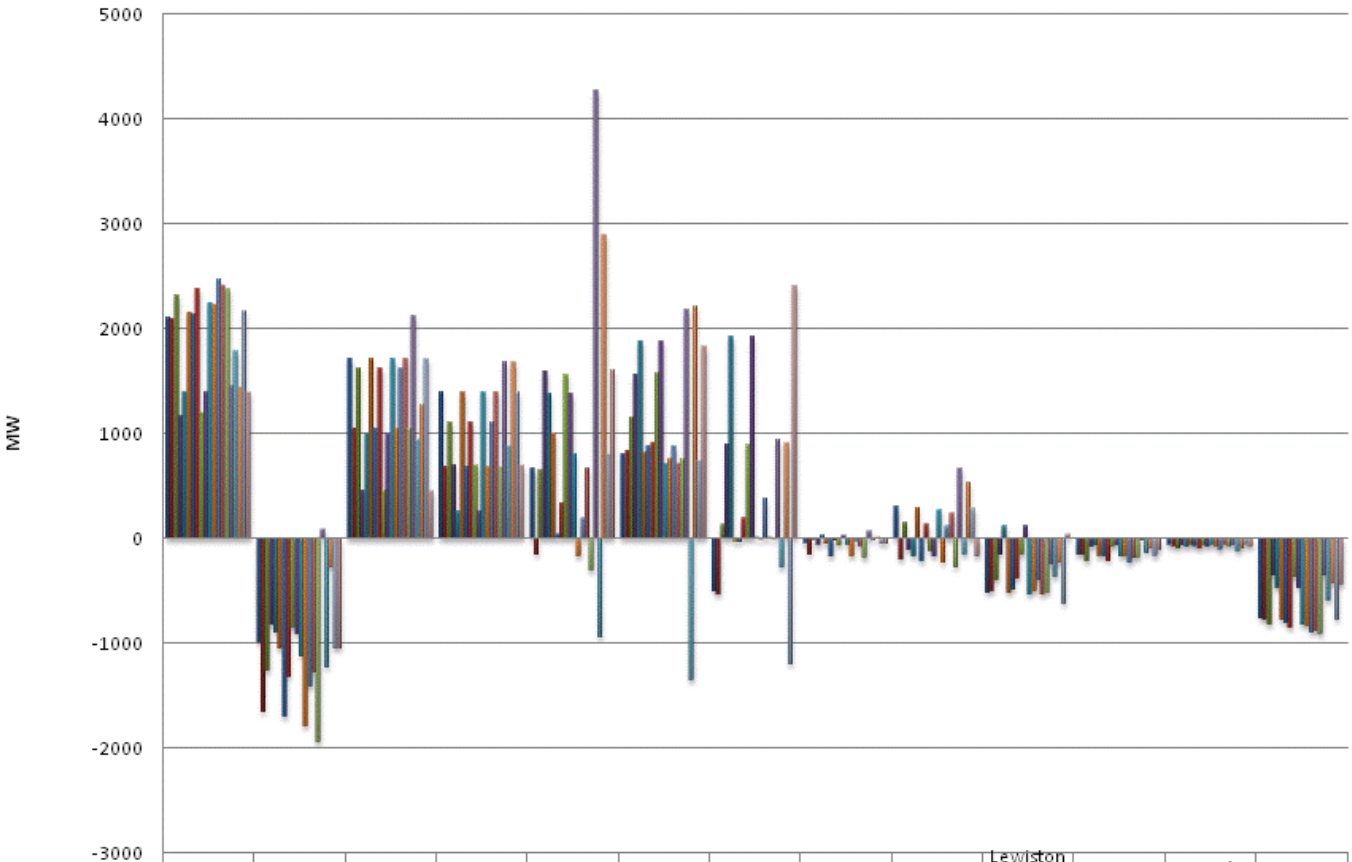
- Heavy Summer and Heavy Winter:
  - Year two (next year, i.e. 2015 case if case is created and used in 2014) (TPL-001-4, R2.1.1,

R2.4.1)

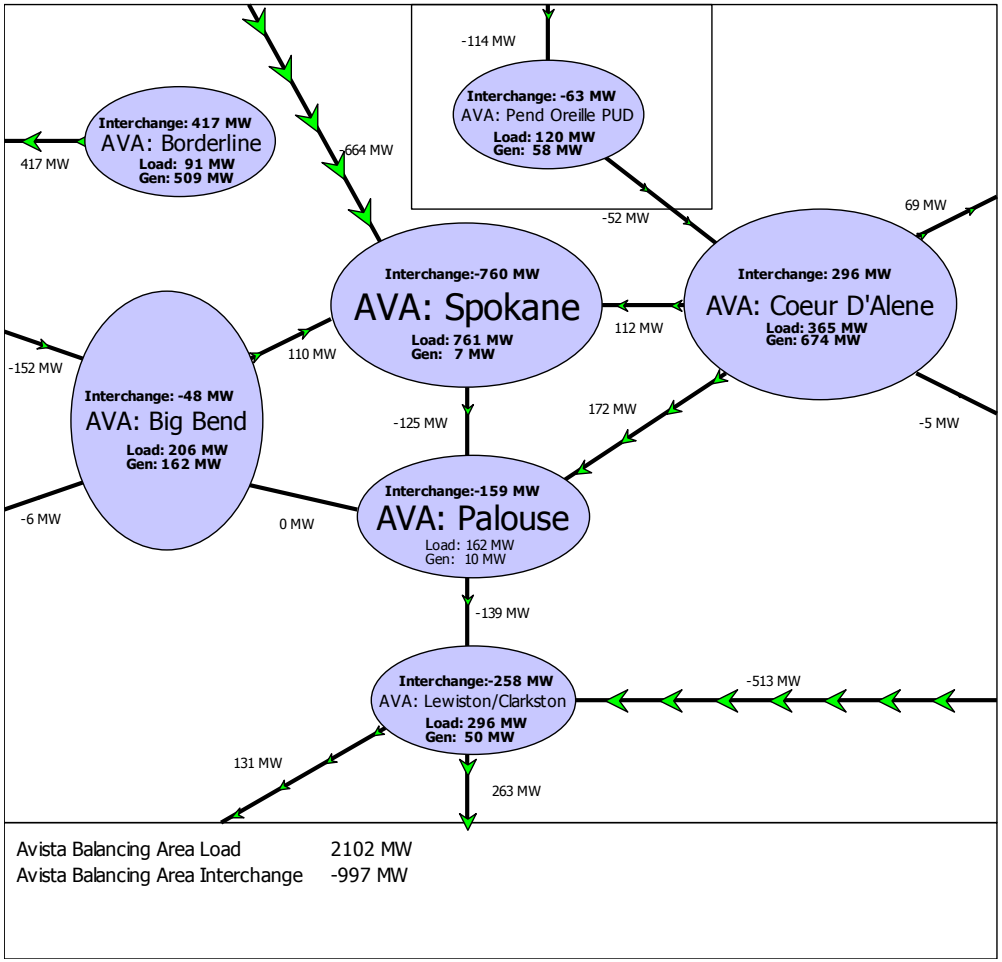
- Year five (TPL-001-4, R2.1.1, R2.4.1)
- Year ten (TPL-001-4, R2.2.1, R2.5)

- Light Summer and Light Winter
  - Year two (next year, i.e. 2015 case if case is created and used in 2014) (TPL-001-4, R2.1.2, R2.4.2)
  - Year five (TPL-001-4, R2.1.2, R2.4.2)
- Heavy Summer with Low Local Hydro Generation (generation dispatch scenario sensitivity):
  - Year five (TPL-001-4, R2.1.4, R2.4.3 for R2.1.1 and R2.4.1)
  - Year ten (TPL-001-4, R2.1.4 for R2.1.1)
- Transfer Scenarios
  - West of Hatwai – East to West (TPL-001-4, R2.1.4, R2.4.3 for R2.1.2 and R2.4.2)
  - Montana to Northwest – East to West (TPL-001-4, R2.1.4, R2.4.3 for R2.1.2 and R2.4.2)
  - Montana to Northwest – West to East (TPL-001-4, R2.1.4, R2.4.3 for R2.1.1 and R2.4.1)
  - Idaho to Northwest – East to West (TPL-001-4, R2.1.4, R2.4.3 for R2.1.2 and R2.4.2)
  - Idaho to Northwest – West to East (TPL-001-4, R2.1.4, R2.4.3 for R2.1.1 and R2.4.1)

A.1 Planning Cases



	Avista Balancing Area Load	Avista Balancing Area Interchange	Avista Generation	Western Montana Hydro	WEST OF HATWAI	MONTANA - NORTH WEST	IDAHO - NORTH WEST	Big Bend Area Interchange	Coeur d'Alene Area Interchange	Lewiston - Clarkston Area Interchange	Palouse Area Interchange	Pend Oreille Area Interchange	Spokane Area Interchange
15HS	2102	-997	1703	1390	653	792	-508	-48	296	-521	-159	-63	-760
15HSLH	2083	-1655	1041	682	-161	822	-530	-163	-208	-507	-165	-77	-785
15HW	2310	-1258	1622	1099	647	1151	131	-23	149	-406	-211	-102	-832
15LS	1160	-831	450	690	1587	1562	882	-67	-117	-156	-83	-68	-360
15LW	1389	-906	1000	258	1371	1873	1921	30	-170	107	-71	-87	-473
19HS	2154	-1047	1704	1390	991	811	-38	-55	283	-515	-166	-64	-785
19HSLH	2132	-1703	1042	682	35	870	-42	-170	-220	-493	-172	-78	-810
19HW	2373	-1319	1618	1099	334	906	196	-29	133	-392	-218	-104	-859
19LS	1187	-857	450	690	1559	1563	882	-70	-123	-158	-86	-69	-372
19LW	1396	-913	1000	258	1369	1873	1921	25	-170	107	-71	-87	-475
24HS	2241	-1133	1703	1390	801	703	10	-62	266	-530	-172	-64	-819
24HSLH	2221	-1789	1040	682	-168	752	0	-177	-238	-511	-178	-79	-843
24HW	2472	-1414	1619	1099	190	879	376	-36	113	-404	-227	-106	-895
34HS	2400	-1288	1703	1390	659	709	11	-79	231	-542	-186	-66	-889
34HSLH	2380	-1944	1040	682	-313	756	0	-194	-274	-524	-192	-80	-914
19WOH	1445	79	2118	1680	4276	2171	928	63	660	-254	-27	-72	-362
19MTNW1350	1781	-1242	932	872	-946	-1350	-275	-22	-155	-366	-139	-129	-603
19MTNW2200	1429	-287	1260	1680	2894	2206	896	13	519	-227	-103	-100	-438
19IDNW1200	2155	-1049	1706	1390	805	737	-1202	-55	283	-627	-167	-64	-785
19IDNW2400	1390	-1046	443	690	1603	1834	2403	-57	-179	40	-114	-85	-445



