AVISTA CORP.
RESPONSE TO REQUEST FOR INFORMATION

JURISDICTION:	WASHINGTON	DATE PREPARED:	04/04/2014
CASE NO:	UE-140188 & UG-140189	WITNESS:	Heather Rosentrater
REQUESTER:	WUTC Staff -Gomez	RESPONDER:	Shawn Bonfield
TYPE:	Data Request	DEPT:	State & Federal Regulation
REQUEST NO.:	Staff – 100	TELEPHONE:	(509) 495-2782
		EMAIL:	shawn.bonfield@avistacorp.com

REQUEST:

Background:

WAC 480-100-398 requires the Company to submit an annual Electric Service Reliability Report to the Commission. The Company has provided the Commission the percentage System Average Interruption Frequency Index (SAIFI) contribution percentages by causes for outages excluding major event days. For reference, Staff has summarized equipment related interruption causes in Table 5 below, extracted from Avista's annual reliability reports filed with the Commission. The trend in total equipment related causes is displayed in Figure 1 below.

Sustained Interruption Causes

% SAIFI Equipment Related Causes

		Cause			
Docket	**Year**	**Equipment Related Total**	**Overhead Equipment**	**Undergroun d Equipment**	**Substation Equipment**
UE-040785	2003	23.7%*			
UE-050617	2004	16.2%*			
UE-060623	2005	23.4%	12.9%	1.9%	8.6%
UE-070839	2006	10.5%	1.6%	2.3%	6.6%
UE-080757	2007	18.2%	13.6%	1.8%	2.8%
UE-090619	2008	16.7%	9.8%	1.8%	5.1%
UE-100659	2009	13.5%	9.7%	0.9%	2.9%
UE-110787	2010	19.2%	0.7%	8.3%	10.2%
UE-120586	2011	13.5%	9.8%	1.1%	2.6%
UE-130649	2012	14.8%	10.4%	1.1%	3.3%

***** The only equipment related categories in these years were Cable Failure and Equipment

Table 5

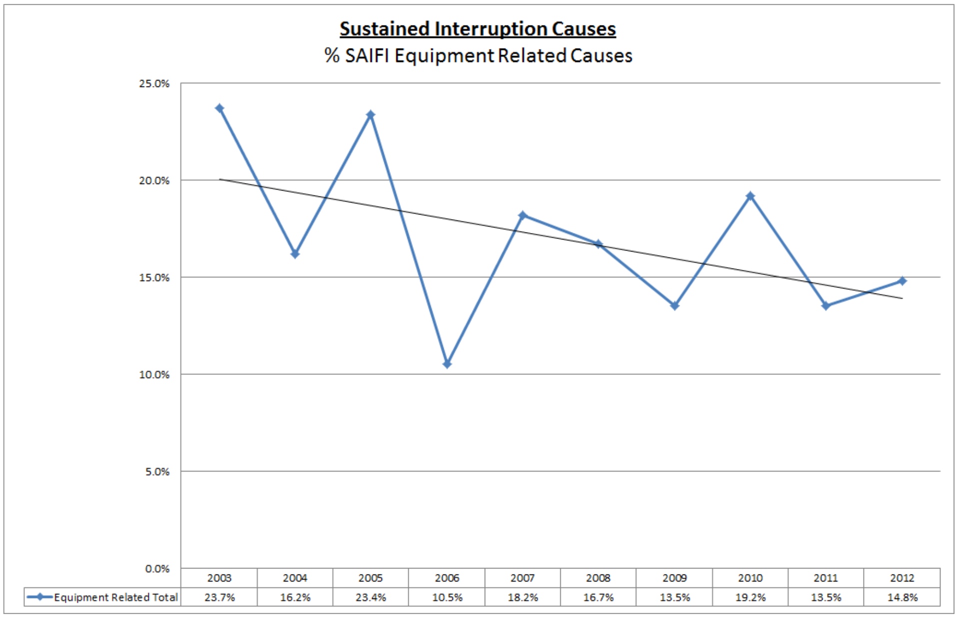


Figure 1

In addition, Avista is required to report annually to the North American Electric Reliability Corporation (NERC)/Western Electric Coordinating Council (WECC) its outage/reliability data for:

1. AC circuits ≥ 200 kV (overhead and underground);
2. Transformers with ≥ 200 kV low-side;
3. AC/DC back-to-back converters with ≥ 200 kV AC on both sides; and
4. DC circuits with ≥ ±200 kV DC voltage.

Request:

<u>For outage/reliability data reported annually to the Commission:</u>

1. Please provide the data for the year 2013 for the categories provided in Table 5 above.

2. For the data in Table 5 (years 2003-2013), please break out the percentages attributed to equipment by FERC Electric Plant Chart of Account and any sub-accounts which identify specific plant equipment causal to each outage or failure event.

Responsive materials provided in Excel format should be fully functional with all workbooks, worksheets, data and formulae left intact.

<u>For outage/reliability data reported to NERC/WECC:</u>

1. Please provide all required outage/reliability data for the years 2003-2013 reported into the NERC Transmission Availability Database Systems (TADS) and WECC Transmission Reliability Database (TRD).

2. For the NERC/WECC data (years 2003-2013), please break out the data on outage/reliability by FERC Electric Plant Chart of Account and any sub-accounts which identify specific plant equipment causal to each outage or failure event.

Responsive materials provided in Excel format should be fully functional with all workbooks, worksheets, data and formulae left intact.

RESPONSE:

For outage/reliability data reported annually to the Commission:

1. Per the Company's Electric Reliability Plan filed in accordance with WAC 480-100-393, the Company must submit its annual Electric Reliability Report to the Commission on or before April 30th of each year. The Company is currently in the process of compiling the data and putting together its 2013 report so the data requested is not yet available.

2. The equipment related SAIFI percentages in Table 5 that have been extracted from the Company's annual Electric Reliability Report are not correlated with the dollars that are booked to FERC plant accounts. The SAIFI index indicates how often the average customer experiences a sustained interruption (greater than five minutes in duration) over a predetermined period of time. The percent of SAIFI due to equipment related causes does not mean that the equipment experienced failure or needed replacement. Often times equipment related outages can be resolved by repairing or resetting certain pieces of equipment. However, if some of the equipment is being replaced due to interruptions, costs associated with that interruption will be booked to ER 2059 - Failed Electric Dist Plant-Storm. When the costs are transferred to plant, they will go to the appropriate FERC account for the related equipment (Overhead, Underground, Design, Transmission, etc.).

For outage/reliability data reported to NERC/WECC:

1. Please see Staff_DR_100 Attachment A. Outage/reliability data reporting into the NERC TADS and WECC TRC did not begin until 2007. For this reason the Company has provided data for the time period 2007-2013.

2. Similar to the outage/reliability data reported to the Commission it is not easily correlated with the dollars that are booked to FERC plant accounts. The cause codes within the TADS documenting process do no link with FERC Account Coding. However, if some of the equipment is being replaced due to interruptions, costs associated with that interruption will be booked to ER 2051- Electric Transmission Plant Storm. When the costs are transferred to plant, they will go to the appropriate FERC account for the related equipment (Station Equipment, Poles and Fixtures, Overhead Conductor and Devices, etc.).

AVISTA CORP.
RESPONSE TO REQUEST FOR INFORMATION

JURISDICTION:	WASHINGTON	DATE PREPARED:	04/01/2014
CASE NO:	UE-140188 & UG-140189	WITNESS:	Heather Rosentrater
REQUESTER:	WUTC Staff - Gomez	RESPONDER:	Karen Schuh
TYPE:	Data Request	DEPT:	State & Federal Regulation
REQUEST NO.:	Staff – 101	TELEPHONE:	(509) 495-2293
		EMAIL:	karen.schuh@avistacorp.com

REQUEST:

Referring to Ms. Rosentrater's direct testimony, Exhibit HLR-1T, please provide the following information:

1. Page 18, at 4-21: Please provide the most recent NERC required transmission "system planning studies" (near term and long term) described in the testimony.

2. Page 21, Rosentrater Exhibit Table 3: For the major capital transmission investment categories: III. Reliability Improvements, IV. Reliability Replacement and V. Reliability Compliance and Improvements, please provide any studies, analysis or documents relating to the internal review process used to approve funding for these projects as described in Rosentrater's Exhibit HLR-1T.

3. Page 28, Table 4: For the major capital distribution investment categories: I. Distribution Projects and II. Distribution Replacement Projects, please provide any studies, analysis or documents relating to the internal review process used to approve funding for these projects as described in Rosentrater's Exhibit HLR-1T.

Responsive materials provided in Excel format should be fully functional with all workbooks, worksheets, data and formulae left intact.

RESPONSE:

1. Please see Staff_DR_101 Attachment A. Due to the voluminous nature of this document, it will be provided in electronic format only.

2. & 3. Per discussion with Commission staff, the Company will supply these documents based on a selection of ER's defined by staff. The Company will supplement this data request once the ER's have been selected by staff.

Avista System Planning Assessment

2013 LOCAL PLANNING REPORT

Avista System Planning Assessment

2013 LOCAL PLANNING REPORT

Date Completed:

Prepared By: Elizabeth Frederiksen
John Gross
Emily Hnatishin
Richard Maguire
Tracy Rolstad
Will Stone

December 20,2013

Scott Waples Director, Asset Management and System Planning — Date

Version History

Version	Version Date	Action	Change Tracking	Reviewed By
0	Dec 20, 2013	2013 Final Version	Incorporated comments	SW

Table of Contents

Local Planning Report

I EXECUTIVE SUMMARY

Avista's System Planning Department has conducted an assessment of the Avista Transmission System (System) and Distribution System. The purpose of the assessment is to identify projects needed to mitigate future reliability, load-service, and condition based requirements for the System. 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.

Some key findings from the assessment are:

- The Big Bend area, while representing less than 9% of Avista area load[1], requires almost 18% of the projected spending identified in this report. Big Bend area planned expenditure is roughly $240k per MW compared to $100k per MW in the Spokane area, and the spending is equally directed at reliability and condition issues. Notable projects include a proposed 230/115 kV station at Saddle Mountain and rebuilds of the Devils' Gap – Lind and Benton – Othello SS 115 kV transmission lines.
- The Coeur d' Alene area represents roughly 22 % of Avista area load, and the projected spending need for the area is approximately $120k per MW. Planned spending is distributed primarily to mitigate plant condition issues followed by reliability needs, with example projects including rebuilds of the Coeur d'Alene – Pine Creek and Cabinet – Bronx – Sand Creek 115 kV transmission lines and the Noxon Rapids 230 kV Swithcyard Rebuild project.
- The Lewis and Clark area represents roughly 16% of Avista area load, and the projected need is approximately $80k per MW. Projects in this area are primarily directed at reliability issues, with notable projects including a 230 kV Voltage Control project and an upgrade to the Clearwater Station.
- The Palouse area represents a little over 11% of Avista area load, and the projected spending need is roughly $140k per MW. Project need is primarily directed at addressing plant condition issues, with notable projects being the Moscow 230 kV Station rebuild and the Benewah – Moscow 230 kV Transmission Line Rebuild.
- The Spokane area respresents over 42% of Avista area load, but projected need in the area is approximately $100k per MW. Almost 60% of required projects are directed at mitigating reliability issues, with notable projects being the Spokane Valley Transmission Reinforcement project and projects associated with the Ninth & Central Station. Additional projects under

[1] Load numbers are derived from an average of the peak winter and summer loads in each area within 2014 scenarios

development include the Garden Springs Station Integration, Westside Tranformer Replacement, and Metro Station Rebuild.

The 2013 assessment of the System has identified the following significant changes from the 2012 assessment update:

- There is insufficient 230 kV to 115 kV transformation capacity in the System, and specific projects have been identified in the assessment which will mitigate the transformation and single point of failure issues.
- A proposal for automatic switching of 230 kV voltage control equipment utilizing a tighter bandwidth will allow the System to maintain applicable voltage ratings for various contingencies or unplanned outages.
- The plan of service for the Westside and Garden Springs 230 kV stations has been modified.

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 2013 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, TPL-002, TPL-003 and TPL-004.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, transient, and short circuit 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 2 followed by a summary of the Corrective Action Plans and Single System Projects in Section 3. Section 4 describes in detail the Local Transmission Planning Process followed by Avista. During the Process, the development of the Planning Assessment is completed. The development is detailed in Section 4.2. 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.

III COMPANY DESCRIPTION

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 III-1 geographically displays the Avista service territory.

FIGURE III-1: AVISTA SERVICE TERRITORY

2 TRANSMISSION SYSTEM

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 III-2 illustrates Avista's Transmission System on a map of the region.

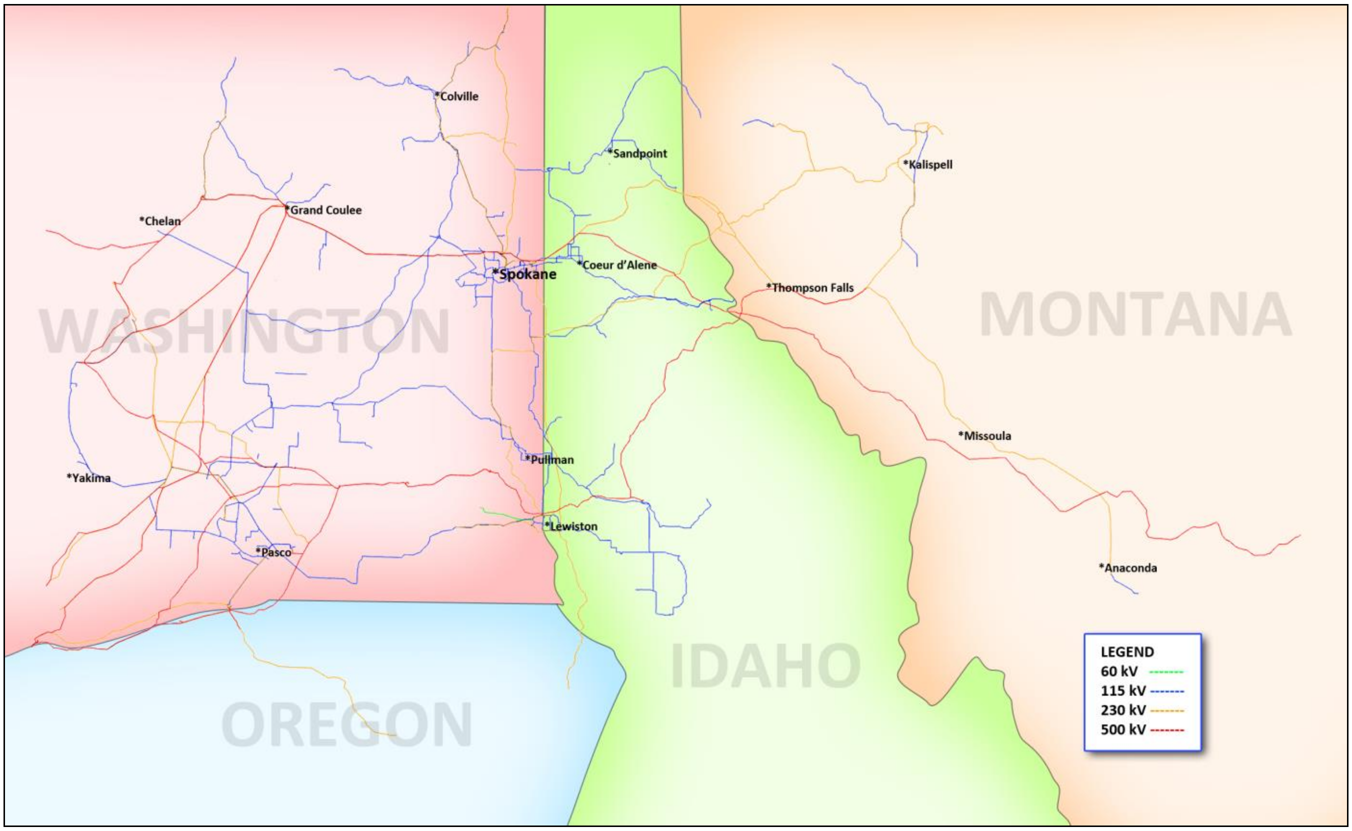


FIGURE III-2: AVISTA TRANSMISSION LINE MAP

The Avista 230 kV transmission lines are the backbone of Avista's Transmission System and consist of two "rings" centered near the Spokane/Coeur D'Alene area and the Lewiston/Clarkston area. Figure III-3 shows a station level drawing of Avista's 230 kV Transmission System including interconnections to foreign utilities. The two rings are interconnected north to south at the Benewah Station. Avista's 230kV Transmission System is interconnected to the BPA 500 kV transmission system at their Bell, Hot Springs and Hatwai Stations.

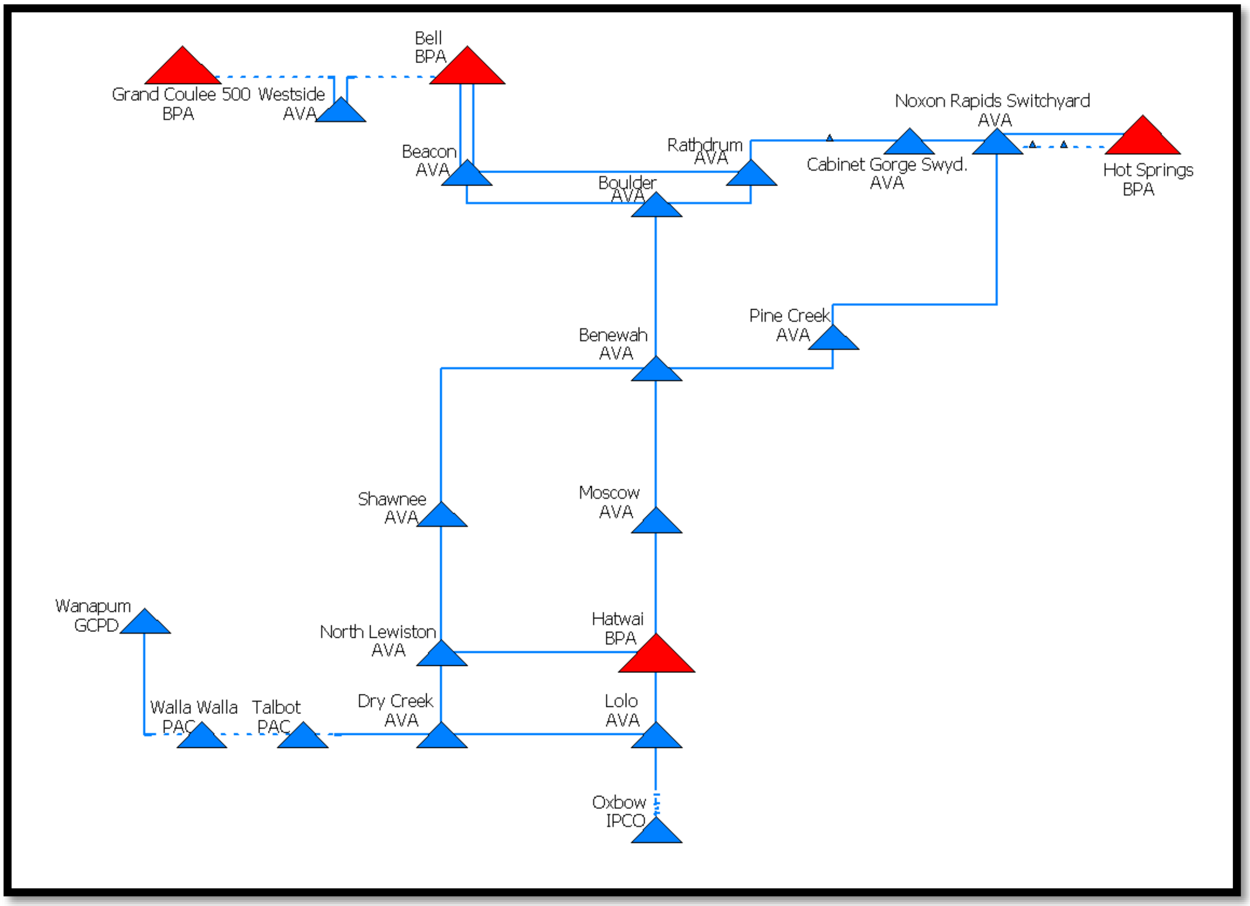


FIGURE III-3: AVISTA 230 KV TRANSMISSION SYSTEM

2.2 Transmission System Areas

Avista has separated its Transmission System into five geographical areas. The areas are: Spokane, Coeur d'Alene, Big Bend, Palouse, and Lewiston-Clarkston. The areas are shown with their approximate boundaries in Figure III-4. The Transmission System Assessment described in Section VI is a compilation of assessments on each of the five areas.

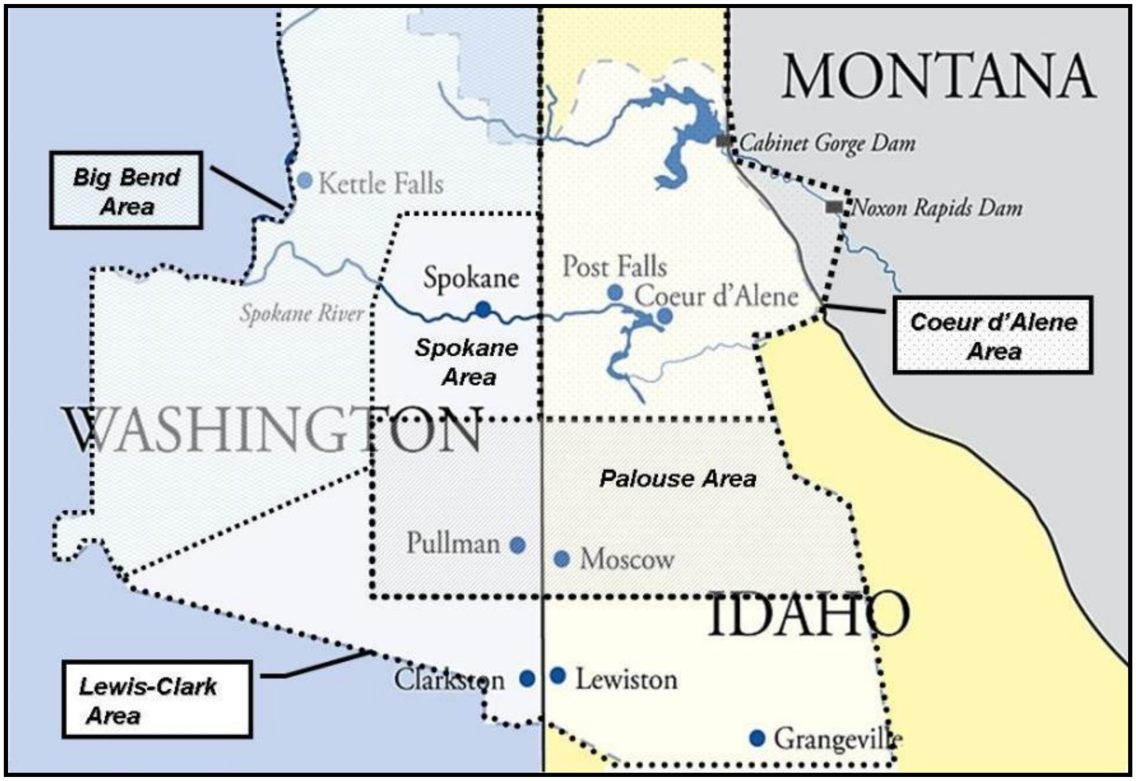


FIGURE III-4: AVISTA TRANSMISSION SYSTEM REGIONS

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

2.4 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.

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 III-1 and Table III-2 summarize the operational capacities of Avista generating projects. Table III-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	Project Start Date	Maximum Capability (MW)[2]	Expected Energy (aMW)
Monroe Street	Spokane River	Spokane, WA	1890	15.0	**11.6**
Post Falls	Spokane River	Post Falls, ID	1906	18.0	**10.0**
Nine Mile	Spokane River	Nine Mile Falls, WA	1925	26.0	**12.5**
Little Falls	Spokane River	Ford, WA	1910	35.2	**22.1**
Long Lake	Spokane River	Ford, WA	1915	89.0	**53.4**
Upper Falls	Spokane River	Spokane, WA	1922	10.2	**7.5**
Cabinet Gorge	Clark Fork	Clark Fork, ID	1952	270.5	**124.8**
Noxon Rapids	Clark Fork	Noxon, MT	1959	610.0	**198.3**
Total	All Hydro			1073.9	440.2

TABLE III-1: AVISTA HYDROELECTRIC GENERATION RESOURCES

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

TABLE III-2: AVISTA THERMAL GENERATION RESOURCES

For more information on Avista's generation, please refer to the IRP, which can be found at the following link:

Avista's 2013 Electric Integrated Resource Plan

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 excpetion as it operates in a networked configuration.

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, which can be found at the following link:

Avista's 2013 Electric Integrated Resource Plan

5.1 Native Load

[3] 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.

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 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 III-5 illustrates the growth levels compared to historical peaks for both summer and winter.

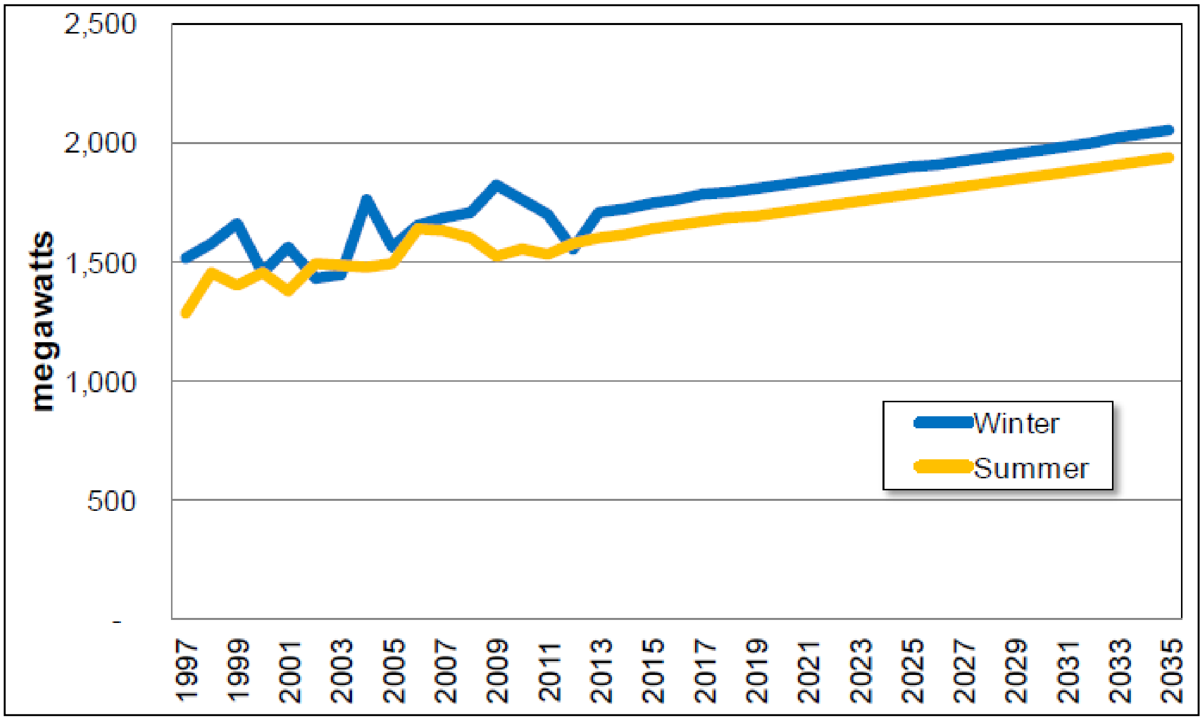


FIGURE III-5: WINTER AND SUMMER NATIVE LOAD PEAK DEMAND, 1997-2035

5.2 Balancing Authority Area (BAA)Load

Avista's BAA load peaks around 2,150 MW in the winter and 2,000 MW in the summer. Figure III-6 shows the BAA load historical monthly peaks from 2004-2012 and the forecasted monthly peaks for 2013-2032. 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.

Balancing Area Peak Data (MW) - Actual and Forecasted Monthly Peak

Year	Jan**	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2004	2162	1793	1694	1478	1441	1742	1795	1834	1497	1592	1813	1822	Actual
2005	2009	1820	1622	1588	1407	1752	1859	1840	1524	1560	1842	2090	Actual
2006	1820	2082	1799	1580	1761	1904	2021	1850	1711	1795	2110	1950	Actual
2007	2164	1929	1885	1653	1610	1676	2022	1896	1613	1720	1929	2017	Actual
2008	2176	1917	1785	1717	1603	1974	1911	2021	1570	1689	1747	2350	Actual
2009	2184	1882	2111	1665	1620	1668	1864	1941	1825	1777	1782	2257	Actual
2010	1986	1787	1756	1674	1626	1712	1935	1917	1540	1698	2179	2030	Actual
2011	2166	2134	1770	1687	1575	1665	1791	1880	1784	1704	1931	2007	Actual
2012	2029	1926	1797	1698	1626	1642	2014	2007	1584	1710	1866	1969	Actual
2013	2262	2043	1825	1653	1545	1729	2040	1949	1639	1759	2062	2260	Forecast
2014	2289	2069	1847	1674	1564	1752	2069	1975	1660	1781	2088	2289	Forecast
2015	2313	2090	1867	1692	1580	1771	2092	1997	1678	1800	2109	2313	Forecast
2016	2339	2110	1884	1708	1595	1789	2113	2018	1695	1817	2130	2335	Forecast
2017	2357	2127	1899	1721	1607	1804	2138	2035	1709	1832	2146	2353	Forecast
2018	2378	2143	1913	1735	1620	1818	2155	2051	1722	1846	2163	2372	Forecast
2019	2398	2160	1928	1748	1632	1833	2175	2068	1736	1861	2179	2390	Forecast
2020	2418	2176	1943	1762	1645	1848	2196	2086	1750	1875	2196	2409	Forecast
2021	2440	2193	1958	1776	1658	1863	2217	2103	1765	1890	2213	2428	Forecast
2022	2461	2210	1973	1790	1671	1878	2237	2120	1779	1905	2230	2447	Forecast
2023	2482	2227	1988	1804	1684	1893	2259	2138	1793	1920	2248	2466	Forecast
2024	2504	2245	2003	1818	1697	1909	2281	2156	1808	1935	2265	2485	Forecast
2025	2527	2262	2019	1833	1710	1925	2303	2174	1823	1951	2283	2505	Forecast
2026	2548	2280	2034	1847	1723	1940	2325	2192	1837	1966	2301	2525	Forecast
2027	2570	2297	2050	1862	1737	1956	2348	2210	1852	1982	2319	2544	Forecast
2028	2593	2315	2066	1876	1750	1972	2371	2229	1868	1998	2337	2564	Forecast
2029	2617	2333	2082	1891	1764	1988	2394	2247	1883	2013	2355	2585	Forecast
2030	2640	2352	2098	1906	1778	2005	2417	2266	1898	2030	2373	2605	Forecast
2031	2663	2370	2114	1921	1792	2021	2441	2285	1914	2046	2392	2625	Forecast
2032	2688	2389	2130	1936	1806	2038	2465	2304	1929	2062	2411	2646	Forecast

** Winter season is considered December - January. Therefore January is counted as the previous years winter.
For example, January 2012 is part of the winter season for 2011.

FIGURE III-6: ACTUAL AND FORECASTED MONTHLY PEAK DATA FOR BALANCING AUTHORITY AREA

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.

IV CORRECTIVE ACTION PLANS AND SINGLE SYSTEM PROJECTS

The following section provides a list of Single System Projects. Single System Projects are defined as projects necessary to ensure the reliability of the Transmission System and to otherwise meet the needs of long-term firm transmission service and native load obligations in accordance with Avista's planning standards. The Single System Projects list includes all Avista projects including conceptual projects. Subjective project selection for the list was intended to by minimized. Projects in a conceptual status may never progress but inclusion in the Planning Assesment provides documentation of each project under consideration. Justification for each project listed can include condition based asset management, necessary to meet performance requirements, customer growth, and others.

The listed Single System Projects justified as necessary to meet performance requirements are categorized as Corrective Action Plans. Corrective Action Plans address how performance requirements will be met where the Transmission System assessment has indicated an inability of the System to meet the performance requirements. Corrective Action Plans are specific projects developed to meet the criteria in NERC Standards. Avista will utilize Non-Consequential Load Loss and curtailment of Firm Transmission Service to operationally correct situations not meeting the performance requirements until Corrective Action Plans are implemented (TPL-001-4 R2.7.3[4]).

A summary of the Single System Projects is provided in Table IV-1. The cost estimate and schedule of each project is subject to change. The shading of the schedule indicates the certainty of each projects execution; the darker shading represents projects presently under construction and ligher shading represents project with less certain schedule.

TABLE IV-1: AVISTA TEN YEAR PROJECT LIST SUMMARY.

	Cost Estimate	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	TBD
Big Bend Area	**$78,019,444**											
49 Degrees Station	$6,000,000											
Addy - Devils Gap 115 kV Transmission Line Reconductor	$2,025,000											
Benton - Othello SS 115 kV Transmission Line Rebuild	$9,600,000											
Bruce Siding Station												
Chelan - Stratford 115 kV Transmission Line Rebuild	$13,000,000											
Devils Gap - Lind 115 kV Transmission Line Rebuild	$10,344,444											
Ford Station Rebuild	$1,275,000											
Gifford Station Rebuild	$900,000											
Harrington Station Rebuild	$3,000,000											
Lee and Reynolds Transformation												
Lind – Warden 115 kV Transmission Line Rebuild	$9,000,000											

[4] TPL-001-4 is subject to future enforcement pending FERC approval. Avista's mitigating actions utilizing Non-Consequential Load Loss and curtailment of Firm Transmission Service is required to releave excedence of applicable facilty ratings regardless of the NERC standard's enforcement status.