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CASE HEADER: AVA-14hs4a-15BA2100.pwb

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WESTERN ELECTRICITY COORDINATING COUNCIL

2014 HS4-OP OPERATING CASE

NOVEMBER 7, 2013

[pre-title comments]

history file date Thu Nov 07 09:38:37 2013

present file date Thu Nov 07 09:38:49 2013

Version 18.0_01

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

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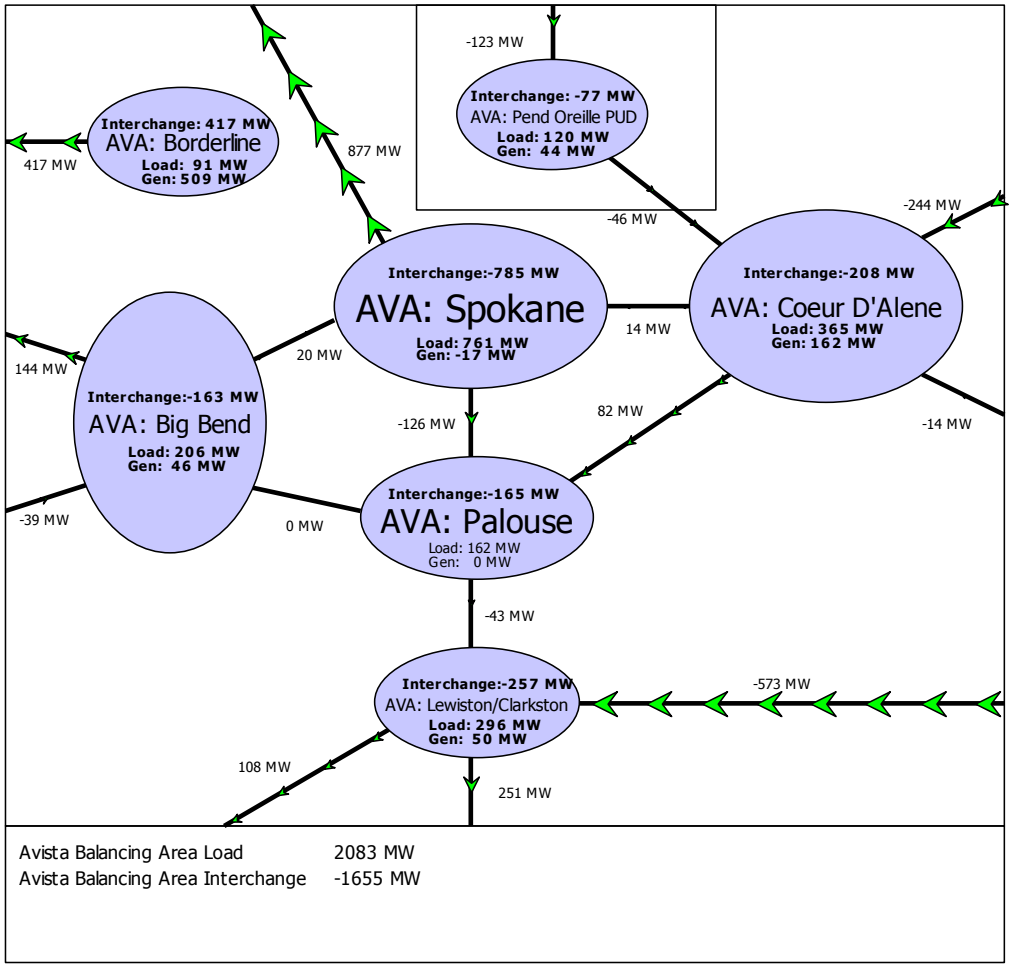

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WESTERN ELECTRICITY COORDINATING COUNCIL

2014 HS4-OP OPERATING CASE

NOVEMBER 7, 2013

[pre-title comments]

history file date Thu Nov 07 09:38:37 2013

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Version 18.0_01

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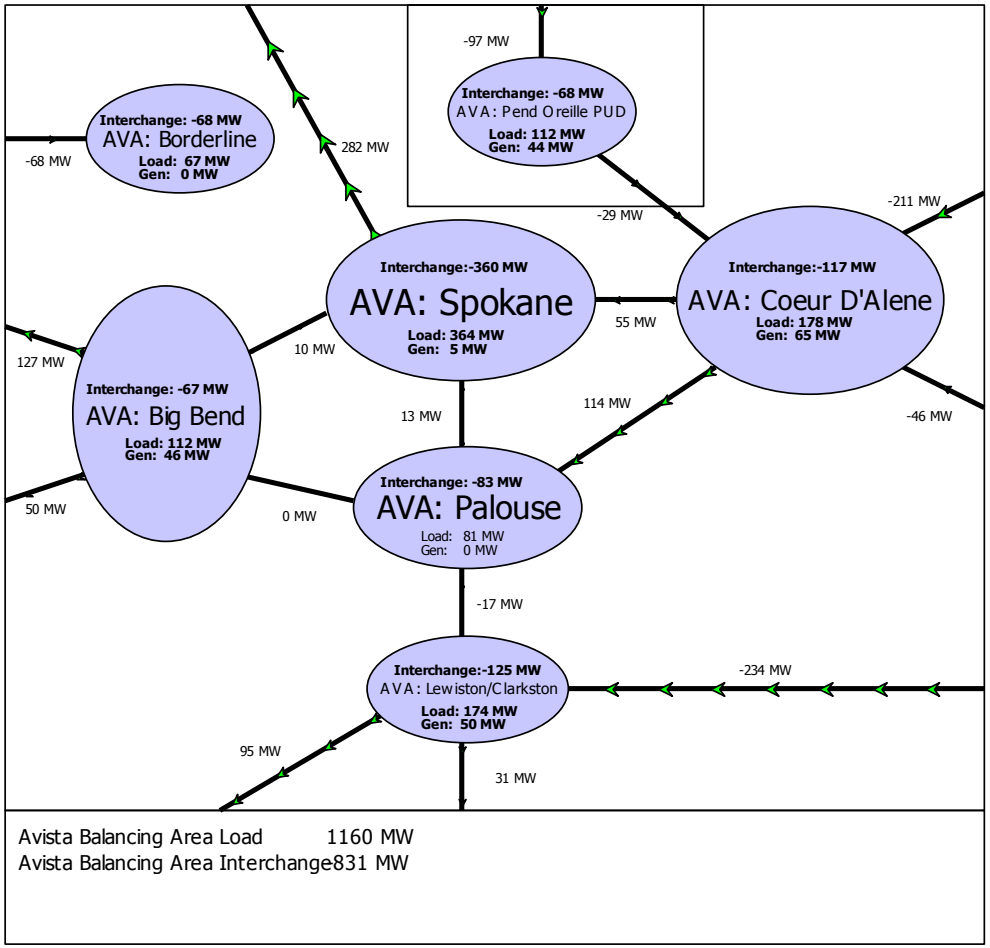

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WESTERN ELECTRICITY COORDINATING COUNCIL

2014 LS1 OPERATING CASE

JANUARY 16, 2014

[pre-title comments]

history file date Wed Jan 15 15:31:55 2014

present file date Wed Jan 15 15:32:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

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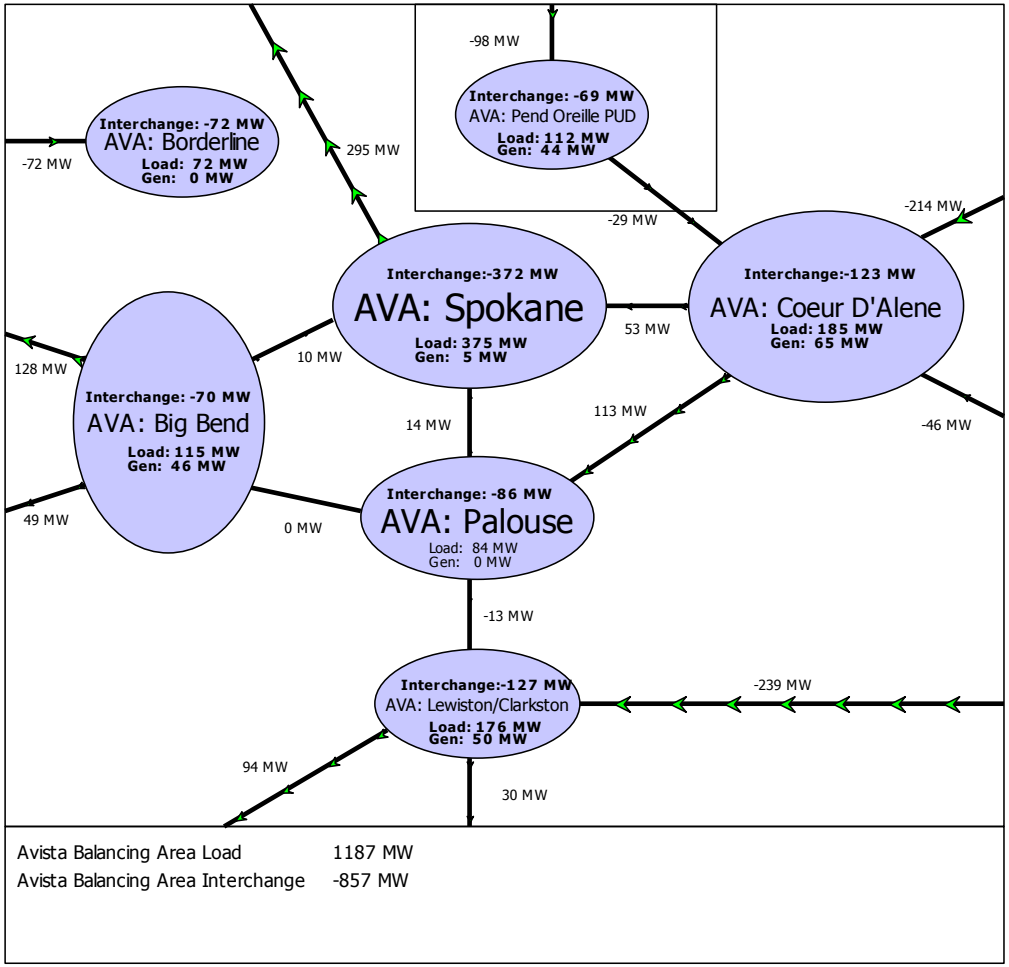

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CASE HEADER: AVA-14ls1a-19BA1185.pwb

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WESTERN ELECTRICITY COORDINATING COUNCIL

2014 LS1 OPERATING CASE

JANUARY 16, 2014

[pre-title comments]

history file date Wed Jan 15 15:31:55 2014

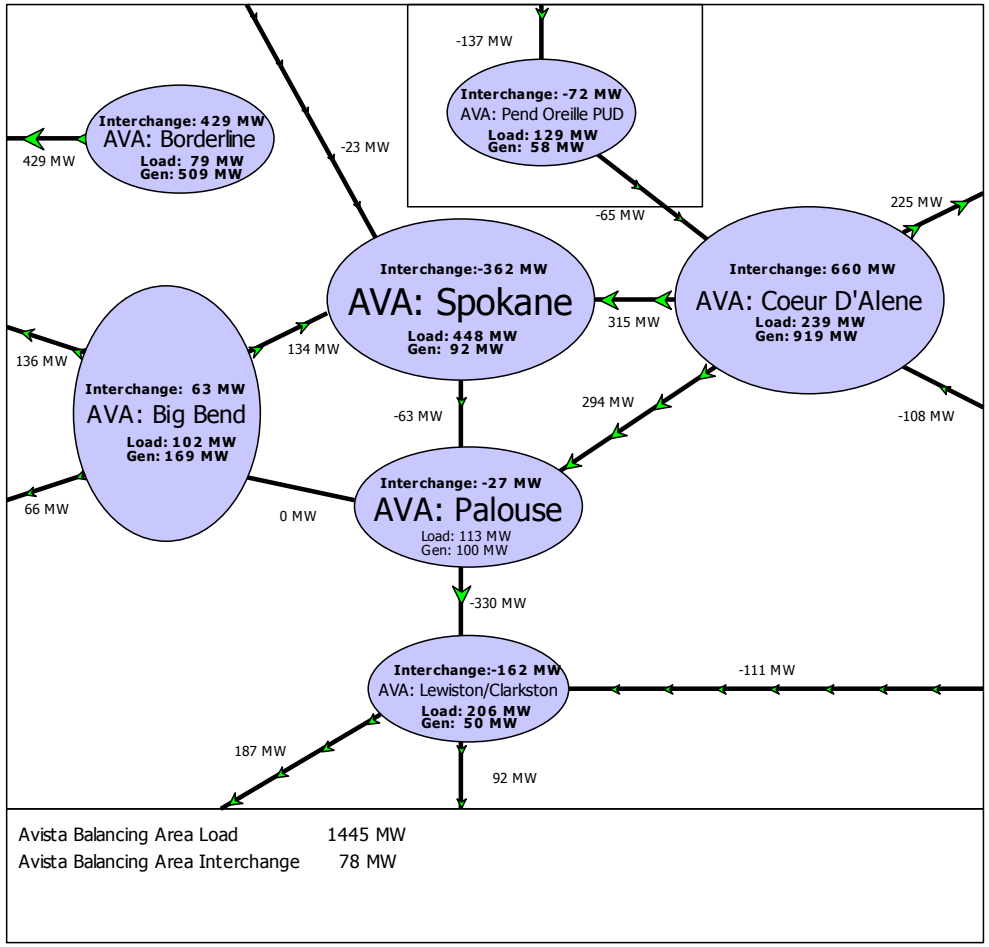
present file date Wed Jan 15 15:32:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Light Summer Dispatch



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CASE HEADER: AVA-14ls1a-19P14-2400.pwb

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WESTERN ELECTRICITY COORDINATING COUNCIL

2014 LS1 OPERATING CASE

JANUARY 16, 2014

[pre-title comments]

history file date Wed Jan 15 15:31:55 2014

present file date Wed Jan 15 15:32:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

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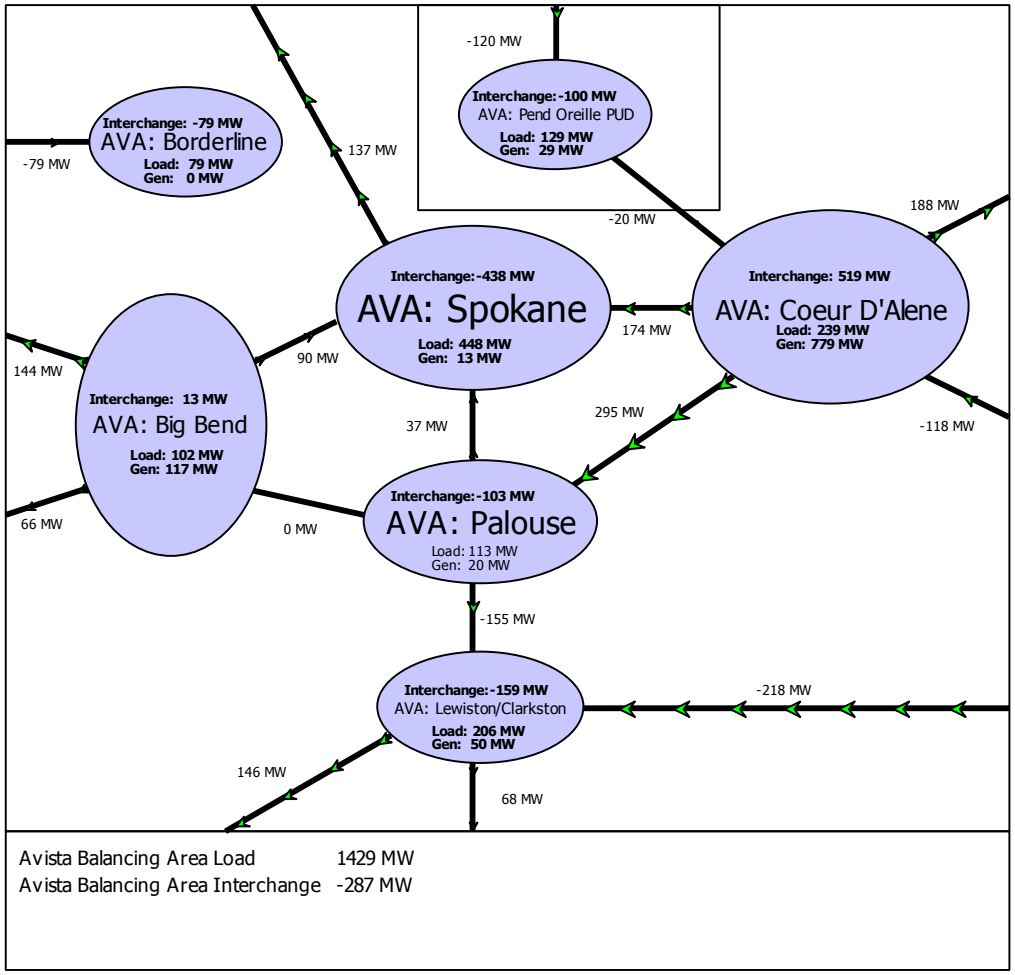

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CASE HEADER: AVA-14ls1a-19P6-4777.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2014 LS1 OPERATING CASE

JANUARY 16, 2014

[pre-title comments]

history file date Wed Jan 15 15:31:55 2014

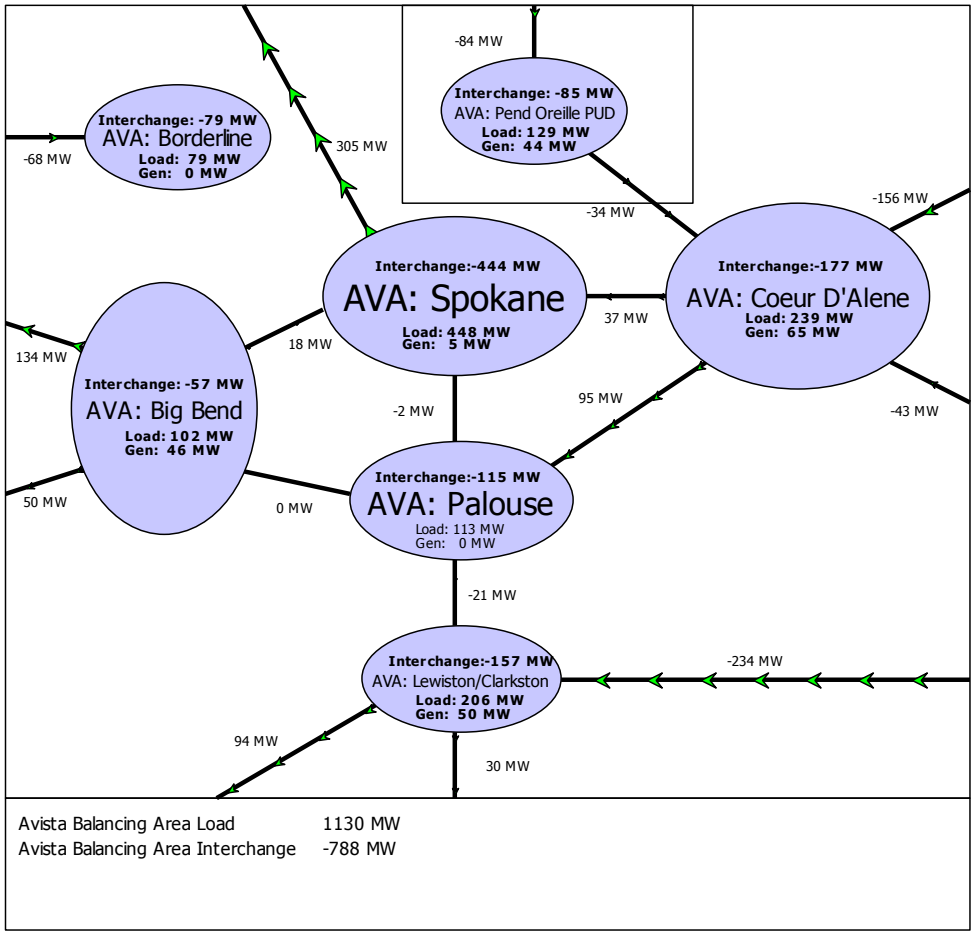
present file date Wed Jan 15 15:32:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to High Transfer Dispatch



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CASE HEADER: AVA-14ls1a-19P8-2200.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2014 LS1 OPERATING CASE