	Cost Estimate	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	TBD
Little Falls Station Rebuild	$4,775,000											
Odessa Capacitor Bank	$500,000											
Saddle Mountain Integration	$16,400,000											
Stratford 115 kV Station Rebuild	$1,200,000											
Coeur d'Alene Area	**$82,632,550**											
Beck Road Station	$182,550											
Big Creek Station Rebuild	$1,425,000											
Blue Creek Station Rebuild	$650,000											
Bronx Station	$1,500,000											
Burke - Pine Creek #3 & #4 115 kV Transmission Line Rebuild	$7,200,000											
Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild	$9,500,000											
Cabinet Gorge Switching Station	$12,000,000											
Carlin Bay Station	$10,000,000											
Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild	$12,775,000											
Noxon - Pine Creek #2 230 kV Transmision Line												
Noxon Construction Station Rebuild	$650,000											
Noxon Rapids 230 kV Switchyard Rebuild	$26,750,000											
Pine Creek Transformer Replacement												
Priest River Station												
Sandpoint, Sagle, and Oden Grid Modernization												
St. Maries SCADA Upgrade/Add Feeder												
Lewiston/Clarkston Area	**$28,305,000**											
10th & Stewart Station Rebuild	$1,000,000											
230 kV Voltage Control	$5,500,000											
Clearwater Station Upgrade	$3,000,000											
Grangeville Station Rebuild	$2,025,000											
Hatwai - Lolo #2 230 KV Transmission Line	$8,025,000											
Kamiah Wood Station Rebuild	$1,485,000											
Kooskia Transformer Replacement												
Lewiston Mill Road Station	$1,950,000											
Pound Land Station Rebuild	$1,300,000											
South Lewiston Station Rebuild	$1,520,000											
Wheatland Station	$2,500,000											
Palouse Area	**$50,008,771**											
Benewah - Moscow 230 kV Transmission Line Rebuild	$24,203,771											
Deary - Potlatch 115 kV Transmission Line	$20,000,000											
Diamond Station Minor Rebuild												
Moscow 230 Station Rebuild	$2,650,000											
Moscow City 115 SCADA/Minor Rebuild												
North Moscow Transformation	$2,280,000											
Potlatch Transformer Replacement												
Tamarack Station	$875,000											
Tekoa SCADA Upgrade/Minor Rebuild												
Spokane Area	**$117,890,000**											
Beacon - Bell - Francis & Cedar - Waikiki Reconfiguration	$2,000,000											
Beacon Substation Rebuild	$15,000,000											
Bell Second Tranformer	$1,000,000											
Chester Station Rebuild	$1,460,000											
College and Walnut Consolidation/Rebuild												
Deer Park Partial Rebuild												
Downtown East Station	$2,000,000											
Downtown West Station	$2,000,000											
Garden Springs Substation Integration	$20,000,000											
Greenacres/Otis Orchards Stations	$2,590,000											

	Cost Estimate	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	TBD
Hallett & White - Silver Lake 115 kV Transmission Line Rebuild	$2,025,000											
Hallett & White Capacitor Bank	$500,000											
Hawthorne Station	$3,000,000											
Hillyard Station	$3,275,000											
Irvin Distribution	$1,225,000											
Metro Station Rebuild	$11,150,000											
Nine Mile - Westside Protection Upgrade	$200,000											
Ninth & Central - Sunset 115 kV Transmisison Line Rebuild	$925,000											
Ninth & Central 230 kV Integration	$15,000,000											
Ninth & Central Station Upgrade	$2,775,000											
Northwest Station Rebuild	$1,675,000											
Spokane Valley Transmission Reinforcement	$8,840,000											
Sunset Station Rebuild	$5,325,000											
Westside Transformer Replacement	$15,925,000											
System Wide	**$134,907,000**											
230 kV Capacitor Automatic Switching	$20,000											
Distribution Programs												
Line Ratings Mitigation	$12,637,000											
New Distribution Stations	$7,500,000											
RAS Update	$1,000,000											
Spokane - Coeur d'Alene 115 kV Relay Upgrades	$3,250,000											
Substation Asset Management	$41,000,000											
Substation Capital Spares	$51,000,000											
Substation Rebuilds	$4,500,000											
Transmission Asset Management	$14,000,000											
Grand Total	**$491,762,765**											

1 SYSTEM WIDE

1.1 Corrective Action Plans

1.1.1 230 kV Capacitor Automatic Switching

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. 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.

The assessment indicated an inability of the System to meet the performance requirements in 2014.

Total projected cost for the project has not been determined.

1.1.2 Remedial Action Scheme Update

Recent transmission system projects and modification to operating procedures has impacted how the transmission system performs during contingency scenarios originally addressed by the existing Clark Fork Remedial Action Scheme (RAS). An update to the arming and triggers levels was developed for the Lancaster Integration Project. Further assessment of the transmission system performance has warranted additional updates to the scheme. Full scope of the necessary updates has not been determined.

1.2 Further Single System Projects

1.2.1 Distribution Programs

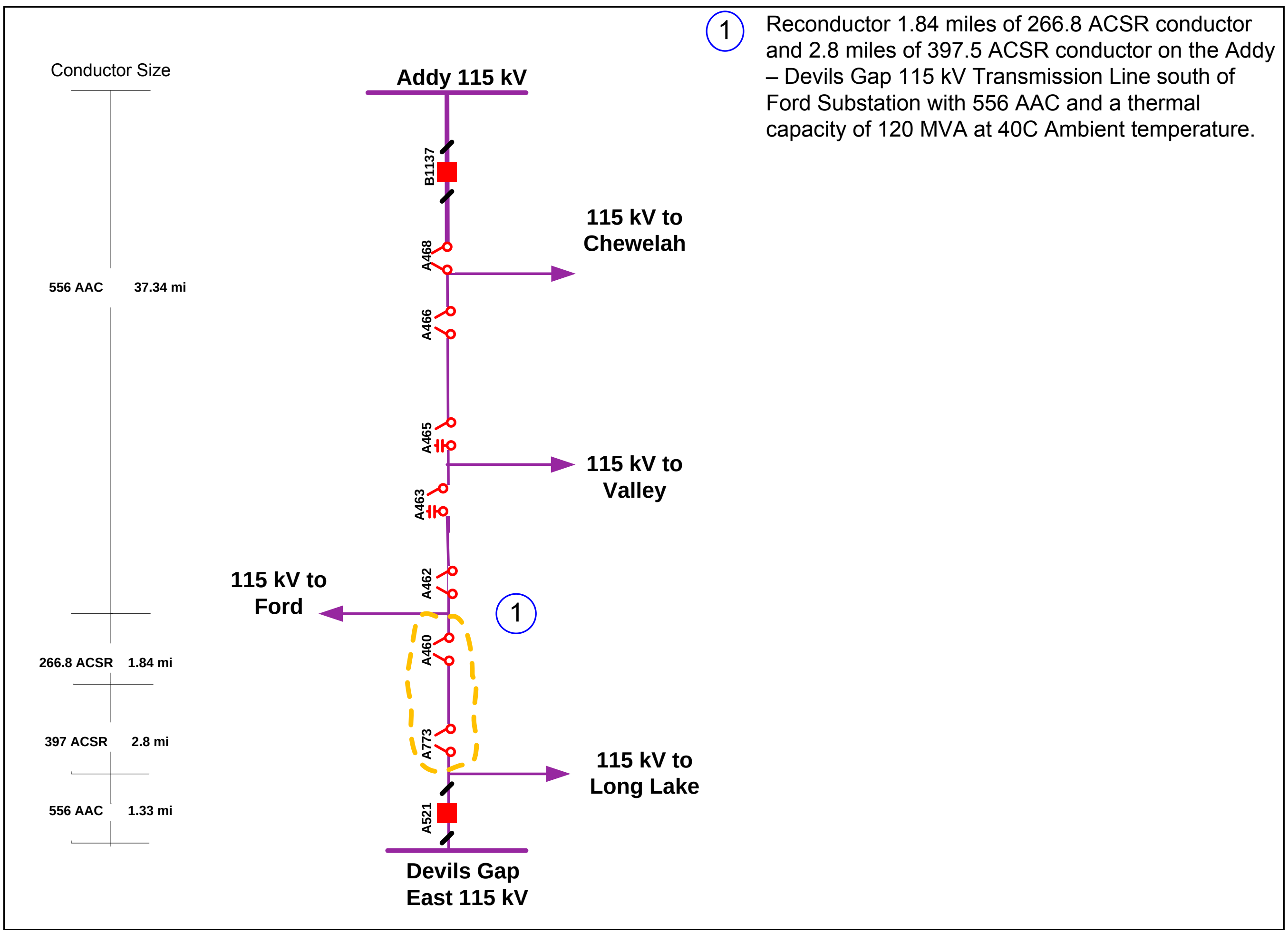
There are a number of system wide programs in place that can address some of the issues identified in the Distribution Assessment. The most pertinent are Grid Modernization (comprised of Feeder Upgrade and Grid Automation), High Resistance Feeder Upgrades (Big R), URD Cable replacement, and Wood Pole Management. In addition, a sub program on Grid Automation of system SCADA will be detailed by area.

2 BIG BEND AREA

2.1 Corrective Action Plans

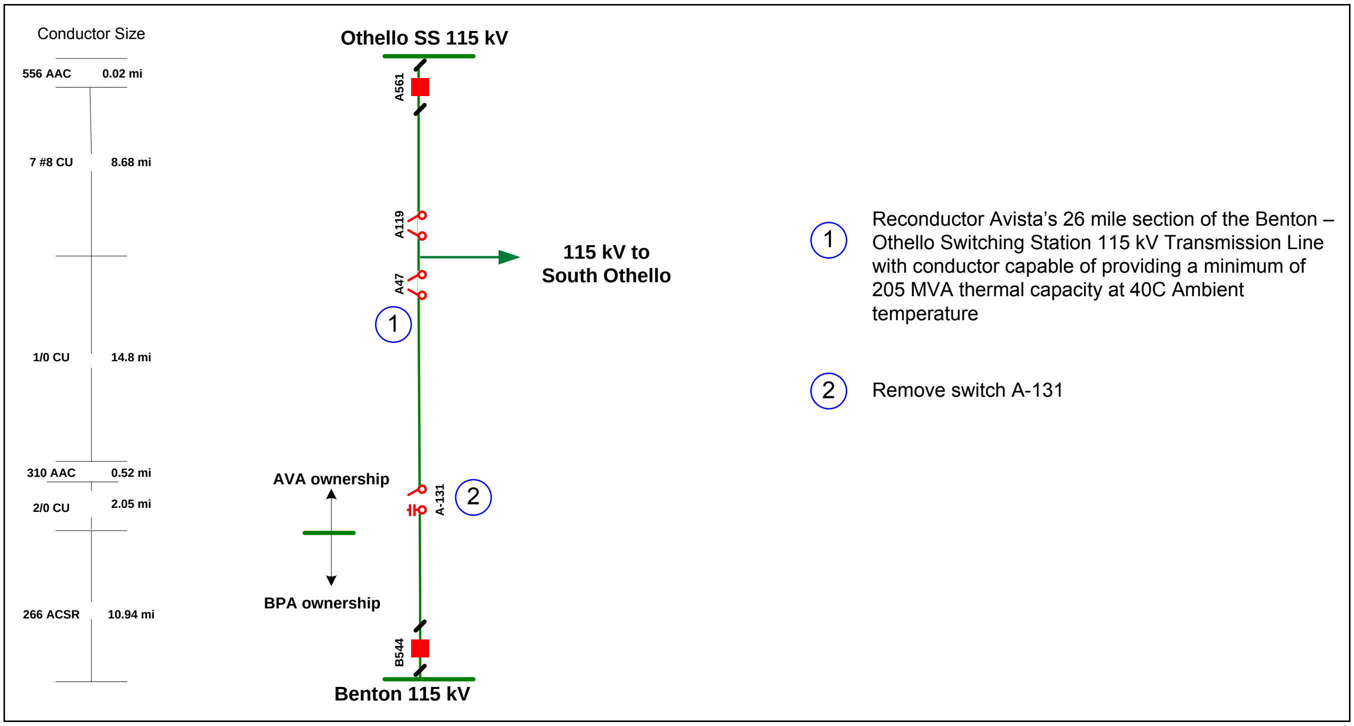
2.1.1 Addy – Devils Gap 115 kV Transmission Line Reconductor

The Ford – Long Lake Tap segment of the Addy – Devil's Gap 115 kV Transmission Line fails to meet performance requirements beginning in 2014 for the common right-of-way outage of the 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 line will be 556 kcmil conductor with a minimum thermal capacity rating of 120 MVA at 40C. This is enough to mitigate these violations over the ten year planning horizon.



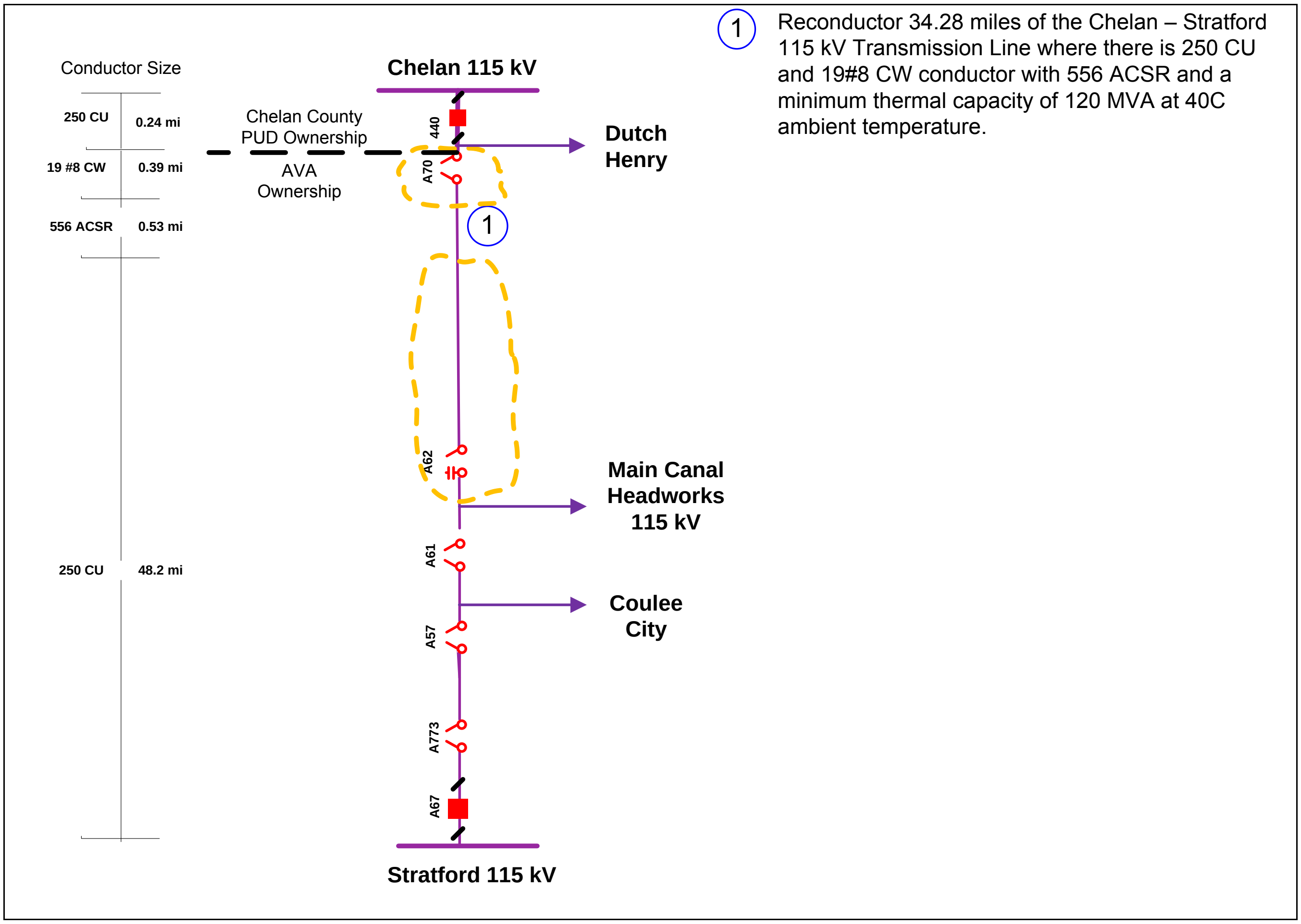
2.1.2 Benton – Othello SS 115 kV Transmission Line Rebuild

The Benton – Othello SS 115 kV Transmission Line failed to meet performance requirements for various contingencies starting in 2014. This transmission line is 37.01 miles long, and it is composed of 1/0 CU, 2/0 CU, 7#8 CU, 310.8 AAC, and 556.5 AAC conductor segments resulting in a 50.2 MVA rating at 40C. The new line will be 795 ACSS conductor with a minumim thermal capacity rating of 205 MVA at 40C. This is enough to mitigate these violations over the ten year planning horizon.



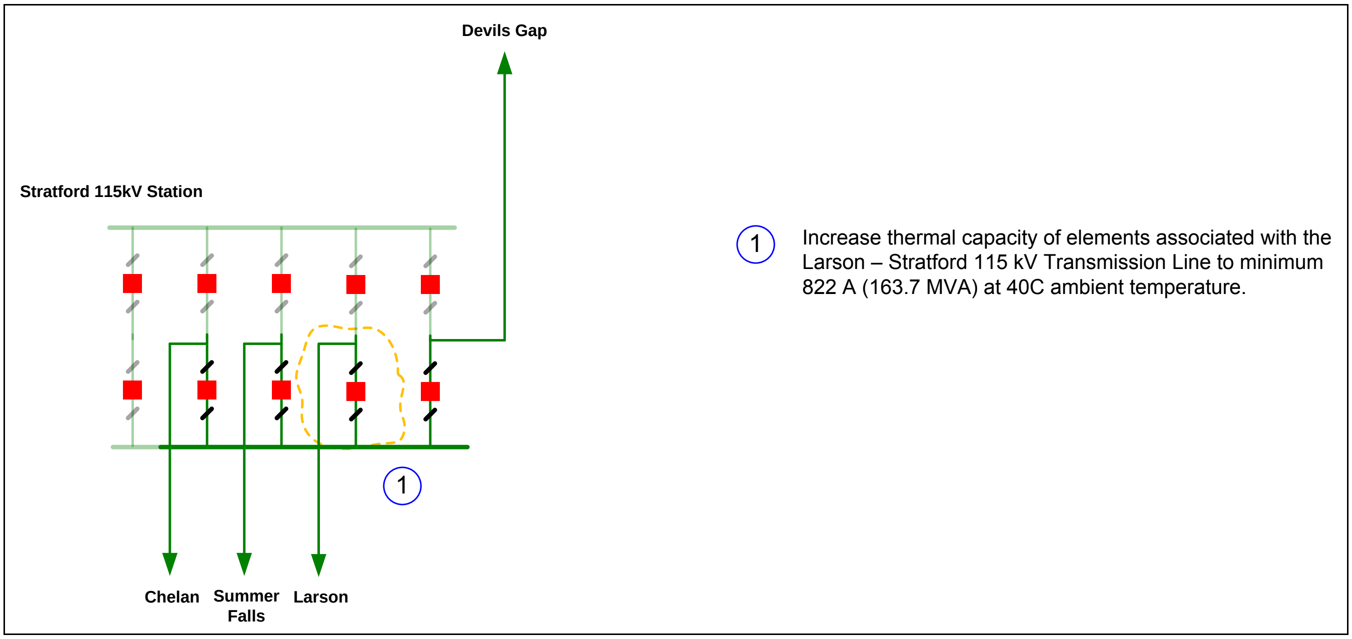
2.1.3 Chelan – Stratford 115 kV Transmission Line Rebuild

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.



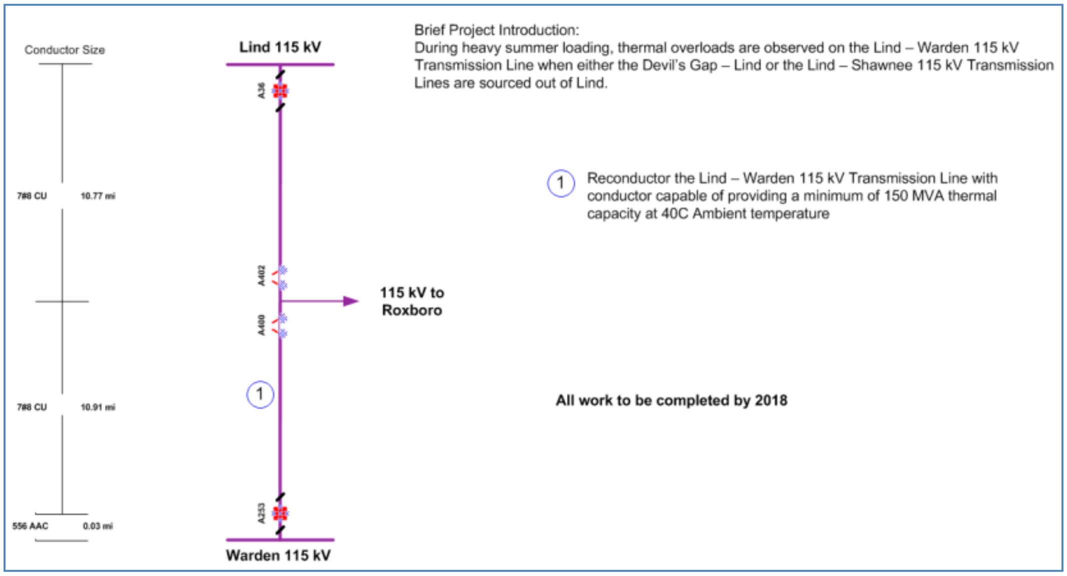
2.1.4 Stratford 115 kV Station Rebuild

The Larson – Stratford 115 kV Transmission Line failed to meet performance requirements for various contingencies starting in 2014. Current transformers and strain bus conductor within the station are the limiting elements, and these are both part of a larger rebuild project. Upon completion, the project will mitigate these violations over the planning horizon. This project satisfied requirements of both the System Planning and Substation Engineering departments.



2.1.5 Lind – Warden 115 kV Transmission Line Rebuild

The Roxboro – Warden segment of the Lind – Warden 115 kV Transmission Line failed to meet performance requirements beginning in 2023 for a breaker failure (GB1250) at the GCPD Sand Dunes 115 kV Station. The Lind – Warden 115 kV Transmission Line is 21 miles long, and it is constructed primarily with 7#8 CU conductor with a rating of 57 MVA at 40C. The new line will be 795 ACSR or 795ACSS conductor with a minimum thermal capacity rating of 150 MVA at 40C. This rating is enough to mitigate thermal violations over the ten year planning horizon.



2.1.6 Saddle Mountain Integration

Beginning in 2014, Avista load in the Big Bend area causes local facility violations for a number of contingencies within the Grant CPUD system. The currently planned projects to rebuild Avista’s portion of the Benton – Othello 115 kV and the Lind – Warden 115 kV transmission lines only mitigate some of the facility violations. A new station named Saddle Mountain has been proposed at the crossing of the Walla Walla – Wanapum 230 kV and Benton – Othello 115 kV transmission lines. Preliminary studies show the project mitigates the remaining facility violations while providing significant mutual benefit throughout the Planning Horizon. The System Planning Department will conduct joint studies in the area to create a more detailed plan for Saddle Mountain to serve Avista’s Big Bend area load during all conditions.

The preliminary scope of the Saddle Mountain Integratrion project includes construction of the new 230 and 115 kV station at the crossing of the Walla Walla – Wanapum 230 kV and Benton – Othello 115 kV transmission lines and necessary transmission line integration into the station. The station will consist of a three terminal double breaker, double bus 230 kV bus, 250 MVA 230/115 kV autotransformer, and four terminal breaker and a half 115 kV bus.

2.2 Further Single System Projects

2.2.1 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.

2.2.2 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.

2.2.3 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.

2.2.4 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.

2.2.5 Harrington Station Rebuild

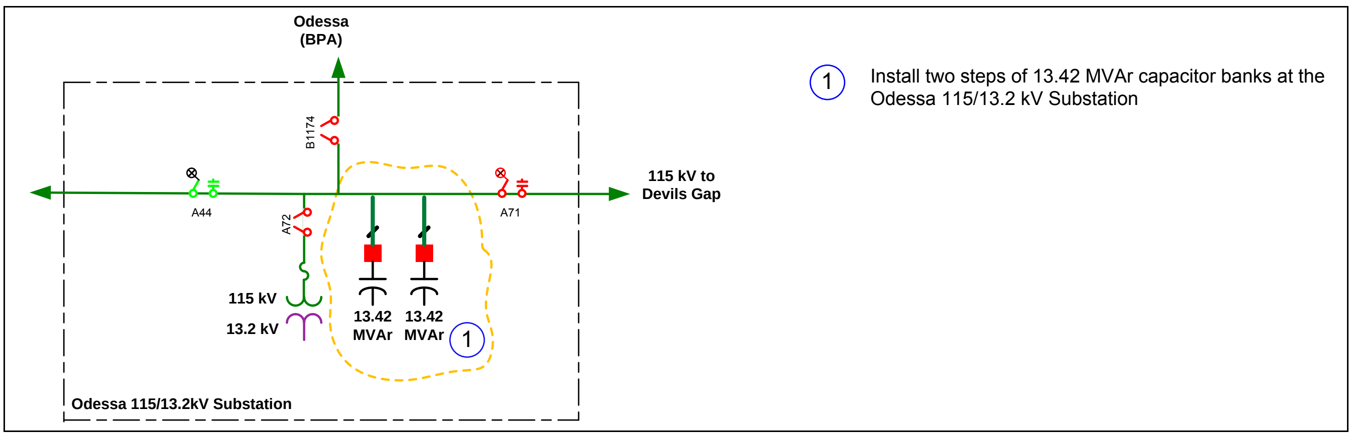
Harrington is the last area Avista serves at the legacy 4 kV voltage. This voltage is obsolete for serving utility distribution systems and we have very limited spare equipment to continue service at this voltage. The Harrington station is very old and the transformer will be difficult and time consuming 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.

2.2.6 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.

2.2.7 Odessa Capacitor Bank

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



2.2.8 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.

2.2.9 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 COEUR D'ALENE AREA

3.1 Corrective Action Plans

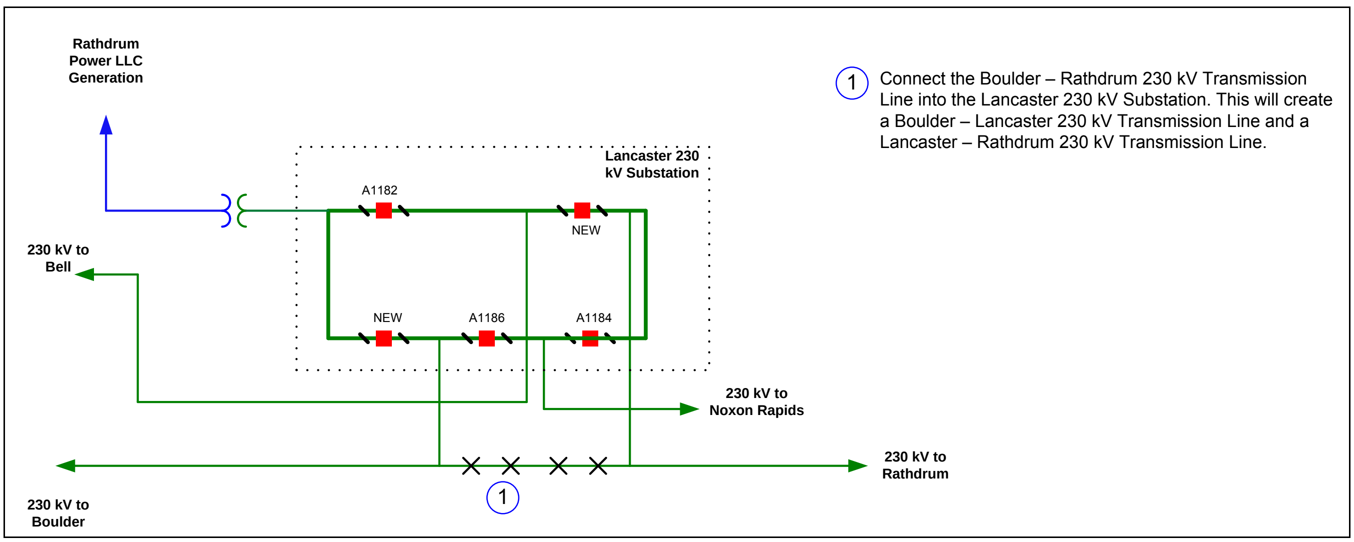
3.1.1 Lancaster Interconnection Project

Avista's Power Supply Group obtained ownership of the Power Purchase Agreement (PPA) for the output of the Lancaster Combined Cycle Combustion Turbine. The Lancaster Loop-in Project study developed in 2009 identifies the interconnection of the BPA's Lancaster Station with Avista's Transmission System by looping in the Boulder – Rathdrum 230 kV Transmission Line. Significant System performance improvement is gained by the interconnection.

The Lancaster Interconnection is identified as one of the required projects to mitigate the forecasted overloading of the Westside 230/115 kV Transformers. A Line and Load Interconnection Request has been submitted to the BPA and the project is under construction.

The assessment indicated an inability of the System to meet the performance requirements in 2014.

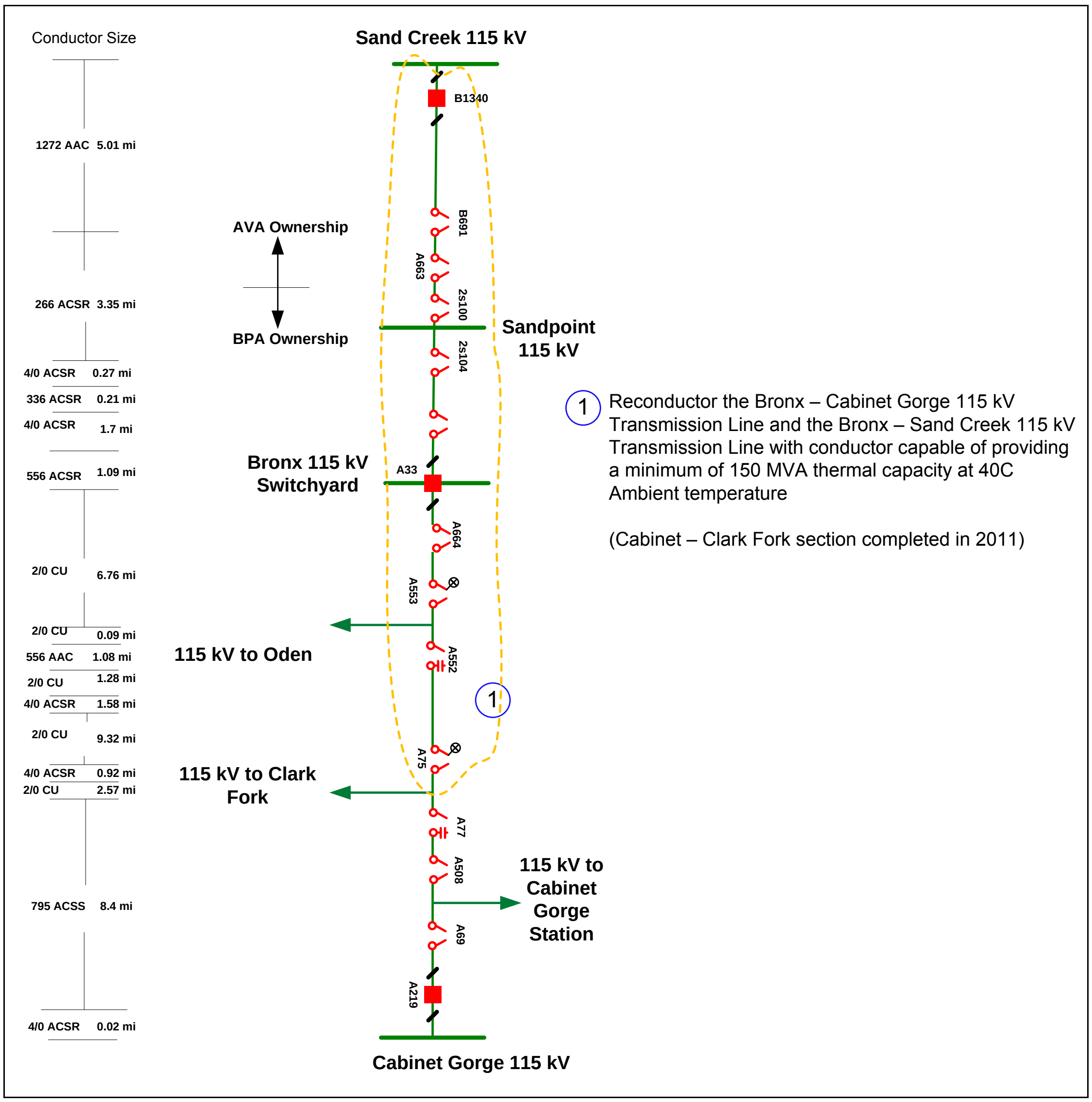
Completion of the project is scheduled for 2013. There is no additional project cost beyond 2013.