JANUARY 16, 2014

[pre-title comments]

history file date Wed Jan 15 15:31:55 2014

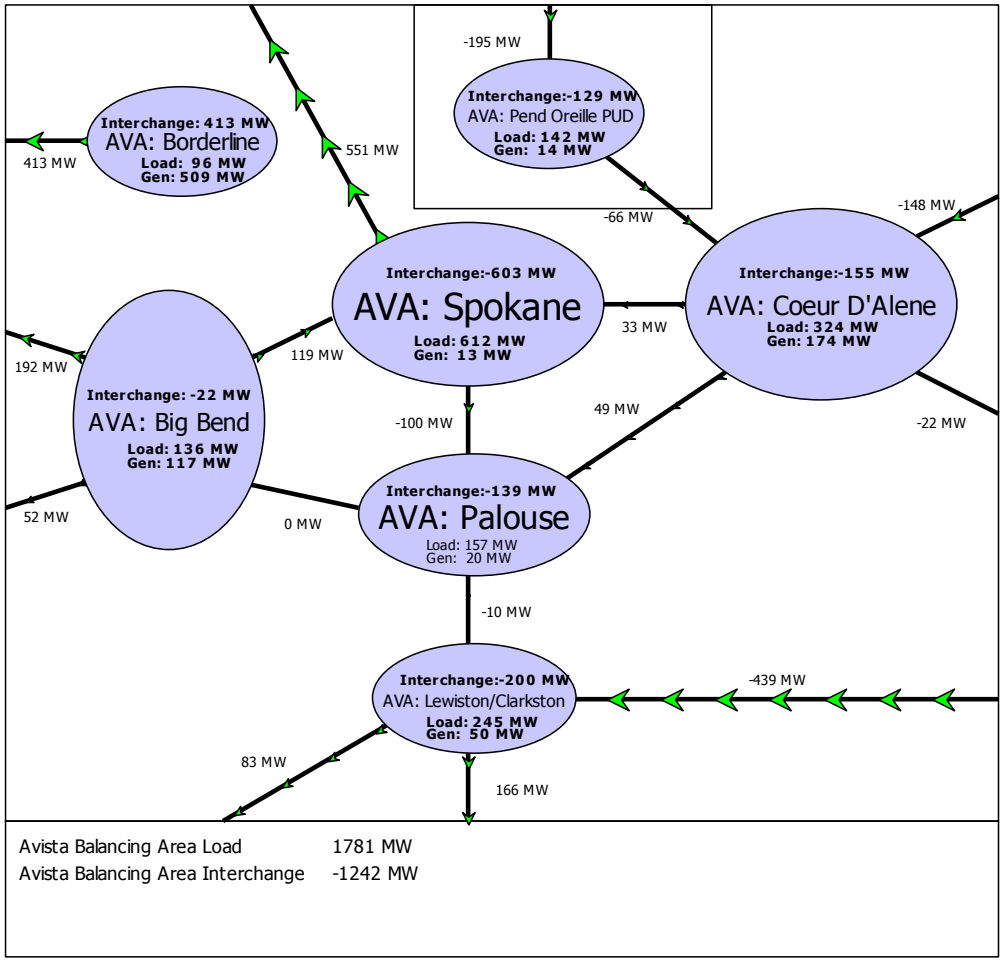
present file date Wed Jan 15 15:32:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Light Spring Dispatch



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CASE HEADER: AVA-15hsp1a-19P8-1350.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2015 HSP1 OPERATING CASE

JUNE, 20 2014

[pre-title comments]

history file date Fri Jun 20 09:54:15 2014

present file date Fri Jun 20 10:16:03 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

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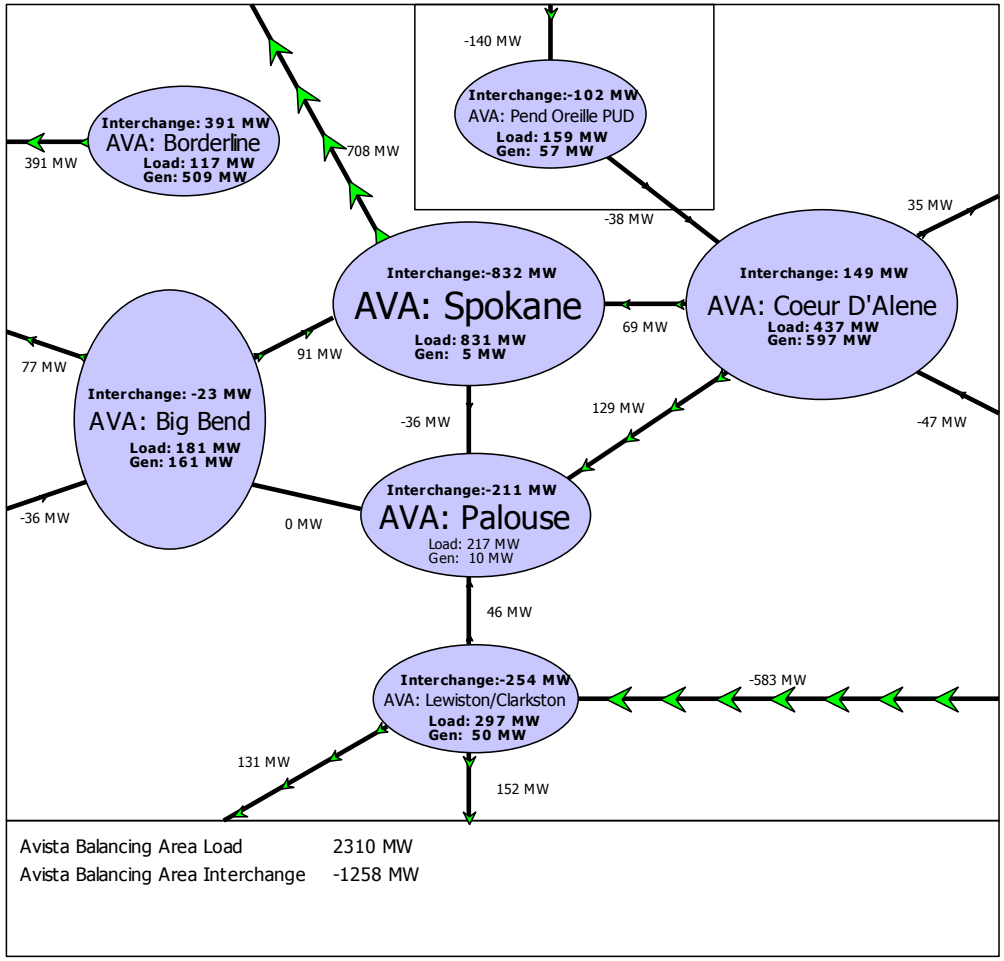

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CASE HEADER: AVA-15hw3a-15BA2304.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2014-15 HW3 OPERATING CASE

MARCH 28, 2014

[pre-title comments]

history file date Fri Mar 28 11:04:06 2014

present file date Fri Mar 28 12:47:58 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

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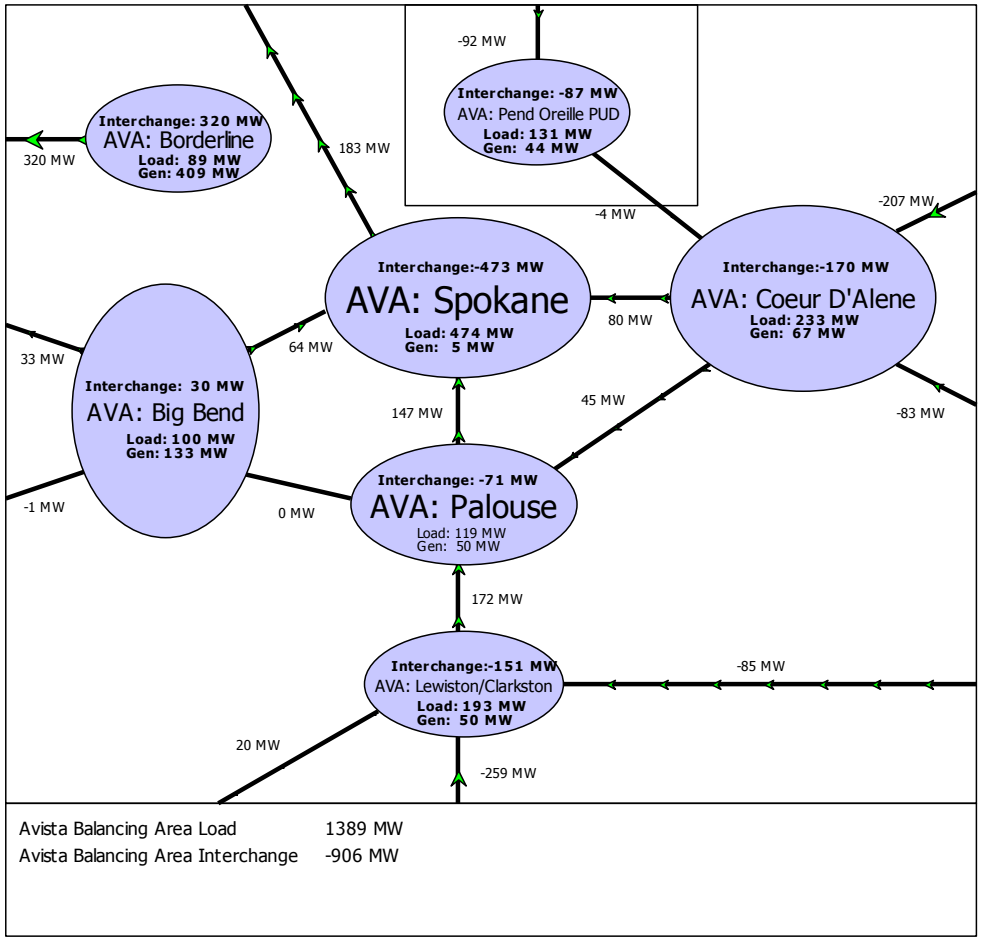

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CASE HEADER: AVA-15lw2a-15BA1389.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2014-15 LW2 OPERATING CASE

APRIL 18, 2014

[pre-title comments]

history file date Fri Apr 18 13:28:29 2014

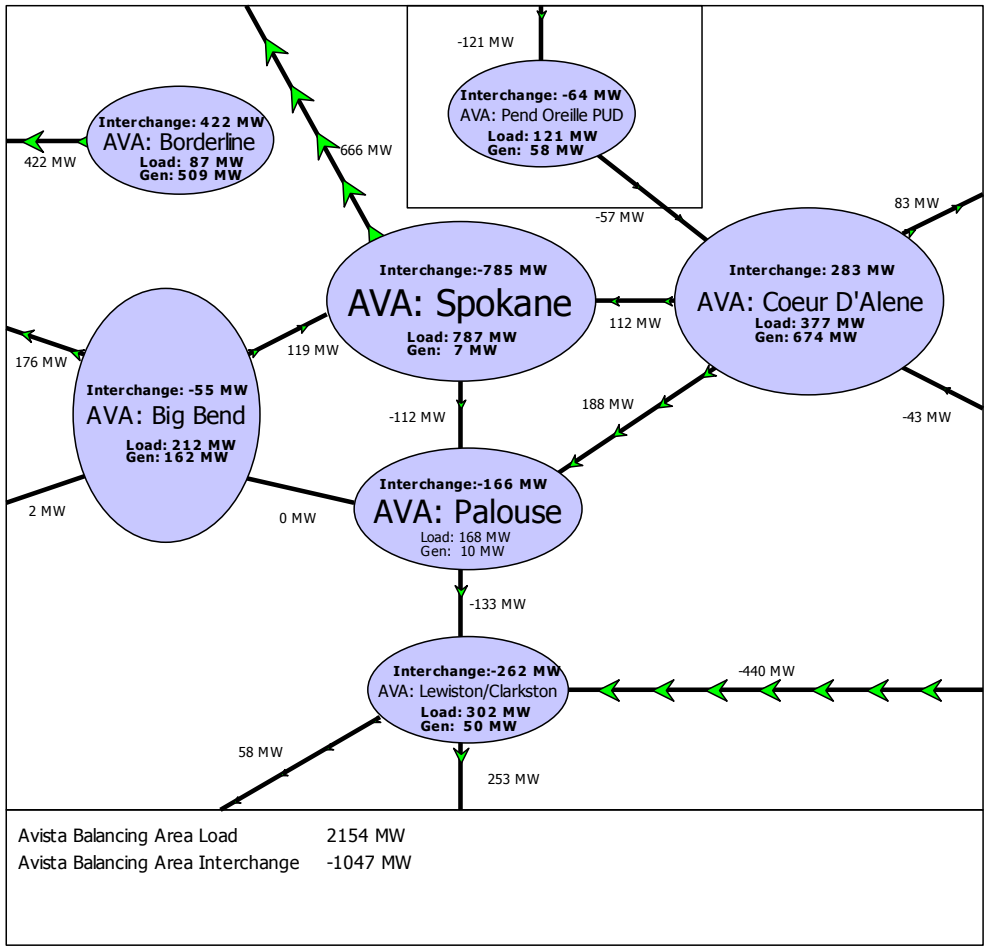
present file date Fri Apr 18 13:48:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS REVIEW ARE INCLUDED

Generators set to Light Winter Dispatch



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CASE HEADER: AVA-19hs2a-19BA2126.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2019 HS2 BASE CASE

SEPTEMBER 10, 2012

[pre-title comments]

history file date Tue Sep 10 13:44:39 2013

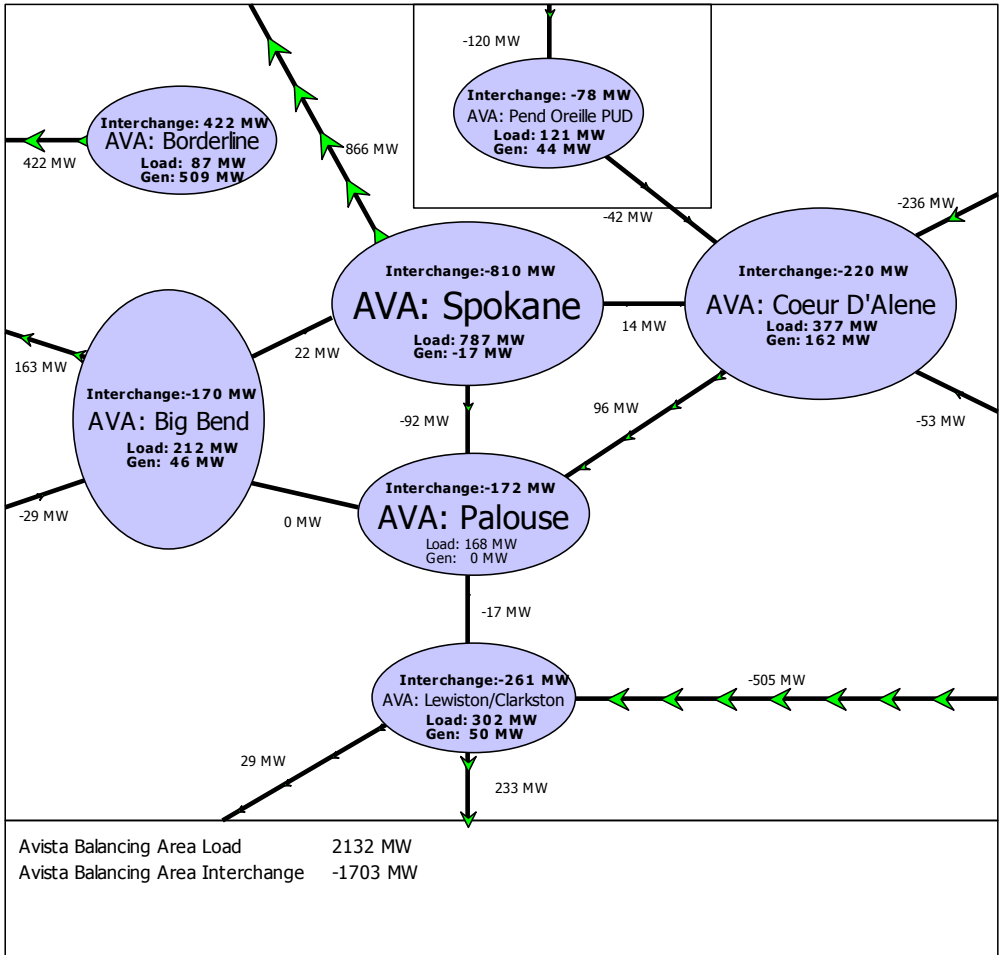
present file date Tue Sep 10 13:44:48 2013

Version 18.0_01

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Summer Dispatch



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CASE HEADER: AVA-19hs2a-19BA2126-LH.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2019 HS2 BASE CASE

SEPTEMBER 10, 2012

[pre-title comments]

history file date Tue Sep 10 13:44:39 2013

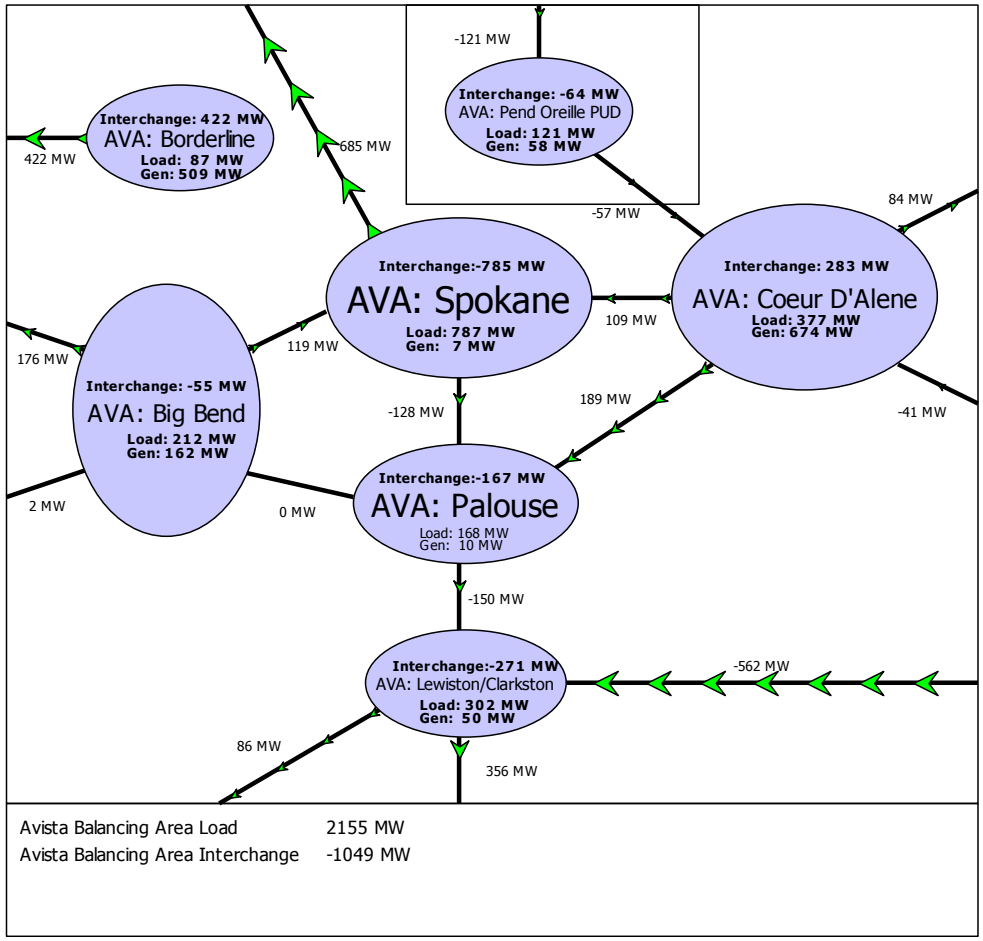
present file date Tue Sep 10 13:44:48 2013

Version 18.0_01

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Summer Dispatch



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CASE HEADER: AVA-19hs2a-19P14-1200.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2019 HS2 BASE CASE

SEPTEMBER 10, 2012

[pre-title comments]

history file date Tue Sep 10 13:44:39 2013

present file date Tue Sep 10 13:44:48 2013

Version 18.0_01

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

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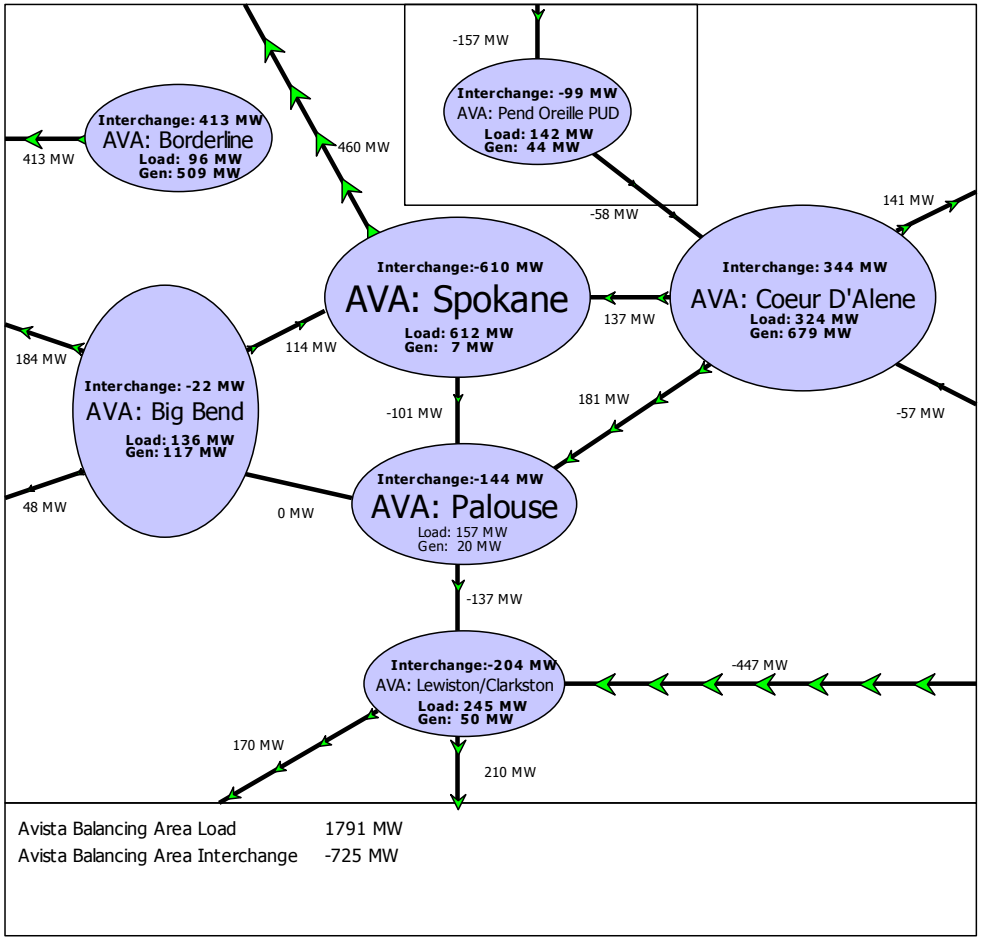