3.1.2 Cabinet – Bronx – Sand Creek 115 kV Transmission Line Rebuild

Reconstruction of the Bronx – Cabinet and Bronx – Sand Creek 115 kV Transmission Lines to 795 ACSS conductor with a minimum thermal capacity rating of 205 MVA at 40C has been identified as a mitigating project for several thermal overloads of the transmission lines. Rebuilding the transmission lines also accommodates the installation of fiber optic shield wire allowing for communication aided protection schemes.

The assessment indicated an inability of the System to meet the performance requirements in 2014.

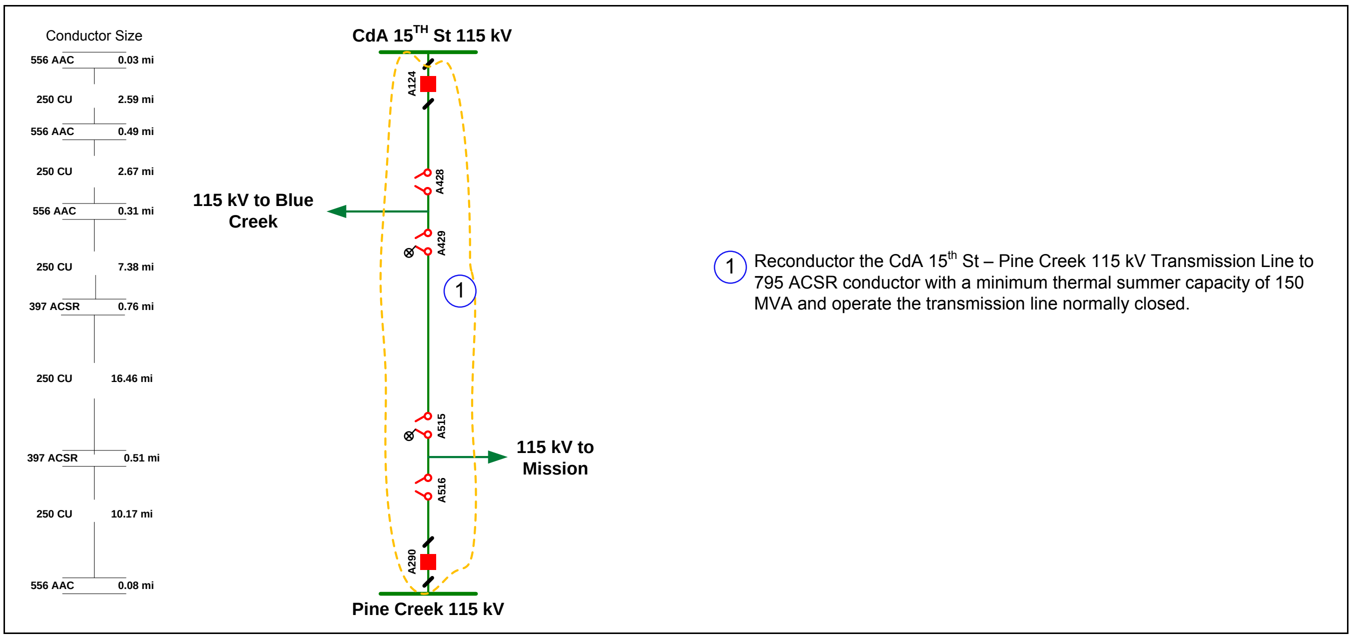


3.1.3 Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild

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.

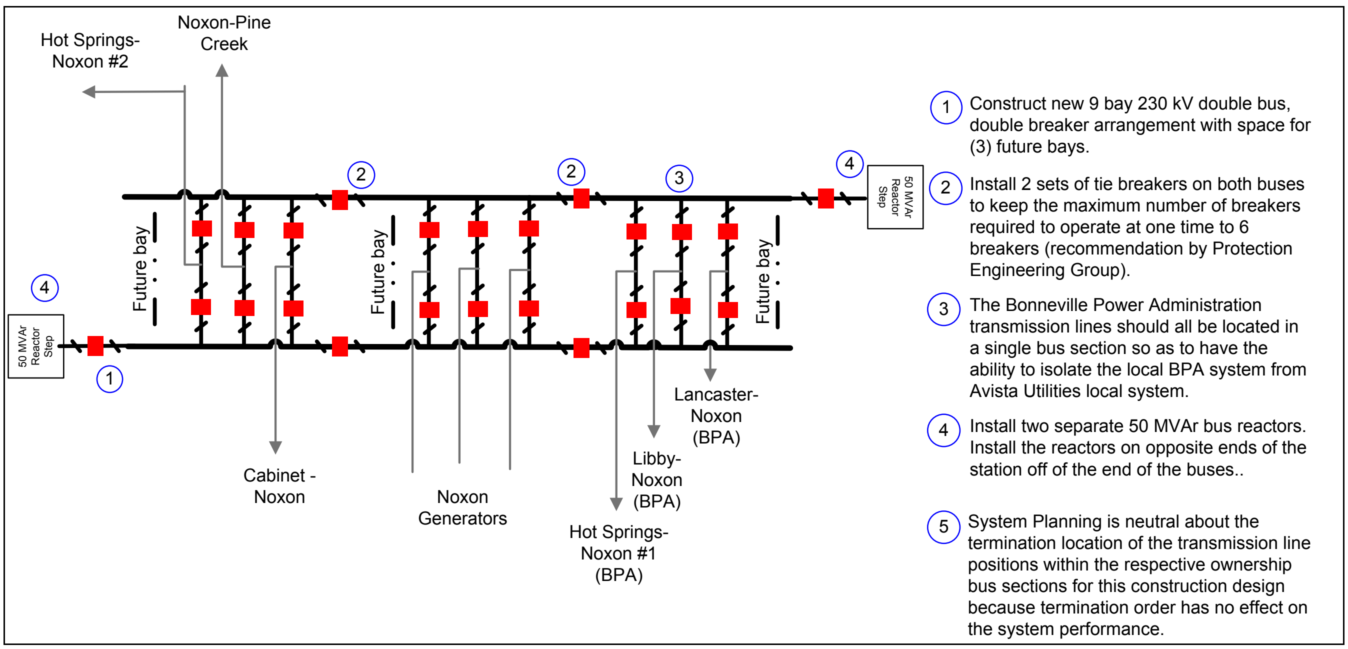
The assessment indicated an inability of the System to meet the performance requirements in 2014.



3.2 Further Single System Projects

3.2.1 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.



3.2.2 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.

3.2.3 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.

3.2.4 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:

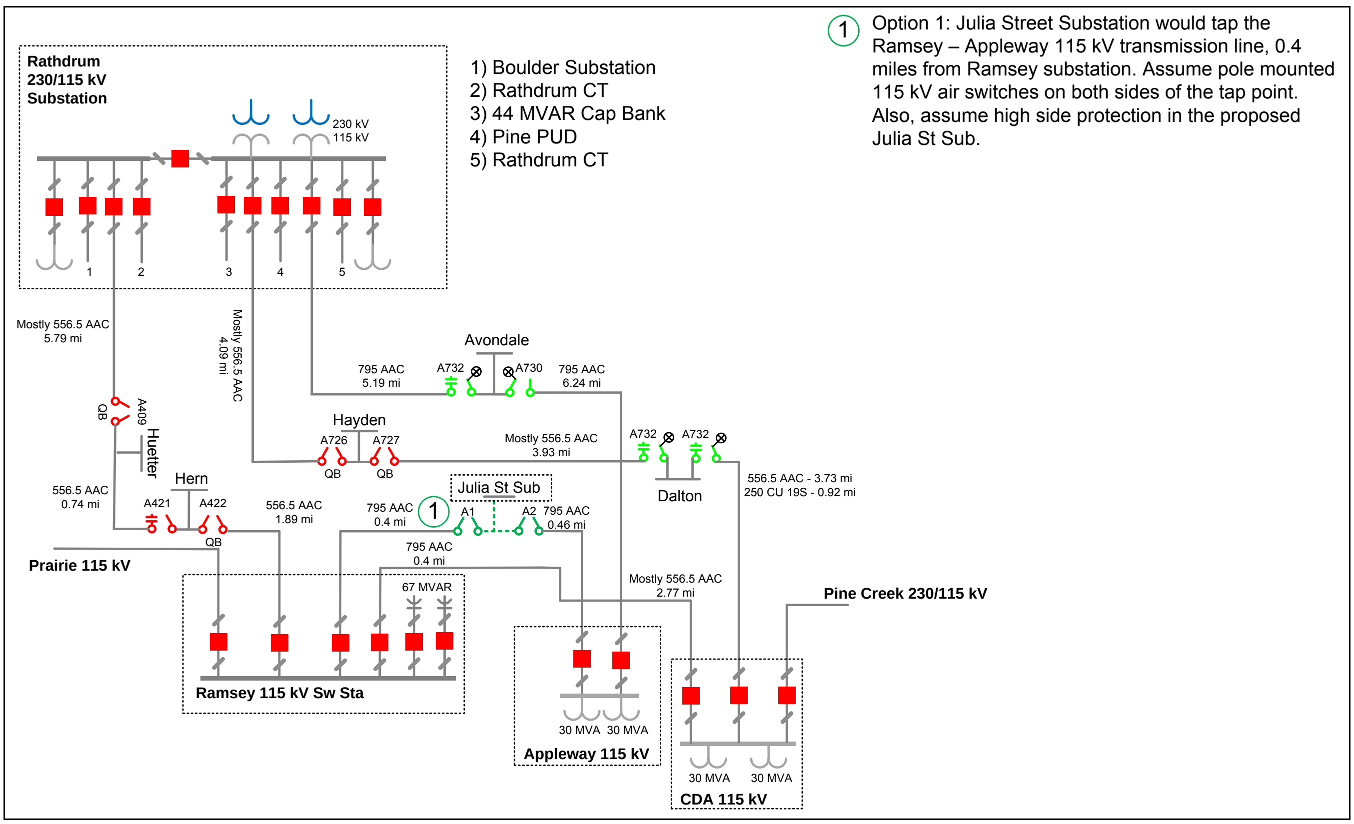
Reconstruct approximately (4) miles (8 miles total) of Avista 115kV transmission facilities on the Burke – Pine Creek #3 & #4 115 kV Transmission Lines between Big Creek Station and a point immediately east of the retired Bunker Hill Mine smelter. Years of smelter atmospheric discharge has caused considerable 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.

3.2.5 Julia Street Station

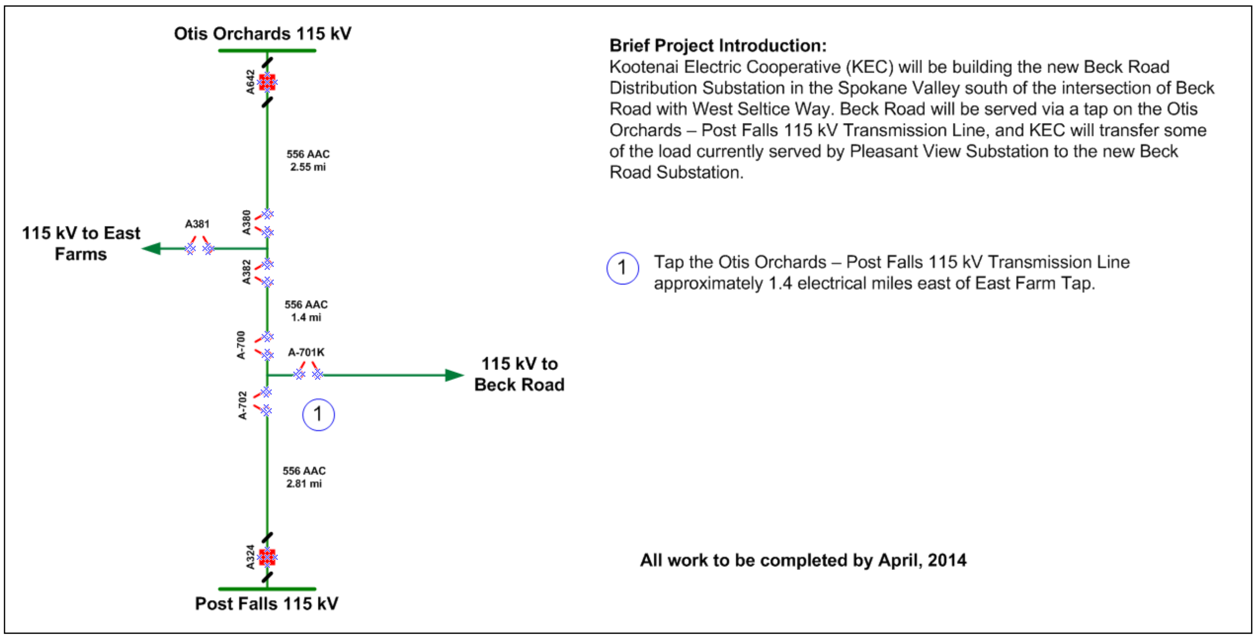
The BPA entered into a Network Integration Transmission Service System Impact Study Agreement with Avista Corporation ("Avista") for a proposed Julia Street Station 0.4 miles southeast of Avista's Ramsey Station. The projected operating date is 2013. A study conducted by Avista's System Planning Department analyzed two Point of Delivery (POD) options as designated in the System Impact Study Agreement, agreed upon in correspondence received April 15, 2011. The study results show the favored POD for the proposed Julia Street Station is a tap of the Ramsey – Rathdrum #2 115 kV Transmission Line (now the Appleway – Ramsey 115 kV Transmission Line). The Network Integration Transmission Service System Impact Study for Julia Street Station developed in June 2011 provides further detail on the proposed interconnection of Julia Street Station.

Completion of the project is scheduled for 2013. There is no additional project cost beyond 2013.



3.2.6 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.



3.2.7 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.

3.2.8 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.

3.2.9 Noxon Construction Station Rebuild

The Noxon Construction Station 230/13 kV transformer and some of the associated distribution facilties are being replaced.

3.2.10Cabinet 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.

3.2.11Pine Creek Transformer Replacement

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.

3.2.12Noxon – 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 intial 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 fo 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.

3.2.13St. 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.

3.2.14Priest 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.

3.2.15Sandpoint, 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 LEWISTON/CLARKSTON AREA

4.1 Corrective Action Plans

There are no required Corrective Action Plans in the Lewiston/Clarkston area.

4.2 Further Single System Projects

4.2.1 Clearwater Station Upgrade

Several components in this station have reached their life cycle and need to be replaced. Some of the station components are non-standard. This project will upgrade the station by adding 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. This work includes construction of a 115 kV line terminal and relocation of 2 lines, upgrading metering, and adding SCADA. The protective relays and associated communication system will be upgraded to improve reliability of service.

4.2.2 10^{th} & Stewart Station Rebuild

Several facilities within the 10^{th} & Stewart Station are desired to be replaced. 10^{th} & 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 10^{th} & 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 10^{th} & Stewart Station will reduce the exposure of three stations connected to the same transmission line.

4.2.3 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.

4.2.4 Pound Lane Station Rebuild

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

4.2.5 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.

4.2.6 South Lewiston Station Rebuild

South Lewiston #1 115/13.8 kV Transformer is one of the three remaining highest loss transformers and is planned to be replaced. Property to the north (vicinity of Southway and 1^{st}) 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.

4.2.7 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.

4.2.8 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.

4.2.9 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.

4.2.10Hatwai – Lolo #2 230 kV Transmission Line

A second 230 kV transmission line from Hatwai to Lolo and bypassing the Lolo Station to create a Hatwai – Oxbow 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. Construction of the proposed transmission line is desired to eliminate the need for the back tripping scheme.

4.2.11230 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.

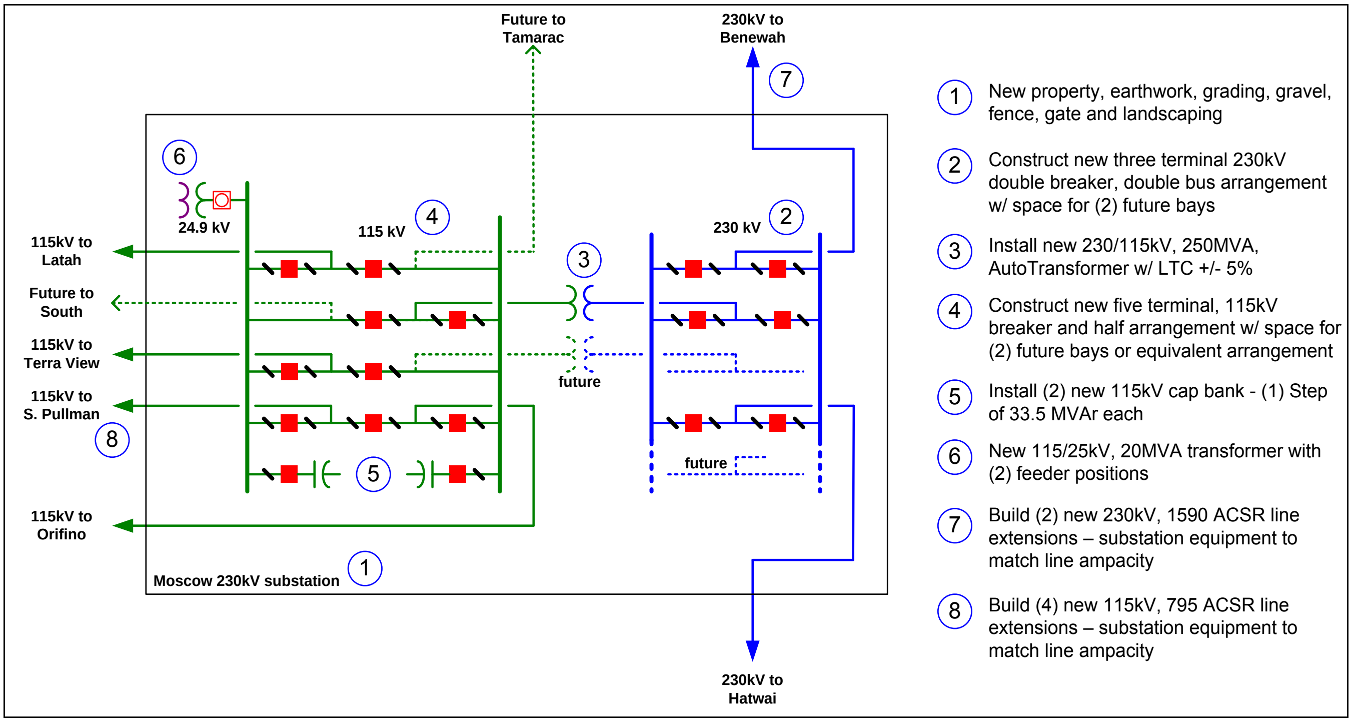
5 PALOUSE AREA

5.1 Corrective Action Plans

5.1.1 Moscow 230 Station Rebuild

To mitigate overloading of the Moscow 230/115 kV Transformer, the 125 MVA transformer needs to be replaced with a 250 MVA transformer. The Substation Engineering Department has identified several issues which warrant a rebuild of the Moscow 230 Station therefore a complete rebuild of the station has been coordinated with the replacement of the transformer. Construction began in 2010 and is scheduled to be completed in 2014.

The assessment indicated an inability of the System to meet the performance requirements in 2014.



5.2 Further Single System Projects

5.2.1 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.

5.2.2 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.

5.2.3 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.

5.2.4 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.

5.2.5 Potlatch Tranformer Replacement

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

5.2.6 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.

5.2.7 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.

5.2.8 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.

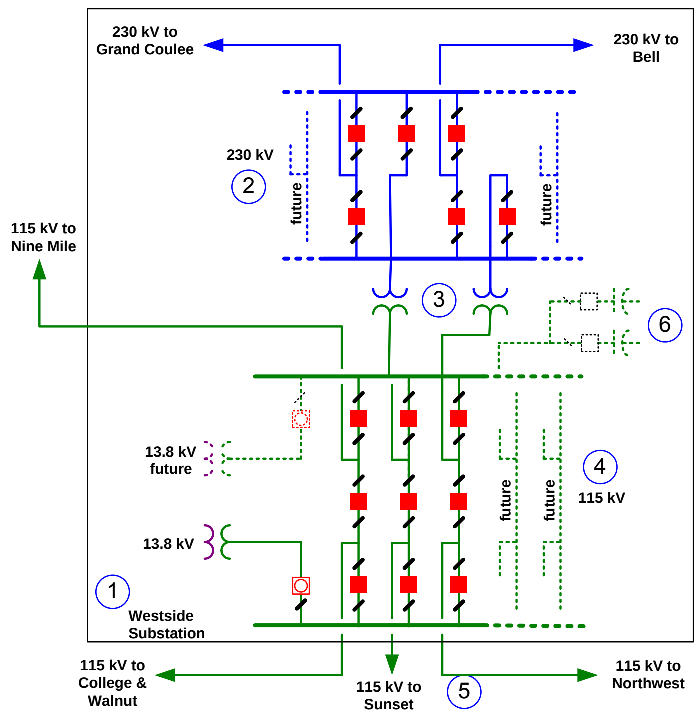
6 SPOKANE AREA

6.1 Corrective Action Plans

6.1.1 Westside Transformer Replacement

Replacing Westside #1 & #2 230/115 kV Transformers with 250 MVA nominal capacity transformers has been identified as a mitigating project for the existing 125 MVA nominal capacity transformers from exceeding their applicable facility ratings for several outages in the Spokane area. The Westside Station cannot be taken out of service for reconstruction. Completing the interconnection at Lancaster Station and constructing the Garden Springs Station will provide more operational flexibility for scheduled outages at the Westside Station. Constructability and the operational flexibility will be analyzed during the detailed project report process.

The assessment indicated an inability of the System to meet the performance requirements in 2014.



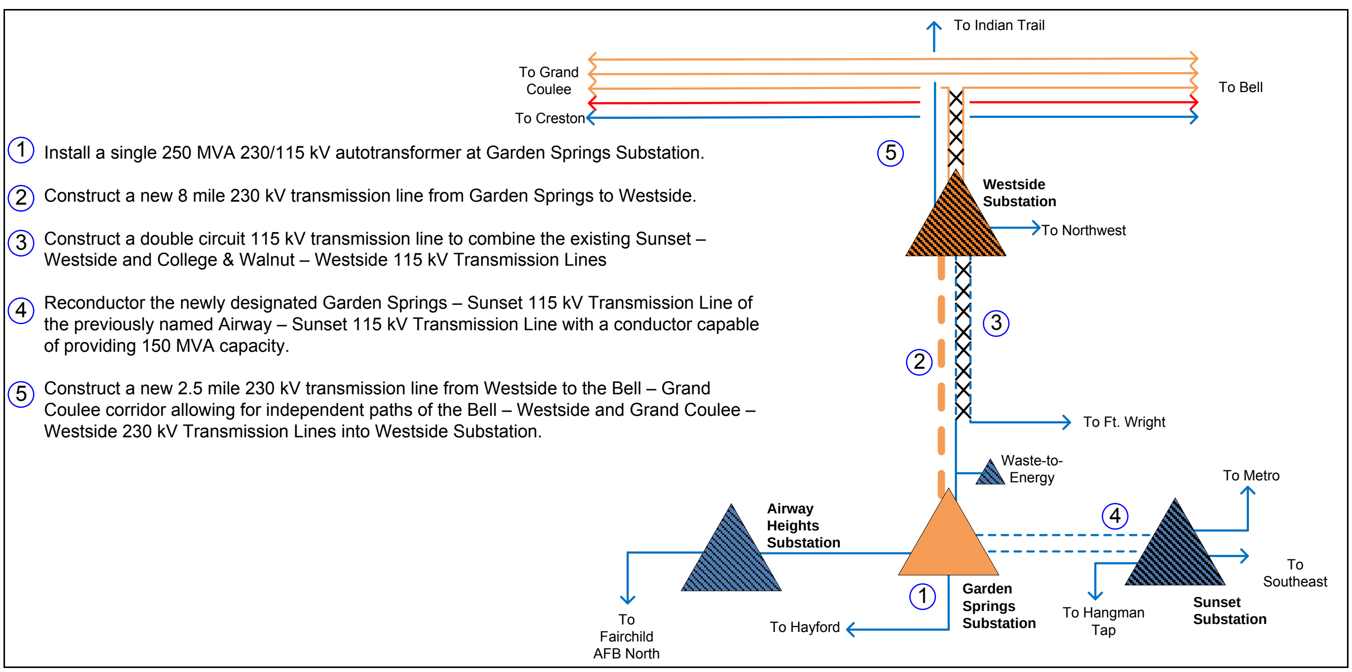
1. New green field site adjacent to existing Westside Substation to include property, earthwork, grading, gravel, fence/gate and landscaping
2. Construct new six terminal 230 kV double bus, double breaker arrangement with space for (2) future bays
3. Install two new 230/115 kV, 250MVA, AutoTransformer w/ LTC +/- 5%
4. Construct new six terminal 115 kV breaker and half arrangement with space for (2) future bays and two distribution transformer positions
5. Construct (4) new 115 kV, 150 MVA line extensions
   Install new 115/13.8 kV 30 MVA distribution transformer w/ space for 2nd future transformer and the potential of (6) 13 kV feeders
6. Potential 115 kV Cap Bank - (2) Step of XX MVar

6.1.2 Garden Springs Station Integration

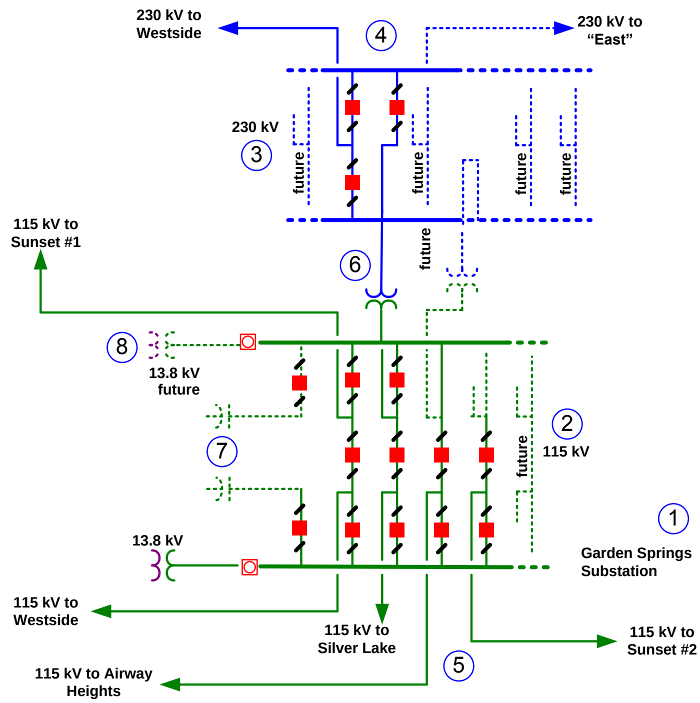
The Garden Springs Station is a proposed 230/115 kV station located on the southwest edge of Spokane. The existing Spokane area transmission system is constrained by limited 230/115 kV transformation. A new 250 MVA 230/115 kV transformer at the Garden Springs Station and replacing the existing Westside #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.

The assessment indicated an inability of the System to meet the performance requirements in 2014.



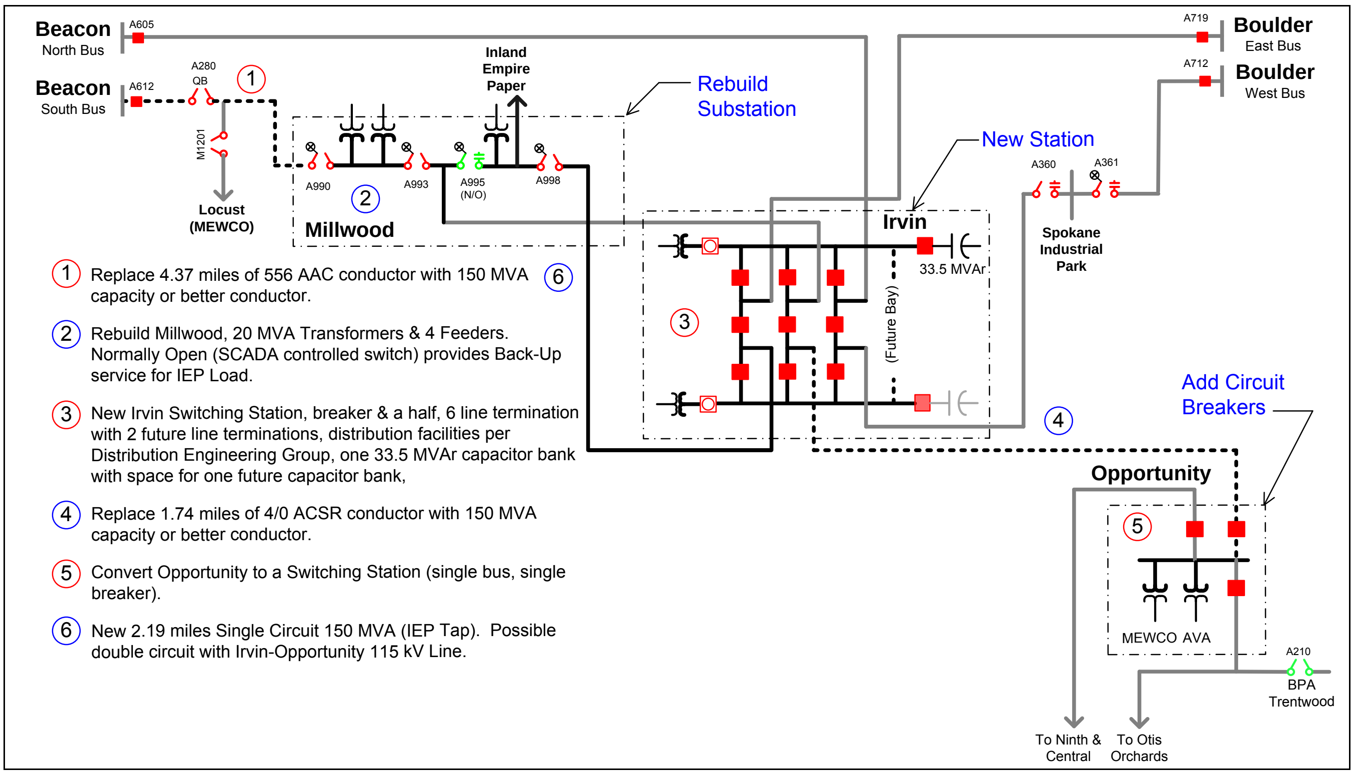
1. New green field site adjacent to existing 115 kV Garden Springs Switching Station to include property, earthwork, grading, gravel, fence/gate and landscaping
2. Construct new six terminal 115 kV breaker and half arrangement w/ space for 4 future terminals.
3. Construct new three terminal 230 kV double bus, double breaker arrangement w/ space for 4 future bays
4. Construct (2) new 230 kV, 800 MVA line extensions
5. Construct (5) new 115 kV, 150 MVA line extensions
6. Install new 230/115 kV, 250MVA, AutoTransformer w/ LTC +/- 5%
7. Potential 115 kV Cap Bank - (2) Step of XX MVAr
8. Install distribution facilities per Distribution Engineering Group.



6.1.3 Spokane Valley Transmission Reinforcement

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.

The assessment indicated an inability of the System to meet the performance requirements in 2014.



6.1.4 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.

The assessment indicated an inability of the System to meet the performance requirements in 2014.

6.1.5 Nine Mile – Westside Protection Upgrade

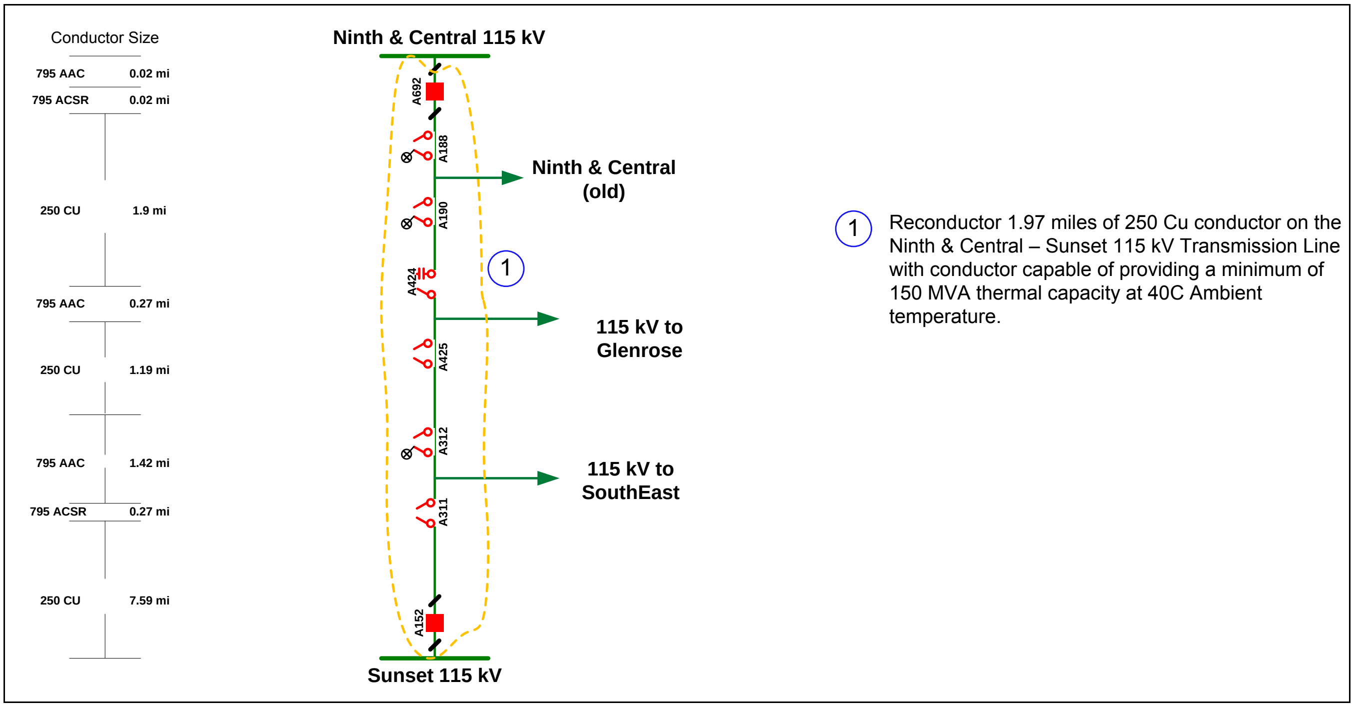
Implementation of a high speed, communication aided tripping scheme on the Nine Mile – Westside 115 kV Transmission Line is necessary to improve stability performance of the Nine Mile units. A new communication path is required between Nine Mile and Westside Stations. Upgrades and setting changes to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

The assessment indicated an inability of the System to meet the performance requirements in 2014.

6.2 Further Single System Projects

6.2.1 Ninth & Central – Sunset 115 kV Transmission Line Rebuild

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 .



6.2.2 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.

6.2.3 Chester Station Rebuild

The Chester Station is planned to be rebuilt.

6.2.4 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.

6.2.5 Northwest Station Rebuild

The Northwest Station is planned to be rebuilt.

6.2.6 Ninth & Central 230 kV Integration

At 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 the either of the existing Beacon – Ninth & Central #1 and #2 115 kV transmission lines to 230 kV is under evaluation.

6.2.7 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.

6.2.8 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.

6.2.9 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.

6.2.10 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.

6.2.11 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.

6.2.12Downtown East Station

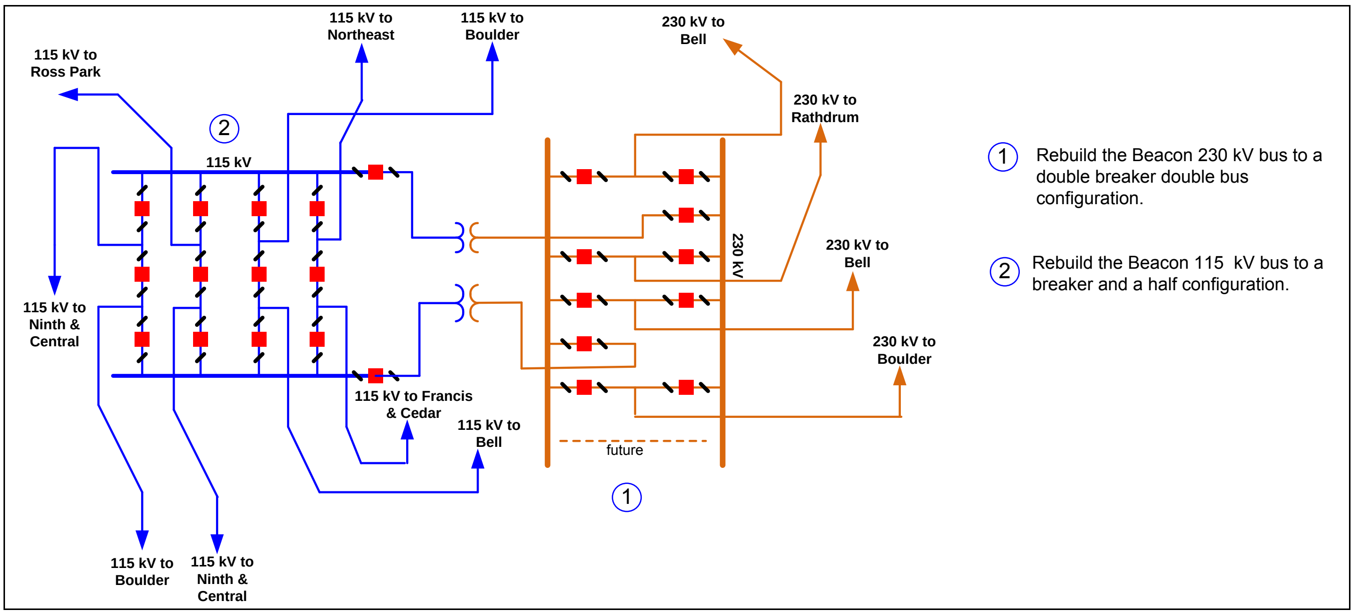
A new distribution station has been proposed on the eastern edge of the downtown Spokane area. The new station has been named Downtown East Station. Integration with the Transmission System has not been determined.

6.2.13Beacon – 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.

6.2.14Beacon 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.



6.2.15Bell 230/115 kV Transformation

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 a 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.

6.2.16 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.

6.2.17 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.

6.2.18 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.

6.2.19 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.

V 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[5]. 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.

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.

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

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.

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.

2.2 Identification of Analytical Tools

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

- PowerWorld Simulator Software, Version 17
  - 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.
- ASPEN OneLiner Software Build 2007.11.7 Group-1
  - ASPEN OneLiner is a PC-based short circuit and relay coordination program for relay engineers. OneLiner is an interactive productivity tool allowing the engineer to accurately model the transmission system, perform fault analysis by simulating all classical fault types, graphically plot fault solution and relay coordination curves and validate relay settings through relay models and automatic checking module.

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.

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:

John Gross
Transmission Planning Engineer, System Planning
PO Box 3727, MSC-16
Spokane, WA 99220
john.gross@avistacorp.com
(509) 495-4591

VI PLANNING ASSESSMENT

1 ASSESSMENT OVERVIEWS

Each area assessment includes a Transmission System assessment and distribution system assessment as described in the following descriptions:

1.1 Transmission System Assessment

Each area Transmission System assessment was conducted using the same analysis techniques. The assessments consisted of steady state analysis and stability analysis. For each analysis, studies based on computer simulation models were conducted using the base cases described in Appendix A - Planning Case Summary.

1.1.1 Transmission Planning Assumptions

The following assumptions have been used in the Process for performing technical studies. The assumptions are made upon the experience of Avista's System Planning Department and to comply with NERC Reliability Standards.

Transmission Planning Criteria

The transmission planning reliability criteria used in evaluating the performance of the Transmission System is the present North American Electric Reliability Corporation (NERC) Reliability Standards and WECC regional reliability regional business practice including the following:

- TPL-001-WECC-RBP-2.1 – System Performance
- TPL-001 – System Performance Under Normal Conditions
- TPL-002 – System Performance Following Loss of Single BES Element
- TPL-003 – System Performance Following Loss of Two or More BES Elements
- TPL-004 – System Performance Following Extreme BES Events
- FAC-010 – System Operating Limit Methodology for the Planning Horizon

A Steady State Performance Criteria

Steady state contingency analysis is performed for all contingencies defined in TP-SPP-06 – Contingency Analysis to determine whether the BES meets the applicable performance requirements. The following criteria are monitored during the analysis:

1. Category A: During normal operating conditions, no facilities shall exceed their applicable facility ratings or exceed the desired voltage range.
2. Category B: During single contingency scenarios, including but not limited to line end open and relocation of normally open points, no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage.
3. Category C: During multiple contingency scenarios (including but not limited to bus outages, common mode outages, and adjacent circuit outages), no facilities shall exceed their applicable facility ratings nor shall they exceed the desired voltage range. NERC allows controlled load shedding or curtailment of transfers to be implemented; however, Avista does not have emergency ratings and therefore does not have the ability to utilize load shedding. A plan of service shall be developed such that the system meets the NERC Category C requirements using normal facility ratings.
4. Category D: During extreme contingencies, system performance is analyzed on a case-by-case basis for performance and potential mitigation.

B Transient Stability Performance Criteria

Transient stability analysis is performed for all contingencies defined in TP-SPP-06 – Contingency Analysis to determine whether the BES meets the applicable performance requirements. The WECC criteria provided in TPL-001-WECC-RBP-2 – System Performance and shown in Table VI-1 are monitored. A graphical representation of the voltage performance criteria is illustrated in Figure VI-1.

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 VI-1: WECC SYSTEM PERFORMANCE CRITERIA TABLE W-1.

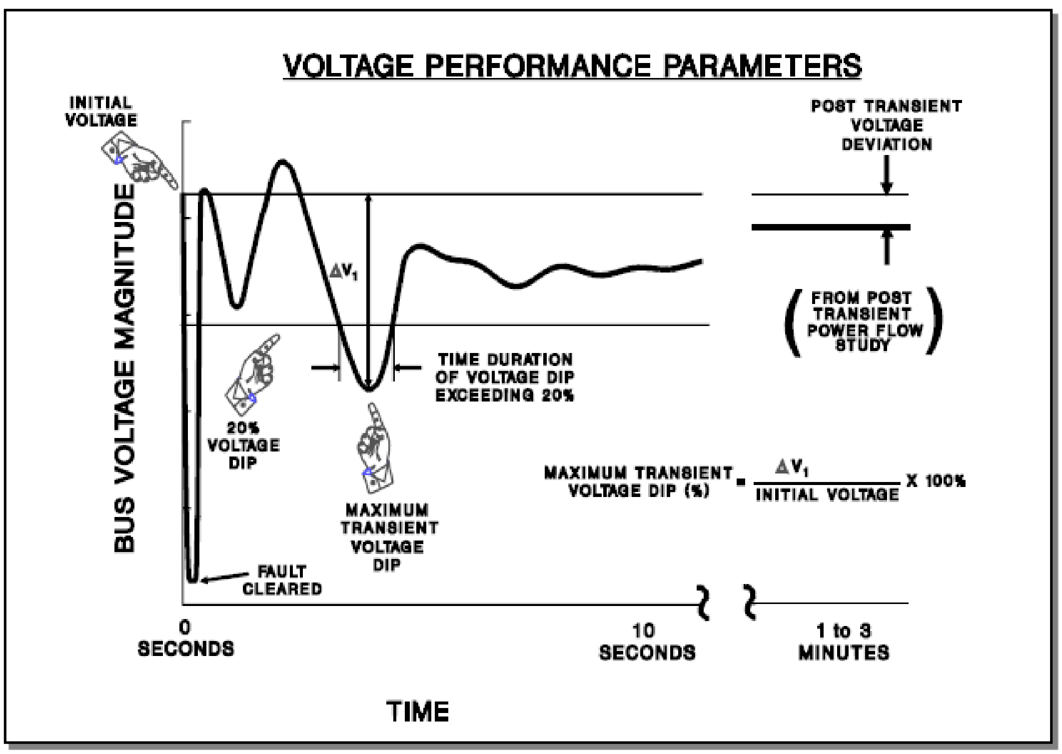


FIGURE VI-1: VOLTAGE PERFORMANCE CRITERIA

Planning Case Development

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. No planned transmission expansion project facilities. During previous studies, inclusion of non-committed planned transmission facilities has incorrectly hidden potential reliability and load-service requirements. Subsequently, a Corrective Action Plan was not developed as required. (TPL-001-0.1 R1.3.8, TPL-002-0b R1.3.8, TPL-003-0b R1.3.8, TPL-004-0a R1.3.5)

- 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-001-0.1 R1.3.12, TPL-002-0b R1.3.12, TPL-003-0b R1.3.12, TPL-004-0a R1.3.9)

- Known commitments for Firm Transmission Service and Interchange. Modeling WECC Rated Paths at their limits represents all existing known commitments. Future commitments exceeding the limits of WECC Rated Paths are not presently studied. (TPL-001-0.1 R1.3.5, TPL-002-0b R1.3.5, TPL-003-0b R1.3.5, TPL-004-0a R1.3.4)

- 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. (TPL-001-0.1 R1.3.4)

- Reactive Power Resources. All existing Reactive Power Resources are modeled to ensure adequate reactive resources are available. (TPL-001-0.1 R1.3.9, TPL-002-0b R1.3.9, TPL-003-0b R1.3.9, TPL-004-0a R1.3.6)

The following scenarios are developed to represent various seasonal conditions (TPL-001-0.1 R1.3.1 & R1.3.6, TPL-002-0b R1.3.2 & R1.3.6,, TPL-003-0b R1.3.2 & R1.3.6,, TPL-004-0a R1.3.2):

- Heavy Summer: typical summer peak scenario where the Avista Balancing Authority Area load is near peak and the local hydro generation is at a typical mid-summer output. This scenario represents Avista's heavy summer loading with moderate transfers into Avista's Balancing Authority Area. 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.
    - Year two (next year, i.e. 2013 case if case is created and used in 2012).

- Year five (TPL-001-0.1 R1.2, TPL-002-0b R1.2, TPL-003-0b R1.2, TPL-004-0a R1.2)
- Year ten (TPL-001-0.1 R1.2 & R1.3.3, TPL-002-0b R1.2 & R1.3.4, TPL-003-0b R1.2 & R1.3.4)

- Heavy Summer with Low Local Hydro Generation (Heavy Summer, Low Hydro case): 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.
  - Year two (next year, i.e. 2013 case if case is created and used in 2012).
  - Year five (TPL-001-0.1 R1.2, TPL-002-0b R1.2, TPL-003-0b R1.2, TPL-004-0a R1.2)
  - Year ten (TPL-001-0.1 R1.2 & R1.3.3, TPL-002-0b R1.2 & R1.3.4, TPL-003-0b R1.2 & R1.3.4)
- Heavy Winter: typical winter peak scenario where the Avista Balancing Authority Area load is heavy but the lower ambient temperature increases the operating limits of the various elements of the Transmission System. Local hydro generation is at a moderate level and there are significant transfers into Avista's Balancing Authority Area from regional thermal resources.
  - Year two (next year, i.e. 2013 case if case is created and used in 2012).
  - Year five (TPL-001-0.1 R1.2, TPL-002-0b R1.2, TPL-003-0b R1.2, TPL-004-0a R1.2)
  - Year ten (TPL-001-0.1 R1.2 & R1.3.3, TPL-002-0b R1.2 & R1.3.4, TPL-003-0b R1.2 & R1.3.4)
- Light Summer with High West of Hatwai Flows (High Transfer case): during light summer (night time loading) with high Western Montana Hydro and high Montana thermal generation, the WECC rated path "West of Hatwai" (WECC Path #6) reaches its heaviest loading. During this scenario, portions of the Transmission System are nearing their stability limits. These limits define some of the operating constraints for the region and also establish some of the arming levels for Remedial Action Schemes (RAS). This scenario is also limited by the summer thermal limits on various elements of the transmission system, which helps to define where the system is near capacity.
  - Year two (next year, i.e. 2013 case if case is created and used in 2012).
  - Year five (TPL-001-0.1 R1.2, TPL-002-0b R1.2, TPL-003-0b R1.2, TPL-004-0a R1.2)

A detailed summary of specific flows and loading levels for the Planning Cases used in the 2013 Planning Assessments is provided in Appendix A - Planning Case Summary.

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 2013 Planning Assessments did not include any potential generation in the technical studies.

1.1.2 Study Methodology

Contingency Analysis

The contingencies evaluated for steady state and transient stability technical 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 Category B, C, and D contingencies evaluated. (TPL-002-0b R1.3.1, TPL-003-0b R1.3.1, TPL-004-0b R1.3.1)

The effects of existing protection systems and control devices are included in the contingency analysis performed. (TPL-002-0b R1.3.10 & R1.3.11, TPL-003-0b R1.3.10 & R1.3.11, TPL-004-0b R1.3.7 & R1.3.8)

Voltage Stability

A Background

Steady state analysis techniques are used to evaluate the voltage stability performance of the transmission system. PV and QV analysis are used to assess the area's conformity with the relevant planning criteria. 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 while QV analysis yields the reactive power margin at a particular bus in the transmission system under consideration.

A key element of voltage stability studies is the determination of a critical bus or a cluster of critical buses. According to the WECC publication "Voltage Stability Criteria, Undervoltage Load Shedding Strategy, and Reactive Power Reserve Monitoring Methodology" (1998), the critical bus exhibits one or more of the following characteristics under the worst single or multiple contingency:

- Has the highest voltage collapse point on the QV curve,
- Has the lowest reactive power margin,
- Has the greatest reactive power deficiency,
- Has the highest percentage change in voltage.

B Methodology

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. A Transfer Path PV Curve analysis was also conducted in the areas where WECC Rated Paths were located. The Transfer Path PV Curve analysis for each area was conducted on the 2014 Heavy Transfer case. The Load Ramp PV Curve analysis was conducted on the 2018 Heavy Summer case.

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 A performance,
2. 5% below the area load magnitude corresponding to the 'nose-point' on the PV curve representing the worst Category B contingency,
3. 2.5% below the area load magnitude corresponding to the 'nose-point' on the PV curve representing the worst Category C contingency (controlled load shedding is allowed to achieve this operating limit).

Using results of the PV analysis, a set of critical buses can be determined. All critical buses and 115 kV buses of 230/115 kV transformers are studied in the QV analysis. For each area, all bus voltages in the area are monitored as the reactive demand at the bus under study is varied. The process is repeated for a set of contingencies depicting one or more transmission outages and for the remaining buses to be studied. LTC and switched shunts were disabled to provide a post-transient response prior to operator intervention. The reactive power margin (RPM) can be assessed from the results of the QV analysis. RPM is defined as the negative of the value of the reactive demand at the minimum point of the QV curve.

Spare Equipment Analysis

The NERC Reliability Standard TPL-001-4, requirement 2.1.5. (currently pending regulatory approval) states the following:

> When an entity's spare equipment strategy could result in the unavailability of major Transmission equipment that has a lead time of one year or more (such as a transformer), the impact of this possible unavailability on System performance shall be studied. The studies shall be performed for the P0, P1, and P2 categories identified in Table 1 with the conditions that the System is expected to experience

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 was 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. Only the Heavy Summer scenario in the five year planning horizon was studied.

1.2 Distribution Assessment

The primary method of analysis for this work is a thorough SynerGEE analysis of each feeder system wide. New models were created and updated as of September. Peak loads were updated to the peak monthly read from 2012. Loads subject to switching variances were omitted where obvious. One primary upgrade in this process from previous methods is that three phase values were used on each feeder, allowing imbalance to be analyzed.

From these analyses, two primary outputs were used for the purposes of these assessments – Level of service issues and capacity problems. A cursory look was taken at reliability statistics, more research will be done as a new spatial analysis is performed. Fault studies were not performed on this analysis, individual protection issues may be identified in the next round of area assessments, provided a more programmatic method of identifying problems is derived.

2 BIG BEND AREA

2013 PLANNING ASSESSMENT

2.1 Executive Summary

The Big Bend area transmission system assessment demonstrated several reliability performance issues. Most reliability performance issues observed occur in 2014 and worsen in the five and ten year planning horizon. The most severe outage is a 115 kV breaker failure at the GCPD Sand Dunes Station. The area's dependence on the Sand Dunes Station leaves the System with a single point of failure causing wide spread outages.

Completion of the Benton – Othello SS 115 kV Transmission Line Rebuild Project and the Lind – Warden 115 kV Transmission Lines Rebuild Project will provide greatly improved transmission system performance in the five and ten year planning horizon. Replacement of several aging facilities within and around Stratford Station will also contribute to improved reliability.

A list of the Corrective Action Plans proposed for the Big Bend area is provided below. A detailed description of each project can be found in Section IVof this document.

- Addy – Devil's Gap 115 kV Transmission Line Project
- Benton – Othello 115 kV Transmission Line Project
- Chelan – Stratford 115 kV Transmission Line Project
- Stratford Station Rebuild Project
- Saddle Mountain Integration
- Lind – Warden 115 kV Transmission Line Project

2.2 General 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 local transmission system consists of 115 kV transmission lines sourced by neighboring utility 230 kV transmission lines.

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.

2.2.1 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:

- Wanapum – Walla Walla (AVA/PACW)
- Talbot – Walla Walla (PACW)

- Talbot – Dry Creek (AVA/PACW).

These last three lines do not serve any Big Bend area load; they merely cross the geographic area.

Transmission Paths

The Western Electricity Coordinating Council (WECC) transfer path West of Hatwai (Path 6) borders the eastern edge of the Big Bend area. Avista owns three transmission lines and three substation terminals within the path:

- Harrington – Odessa 115 kV; metered at Harrington
- Lind – Roxboro 115 kV; metered at Lind
- Dry Creek – Talbot 230 kV; metered at Dry Creek

The BPA owns the remaining transmission facilities which comprise the West of Hatwai path.

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).

2.2.2 Area Generation

Local Generation

Local generation facilities within the Big Bend area include the following:

Kettle Falls ST	Unit 1 @ 50 MW	Avista
Kettle Falls CT	Unit 1 @ 7 MW	Avista
Little Falls HED	Unit 1 & 3 @ 8.2 MW each	Avista
	Unit 2 @ 8.8 MW	Avista
	Unit 4 @ 8.6 MW	Avista
Long Lake HED	Unit 1, 2 & 4 @ 22.2 MW each	Avista
	Unit 3 @ 21.9 MW	Avista

- Main Canal HED Unit 1 @ 22 MW GCPHA[6]
- Summer Falls HED Unit 1 & 2 @ 46.2 MW GCPHA

Active Generation Interconnection Requests (as of October 2013)

- Project #33 250 MW Lind 115 kV Station
- Project #35 200 MW Thornton 230 kV Station
- Project #36 105 MW Thornton 230 k Station
- Project #39 7.6 MW Nine Mile HED

2.2.3 Area Loads

Load growth in the Big Bend area is projected to be 0.93% for summer and 0.80% for winter. Total anticipated load not including transmission system losses for 2014 peak summer is 203 MW and for peak winter is 180 MW.

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

2.3 Transmission System Assessment

2.3.1 Steady State Analysis

Contingency Study

The following sections describe system deficiencies and the associated actions needed to achieve required system performance.

A GCPD Frenchman – Sand Dunes 115 kV Line

PROBLEM

Beginning in 2014, Avista load in the Big Bend area causes overloads within GCPD for the N-1-1 outage of the Sand Dunes 230/115 kV Transformer followed by the loss of the 3-terminal Larson – Sand Dunes – Warden 115 kV Transmission Line (Figure VI-2).

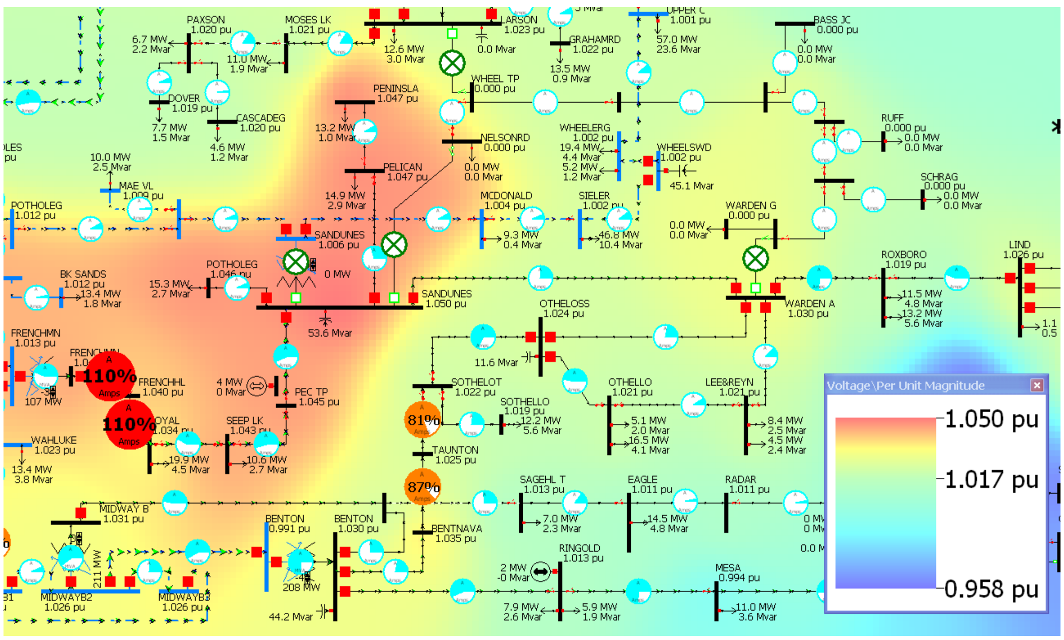


FIGURE VI-2: GRANT CPUD FACILITY VIOLATIONS DUE AVISTA LOADING

A reasonable response to this contingency is for GCPD to separate their system from the Avista Big Bend area by opening the Sand Dunes – Warden 115 kV Transmission Line. Opening this line clears the violations within GCPD, but it would introduce both thermal and voltage facility violations into the Big Bend area (Figure VI-3).

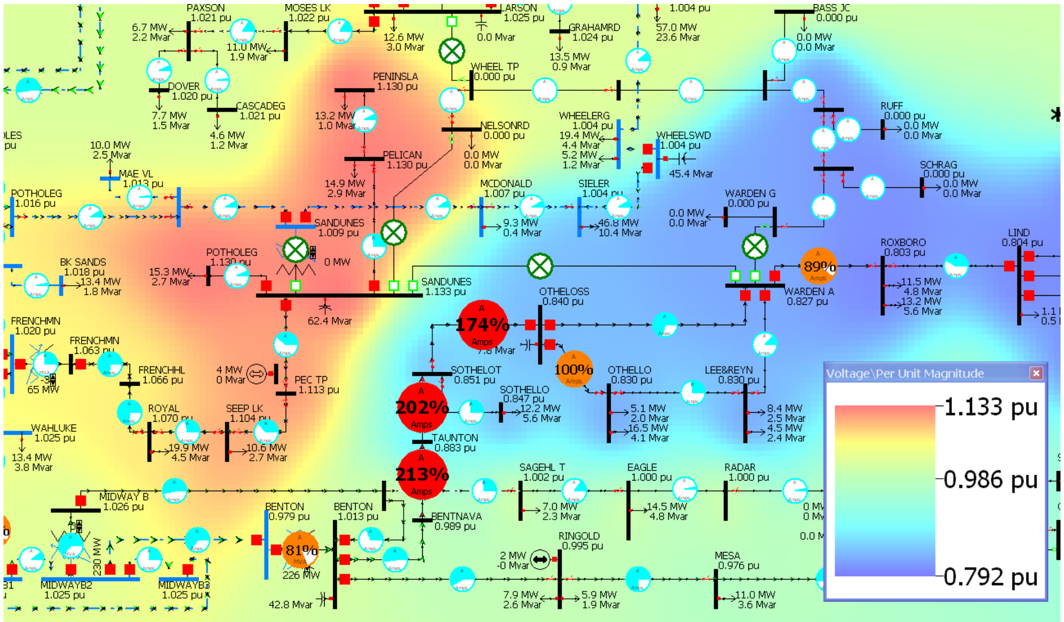


FIGURE VI-3: GCPD AND AVISTA SYSTEMS SEPERATED

MITIGATION

Accelerating the currently planned rebuild of Avista's portion of the Benton – Othello 115 kV and Avista's Lind – Warden 115 kV transmission lines clears the facility thermal violations, but the two projects alone do not adequately address the remaining facility voltage violations. The System Planning Department will conduct joint studies in the area to create a plan to more adequately serve Avista's Big Bend area load during all conditions.

B Benton – Othello 115 kV Transmission Line

PROBLEM

The Benton – OthelloSS 115 kV Transmission Line exhibits thermal overloads for various contingencies beginning in 2014 (Table VI-2 and Figure VI-4). This line is 37.01 miles long, and it is composed of 1/0 CU, 2/0 CU, 7#8 CU, 310.8 AAC, and 556.5 AAC conductor segments resulting in a 50.2 MVA capacity limit at 40C.

TABLE VI-2: BENTON – OTHELLO 115 KV THERMAL VIOLATIONS

Thermal Rating % / Row Labels	Column Labels 14HS	14HSLH	18HS	18HSLH	23HS	23HSLH	32HS	32HSLH	32HW
⊟BENTNAVA - TAUNTON 115.00 kV #1 Line									
⊟C.1 / C.2 / C.8 / C.9									
BUS: Warden 115 kV							107.9	103.1	
⊟C.2 / C.8									
BF: A253 Warden 115 kV, Lind-Warden							107.9	103.1	
BF: A254 Warden 115 kV, Larson-Sand Dunes-Warden							107.8	103.1	
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden	198.9	198.6	211.6	211.5	237.4	219.9			110.3
⊟OTHELOSS - SOTHELOT 115.00 kV #1 Line									
⊟C.2 / C.8									
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden	162.3	162.1	172.4	172.3	193.4	179.5			
⊟SOTHELOT - TAUNTON 115.00 kV #1 Line									
⊟C.1 / C.2 / C.8 / C.9									
BUS: Warden 115 kV							102.3		
⊟C.2 / C.8									
BF: A253 Warden 115 kV, Lind-Warden							102.3		
BF: A254 Warden 115 kV, Larson-Sand Dunes-Warden							102.3		
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden	188.6	188.2	200.6	200.5	225.0	208.4			104.1

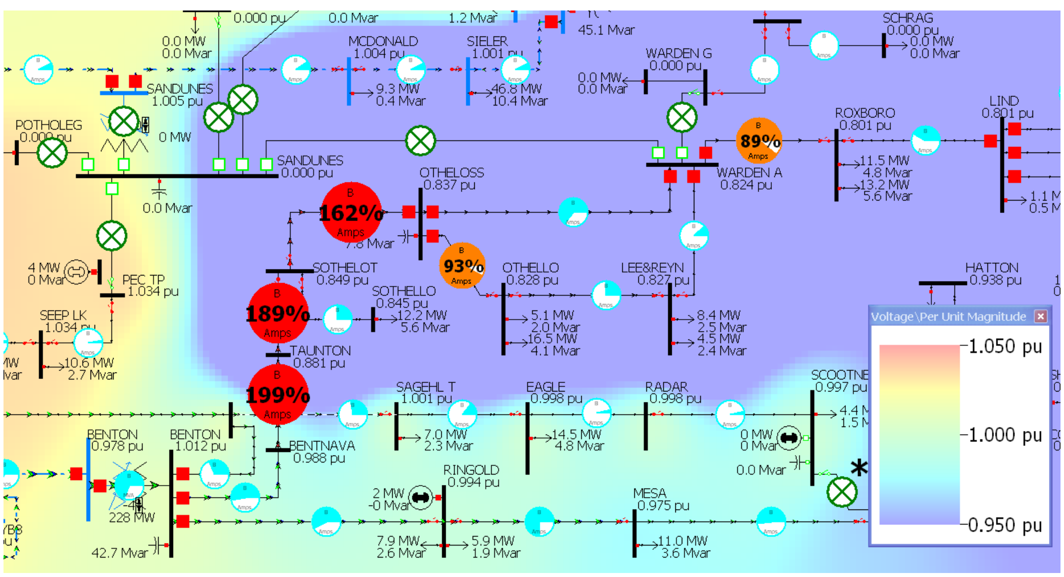


FIGURE VI-4: SAND DUNES BREAKER FAILURE; 2014 HEAVY SUMMER

MITIGATION

The Benton – Othello 115 kV Transmission Line is scheduled to be rebuilt to roughly 205 MVA capacity at 40C by the end of 2016. The increased thermal capacity is sufficient to mitigate the observed thermal overloads.

C Chelan – Stratford 115 kV Transmission Line

PROBLEM

The Chelan – Stratford 115 kV Transmission Line overloads for various outages beginning in 2014 as shown in Table VI-3 and Figure VI-5. The line is 49.36 miles long, and it is composed of 19#8 CU, 250 CU, and 556.5 ACSR conductor segments resulting in a capacity limitation of 78.2 MVA at 40C.