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CASE HEADER: AVA-19hsp1a-19BA1760.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2015 HSP1 OPERATING CASE

JUNE, 20 2014

[pre-title comments]

history file date Fri Jun 20 09:54:15 2014

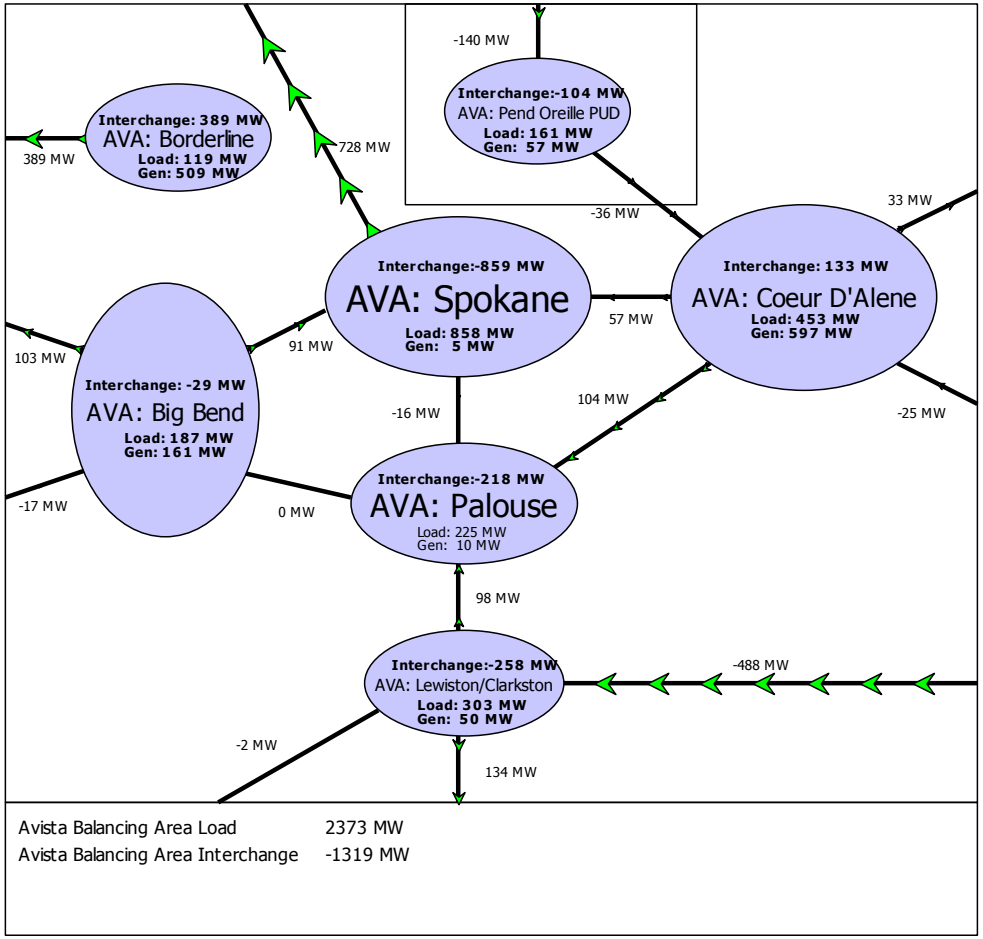
present file date Fri Jun 20 10:16:03 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Spring Dispatch



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CASE HEADER: AVA-19hw2a-15BA2373.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2018-19 HW2 BASE CASE

OCTOBER 7, 2013

[pre-title comments]

history file date Mon Oct 07 10:19:11 2013

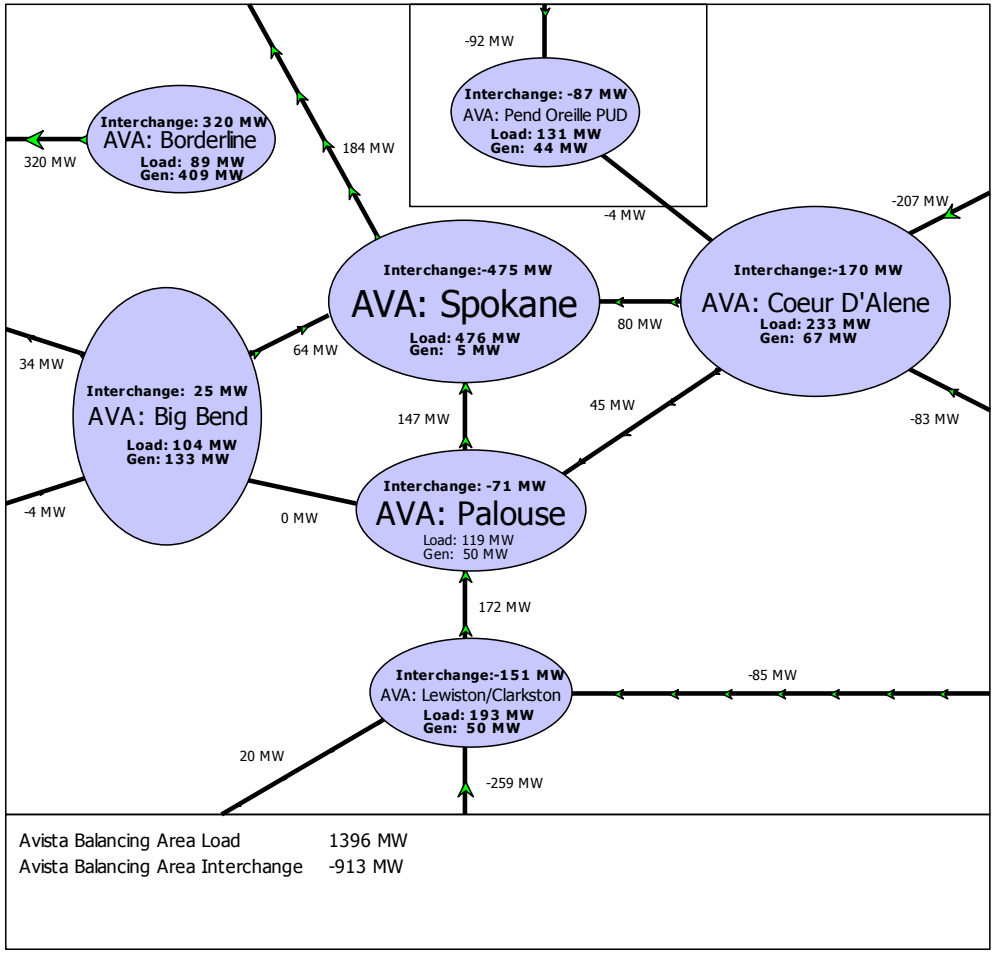
present file date Mon Oct 07 10:19:24 2013

Version 18.0_01

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Winter Dispatch



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CASE HEADER: AVA-19LW-15BA1424.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2014-15 LW2 OPERATING CASE

APRIL 18, 2014

[pre-title comments]

history file date Fri Apr 18 13:28:29 2014

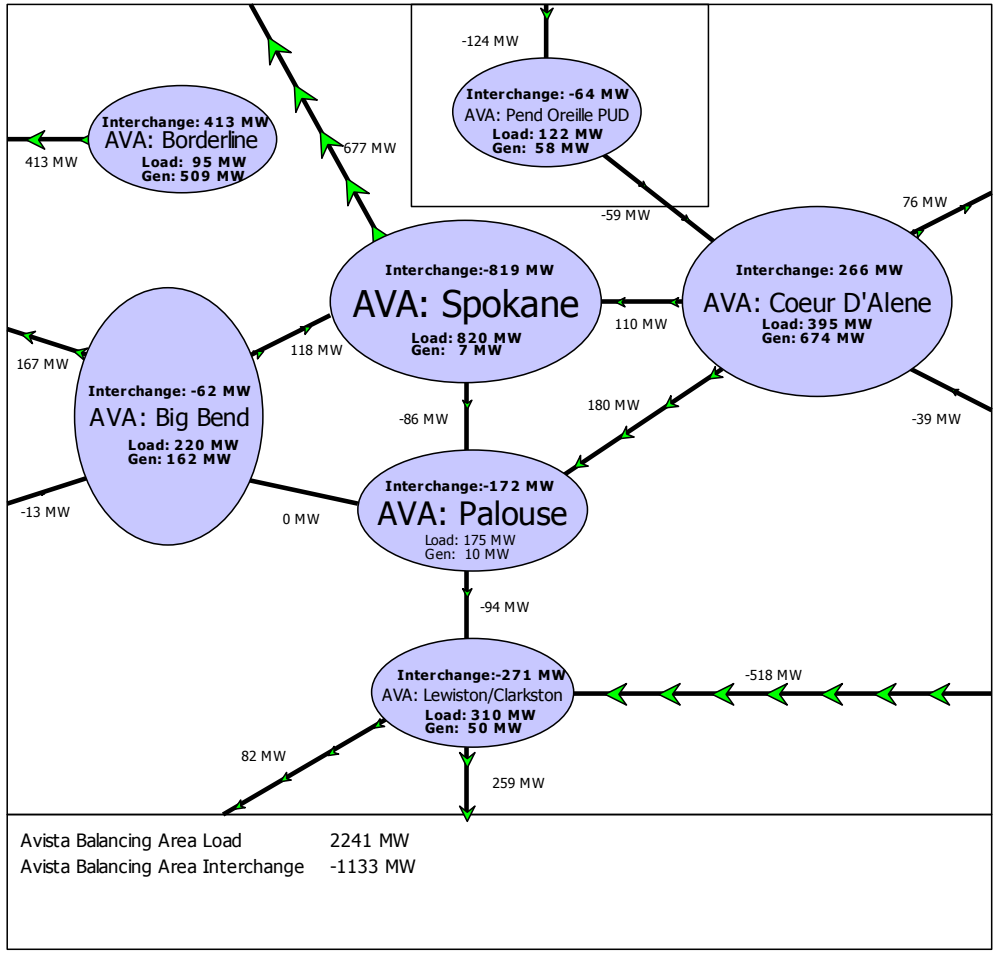
present file date Fri Apr 18 13:48:02 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS REVIEW ARE INCLUDED

Generators set to Light Winter Dispatch



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CASE HEADER: AVA-24hs1sa-24BA2201.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2024 HS1-S BASE CASE

FEBRUARY 21, 2014

[pre-title comments]

history file date Fri Feb 21 14:00:38 2014

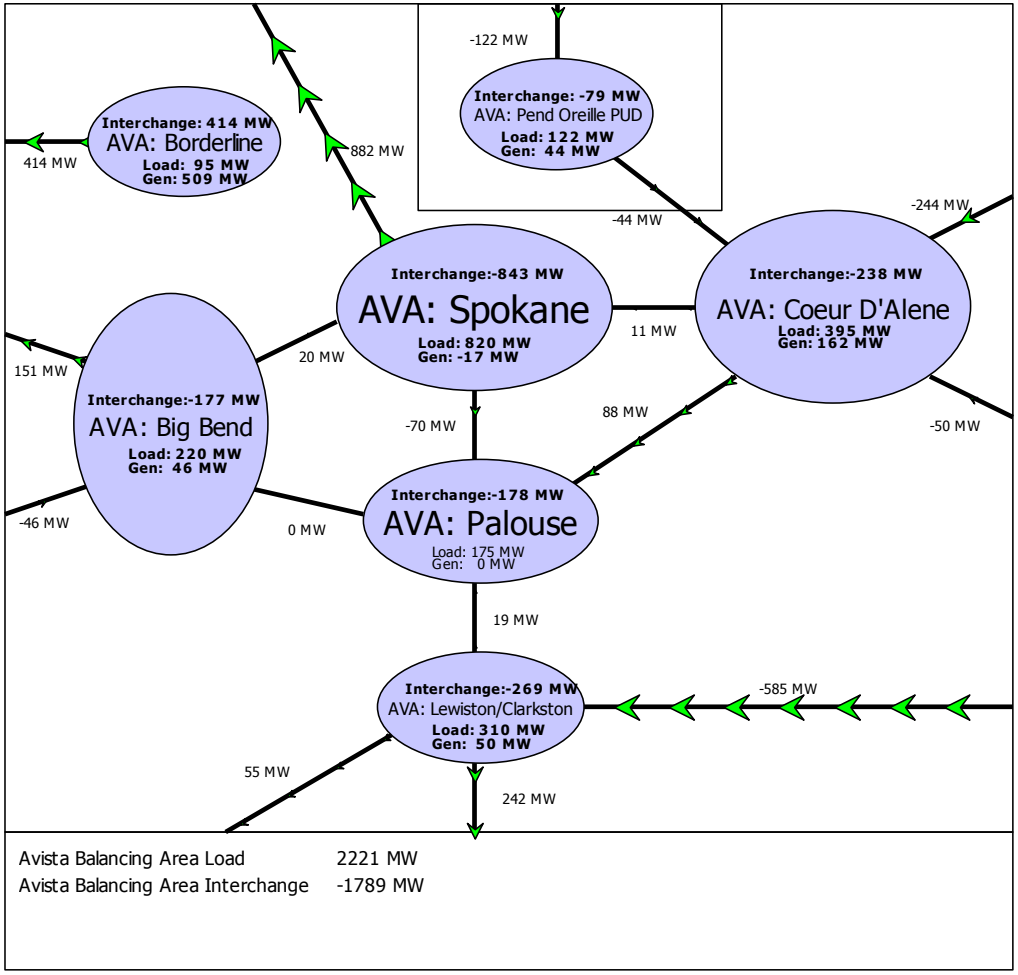
present file date Fri Feb 21 14:00:45 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Summer Dispatch



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CASE HEADER: AVA-24hs1sa-24BA2201-LH.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2024 HS1-S BASE CASE

FEBRUARY 21, 2014

[pre-title comments]

history file date Fri Feb 21 14:00:38 2014

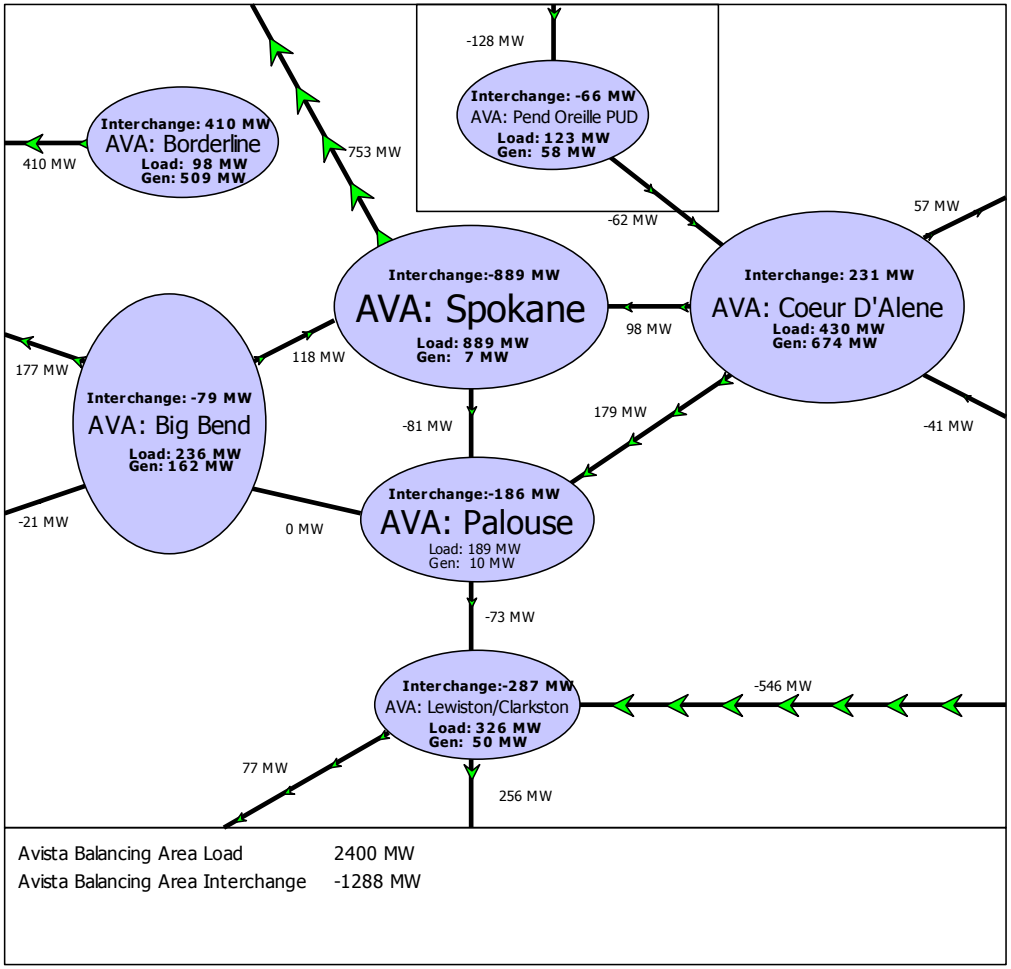
present file date Fri Feb 21 14:00:45 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Summer Dispatch



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CASE HEADER: AVA-24hs1sa-34BA2339.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2024 HS1-S BASE CASE

FEBRUARY 21, 2014

[pre-title comments]

history file date Fri Feb 21 14:00:38 2014

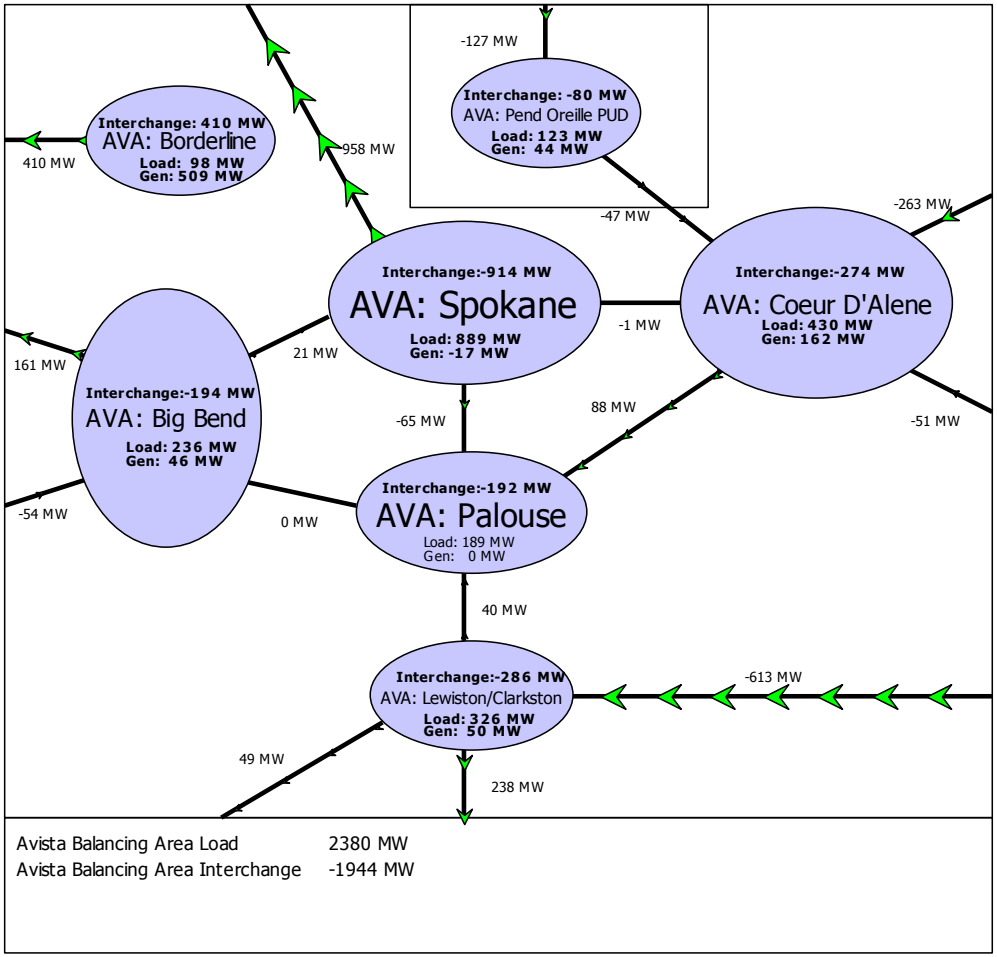
present file date Fri Feb 21 14:00:45 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Summer Dispatch