TABLE VI-3: CHELAN – STRATFORD 115 KV THERMAL VIOLATIONS

Thermal Rating % / Row Labels	14HT	18HT
CHELAN - HEADWORK 115.00 kV #1 Line		
B.2		
N-1: Larson - Stratford 115 kV	129.5	131.4
N-1: Larson - Stratford 115 kV Open @ LAR	124.9	127.0
N-1: Larson - Stratford 115 kV Open @ STR	129.5	131.4
C.1 / C.2 / C.7 / C.8 / C.9		
BUS: Larson 115 kV	124.8	126.9
C.2 / C.8		
BF: GB1410 Larson 115 kV, Larson-Sand Dunes-Warden	124.7	126.9
BF: GB1412 Larson 115 kV, Larson-Stratford	129.4	131.3

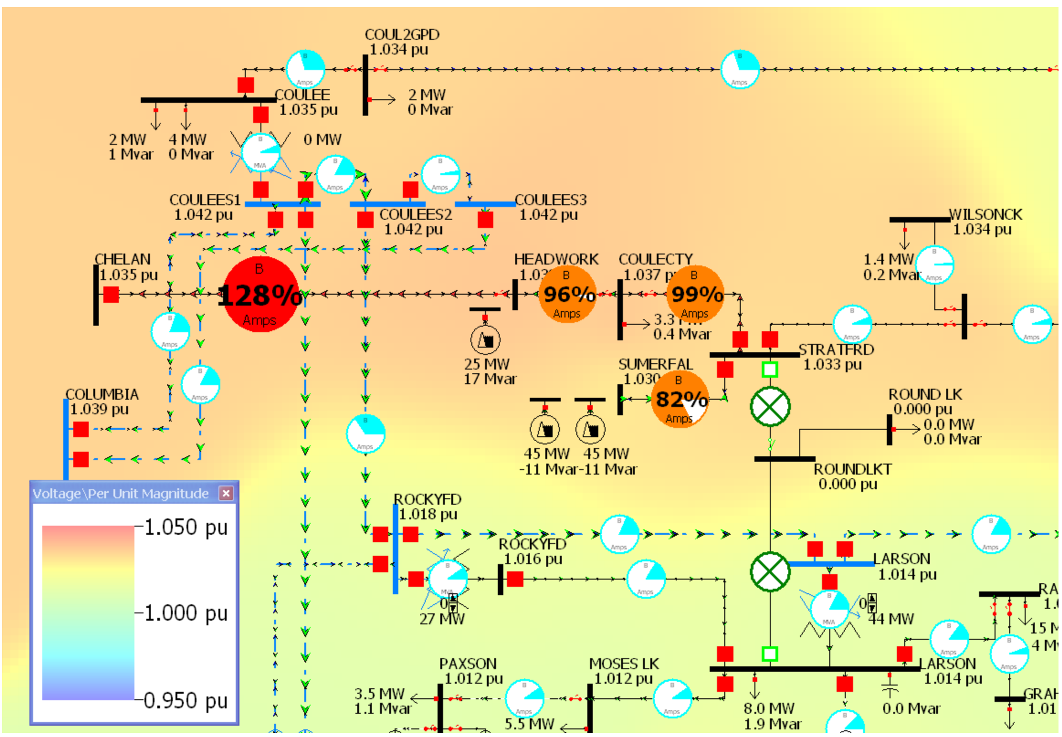


FIGURE VI-5: LARSON – STRATFORD 115 KV OUTAGE; 2014 HIGH TRANSFER

MITIGATION

The Chelan – Stratford 115 kV Transmission Line is scheduled to be rebuilt to 120 MVA capacity at 40C by the end of 2016.The increased thermal capacity is sufficient to mitigate the observed thermal overloads.

D Addy – Devil's Gap 115 kV Transmission Line

PROBLEM

The Ford – Long Lake Tap segment of the Addy – Devil's Gap 115 kV Transmission Line overloads beginning in 2014 for the common right-of-way outage of the Airway Heights – Devil's Gap and Devil's Gap – Nine Mile 115 kV transmission lines (Table VI-4 and Figure VI-6). The line segment under consideration is 5.19 miles long, and it is primarily constructed with 266.8 ACSR and 397.5 ACSR conductor resulting in a capacity limitation of 71.5 MVA at 40C.

TABLE VI-4: ADDY – DEVIL'S GAP 115 KV THERMAL VIOLATIONS

Thermal Rating %	Column Labels					
Row Labels	14HS	14HT	18HS	18HT	23HS	32HS
⊟ FORD - LONGLAKT 115.00 kV #1 Line						
⊟ D.7						
N-2: Airway Heights - Devils Gap 115 kV and Devils Gap - Nine Mile 115 kV	137.1	142.8	136.2	142.2	135.1	133.5

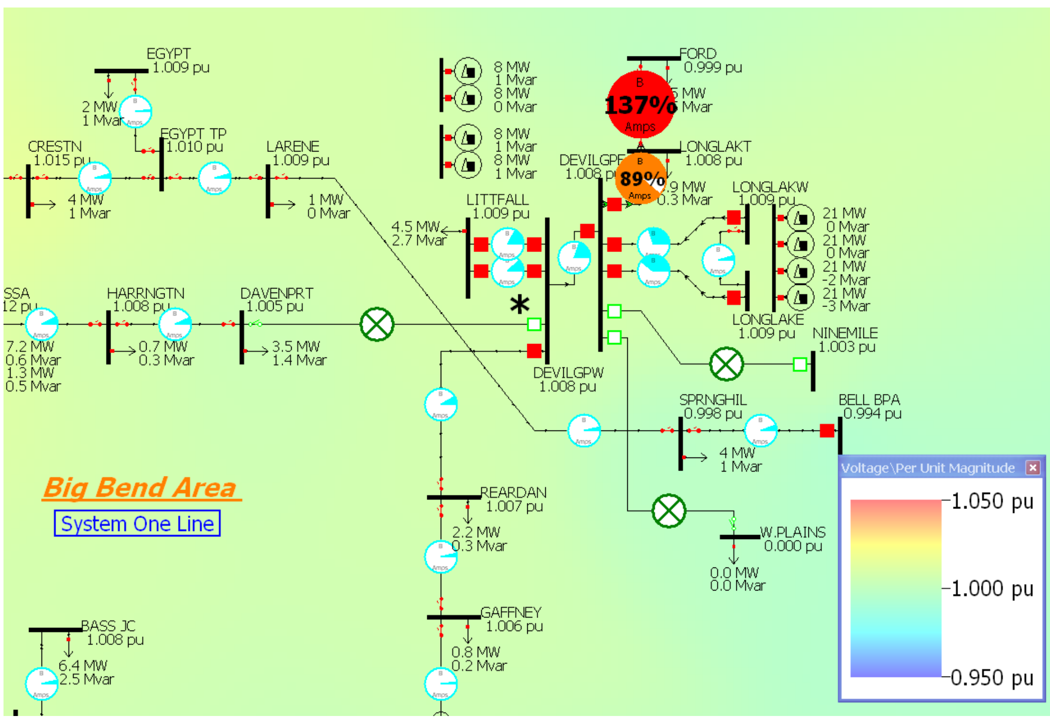


FIGURE VI-6: N-2 RIGHT OF WAY OUTGAGE; 2014 HEAVY SUMMER

MITIGATION

The limiting segments of the Addy – Devil's Gap 115 kV Transmission Line are scheduled to be rebuilt to a capacity of 150 MVA at 40C by the end of 2017.The increased thermal capacity is sufficient to mitigate the observed thermal overloads.

E Lind – Warden 115 kV Transmission Line

Problem

The Roxboro – Warden segment of the Lind – Warden 115 kV Transmission Line overloads beginning in 2023 for a breaker failure (GB1250) at the Sand Dunes 115 kV bus (Table VI-5 and Figure VI-7: Sand Dunes gb1250 breaker failure; 2023 Heavy Summer). 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.

TABLE VI-5: LIND – WARDEN 115 KV FACILITY THERMAL VIOLATIONS

Thermal Rating % / Row Labels	Column Labels: 23HS	23HSLH
⊟ ROXBORO - WARDEN A 115.00 kV #1 Line		
⊟ C.2 / C.8		
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden	109.3	101.4

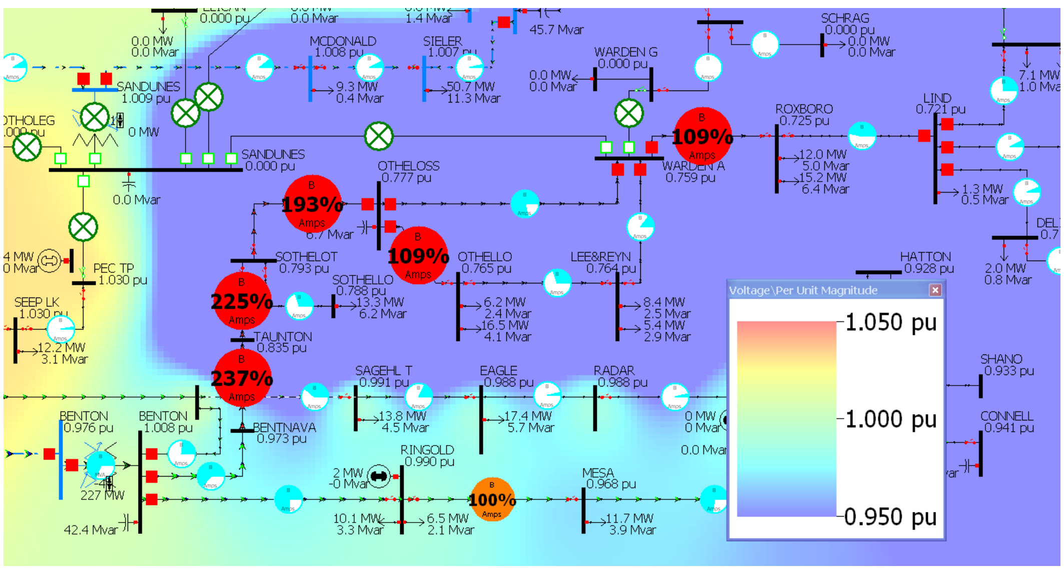


FIGURE VI-7: SAND DUNES GB1250 BREAKER FAILURE; 2023 HEAVY SUMMER

Mitigation

The Lind – Warden 115 kV Transmission Line is scheduled to be rebuilt to a capacity of 150 MVA at 40C by the end of 2018.The increased thermal capacity is sufficient to mitigate the observed thermal overloads.

F Area Low Voltage Issues

PROBLEM

Several regional outages cause low voltages on the 115 kV buses from Othello to Ritzville starting in 2014 (Table VI-6 and Figure VI-8). Capacitor banks at Othello and Lind do not, on their own, mitigate the low voltage issues.

TABLE VI-6: 115 KV VOLTAGE VIOLATIONS

Min of Value / Row Labels	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
Bus Low Volts												
115												
BF: A253 Warden 115 kV, Lind-Warden												
LEE&REYN (48308) 115.00 kV	0.9398	0.9403	0.9212	0.9369	0.9371	0.9473	0.9312		0.9199	0.9200	0.9492	
OTHELLO (48307) 115.00 kV	0.9402	0.9408	0.9217	0.9374	0.9376	0.9478	0.9318		0.9205	0.9206	0.9497	
OTHELOSS (48309) 115.00 kV	0.9469	0.9474	0.9283	0.9442	0.9444		0.9389		0.9277	0.9282		
SOTHELLO (48391) 115.00 kV	0.9478	0.9484	0.9320	0.9452	0.9454		0.9400		0.9316	0.9295		
BF: A254 Warden 115 kV, Larson-Sand Dunes-Warden												
LEE&REYN (48308) 115.00 kV	0.9401	0.9407	0.9218	0.9373	0.9374	0.9477	0.9318		0.9206	0.9205	0.9498	
OTHELLO (48307) 115.00 kV	0.9406	0.9411	0.9222	0.9378	0.9379	0.9482	0.9323		0.9211	0.9211		
OTHELOSS (48309) 115.00 kV	0.9472	0.9478	0.9288	0.9446	0.9448		0.9394		0.9284	0.9288		
SOTHELLO (48391) 115.00 kV	0.9481	0.9487	0.9325	0.9456	0.9458		0.9405		0.9322	0.9301		
BF: A561 Othello SS 115 kV, Benton-Othello Switching Station												
DELIGHT (47025) 115.00 kV											0.9445	
LEE&REYN (48308) 115.00 kV											0.9487	
LIND (48187) 115.00 kV											0.9463	
MARENGO (48221) 115.00 kV											0.9432	
OTHELLO (48307) 115.00 kV											0.9479	
RALSTONB (47073) 115.00 kV											0.9437	
RITZVILL (48365) 115.00 kV								0.9475		0.9425	0.9353	
ROXBORO (48375) 115.00 kV											0.9434	
WASHTUNA (48457) 115.00 kV											0.9442	
BF: GB1250 Sand Dunes 115 kV, Larson-Sand Dunes-Warden												
DELIGHT (47025) 115.00 kV	0.7993	0.8007	0.8978	0.7739	0.7744	0.9484	0.7183	0.7736	0.9095			0.9369
LEE&REYN (48308) 115.00 kV	0.8272	0.8285	0.9053	0.8075	0.8080	0.9458	0.7642	0.8114	0.9106			0.9407
LIND (48187) 115.00 kV	0.8013	0.8027	0.8980	0.7762	0.7767	0.9484	0.7211	0.7761	0.9098			0.9373
MARENGO (48221) 115.00 kV	0.7989	0.8003	0.8978	0.7733	0.7739	0.9483	0.7175	0.7728	0.9095			0.9368
OTHELLO (48307) 115.00 kV	0.8280	0.8293	0.9056	0.8084	0.8088	0.9459	0.7653	0.8123	0.9109			0.9411
OTHELOSS (48309) 115.00 kV	0.8373	0.8385	0.9118	0.8184	0.8189		0.7768	0.8229	0.9174			0.9481
RALSTONB (47073) 115.00 kV	0.7993	0.8007	0.8979	0.7738	0.7743	0.9484	0.7180	0.7733	0.9096			0.9369
RITZVILL (48365) 115.00 kV	0.7893	0.7908	0.8917	0.7635	0.7640	0.9419	0.7068	0.7628	0.9022			0.9285
ROXBORO (48375) 115.00 kV	0.8009	0.8023	0.9019	0.7772	0.7777	0.9481	0.7252	0.7780	0.9109			0.9394
SOTHELLO (48391) 115.00 kV	0.8451	0.8463	0.9166	0.8273	0.8277		0.7879	0.8308	0.9218			0.9492
TAUNTON (48425) 115.00 kV	0.8813	0.8824	0.9399	0.8670	0.8674		0.8348	0.8698	0.9464			
WARDEN A (48455) 115.00 kV	0.8244	0.8256	0.9071	0.8038	0.8043	0.9490	0.7587	0.8071	0.9136			0.9435
WASHTUNA (48457) 115.00 kV	0.7986	0.8001	0.8975	0.7732	0.7737	0.9481	0.7175	0.7729	0.9092			0.9365
BF: GC1302 Sand Dunes 230 kV, Potholes-Sand Dunes												
DELIGHT (47025) 115.00 kV										0.9498		
MARENGO (48221) 115.00 kV										0.9486	0.9490	
RALSTONB (47073) 115.00 kV										0.9490	0.9495	
RITZVILL (48365) 115.00 kV										0.9407	0.9411	
ROXBORO (48375) 115.00 kV										0.9485	0.9490	
WASHTUNA (48457) 115.00 kV										0.9496	0.9500	

⊟BF: GC1306 Sand Dunes 230 kV, Sand Dunes-Wheeler												
RITZVILL (48365) 115.00 kV										0.9463	0.9483	
⊟BUS: Larson 230 kV												
DELIGHT (47025) 115.00 kV										0.9488	0.9444	
LIND (48187) 115.00 kV											0.9462	
MARENGO (48221) 115.00 kV										0.9475	0.9431	
RALSTONB (47073) 115.00 kV										0.9480	0.9436	
RITZVILL (48365) 115.00 kV								0.9479		0.9396	0.9352	
ROXBORO (48375) 115.00 kV										0.9476	0.9433	
WASHTUNA (48457) 115.00 kV										0.9485	0.9441	
⊟BUS: Othello SS 115 kV												
DELIGHT (47025) 115.00 kV											0.9442	
LEE&REYN (48308) 115.00 kV											0.9485	
LIND (48187) 115.00 kV											0.9460	
MARENGO (48221) 115.00 kV											0.9429	
OTHELLO (48307) 115.00 kV											0.9477	
RALSTONB (47073) 115.00 kV											0.9434	
RITZVILL (48365) 115.00 kV								0.9473		0.9424	0.9350	
ROXBORO (48375) 115.00 kV											0.9431	
WASHTUNA (48457) 115.00 kV											0.9439	
⊟BUS: Sand Dunes 115 kV												
BASS JC (46134) 115.00 kV											0.9499	
DELIGHT (47025) 115.00 kV	0.9416	0.9421		0.9266	0.9271		0.9046	0.9120		0.8867	0.8926	
LEE&REYN (48308) 115.00 kV				0.9395	0.9398		0.9231	0.9314	0.9481	0.9115	0.9185	
LIND (48187) 115.00 kV	0.9430	0.9434		0.9281	0.9286		0.9064	0.9137		0.8888	0.8947	
MARENGO (48221) 115.00 kV	0.9412	0.9416		0.9260	0.9265		0.9038	0.9112		0.8854	0.8913	
OTHELLO (48307) 115.00 kV				0.9398	0.9401		0.9235	0.9319	0.9482	0.9119	0.9191	
OTHELOSS (48309) 115.00 kV				0.9451	0.9455		0.9295	0.9384		0.9184	0.9261	
RALSTONB (47073) 115.00 kV	0.9415	0.9419		0.9263	0.9268		0.9042	0.9116		0.8859	0.8918	
RITZVILL (48365) 115.00 kV	0.9330	0.9334		0.9177	0.9182		0.8953	0.9027	0.9437	0.8770	0.8829	
ROXBORO (48375) 115.00 kV	0.9380	0.9384		0.9240	0.9245		0.9037	0.9108		0.8878	0.8935	
RUFF (46083) 115.00 kV										0.9443	0.9436	
RUFF TP (46085) 115.00 kV										0.9452	0.9445	
SCHRAG T (46091) 115.00 kV							0.9446	0.9465		0.9369	0.9374	
SOTHELLO (48391) 115.00 kV				0.9460	0.9464		0.9312	0.9395		0.9204	0.9274	
TAUNTON (48425) 115.00 kV										0.9446		
WARDEN A (48455) 115.00 kV				0.9411	0.9416		0.9242	0.9308		0.9128	0.9181	
WARDEN G (46115) 115.00 kV				0.9400	0.9406		0.9232	0.9293		0.9122	0.9169	
WARDEN T (46117) 115.00 kV				0.9406	0.9412		0.9239	0.9299		0.9129	0.9176	
WASHTUNA (48457) 115.00 kV	0.9412	0.9416		0.9261	0.9266		0.9042	0.9115		0.8863	0.8922	
⊟BUS: Sand Dunes 230 kV												
DELIGHT (47025) 115.00 kV										0.9497		
MARENGO (48221) 115.00 kV										0.9484	0.9489	
RALSTONB (47073) 115.00 kV										0.9489	0.9494	
RITZVILL (48365) 115.00 kV										0.9405	0.9410	
ROXBORO (48375) 115.00 kV										0.9484	0.9489	
WASHTUNA (48457) 115.00 kV										0.9494	0.9499	
⊟BUS: Warden 115 kV												
LEE&REYN (48308) 115.00 kV	0.9398	0.9403	0.9212	0.9369	0.9371	0.9473	0.9312		0.9199	0.9200	0.9492	
OTHELLO (48307) 115.00 kV	0.9402	0.9408	0.9217	0.9374	0.9376	0.9478	0.9318		0.9205	0.9206	0.9497	
OTHELOSS (48309) 115.00 kV	0.9469	0.9474	0.9283	0.9442	0.9444		0.9389		0.9277	0.9282		
SOTHELLO (48391) 115.00 kV	0.9478	0.9484	0.9320	0.9452	0.9454		0.9400		0.9316	0.9295		
⊟N-1: Columbia - Larson 230 kV												
DELIGHT (47025) 115.00 kV										0.9499	0.9444	
LIND (48187) 115.00 kV											0.9463	
MARENGO (48221) 115.00 kV										0.9486	0.9432	
RALSTONB (47073) 115.00 kV										0.9491	0.9437	
RITZVILL (48365) 115.00 kV								0.9479		0.9407	0.9352	
ROXBORO (48375) 115.00 kV										0.9486	0.9434	
WASHTUNA (48457) 115.00 kV										0.9496	0.9442	
⊟N-1: Lind 115kV Switched Shunt												
DELIGHT (47025) 115.00 kV										0.9424	0.9450	
LIND (48187) 115.00 kV										0.9442	0.9468	
MARENGO (48221) 115.00 kV										0.9411	0.9437	
RALSTONB (47073) 115.00 kV										0.9416	0.9442	
RITZVILL (48365) 115.00 kV							0.9433	0.9466		0.9332	0.9357	
WASHTUNA (48457) 115.00 kV										0.9421	0.9447	

⊟N-1: Othello SS 115kV Switched Shunt												
RITZVILL (48365) 115.00 kV											0.9492	
⊟N-1: San Dunes 115kV Switched Shunt												
RITZVILL (48365) 115.00 kV										0.9469	0.9486	
⊟N-1: Sand Dunes - Warden #2 115 kV												
DELIGHT (47025) 115.00 kV					0.9470		0.9325	0.9410		0.9169	0.9246	
LEE&REYN (48308) 115.00 kV							0.9467			0.9370	0.9456	
LIND (48187) 115.00 kV					0.9484		0.9342	0.9426		0.9189	0.9265	
MARENGO (48221) 115.00 kV					0.9463		0.9317	0.9402		0.9157	0.9233	
OTHELLO (48307) 115.00 kV							0.9470			0.9373	0.9461	
OTHELOSS (48309) 115.00 kV										0.9429		
RALSTONB (47073) 115.00 kV					0.9467		0.9321	0.9406		0.9162	0.9238	
RITZVILL (48365) 115.00 kV				0.9420	0.9383		0.9234	0.9319		0.9075	0.9152	
ROXBORO (48375) 115.00 kV				0.9473	0.9437		0.9306	0.9387		0.9169	0.9243	
SOTHELLO (48391) 115.00 kV										0.9431		
WARDEN A (48455) 115.00 kV							0.9494			0.9400	0.9469	
WARDEN G (46115) 115.00 kV							0.9488			0.9397	0.9459	
WARDEN T (46117) 115.00 kV							0.9494			0.9403	0.9466	
WASHTUNA (48457) 115.00 kV					0.9465		0.9321	0.9406		0.9166	0.9243	
⊟N-1: Sand Dunes 230/115 kV												
RITZVILL (48365) 115.00 kV										0.9467		
⊟**Change Bus Low Volts**												
⊟**115**												
⊟BF: A253 Warden 115 kV, Lind-Warden												
TAUNTON (48425) 115.00 kV			0.9524						0.9544			
⊟BF: A254 Warden 115 kV, Larson-Sand Dunes-Warden												
TAUNTON (48425) 115.00 kV			0.9529						0.9551			
⊟BUS: Sand Dunes 115 kV												
TAUNTON (48425) 115.00 kV											0.9503	
⊟BUS: Warden 115 kV												
TAUNTON (48425) 115.00 kV			0.9524						0.9544			

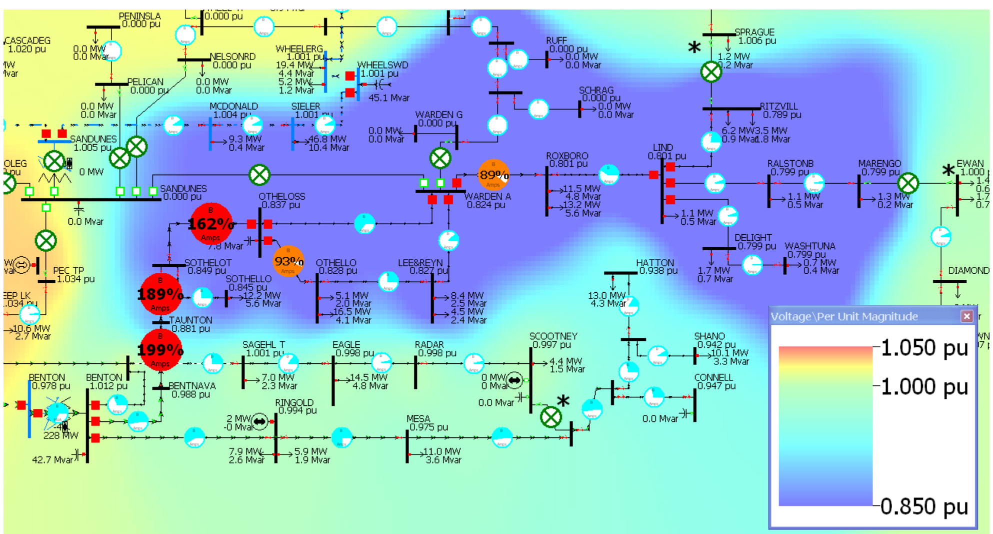


FIGURE VI-8: SAND DUNES GB1250 BREAKER FAILURE; 2014 HEAVY SUMMER

MITIGATION

The Benton – Othello 115 kV Transmission Line is scheduled to be rebuilt to 205 MVA capacity at 40C by the end of 2016, and the Lind – Warden 115 kV Transmission Line is scheduled to be rebuilt to a capacity of 150 MVA at 40C by the end of 2018. The increased capacity is sufficient to mitigate the observed facility voltage violations.

Voltage Stability Study

G PV Analysis

METHODOLOGY

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.

RESULTS

The PV Curve Analysis showed a theoretical flow limit of 570 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 any contingency causing a loss of the GCPD Sand Dunes 115 kV Station, which results in an incremental load increase of 25 MW for a total area load of 595 MW (Figure VI-9).

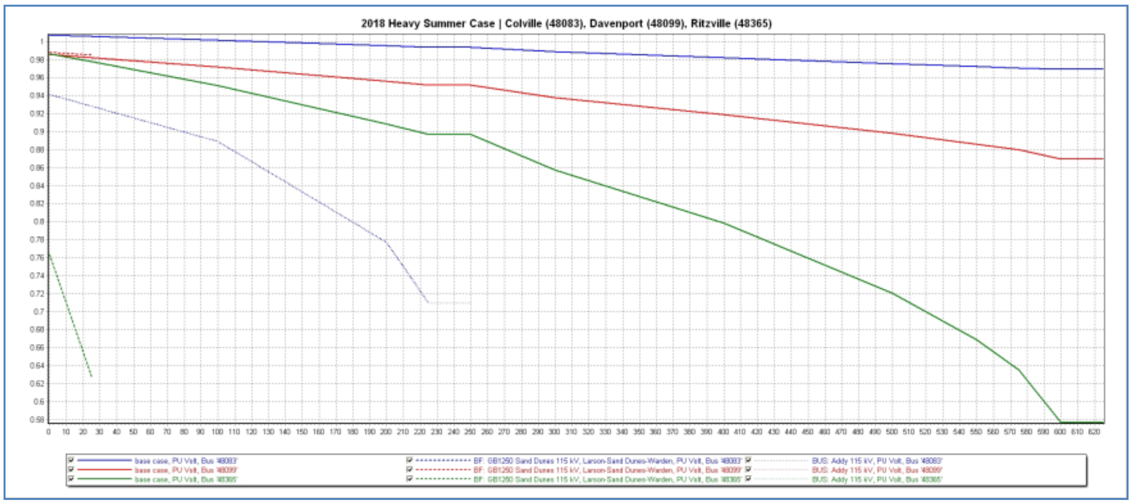


FIGURE VI-9: LOAD RAMP PV CURVE RESULTS FOR CRITICAL BUSES

For comparison, when planned projects are installed, the flow limit for all lines in service increases from 570 MW to 822 MW, and the limiting contingency increases the load limit from 25 MW to 160 MW (Figure VI-10).

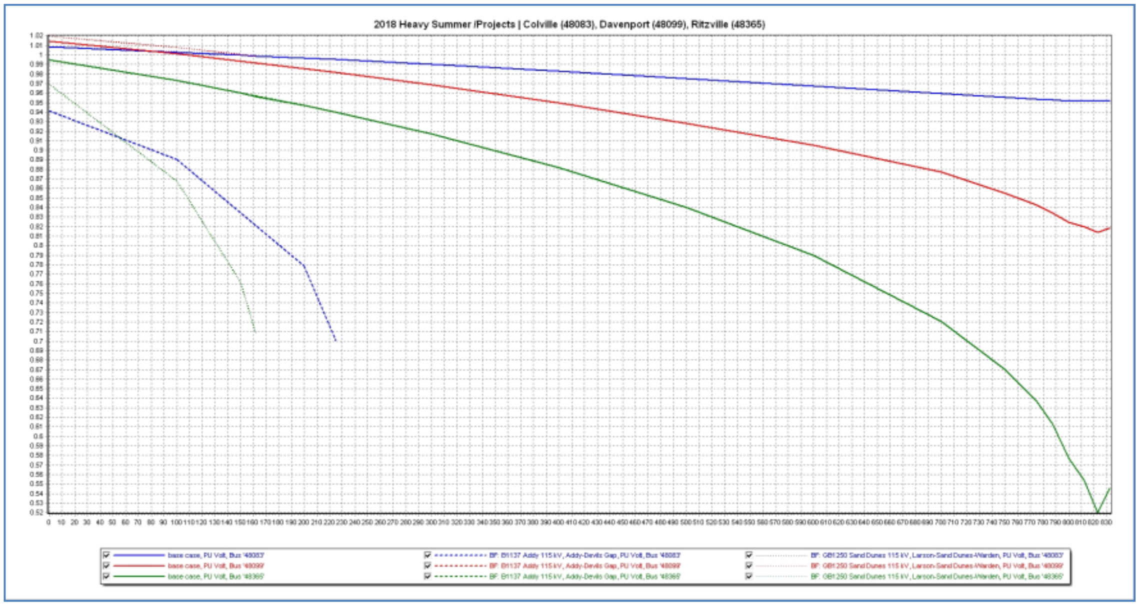


FIGURE VI-10: LOAD RAMP PV CURVE RESULTS FOR CRITICAL BUSES WITH PROJECTS INSTALLED

H QV Analysis

RESULTS

The QV analysis showed there is adequate reactive power margin for the 115 kV source buses and critical buses in the Big Bend Area. Table VI-7 shows the results of the base case and worst performing contingency for each bus analyzed.

The smallest base case reactive margin for the buses analyzed occurred at the Davenport 115 kV bus with a margin of 48 MW, and the smallest reactive during outage conditions occurred at the Colville AVA 115 kV bus with a margin of 37 MVAr for the breaker failure at BPA's Addy Station.

TABLE VI-7: QV ANALYSIS RESULTS

Name	Nom kV	Contingency	Qmin
DAVENPRT	115	BASECASE	-48.06
RITZVILL	115	BASECASE	-64.31
COLV AVA	115	BASECASE	-227.51
BOUNDARY	115	BASECASE	-383.17
ADDY	115	BASECASE	-444.8
SANDUNES	115	BASECASE	-621.49
LARSON	115	BASECASE	-701.16
BENTON	115	BASECASE	-724.9
COLV AVA	115	BF: B1137 ADDY 115 KV, ADDY-DEVILS GAP	-37.13
BOUNDARY	115	BF: B1137 ADDY 115 KV, ADDY-DEVILS GAP	-257.52
RITZVILL	115	BF: GB1250 SAND DUNES 115 KV, LARSON-SAND DUNES-WARDEN	-10.11
BENTON	115	BF: GB1250 SAND DUNES 115 KV, LARSON-SAND DUNES-WARDEN	-142.01
DAVENPRT	115	BUS: LARSON 115 KV	-34.72
LARSON	115	BUS: LARSON 230 KV	-439.59
SANDUNES	115	BUS: SAND DUNES 230 KV	-341.34
ADDY	115	N-2: AIRWAY HEIGHTS - DEVILS GAP 115 KV AND DEVILS GAP - NINE MILE 115 KV	-324.04

2.3.2 Stability Analysis

Kettle Falls Out-of-Step; 2014 Issue

A Problem

A three phase fault on the Addy – Kettle Falls 115 kV Transmission Line results in the generation going out-of-step as shown in Figure VI-11.

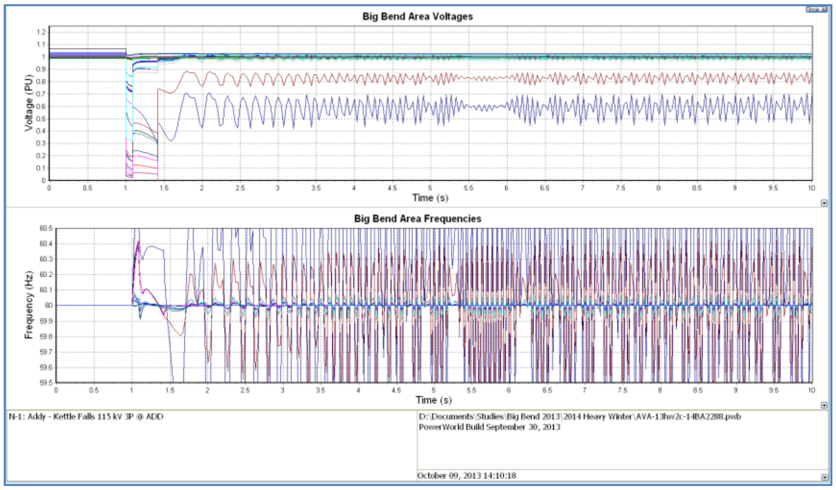


FIGURE VI-11: ADDY – KETTLE FALLS 115 KV FAULT W/O OOS TRIPPING

B Mitigation

Out-of-step relay protection is currently installed at Kettle Falls, with the resulting performance shown in Figure VI-12

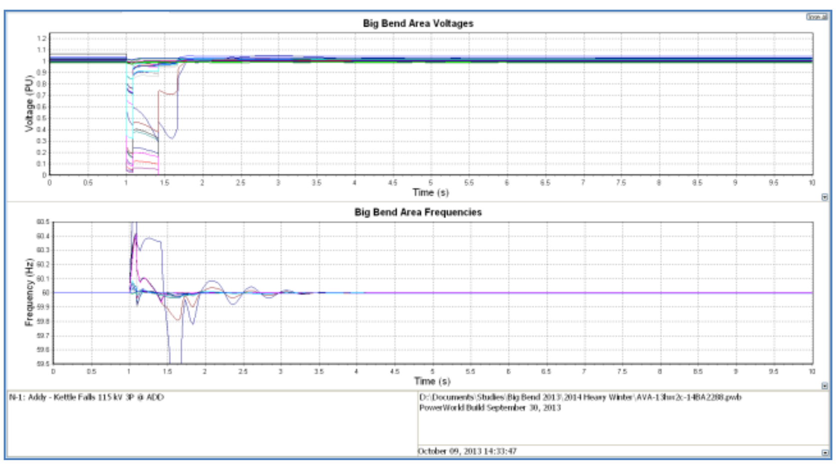


FIGURE VI-12: ADDY – KETTLE FALLS 115 KV FAULT WITH OOS TRIPPING ENABLED

Slow Voltage Recovery

C Problem

Three phase faults on the Beacon – Bell #4 & #5 and Bell – Westside 230 kV transmission lines result in slow voltage recovery for several buses in the Big Bend Area as shown in Figure VI-13 and Table VI-8.

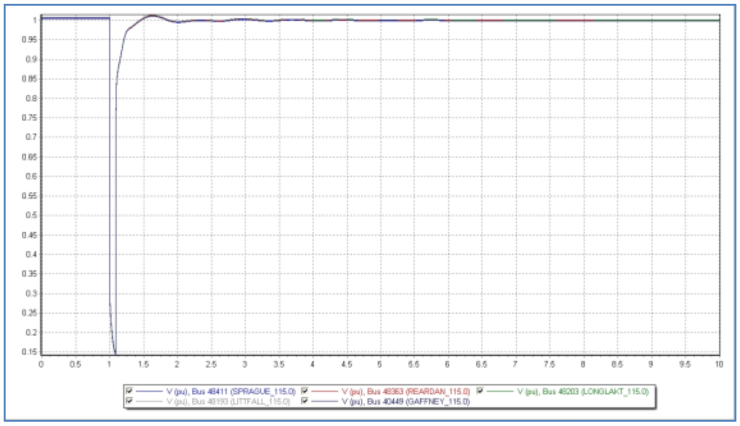


FIGURE VI-13: SIMULATION RESULTS FOR A THREE PHASE FAULT ON BEACON – BELL #6 NEAR BELL.TABLE X-X: STABILITY

TABLE VI-8: VIOLATIONS FOR SELECT OUTAGES IN THE BING BEND AREA

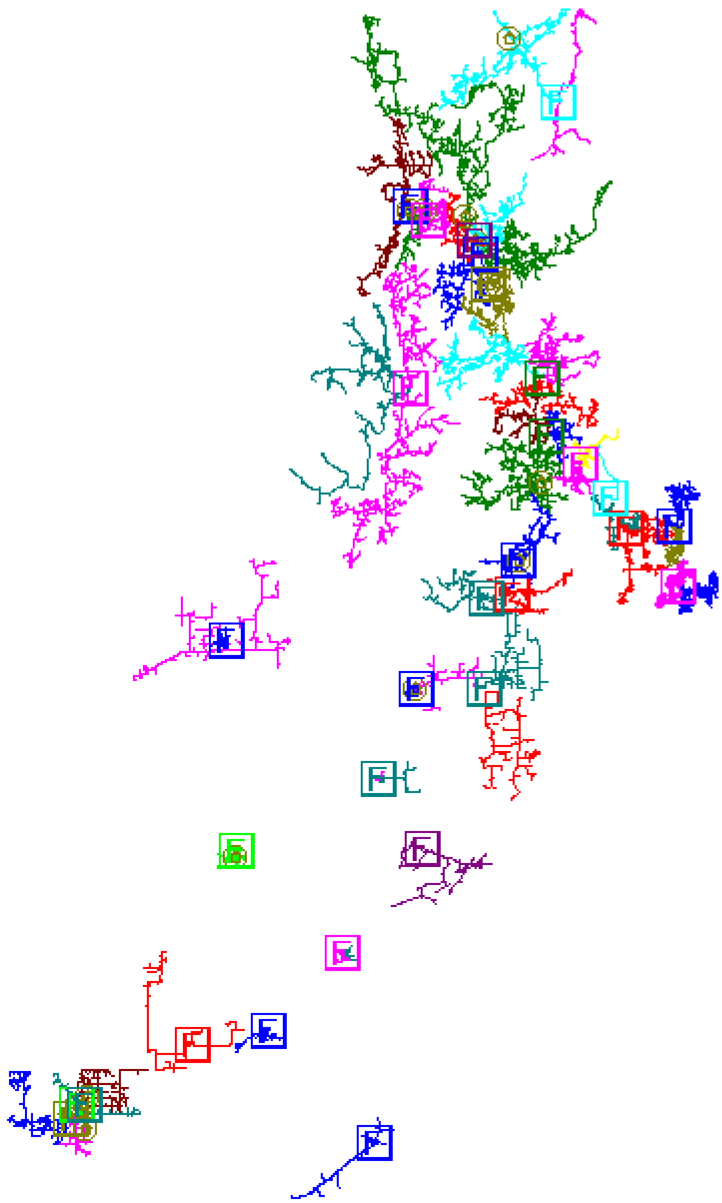
Row Labels	14HSLH % Voltage Dip	18HSLH % Voltage Dip	23HSLH % Voltage Dip
N-1: Beacon - Bell #4 230 kV 3P @ BEL			
WECC Category B Voltage Dip Load Bus			
Bus '40449'			-26.38810158
Bus '48123'			-25.44180489
Bus '48193'			-26.31790924
Bus '48203'			-26.16341019
Bus '48363'			-26.34094048
Bus '48411'			-26.39831543
N-1: Beacon - Bell #5 230 kV 3P @ BEL			
WECC Category B Voltage Dip Load Bus			
Bus '40449'			-26.41830254
Bus '48123'			-25.46813774
Bus '48193'			-26.34801865
Bus '48203'			-26.19309998
Bus '48363'			-26.37109184
Bus '48411'			-26.42852592
N-1: Bell - Westside 230 kV 3P @ BEL			
WECC Category B Voltage Dip Load Bus			
Bus '40449'	-25.33028603	-25.43170929	-27.0303669
Bus '48123'			-25.93120766
Bus '48193'	-25.23335838	-25.32765961	-26.95679092
Bus '48203'	-25.12030029	-25.20827866	-26.78526688
Bus '48363'	-25.29210091	-25.39035988	-26.98217201
Bus '48411'	-25.33843613	-25.44066429	-27.04080582

D Mitigation

The Lancaster Interconnection Project mitigates the slow voltage recovery.

2.4 Distribution System Assessment

2013 Big Bend Distribution Area Assessment



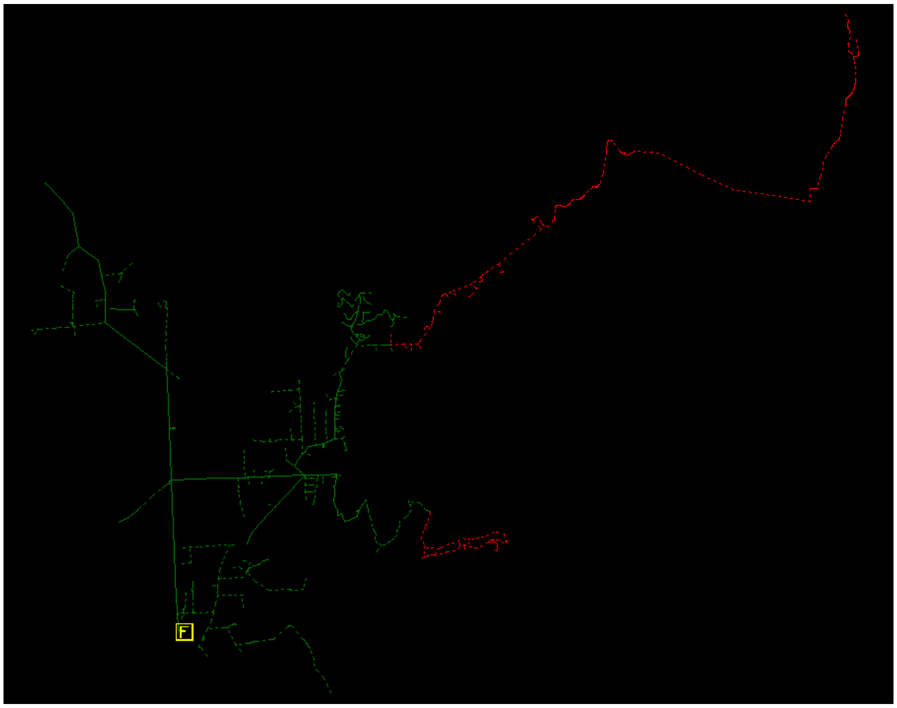
Current 5 year budget items

Harrington - Convert to 13 kV	2015
Bruce Siding 531 - Cx FDR	Outyear
49N Sub - Dx Line Integration	Outyear
GIF 34F1 (17) Worst Feeder	2013-2015
GIF 34F2 (7) - Twin Lake Worst Feeder	2013-2015
CLV 34F1 (11) Worst Feeder	2013-2015
ROX 751 Recond (10) Worst Feeder	2013-2015
OTH502 (McCains) Grid Modernization	Outyear
SPI12F1 Grid Modernization	2013-2014
WIL12F2 Grid Modernization	2013-2014
Deer Lake Xing	2013
COB 12F2 Green Bluff Tie	2016
LOO 12F2 Deer Lk Narrows Xing	2014
COB 12F1 Recond Midway 1 Mi	2017
DEP 12F2 Bear Lk-Antler Tie	2014
DEP 12F2 Recond to LOO 12F1	2013-2016
SOT 522/523 - Recond- 6A	2014-2015
WAS781 - Interset Poles	2015
CHW12F2- Angel Pk Recond 0.75mi	2014
GRN12F1 Tie to CLV12F2 4.5 mi	2015-2016
GIF 34F1 - CHW 12F3 FDR Tie	2016-2017
GRN 12F2 Recond 4.1 Mi Old Kettle Rd	2014
CHW 12F4 Recond near Ctnwd Road	2013-2014

CLV 12F4 Recond 1.6 mi	2015
KET 12F2 - Chg FDR Voltage to 13.2 kV	2015
DVP 12F2- Recond 6 miles Hwy 2	2013-2015
SPG 761 - Recond Small CU	2013-2015
LIN 711 - Convert to 25 kV - tie Rox751	2013-2015
COB 12F2 Bernhill Rd Rcd 2 ACSR	2017
COB 12F1 - Split FDR	Outyear
COB 12F2 Recond Bernhill to Greenbluff	Outyear
DEP 12F1 Midine (protection req.)	2013
CLV Area Switched Banks	Outyear
CHW 12F3- ARD 12F2 FDR Tie (5 mi UG)	2014-2016
LF34F1- Midline	2013
CLV 34F1 Midline	2013

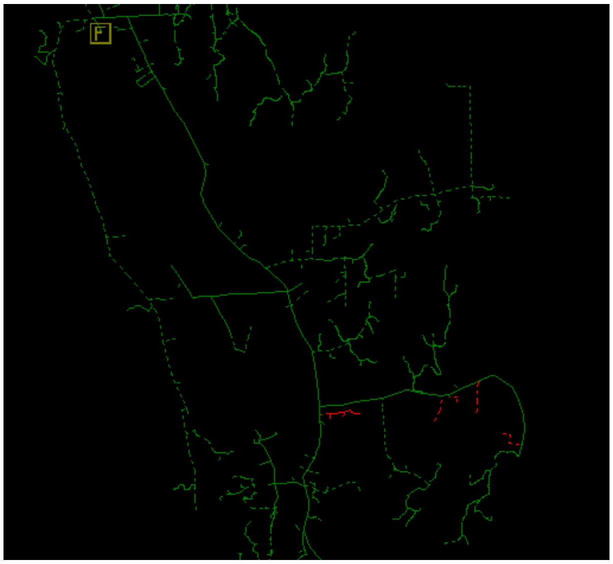
Level of Service Issues

In the Deer Park Office, at peak load LOO12F2 shows low voltage of 114.4V on the west end of the feeder. The laterals on Southlake Shore Rd and Deer Lake Rd are small wire with a fair amount of load – either some reconductor work or a regulator bank before the laterals begin is recommended.

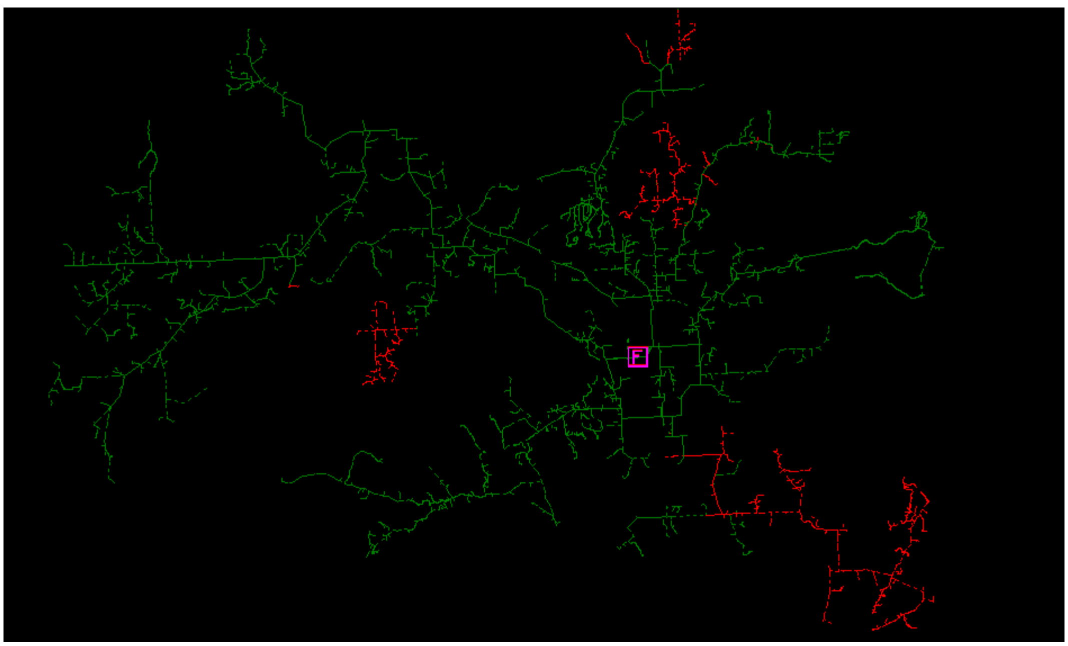


In the Colville office, a number of feeders experience significant low voltage issues at peak loads.

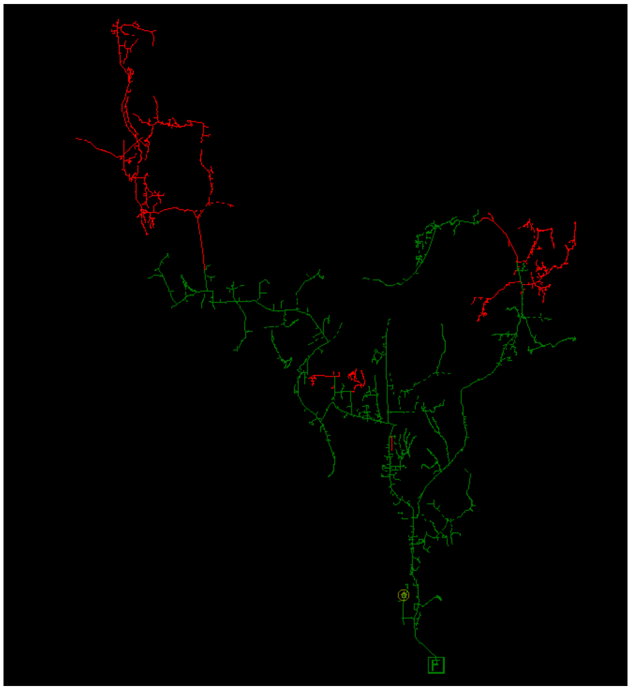
ARD12F2 – Low voltage along the Slide Creek Rd lateral. Might be possible to move the regulator bank north a bit to pick up this lateral as well, further studies needed with load loggers.



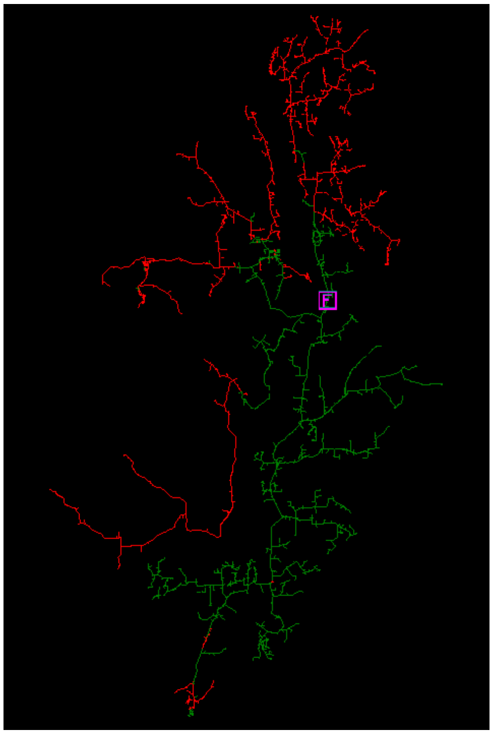
CHW12F2, CHW12F3, and CHW12F4 – CHW12F2 shows low voltage on Arrington Rd and on Major Rd as well. CHW12F3 has a significant low voltage area on Dry Creek Rd. CHW12F4 shows low voltage on Cottonwood Creek Rd from Skok Rd onward. All three of these are fed by small wire including 8CU and 6AMER. Significant reconductor is needed, these would all be good candidates for grid modernization work.



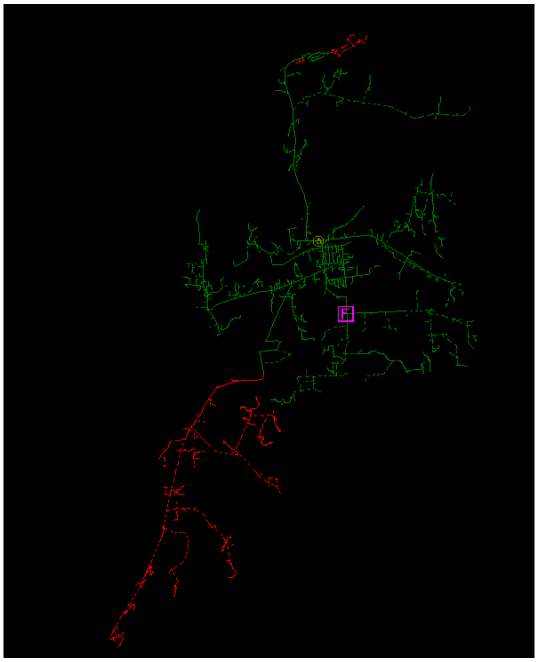
CLV34F1 shows seriously low voltage on peak loads on the north ends of the feeder. Much 6A, 6AMER, and other small high resistance wire needs to be eliminated.



GIF34F1 and GIF34F2 both have serious low voltage violations at peak load. A significant amount of reconductor work needs to be done, including some 8AMER. Of note as well is the neutral in much of this is 9 1/2D, which likely provides very little fault return path which makes protecting some of this impossible. Either feeder would be a good candidate for grid modernization.

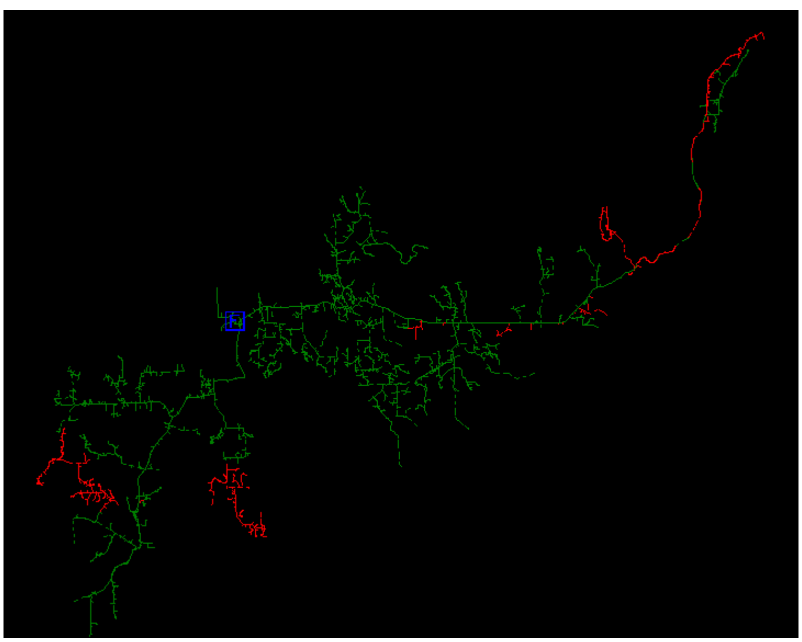


GRN12F1 and GRN12F2 show low voltage on the south branch along HWY25 and at the north in Marcus area. Mostly due to loaded 6A wire.

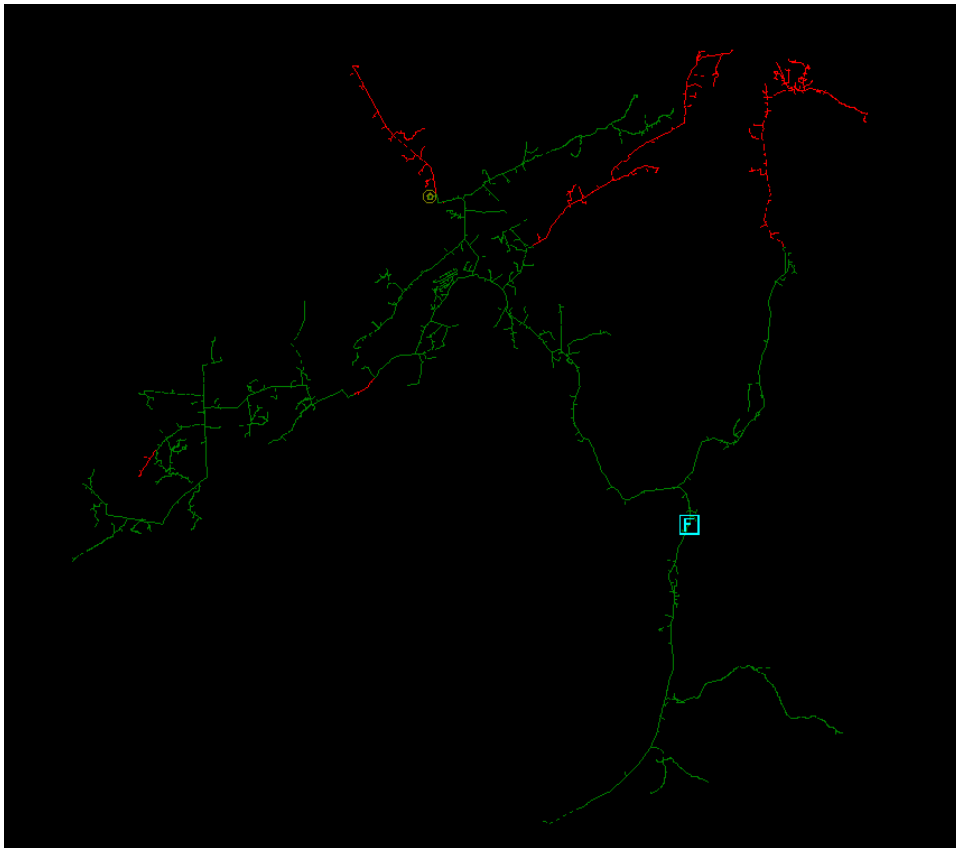


KET12F2 shows low voltage on most of the feeder at peak loads. #6 wire is not sufficient for even rural trunk.

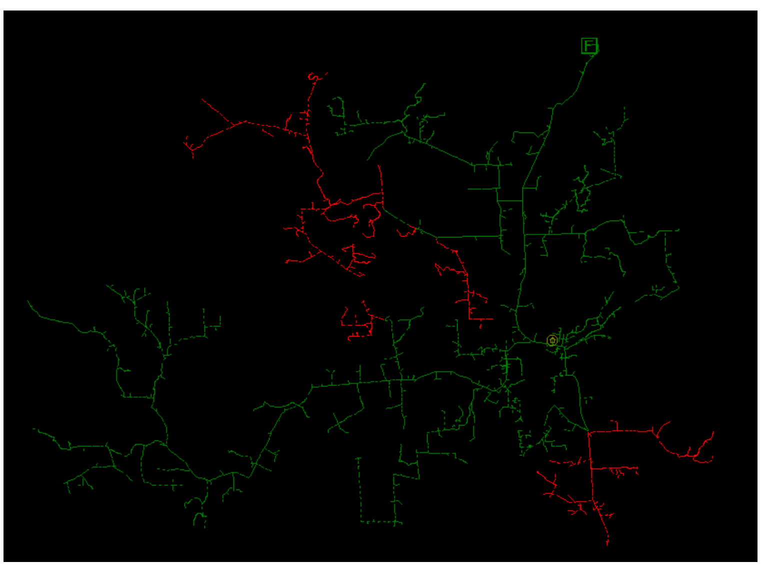
ORI12F1 and ORI12F3 show quite a bit of #6 and smaller wire needing reconductor



SPI12F1 and SPI12F2 show low voltage on Sheep Creek, Deep Lake, and Waneta areas. These will be fixed with grid modernization in 2014

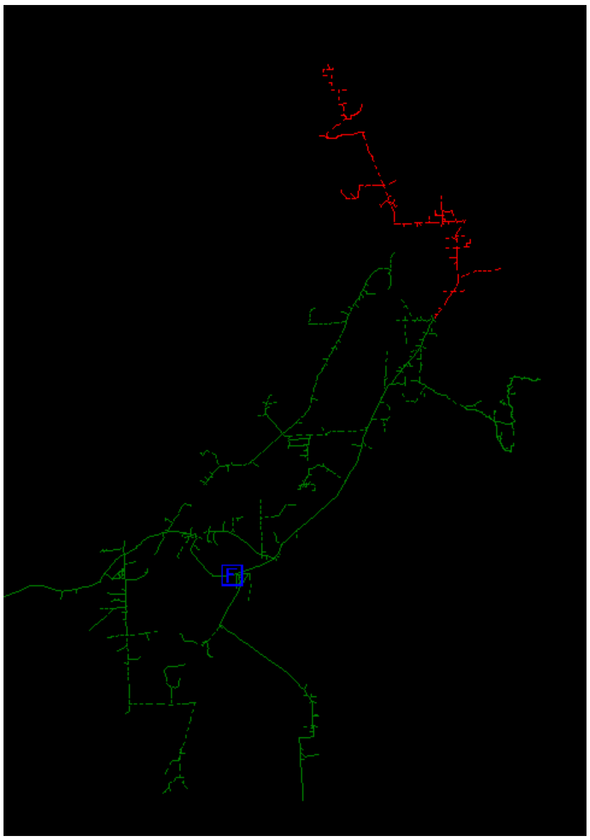


VAL12F1 shows low voltage on both north and south ends of the feeder. Likely both reconductor and possibly a regulator bank on the south end are needed.



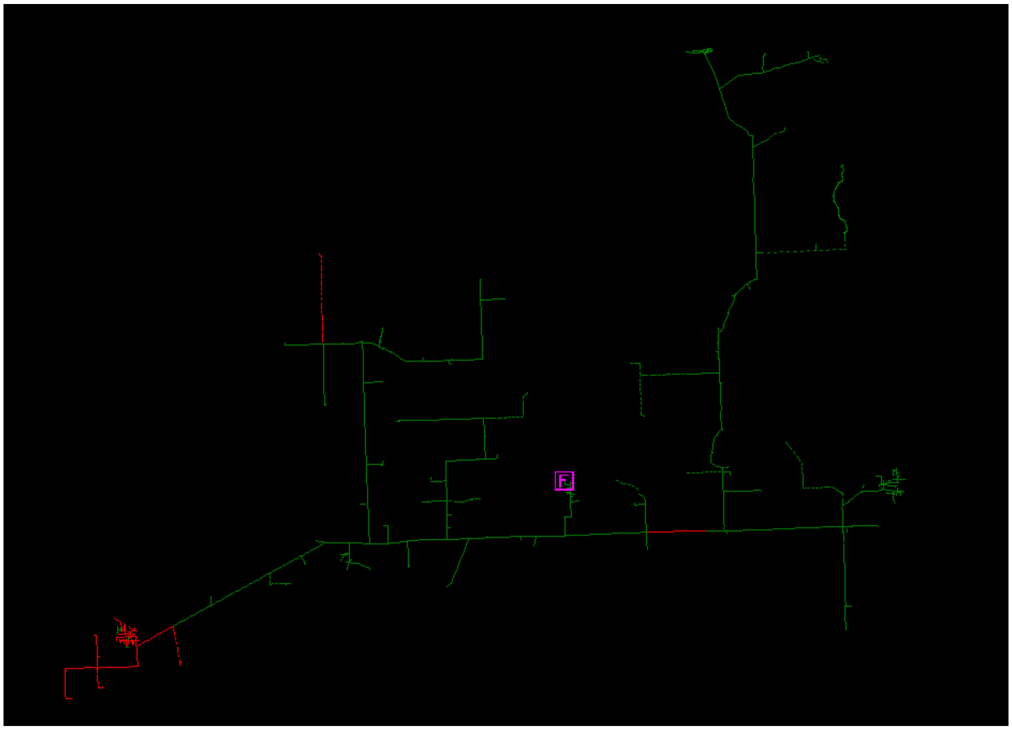
In the Davenport office the following feeders show low voltage:

FOR12F1 – North end of the feeder on 6AMER.



RDN12F1 – On Crescent Rd upstream of the regulator bank. Would be solved by moving the regulator south .

WIL12F2 – Several sections showing low voltage. This will be fixed by the grid modernization work.



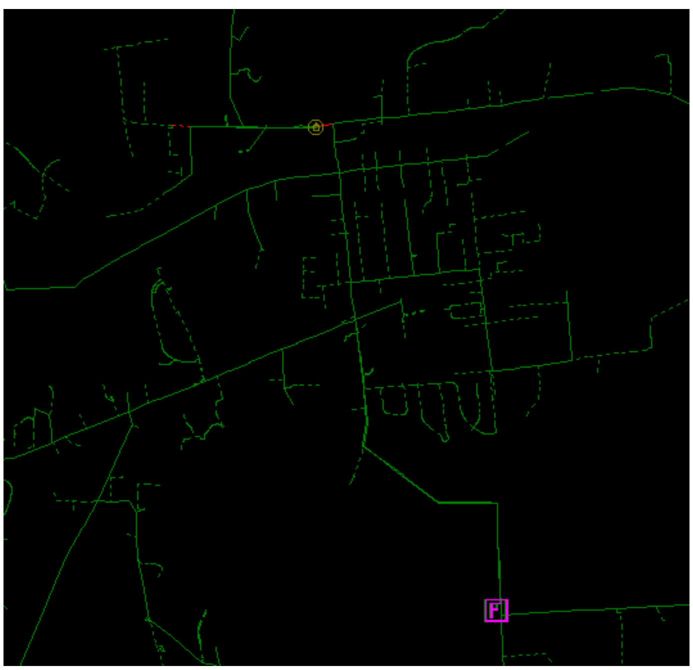
For the Othello office, SOT523 shows low voltage on A phase on the south sections. Balancing might fix this.

Capacity Issues

Fortunately, the Big Bend region has fewer immediate capacity problems than level of service issues.

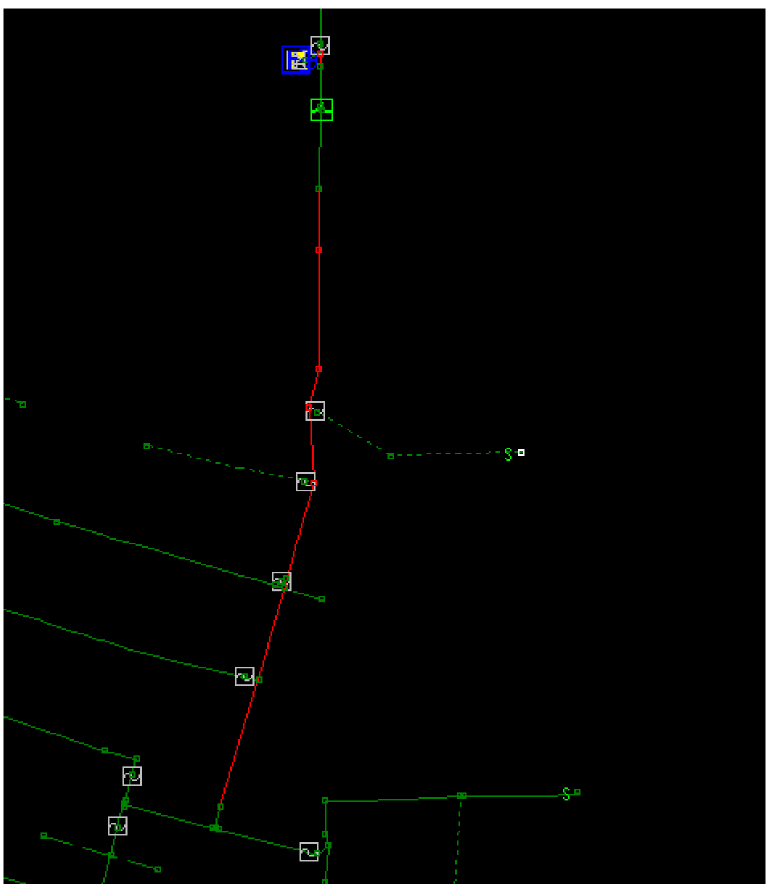
GIF34F2 – overloaded 8CW on the north branch on Cobbs Creek Rd

GRN12F1 – Overloaded 6CR on Lakeview Rd



GRN12F2 – overloaded 6CW on the south branch on Hwy 25 near Rickey Canyon

WIL12F2 – overloaded 2STCU on the main trunk south of the substation. Grid modernization will fix this.