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CASE HEADER: AVA-24hs1sa-34BA2339-LH.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2024 HS1-S BASE CASE

FEBRUARY 21, 2014

[pre-title comments]

history file date Fri Feb 21 14:00:38 2014

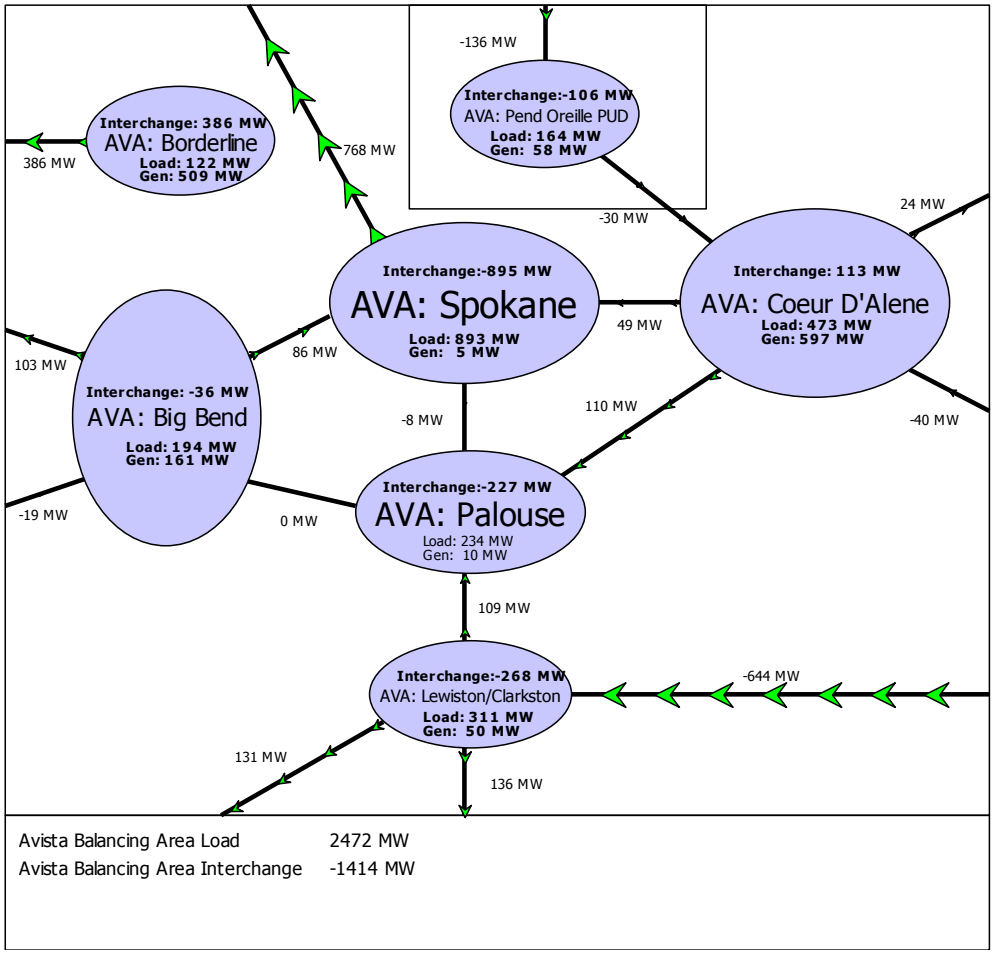
present file date Fri Feb 21 14:00:45 2014

Version 18.1_02

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Summer Dispatch



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CASE HEADER: AVA-24hw1a-24BA2472.pwb

WESTERN ELECTRICITY COORDINATING COUNCIL

2023-24 HEAVY WINTER 1 BASE CASE

OCTOBER 18, 2013

[pre-title comments]

history file date Fri Oct 18 15:16:02 2013

present file date Fri Oct 18 15:16:16 2013

Version 18.0_01

[comments]

ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED.

Generators set to Heavy Winter Dispatch

Projects Modeled

The following is a list of the projects modeled in this Assessment within Avista's territory for the next 20 years, sorted by scheduled completion date.

Expected Projects

Project Name	Project Scope	Targeted Date of Operation
Chelan - Stratford River Crossing Rebuild Project	Rebuild the Columbia River crossing to 795ACSS to correct Chelan – Stratford line overload	2015
Odessa Capacitor Installation	Install two steps of 13.4 MVAR shunt capacitors for reactive support at Odessa Substation for added restoration capability	2015
Stratford Strain Bus Rebuild Project	Stratford strain bus replacement to relieve existing bottle neck on Stratford - Larson line within the Stratford Substation	2015
Ninth and Central – Sunset 115 kV Line Reconductoring	Reconductor 1.97 miles of limiting 250 CU conductor with 795AAC conductor with minimum thermal capacity rating of 150 MVA at 40C.	2016
Benton – Othello SS 115 kV Transmission Line Rebuild	Reconductor Avista's 26 mile section of the Benton – Othello Switching Station 115 kV Transmission Line with 795 ACSS with a minimum thermal capacity of 205MVA at 40C.	2016
Spokane Valley Transmission Reinforcement	A comprehensive project that includes: 1) Replace 4.37 miles of 556 AAC conductor with 150 MVA capacity or better conductor. 2) Rebuild Millwood, 20 MVA Transformers & 4 Feeders. Normally Open (SCADA controlled switch) provides Back-Up service for IEP Load. 3) New Irvin Switching Station, breaker & a half, 6 line termination with 2 future line terminations, distribution facilities per Distribution Engineering Group, one 33.5 MVAr capacitor bank with space for one future capacitor bank, 4) Replace 1.74 miles of 4/0 ACSR conductor with 150 MVA capacity or better conductor. 5) Convert Opportunity to a Switching Station (single bus, single breaker). 6) New 2.19 miles Single Circuit 150 MVA (IEP Tap). Possible double circuit with Irvin-Opportunity 115 kV Line.	2016
Addy – Devil's Gap 115 kV Transmission Line	Reconductor 5.19 miles (rebuild between Ford and Long Lake Tap) of limiting conductor which consist of 266.8 ACSR and 397.5 ACSR conductor resulting in a capacity limitation of 71.5 MVA at 40C, to be rebuilt to a capacity of 150 MVA at 40C	2017

Project Name	Project Scope	Targeted Date of Operation
Noxon Reactors Installation	Install two steps of 50 MVAR shunt reactors for reactive support at Odessa Substation for high voltages	2017
Sandcreek-Bronx-Cabinet Rebuild	Bronx - Cabinet Rebuild from Cabinet to Clark Fork with 795 ACSS	2017
Coeur d'Alene - Pine Creek 115 Rebuild	Coeur d'Alene - Pine Creek 115 Rebuild replace with 795 conductor and operate closed	2018
Hallett & White – Silver Lake 115 kV Transmission Line Rebuild	The transmission line will be rebuilt with 795 ACSR conductor with minimum thermal capacity of 150 MVA at 40C	2018
Westside Transformer phase 1	Westside Transformer Replacement Project includes a new 250 MVA Westside No.1 230/115 kV Transformer installation which was identified in the 2013 Planning Assessment to be implemented by 2018 for an N-1 contingency (Westside No.2 230/115 kV outage)	2018
Garden Springs 115 Station	Garden Springs 115 kV station -Loops the existing Airway Height - Sunset line into Garden Springs -Includes rebuild of Sunset - Westside from GDN to SUN with 795	2019
Roxboro-Warden Rebuild	The Lind – Warden 115 kV Transmission Line is 21 miles long, and is constructed primarily with 7#8 CU conductor resulting in a capacity limit of 57 MVA at 40C. Rebuild to 795 ACSS with aminimum of 150 MVA thermal capacity at 40C.	2020
Westside Transformer phase 2	Remove Westside Transformers 1 and 2 and replace with a new 250 MVA Transformer.	2020

Conceptual Projects

Project Name	Project Scope	Targeted Date of Operation
North Lewiston Reactors	Install new Reactors at North Lewiston 230 kV Substation	2016
Pine Creek 1 Transformer Replacement	Replace Pine Creek 1 230/115 kV Transformer	2017
Chelan - Stratford Transmission Line Rebuild	Chelan - Stratford 115kV line rebuild to 556 ACSR	2022
Beacon-FrancisCedar Reconductor	Reconductor 3/0 cu between Bell and Waikiki on Beacon - Francis and Cedar 115	2024

Project Name	Project Scope	Targeted Date of Operation
Bell Transformer No.7	New Bell Transformer No.7 230/115 kV Transformer with 250 MVA capacity	2024
Lolo Transformer Replacement	Replace Lolo 230/115 kV Transformers with 250 MVA capacity	2024
Ninth Central 230	Build new 230 kV Substation. Reconfigure line and build new line sections to obtain - Bell – Ninth and Central 230 kV Line - Beacon – Ninth and Central 230 kV Line	2024
Rathdrum - Westside 230 kV Transmission Line	Build new Transmission Line	2024
Shawnee Transformer No.2	Add new 230/115 kV Transformer with 250 MVA capacity	2025
South Lewiston SS	Install breakers at South Lewiston 115 kV to convert to a switching station	2025
Rathdrum 115 Bus Reconfiguration	Rathdrum 115 kV bus reconfiguration to eliminate tie breaker failure	2028
Garden Springs 230 Station	Adds 230 bus to Garden Springs and 250 MVA transformer New 230 line from Garden Springs to Westside with double circuiting of 115 lines	2030
Hatwai - Lolo 2 Transmission Line	Build new Transmission Line	2030
Silver Lake SS	Install breakers at Silver Lake 115 kV to convert to a switching station	2032
Garden Springs - Thornton 230 kV Transmission Line	Build new transmission line	2032
Beacon 230 kV Cap	Add 2 steps of 67.1 MVAr capacitor at Beacon 230	2034
Garden Springs - Ninth & Central 230 kV Transmission Line	Build new transmission line	2034

TABLE 2-1 PROJECTS MODELED IN BASECASE