Reliability

Fifteen (15) of the worst 30 feeders for 3 year average SAIFI numbers are in the Big Bend region. Worst feeder work on GIF34F1, GIF34F2, CLV34F1, and ROX751 will help this, but a broader approach may be necessary. Asset management likely has recommendations in terms of cable replacement due to cable faults. Colville is heavily treed, and has high exposure with low fault duty availability. Reconductor work on some of the high resistance wire is necessary, and an approach to grid modernization in rural areas is needed with fault indicators in particular potentially helping cut down outage time for a majority of customers. Continued undergrounding where possible will also help in timbered and high wind areas. Wildlife guards on wood pole management follow up and transformer change out will also help. Once a standard for rural grid modernization is decided upon, we may look at systematically approaching this area in pieces so as to help cut outage and O&M costs.

System Wide Programs

Three (3) feeders are identified for the grid modernization program as of now, expanded funding may lend more. In particular eliminating high resistance wire and cutting outage time are of interest in these areas. Voltage conversion is also of interest here, with Harrington scheduled in the 2014-2015 timeframe to finally eliminate 4kV from our system. This will be followed by converting KET12F2 from 12.47kV to 13.2kV in 2015. Depending on the results of that conversion, further 13.2kV conversion of the Colville area may follow to reduce spares needs and streamline operations.

SCADA Needs

In the Deer Park area the following upgrades are needed:

CLA from no SCADA to 3 phase
COB from single phase to 3 phase
DEP from no SCADA to 3 phase
LOO from no SCADA to 3 phase

In the Colville area the following upgrades are needed:

ARD from no SCADA to 3 phase
CLV sub from single phase to 3 phase
GIF from single phase to 3 phase

GRN12F1 and 12F2 from no SCADA to 3 phase
KET from single phase to 3 phase
ORI12F1 from no SCADA to 3 phase
VAL from no SCADA to 3 phase

In the Davenport area the following subs/feeders need upgrading to 3 phase:

DVP
FOR
HAR
RDN
SOT523

In the Othello area the following subs/feeders need upgrading to 3 phase:

OTH (1ph now)
ROX
SPR
WAS

Future Station needs

Two future stations are slated for the Big Bend area depending on customer load: Bruce Siding and 49 Degrees North. Bruce Siding could also allow more operational flexibility in the Othello area for some significant large customers, notably McCains. 49 Degrees North would be a feed for a mountain village at the base of the 49 Degrees North Ski area. It would also serve other native load in the area. This would improve level of service to the resort and surrounding area.

3 COEUR D'ALENE AREA

2013 PLANNING ASSESSMENT

3.1 Executive Summary

The Coeur d'Alene area transmission system assessment demonstrated several reliability performance issues. All reliability performance issues observed occur in 2014 and worsen in the five and ten year planning horizon. The most severe outage is a 115 kV bus tie breaker failure at Rathdrum Station. The area's dependence on the Rathdrum Station leaves the System with a single point of failure causing localized area outages. The System also demonstrated an inability to maintain the West of Hatwai Path System Operating Limit of 4,277 MW without exceeding applicable facility ratings following a 230 kV double circuit transmission line outage.

Completion of the Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild Project and Bronx – Cabinet and Bronx – Sand Creek 115 kV Transmission Lines Rebuild Project will provide greatly improved transmission system performance in the five and ten year planning horizon. Replacement of several aging facilities will also contribute to improved reliability. The Noxon Rapids Switchyard 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 below. A detailed description of each project can be found in Section IV of this document.

- Lancaster Interconnection Project
- Bronx – Cabinet and Bronx – Sand Creek 115 kV Transmission Line Rebuild Project
- Coeur d'Alene – Pine Creek 115 kV Transmission Line Rebuild Project
- 230 kV Capacitor Automatic Switching Project

3.2 General 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 major sources to the Coeur d'Alene area include hydro generation resources located within the area or near the eastern edge in Western Montana, natural gas fired combustion turbines and combined cycle combustion turbines in northern Idaho, the 500/230 kV transformer at Hot Springs Station in western Montana, and local hydro generation resources on the Spokane River. Avista owns two 230 kV transmission lines, the Noxon – Pine Creek and Cabinet Gorge – Rathdrum 230 kV transmission lines, which connect the Clark Fork Hydro Complex located in northern Idaho and western Montana to 230 kV stations in the Coeur d'Alene area. In general, the remaining sources are connected to the Coeur d'Alene area through the BPA Transmission System.

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 approximately the first four miles of the Burke – Thompson Falls A & B 115 kV transmission lines from the Burke Station. These two transmission lines are included in the Montana to Northwest Path definition. The BPA and Northwestern Energy own the remaining transmission facilities which comprise the Montana to Northwest Path.

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
- Cabinet Gorge HED — Unit 1 & 4 @ 65 MW each; Unit 2 & 3 @ 78 MW each — Avista
- Noxon Rapids HED — Unit 1 -4 @ 115 MW each; Unit 5 @ 123 MW — Avista
- 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
- Post Falls HED — Unit 1-5 @ 2.8 MW each; Unit 6 @ 4 MW — Avista

- Rathdrum CT — Unit 1 & 2@ 89 MW each, Winter; 70 MW each, Summer — Avista

There are presently no generation interconnection requests within the Coeur d'Alene area.

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.

Load growth in the Coeur d'Alene area is projected to be 1.5% for summer and 1.3% for winter. Total anticipated load not including transmission system losses for peak summer 2014 is 342 MW and 408 MW for peak winter 2014.

3.3 Transmission System Assessment

3.3.1 Steady State Analysis

Contingency Study

A Bronx – Cabinet & Bronx – Sand Creek 115 kV transmission lines

PROBLEM

The Bronx – Cabinet Gorge 230 kV Switchyard and Bronx – Sand Creek 115 kV transmission lines exhibit thermal overloads for various contingency issues in the Sandpoint sub-area. Outages causing thermal overloads include Libby 230/115 kV Transformer (see Figure VI-14), and the Albeni Falls – Sand Creek 115 kV Transmission Line open at BPA's Albeni Falls Station (see Figure VI-15). Other outages causing the loss of the Albeni Falls 115 kV bus causes similar overloads. The observed overloads occur starting in 2014, making these issues an operational concern.

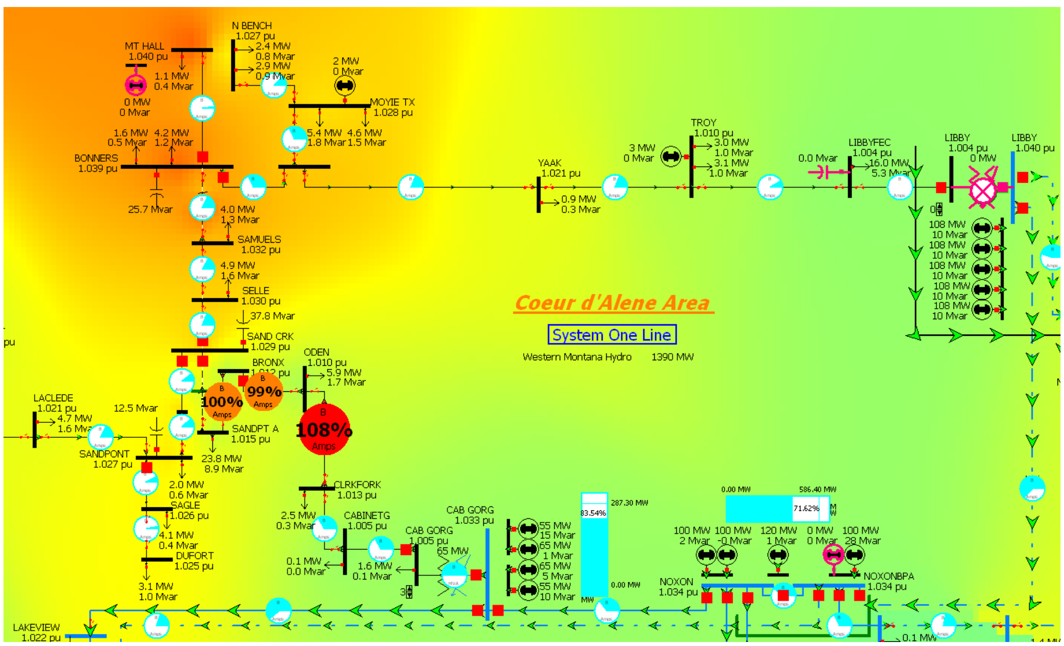


FIGURE VI-14: LIBBY TRANSFORMER OUTAGE IN 2023 HEAVY SUMMER

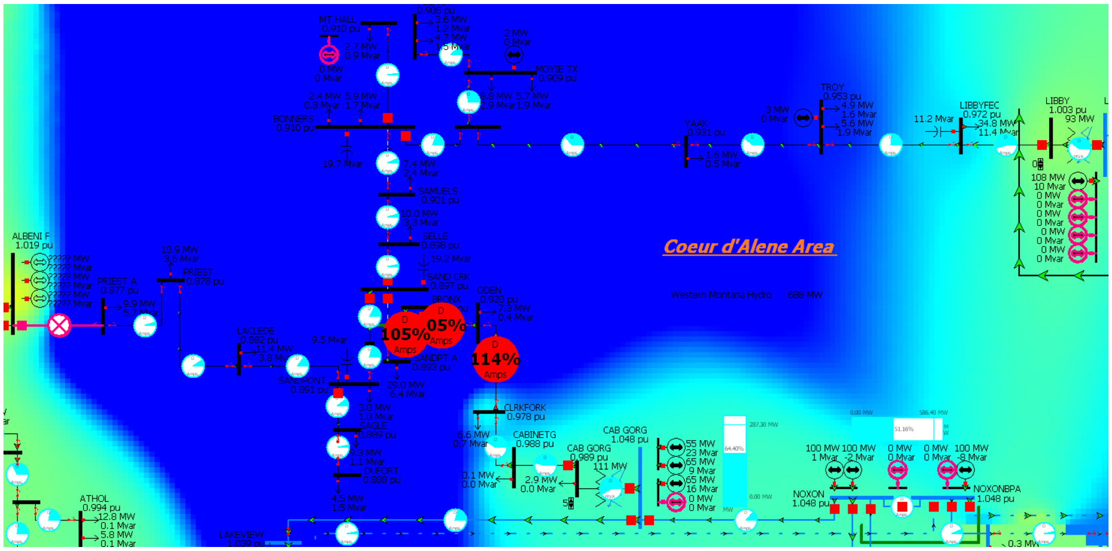


FIGURE VI-15: ALBENI FALLS - SANDCREEK OUTAGE AT ALBENI FALLS IN 2023 HEAVY WINTER

	14HS	18HS	18HT	18HW	23HS	23HW	32HS	32HW
BF: B960 Albeni Falls 115 kV, Albeni Falls-Sacheen								
BRONX - ODEN 115.00 kV #1 Line						104.4		114.9
BRONX - SANDPT A 115.00 kV #1 Line						104.6		115.0
CLRKFORK - ODEN 115.00 kV #1 Line						113.3		125.3
BF: B964 Albeni Falls 115 kV, Albeni Falls-Pine Street								
BRONX - ODEN 115.00 kV #1 Line						104.4		114.8
BRONX - SANDPT A 115.00 kV #1 Line						104.6		115.0
CLRKFORK - ODEN 115.00 kV #1 Line						113.3		125.3
BF: R404 Cabinet-Rathdrum, Rathdrum #2 230/115 Transformer								
CLRKFORK - ODEN 115.00 kV #1 Line							103.3	
BF: R504 Cabinet-Rathdrum, Rathdrum #1 230/115 Transformer								
CLRKFORK - ODEN 115.00 kV #1 Line							102.9	
BUS: Albeni Falls 115 kV								
BRONX - ODEN 115.00 kV #1 Line						104.4		114.8
BRONX - SANDPT A 115.00 kV #1 Line						104.6		115.0
CLRKFORK - ODEN 115.00 kV #1 Line						113.3		125.3
N-1: Albeni Falls - Sand Creek 115 kV Open @ ALB								
BRONX - ODEN 115.00 kV #1 Line						104.6		115.0
BRONX - SANDPT A 115.00 kV #1 Line						104.8		115.2
CLRKFORK - ODEN 115.00 kV #1 Line				100.0		113.5		125.4
N-1: Bonner Ferry - Libby 115 kV Open @ LIB								
BRONX - ODEN 115.00 kV #1 Line							100.6	
BRONX - SANDPT A 115.00 kV #1 Line							100.8	
CLRKFORK - ODEN 115.00 kV #1 Line	100.7	102.7	105.2		107.3		110.2	
N-1: Cabinet - Rathdrum 230 kV								
CLRKFORK - ODEN 115.00 kV #1 Line							102.4	
N-1: Cabinet - Rathdrum 230 kV Open @ CAB								
CLRKFORK - ODEN 115.00 kV #1 Line							102.4	
N-1: Cabinet - Rathdrum 230 kV Open @ RAT								
CLRKFORK - ODEN 115.00 kV #1 Line							102.3	
N-1: Libby 230/115 kV								
BRONX - ODEN 115.00 kV #1 Line							100.8	
BRONX - SANDPT A 115.00 kV #1 Line			100.1				101.0	
CLRKFORK - ODEN 115.00 kV #1 Line	100.9	102.9	105.4		107.5		110.4	

MITIGATION

The Bronx – Cabinet and Bronx – Sand Creek 115 kV transmission lines are in the process of being rebuilt with 795 ACSS conductor. The increased thermal capacity is sufficient to mitigate the observed thermal overloads. The rebuild project is scheduled for completion in 2016. Possible operational mitigation action can be taken prior to completion of the project by opening the Bronx – Cabinet 115 kV Transmission Line at Cabinet and coordinating with the BPA to monitor the voltage on the Bonners Ferry – Libby and Bonners Ferry – Sand Creek 115 kV transmission lines.

B Ramsey – Rathdrum #1 115 kV Transmission Line

PROBLEM

The Ramsey – Rathdrum #1 115 kV Transmission Line overloads for outages causing the loss of the Rathdrum 115 kV East Bus (see Figure VI-16). Loss of the Rathdrum 115 kV East Bus causes the entire load in Coeur d'Alene to be served by the remaining Ramsey – Rathdrum #1 and Post Falls – Ramsey 115 kV transmission lines. The observed overloads begin in 2014, making these issues an operational concern.

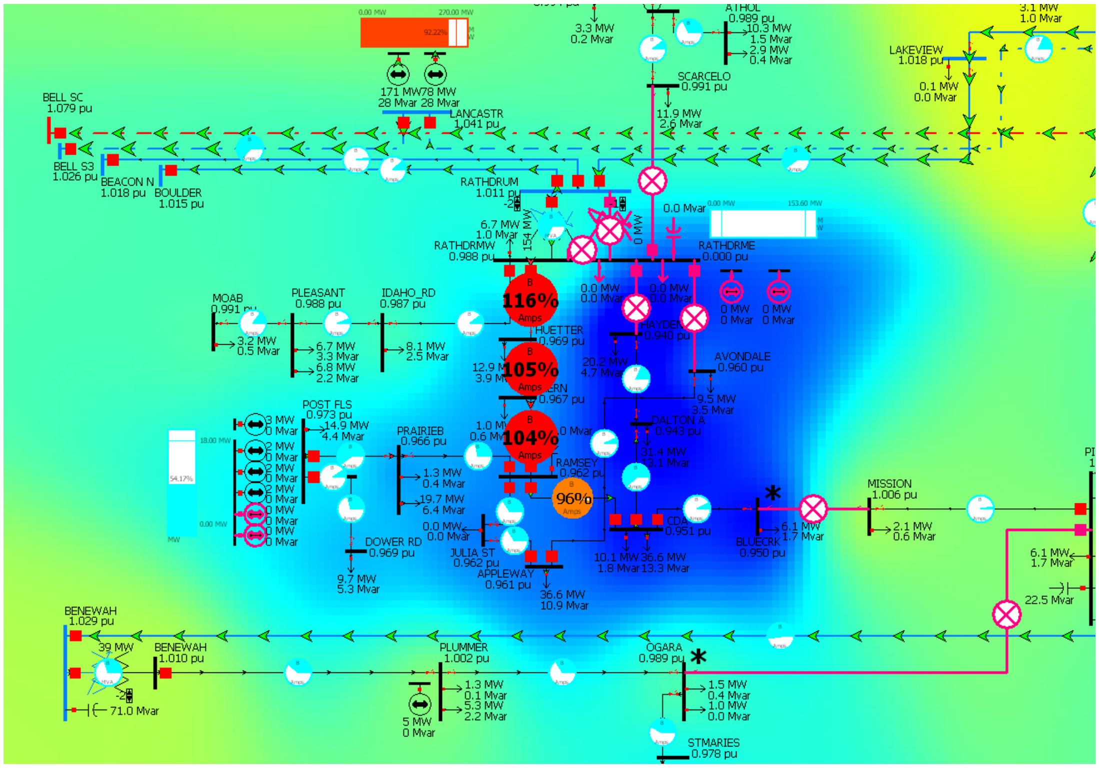


FIGURE VI-16: RATHDRUM 115 KV EAST BUS OUTAGE IN 2023 HEAVY SUMMER

	14HS	18HS	18HSLH	23HS	23HSLH	32HS	32HSLH
BF: A506 Rathdrum 115 kV, Pine Street-Rathdrum							
CDA - RAMSEY 115.00 kV #1 Line						107.4	107.5
HERN - HUETTER 115.00 kV #1 Line				104.9	100.5	116.4	113.4
HERN - RAMSEY 115.00 kV #1 Line				104.0		115.5	112.4
HUETTER - RATHDRMW 115.00 kV #1 Line	103.7	107.8	104.7	116.3	111.9	128.5	125.5
BF: A638 Rathdrum 115 kV, Ramsey-Rathdrum #2							
CDA - RAMSEY 115.00 kV #1 Line						105.2	105.2
HUETTER - RATHDRMW 115.00 kV #1 Line						101.4	
BF: A667 Ramsey 115 kV, Ramsey-Rathdrum #2							
HAYDEN - RATHDRME 115.00 kV #1 Line						104.0	103.9
BF: A668 Ramsey 115 kV, Ramsey-Rathdrum #1							
HAYDEN - RATHDRME 115.00 kV #1 Line						104.6	104.5
BF: A669 Ramsey 115 kV, Post Falls-Ramsey							
HAYDEN - RATHDRME 115.00 kV #1 Line						104.6	104.5
BUS: Ramsey 115 kV							

	14HS	18HS	18HSLH	23HS	23HSLH	32HS	32HSLH
HAYDEN - RATHDRME 115.00 kV #1 Line						104.8	104.7
BUS: Rathdrum East 115 kV							
CDA - RAMSEY 115.00 kV #1 Line						107.4	107.5
HERN - HUETTER 115.00 kV #1 Line				104.8	100.5	116.4	113.3
HERN - RAMSEY 115.00 kV #1 Line				103.9		115.5	112.4
HUETTER - RATHDRMW 115.00 kV #1 Line	103.6	107.7	104.7	116.3	111.9	128.5	125.4
N-1: Coeur d'Alene 15th St - Ramsey 115 kV							
HAYDEN - RATHDRME 115.00 kV #1 Line						104.0	103.9
N-1: Coeur d'Alene 15th St- Rathdrum 115 kV Open @ RAT							
CDA - RAMSEY 115.00 kV #1 Line						104.4	104.3
N-2: Coeur d'Alene - Ramsey 115 kV & Ramsey - Rathdrum #2 115 kV							
HAYDEN - RATHDRME 115.00 kV #1 Line						103.4	103.2
PSF: Ramsey 115 kV							
HAYDEN - RATHDRME 115.00 kV #1 Line						103.7	103.5

MITIGATION

Rebuilding the Coeur d’Alene – Pine Creek 115 kV Transmission Line to 795 ACSR conductor with 150 MVA summer thermal capacity and operating the transmission line normally closed will mitigate the observed thermal overloads on the Ramsey – Rathdrum #1 115 kV Transmission Line. The proposed rebuild project is scheduled for completion in 2017. Possible operational mitigation action can be taken by closing the normally open point on the Coeur d’Alene – Pine Creek 115 kV Transmission Line and restore service as feasible.

C Rathdrum Station 115 kV Tie Breaker Failure

PROBLEM

The Rathdrum Station 115 kV bus configuration includes a bus tie breaker between the East and West 115 kV Buses. Failure of the bus tie breaker causes severe thermal overloads on the Otis Orchards – Post Falls and Post Falls – Ramsey 115 kV transmission lines far exceeding 200%. Consequently, the tripping of the Post Falls – Ramsey 115 kV Transmission Line by thermal relay during a heavy summer scenario in the ten year planning horizon (see Figure VI-17) would cause the entire Coeur d'Alene sub-area to be out of service. The observed overloads occur starting in 2014 making the issues an operational concern.

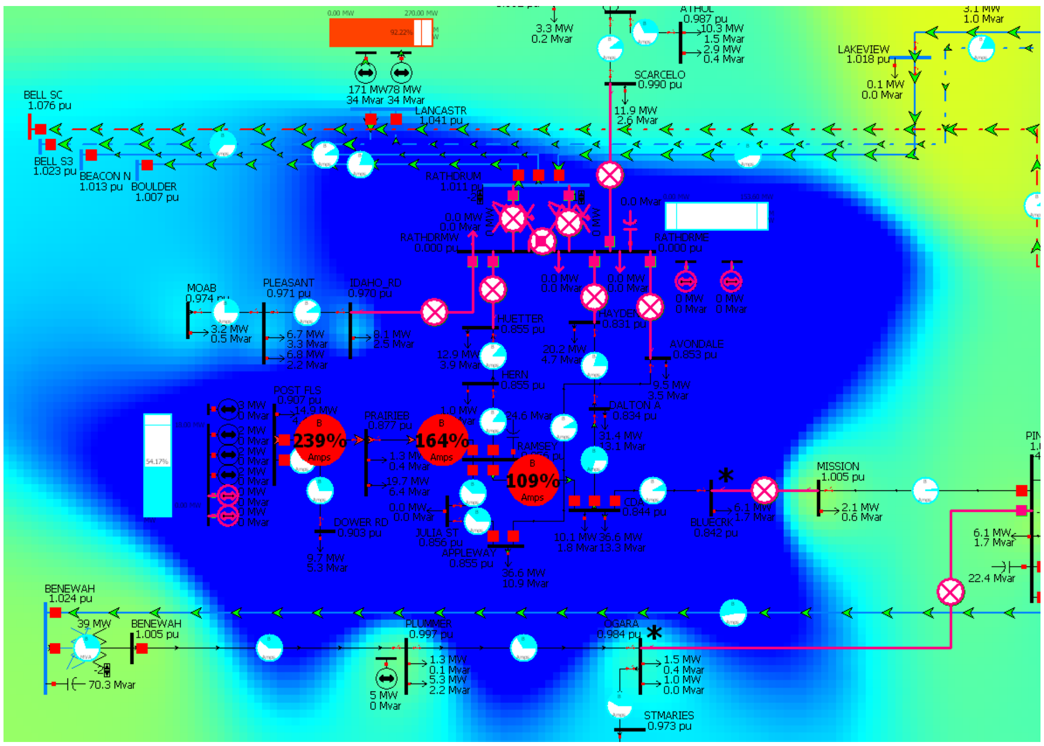


FIGURE VI-17: RATHDRUM A624 TIE BREAKER FAILURE IN 2023 HEAVY SUMMER

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
BF: A624 Rathdrum East & West 115 kV												
CDA - RAMSEY 115.00 kV #1 Line							108.9	107.9		125.4	126.1	
EASTFARM - POST FLS 115.00 kV #1 Line	168.7	174.1	126.6	179.4	186.2	132.6	200.5	204.8	141.1	231.5	239.1	160.9
POST FLS - PRAIRIEB 115.00 kV #1 Line	202.5	201.4	149.6	214.6	215.2	155.5	239.5	237.1	164.2	276.5	278.0	184.8
PRAIRIEB - RAMSEY 115.00 kV #1 Line	140.7	140.0		147.8	148.2		163.8	162.2	100.5	186.8	187.8	113.4

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
BF: A624 Rathdrum East & West 115 kV												
Bus Low Volts												
115												
APPLEWAY (48013) 115.00 kV	0.8865	0.8909	0.9266	0.8870	0.8845	0.9237	0.8551	0.8631	0.9142	0.8302	0.8260	0.8846
AVONDALE (48019) 115.00 kV	0.8849	0.8893	0.9256	0.8853	0.8827	0.9226	0.8532	0.8612	0.9131	0.8279	0.8237	0.8834
BLUECRK (48045) 115.00 kV	0.8757	0.8801	0.9180	0.8756	0.8731	0.9146	0.8424	0.8506	0.9042	0.8156	0.8113	0.8726
CDA (48067) 115.00 kV	0.8770	0.8813	0.9192	0.8770	0.8744	0.9159	0.8439	0.8520	0.9057	0.8173	0.8129	0.8747

DALTON A (48093) 115.00 kV	0.8685	0.8729	0.9136	0.8681	0.8655	0.9099	0.8339	0.8422	0.8994	0.8057	0.8013	0.8673
DOWER RD (47033) 115.00 kV	0.9241	0.9281	0.9463	0.9274	0.9251	0.9448	0.9026	0.9097	0.9375	0.8874	0.8837	0.9135
HAYDEN (48148) 115.00 kV	0.8666	0.8710	0.9123	0.8659	0.8633	0.9085	0.8314	0.8397	0.8978	0.8025	0.7981	0.8653
HERN (48155) 115.00 kV	0.8867	0.8910	0.9268	0.8872	0.8847	0.9239	0.8553	0.8634	0.9144	0.8305	0.8263	0.8849
HUETTER (48159) 115.00 kV	0.8864	0.8907	0.9267	0.8869	0.8843	0.9238	0.8550	0.8630	0.9143	0.8302	0.8259	0.8848
JULIA ST (48170) 115.00 kV	0.8870	0.8913	0.9269	0.8875	0.8849	0.9240	0.8556	0.8637	0.9145	0.8308	0.8266	0.8850
POST FLS (48329) 115.00 kV	0.9280	0.9319		0.9316	0.9294		0.9075	0.9146	0.9447	0.8936	0.8899	0.9226
PRAIRIEB (40855) 115.00 kV	0.9037	0.9079	0.9363	0.9054	0.9030	0.9342	0.8767	0.8844	0.9259	0.8562	0.8522	0.8994
RAMSEY (48349) 115.00 kV	0.8876	0.8919	0.9272	0.8881	0.8856	0.9243	0.8563	0.8643	0.9149	0.8316	0.8274	0.8854
230												
RATHDRUM (48357) 230.00 kV										1.0065	1.0061	
Change Bus Low Volts												
115												
POST FLS (48329) 115.00 kV						0.9513						

MITIGATION

Rebuilding the Coeur d'Alene – Pine Creek 115 kV Transmission Line to 795 ACSR conductor with 150 MVA summer thermal capacity and operating the transmission line normally closed will mitigate the observed thermal overloads for the Rathdrum tie breaker failure in the ten year planning horizon. Thermal overloads are observed again in the 2032 Heavy Summer base case. The proposed transmission line rebuild project is scheduled for completion in 2017. Possible operational mitigation action can be taken by closing the normally open point on the Coeur d'Alene – Pine Creek 115 kV Transmission Line and restore service as feasible.

D High Transfer Scenario

PROBLEM

In 2014 and 2018 High Transfer cases, thermal overloads are observed on the underlying 115 kV transmission lines for the outage of the double circuit Beacon – Rathdrum and Boulder – Rathdrum 230 kV transmission lines (see Figure VI-18). The Boulder – Rathdrum and Post Falls – Ramsey 115 kV transmission lines have thermal relays set to trip the transmission lines at a conductor temperature of 80C.

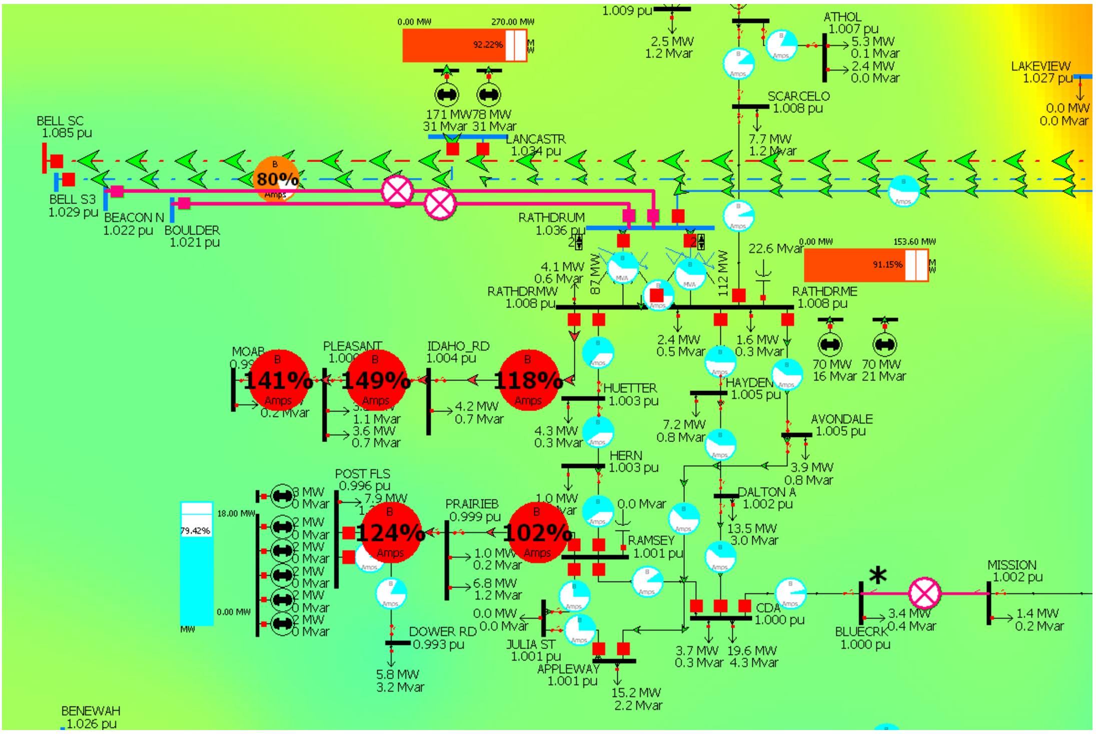


FIGURE VI-18: BEACON - RATHDRUM & BOULDER - RATHDRUM DOUBLE CIRCUIT OUTAGE IN 2014 HIGH TRANSFER

The Cabinet – Rathdrum 230 kV Transmission Line shows heavy loading or actual overloads, depending on specific generation dispatch, for the adjacent transmission line outage of the Bell – Taft 500 kV and Bell – Lancaster 230 kV transmission lines (Figure VI-19).

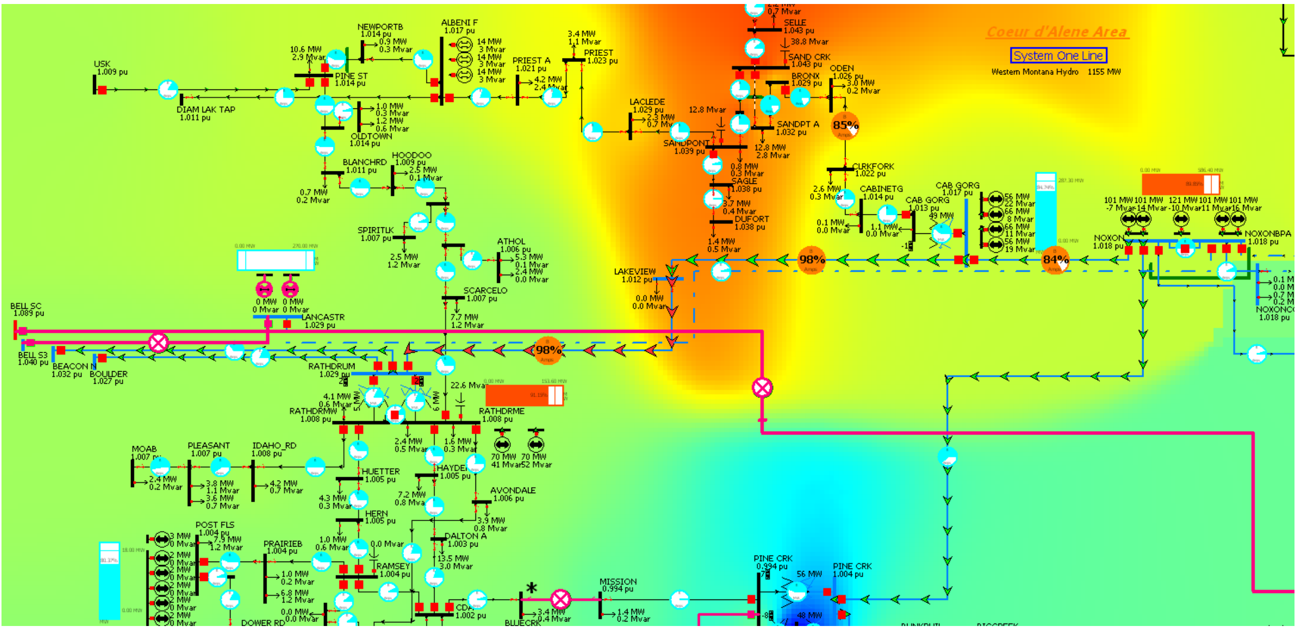


FIGURE VI-19: BELL - TAFT 500 KV AND BELL - LANCASTER 230 KV ADJACENT OUTAGE IN 2014 HIGH TRANSFER

	14HT	18HT
N-1: 3TM Bell - Boundary #1 230 kV Open @ BELL		
ALBENI F - NEWPORTB 115.00 kV #1 Line	102.9	100.5
N-1: Bonner Ferry - Libby 115 kV Open @ LIB		
CLRKFORK - ODEN 115.00 kV #1 Line		105.2
N-1: Burke - Pine Creek #3 115 kV (BUR-LKY)		
BIGCREEK - BURKE 115.00 kV #1 Line	101.9	
N-1: Burke - Pine Creek #3 115 kV Open @ BUR		
BIGCREEK - BURKE 115.00 kV #1 Line	101.9	
N-1: Libby 230/115 kV		
BRONX - SANDPT A 115.00 kV #1 Line		100.1
CLRKFORK - ODEN 115.00 kV #1 Line		105.4
N-2: Beacon - Rathdrum 230 kV & Boulder - Rathdrum 230 kV		
IDAHO_RD - PLEASANT 115.00 kV #1 Line	148.8	147.8
IDAHO_RD - RATHDRMW 115.00 kV #1 Line	118.2	117.4
MOAB - PLEASANT 115.00 kV #1 Line	141.2	139.7
POST FLS - PRAIRIEB 115.00 kV #1 Line	123.7	123.2
PRAIRIEB - RAMSEY 115.00 kV #1 Line	101.6	101.3
N-2: Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV and Lancaster - Noxon 230 kV		
IDAHO_RD - PLEASANT 115.00 kV #1 Line	145.3	145.1
IDAHO_RD - RATHDRMW 115.00 kV #1 Line	115.5	115.4
MOAB - PLEASANT 115.00 kV #1 Line	137.8	137.1
POST FLS - PRAIRIEB 115.00 kV #1 Line	120.6	120.9
N-2: Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV		
IDAHO_RD - PLEASANT 115.00 kV #1 Line	148.6	148.3
IDAHO_RD - RATHDRMW 115.00 kV #1 Line	118.0	117.8
MOAB - PLEASANT 115.00 kV #1 Line	141.2	140.4
POST FLS - PRAIRIEB 115.00 kV #1 Line	123.7	123.9
PRAIRIEB - RAMSEY 115.00 kV #1 Line	101.6	101.7
N-2: Bell - Taft 500 kV and Bell - Lancaster 230 kV		
CAB GORG - LAKEVIEW 230.00 kV #1 Line		104.2
LAKEVIEW - RATHDRUM 230.00 kV #1 Line		104.1
N-2: Bell - Taft 500 kV and Lancaster - Noxon 230 kV		
CAB GORG - LAKEVIEW 230.00 kV #1 Line		100.8
LAKEVIEW - RATHDRUM 230.00 kV #1 Line		100.7

MITIGATION

The Boulder – Rathdrum and Otis Orchards – Post Falls 115 kV transmission lines are parallel to the 230 kV corridor between the Spokane and Coeur d'Alene areas. An outage causing loss of more than one 230 kV transmission line in the corridor will cause the parallel 115 kV transmission lines to exceed applicable facility ratings. The Boulder – Rathdrum 115 kV Transmission Line presently consists of 795 AAC, 556 AAC, 397 ACSR and 250 CU conductor. Reconductoring the transmission line to all 795 AAC with 150 MVA thermal capacity was analyzed. Reducing line impedance causes additional power to flow on the transmission lines and the applicable facility ratings are still exceeded.

Mitigation of issue on the Boulder – Rathdrum 115 kV Transmission Line and the Otis Orchards – Post Falls 115 kV Transmission Line overloads is proposed by tripping one end of each transmission line for specific outages. Figure VI-20 illustrates the logic and specific outages triggering the transmission line back tripping used for N-0 conditions.

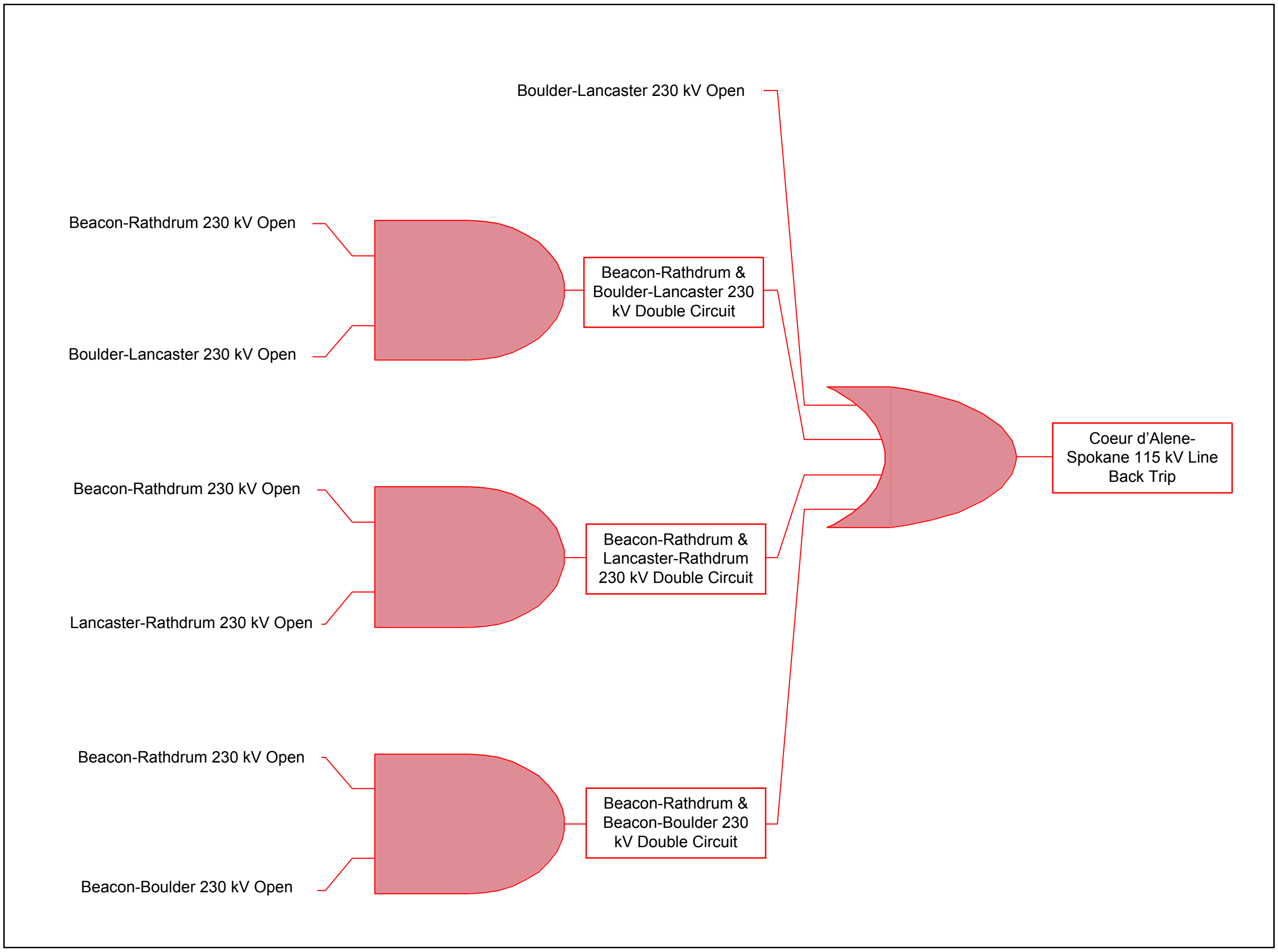


FIGURE VI-20: COEUR D'ALENE - SPOKANE 115 KV LINE BACK TRIP LOGIC

Utilizing 115 kV transmission line back tripping for specific outages can cause additional loading on the Bell – Lancaster 230 kV Transmission Line. The most constraining contingency is the Boulder – Lancaster 230 kV Transmission Line and the Beacon – Rathdrum 230 kV Transmission Line double circuit outage. It is proposed to back trip the Lancaster – Rathdrum 230 kV Transmission Line for only the Boulder – Lancaster 230 kV Transmission Line and Beacon – Rathdrum 230 kV Transmission Line double circuit outage.

Further analysis is necessary to determine a feasible project to mitigate the observed overloads on the Cabinet – Rathdrum 230 kV Transmission Line. A detailed Clark Fork RAS assessment is presently under development. The assessment includes the impacts of the Lancaster Interconnection and Spokane Valley Transmission Reinforcement projects. The conclusion of the assessment will state the necessary projects to mitigate the observed transmission system performance issues.

E 230 kV Voltage Control

PROBLEM

Several regional outages cause low voltages on the 230 kV buses at Rathdrum and Pine Creek Stations. Bus outages at Bell or Beacon Stations and outages causing a loss of the Hatwai 500/230 kV Transformer are the primary examples causing low voltage issues.

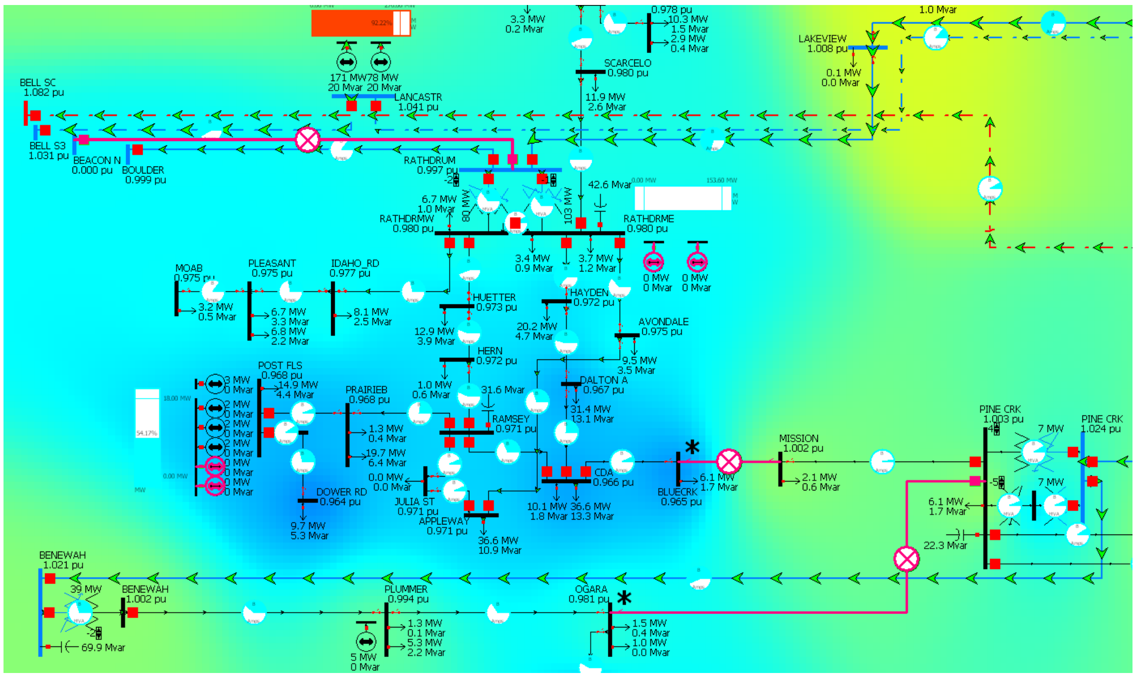


FIGURE VI-21: BEACON R427 TIE BREAKER FAILURE IN 2023 HEAVY SUMMER

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
Bus High Volts												
230												
PINE CRK (48317) 230.00 kV									1.0526			
Bus Low Volts												
230												
LAKEVIEW (48179) 230.00 kV	1.0016	1.0080		1.0082			1.0078	1.0040		0.9996	0.9953	
PINE CRK (48317) 230.00 kV	0.9975			1.0069	1.0081		1.0049			1.0065		
RATHDRUM (48357) 230.00 kV	0.9964	1.0005	1.0034	0.9974	0.9984	1.0031	0.9970	0.9883	1.0058	0.9844	0.9759	0.9889

MITIGATION

The interconnection of the Lancaster Station to the Boulder – Rathdrum 230 kV Transmission Line will mitigate the observed low voltage issues at Rathdrum and Pine Creek Stations. The Lancaster Interconnection Project is scheduled to be completed by the end of 2013.

F St. Maries Low Voltage

PROBLEM

Low voltages are observed at St. Maries Station for an outage of the BPA Hot Springs 500/230 kV Transformer. The 230 kV transmission system voltages are reduced as a result of the transformer outage, and using the post-transient contingency methodology does not consider system operator intervention to switch capacitor banks or modify 230/115 kV transformer tap positions. Other outages related to the loss of the BPA Hatwai 500/230 kV Transformer also cause low voltages at St. Maries Station (see Figure VI-22).

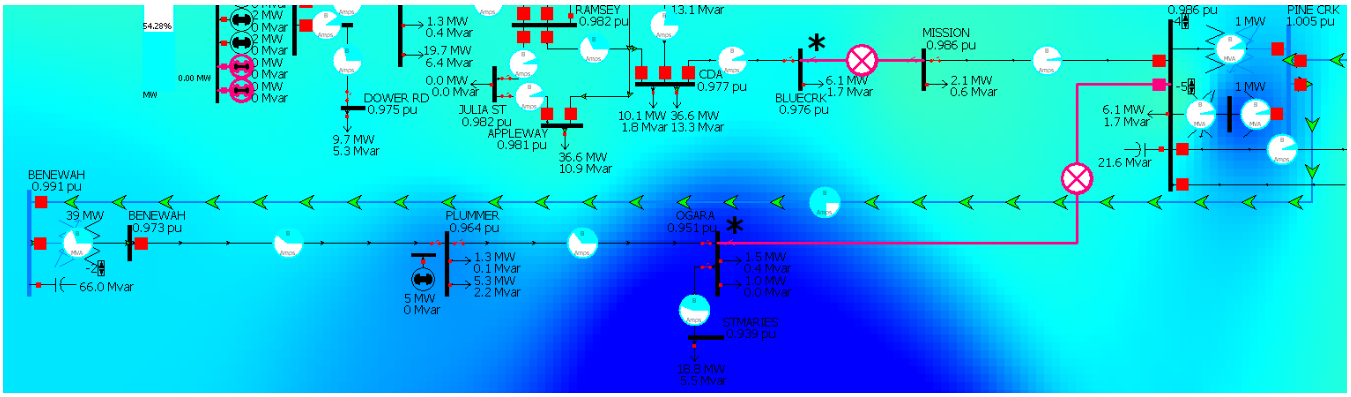


FIGURE VI-22: DWORSHAK 500 KV BREAKER FAILURE IN 2023 HEAVY SUMMER

	14HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
Bus Low Volts							
115							
OGARA (48297) 115.00 kV					0.9497		
STMARIES (48417) 115.00 kV	0.9477	0.9390	0.9394	0.9413	0.9368	0.9469	0.9406

MITIGATION

Automatic insertion of shunt capacitor banks at Benewah Station will mitigate the low voltages observed at St. Maries Station. Avista's 230 kV shunt capacitor banks presently have relay protection settings to switch in single capacitor banks when the voltage drops below 228 kV. Increasing the low voltage set point to the present operating limit of 232.3 kV will help ensure the 230 kV system voltage will be operated to facilitate the 115 kV system operating within the applicable voltage limits. Until the relay protection settings are modified, the System Operator could manually switch in the shunt capacitor banks and manually change tap positions on the Benewah 230/115 kV Transformer. Relying on manual operator intervention will cause the applicable facility ratings to be exceeded until the appropriate actions are taken.

G Libby Loop Voltage

PROBLEM

The area served by the BPA's Bonners Ferry – Libby and Bonners Ferry – Sand Creek 115 kV transmission lines experiences high voltage issues for the double circuit outage of the Albeni Falls – Sand Creek and Bronx – Sand Creek 115 kV transmission lines (see Figure VI-23). Shunt capacitors located at Sand Creek and Bonners Ferry Stations are not presently modeled with relay protection settings which will automatically switch out capacitors banks reducing the observed overvoltage.

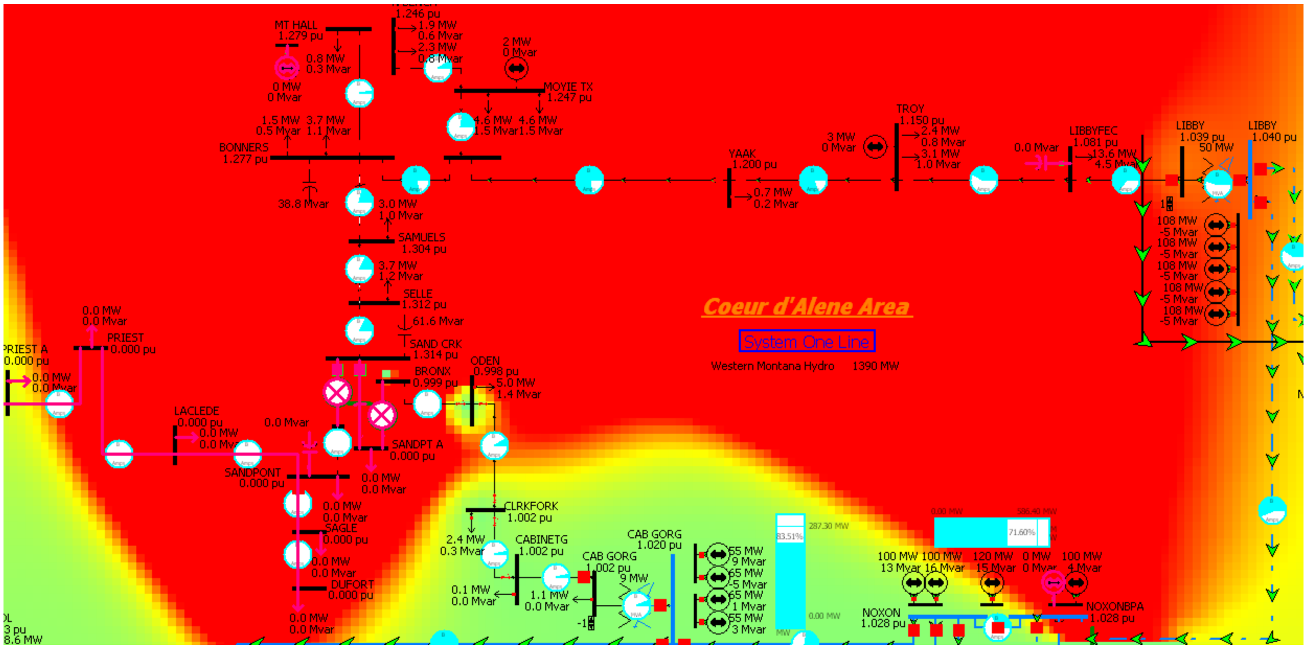


FIGURE VI-23: ALBENI FALLS - SAND CREEK & BRONX - SAND CREEK 115 KV DOUBLE CIRCUIT OUTAGE IN 2014 HEAVY SUMMER

The Kalispel area is served by two 230 kV and one 115 kV transmission lines. The loss of the Hot Springs 230 kV bus during a heavy winter scenario causes extreme low voltages in the area when generation levels are low at Libby and Hungry Horse (see Figure VI-24).

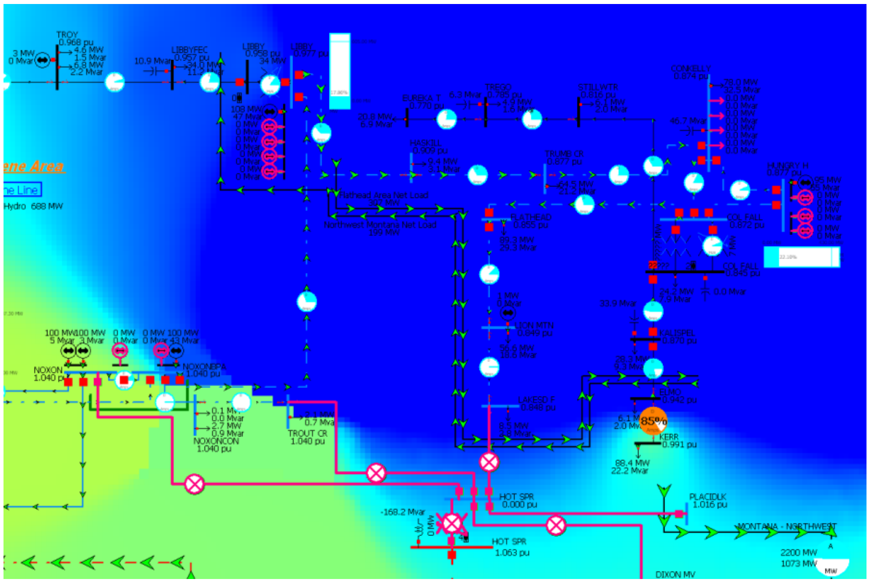


FIGURE VI-24: HOT SPRINGS 230 KV BUS OUTAGE IN 2018 HEAVY WINTER

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
Bus High Volts												
115												
BONNERS (40133) 115.00 kV	1.2771	1.1953	1.2021	1.1744	1.1744	1.2286	1.2741	1.1917		1.2728	1.2728	1.1638
MOYIE T (41239) 115.00 kV	1.2483	1.1743	1.1784	1.1547	1.1547	1.2041	1.2461	1.1715		1.2449	1.2449	1.1430
MT HALL (47194) 115.00 kV	1.2787	1.1968	1.2030	1.1756	1.1756	1.2298	1.2756	1.1930		1.2743	1.2743	1.1640
N BENCH (41241) 115.00 kV	1.2457	1.1715	1.1740	1.1514	1.1514	1.1994	1.2430	1.1682		1.2418	1.2418	1.1371
PRIEST A (48347) 115.00 kV	1.0552											
SAGLE (48376) 115.00 kV	1.0599										1.0552	
SAMUELS (40927) 115.00 kV	1.3040	1.2119	1.2256	1.1904	1.1904	1.2527	1.3005	1.2078	1.1102	1.2991	1.2991	1.1854
SAND CRK (40929) 115.00 kV	1.3141	1.2181	1.2348	1.1964	1.1964	1.2620	1.3105	1.2139	1.1153	1.3091	1.3091	1.1940
SANDPT A (48377) 115.00 kV	1.0524											
SELLE (40965) 115.00 kV	1.3119	1.2168	1.2328	1.1951	1.1951	1.2599	1.3084	1.2126	1.1141	1.3070	1.3070	1.1921
SMITHFLS (41299) 115.00 kV	1.2792	1.1973	1.2034	1.1760	1.1760	1.2303	1.2761	1.1935		1.2748	1.2748	1.1645
YAAK (41169) 115.00 kV	1.2003	1.1408	1.1436	1.1249	1.1249	1.1681	1.2005	1.1406		1.1995	1.1995	1.1168
230												
CONKELLY (40267) 230.00 kV						1.1516			1.1964			1.1967
HASKILL (40513) 230.00 kV						1.1197			1.1528			1.1531
LIB PH2 (44201) 230.00 kV									1.1003			1.1005
LIBBY (40657) 230.00 kV									1.1003			1.1005
TRUMB CR (47360) 230.00 kV						1.1440			1.1859			1.1862
Bus Low Volts												
115												
BONNERS (40133) 115.00 kV									0.9104			0.8943
COL FALL (40247) 115.00 kV			0.9135	0.8866		0.8319						
DUFORT (47369) 115.00 kV									0.8878			0.8713
ELMO (40391) 115.00 kV						0.9269						
EUREKA T (40396) 115.00 kV			0.8591	0.8760		0.7541			0.9361			0.9352
HAYDEN (48148) 115.00 kV							0.9404	0.9442		0.9392	0.9385	
KALISPEL (40589) 115.00 kV			0.9077	0.9144		0.8587						
LACLEDE (40617) 115.00 kV									0.8821			0.8648
LIBBY (40655) 115.00 kV			0.8905	0.9478		0.9206			0.8781			0.8713
LIBBYFEC (47278) 115.00 kV			0.8865			0.9160			0.8738			0.8669
MOYIE T (41239) 115.00 kV			0.9390			0.9469			0.9131			0.8973
MT HALL (47194) 115.00 kV									0.9100			0.8936
N BENCH (41241) 115.00 kV			0.9334			0.9409			0.9063			0.8897
ODEN (48293) 115.00 kV							0.9477		0.9204			0.9079

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
PRIEST (40857) 115.00 kV									0.8780			0.8602
PRIEST A (48347) 115.00 kV									0.8773			0.8593
SAGLE (48376) 115.00 kV									0.8887			0.8722
SAMUELS (40927) 115.00 kV									0.9006			0.8857
SAND CRK (40929) 115.00 kV									0.8974			0.8832
SAND TP (40931) 115.00 kV									0.8936			0.8782
SANDPONT (40933) 115.00 kV									0.8913			0.8753
SANDPT A (48377) 115.00 kV	0.9493	0.9485	0.9433	0.9474		0.9458	0.9310	0.9434	0.8930	0.9364	0.9344	0.8779
SELLE (40965) 115.00 kV									0.8979			0.8835
SMITHFLS (41299) 115.00 kV									0.9103			0.8940
STILLWTR (41039) 115.00 kV			0.8933	0.8839		0.8024						
TREGO (41087) 115.00 kV			0.8720	0.8820		0.7701			0.9494			0.9485
YAAK (41169) 115.00 kV			0.9291			0.9442			0.9059			0.9002
230												
COL FALL (40248) 230.00 kV				0.9147								
COL FALL (40249) 230.00 kV			0.9436	0.9147		0.8544						
COL FALL E (40248) 230.00 kV						0.8544						
CONKELLY (40267) 230.00 kV			0.9440	0.9145	0.9430	0.8560						
DIXON MV (40348) 230.00 kV						0.9245	0.9423	0.9474		0.9439	0.9473	
FLATHEAD (40421) 230.00 kV			0.9319	0.9057		0.8367						
HASKILL (40513) 230.00 kV				0.9386		0.8907						
HUNGRY H (40557) 230.00 kV			0.9473	0.9183		0.8589						
LAKESD F (47367) 230.00 kV			0.9274	0.9028		0.8298						
LIBBY (40657) 230.00 kV			0.9133			0.9441			0.9006			0.8935
RATTLE S (40867) 230.00 kV						0.9282	0.9439	0.9489		0.9455	0.9488	
TRUMB CR (47360) 230.00 kV			0.9429	0.9157	0.9476	0.8583						
Change Bus High Volts												
115												
BONNERS (40133) 115.00 kV	1.0827			1.0643			1.0737		1.0976	1.0753		
LIBBY (40655) 115.00 kV									1.0703			1.0709
LIBBYFEC (47278) 115.00 kV	1.0808	1.0560	1.0575	1.0488		1.0795	1.0870	1.0620		1.0866	1.0866	
MOYIE T (41239) 115.00 kV									1.0832			
MT HALL (47194) 115.00 kV	1.0840			1.0651			1.0748		1.0978	1.0764		
N BENCH (41241) 115.00 kV									1.0775			
SMITHFLS (41299) 115.00 kV	1.0844			1.0655			1.0752		1.0982	1.0768		
YAAK (41169) 115.00 kV									1.0681			
230												
LIB PH1 (44200) 230.00 kV									1.0996			1.0998
Change Bus Low Volts												
115												
BONNERS (40133) 115.00 kV			0.9735						0.9503			
COL FALL (40247) 115.00 kV				0.9562			0.9593			0.9599		
COLV BPA (40263) 115.00 kV												0.9645
DUFORT (47369) 115.00 kV												0.9570
EUREKA T (40396) 115.00 kV	0.9690			0.9519			0.9525			0.9531		
KALISPEL (40589) 115.00 kV				0.9641								
LACLEDE (40617) 115.00 kV			0.9639									
LIBBY (40655) 115.00 kV						0.9575						
LIBBYFEC (47278) 115.00 kV						0.9574						
MOYIE T (41239) 115.00 kV	0.9646	0.9646	0.9542		0.9573	0.9647			0.9560		0.9693	
MT HALL (47194) 115.00 kV			0.9737						0.9502			
N BENCH (41241) 115.00 kV	0.9612	0.9612	0.9506		0.9532	0.9588			0.9501		0.9652	
ODEN (48293) 115.00 kV	0.9641	0.9633	0.9588					0.9598		0.9545	0.9525	
PRIEST (40857) 115.00 kV			0.9607									
PRIEST A (48347) 115.00 kV			0.9601									
SAGLE (48376) 115.00 kV												0.9578
SAMUELS (40927) 115.00 kV			0.9744						0.9521			0.9507
SAND CRK (40929) 115.00 kV			0.9733						0.9548			0.9544
SAND TP (40931) 115.00 kV												0.9580
SANDPT A (48377) 115.00 kV			0.9634		0.9537							
SELLE (40965) 115.00 kV			0.9734						0.9537			0.9534
SMITHFLS (41299) 115.00 kV			0.9741						0.9503			

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
STILLWTR (41039) 115.00 kV				0.9560			0.9581			0.9587		
TREGO (41087) 115.00 kV	0.9739			0.9573			0.9582			0.9589		
YAAK (41169) 115.00 kV						0.9581			0.9530			
230												
COL FALL (40248) 230.00 kV				0.9752								
COL FALL (40249) 230.00 kV			0.9614	0.9752			0.9728			0.9734		
COL FALL E (40248) 230.00 kV							0.9728			0.9734		
CONKELLY (40267) 230.00 kV	0.9607	0.9607	0.9614	0.9747			0.9591	0.9591		0.9591	0.9591	
DIXON MV (40348) 230.00 kV		0.9711	0.9546	0.9609	0.9602							
FLATHEAD (40421) 230.00 kV				0.9694		0.9635	0.9687		0.9736	0.9693		0.9728
HASKILL (40513) 230.00 kV			0.9619									
HOT SPR (40551) 230.00 kV			0.9734			0.9668		0.9712	0.9753		0.9713	0.9745
HUNGRY H (40557) 230.00 kV			0.9649	0.9785			0.9825			0.9831		
LAKESD F (47367) 230.00 kV							0.9657			0.9663		
LIB PH1 (44200) 230.00 kV						0.9643						
LIB PH2 (44201) 230.00 kV						0.9634						
LIBBY (40657) 230.00 kV				0.9772		0.9634						
RATTLE S (40867) 230.00 kV			0.9576	0.9621								
TRUMB CR (47360) 230.00 kV	0.9651	0.9651	0.9590	0.9742			0.9635	0.9635		0.9635	0.9635	

MITIGATION

The issues observed in the Bonners Ferry and Kalispel areas are the BPA's transmission system issues. Avista will communicate the observed issues with the BPA and coordinate the appropriate Corrective Action Plans as necessary.

H Extreme Events

The worst extreme event observed in the Coeur d'Alene Area is the loss of the Libby – Noxon 230 kV Transmission Line with the Libby Generator Dropping remedial action scheme not operating. Thermal overloads of the Bonners Ferry – Libby 115 kV Transmission Line are caused by the excess generation at Libby. The High Transfer cases were evaluated for extreme events, the results are provided for informational purposes only as the High Transfer cases represent an extreme scenario.

	14HS	18HS	23HS	23HW	32HS	32HSLH	32HW
D.7							
N-2: Bell - Taft 500 kV and Cabinet - Rathdrum 230 kV and Lancaster - Noxon 230 kV							
BRONX - ODEN 115.00 kV #1 Line	118.6	106.5	118.3		120.5		
BRONX - SANDPT A 115.00 kV #1 Line	119.0	106.8	118.7		121.0		
CLRKFORK - ODEN 115.00 kV #1 Line	126.3	114.7	127.2		130.9		
D.8							
SUB: Beacon 230 & 115 (AVA)							
NEWPORTT - PINE ST 115.00 kV #1 Line						106.6	
SUB: Bell 500, 230 & 115 (BPA)							
NEWPORTT - PINE ST 115.00 kV #1 Line	102.8	103.0					
D.12							
BF: R318 Noxon East & West 230 kV - No RAS							
BONNERS - MOYIE T 115.00 kV #1 Line	117.4	113.1	113.6		115.4		
LIBBY - LIBBYFEC 115.00 kV #1 Line	108.5	107.5	109.1		110.6		
MOYIE T - YAAK 115.00 kV #1 Line	125.4	123.0	123.2		125.1		
TROY - YAAK 115.00 kV #1 Line	126.3	123.9	124.2		126.1	100.2	
BUS: Columbia Falls 230 kV - No RAS							
COL FALL - KALISPEL 115.00 kV #1 Line		102.2	101.6		101.0		
COL FALL E 230.00 to 115.00 kV #2 Transformer	102.2						
BUS: Flathead 230 kV - No RAS							
COL FALL - KALISPEL 115.00 kV #1 Line	104.4	111.2	110.5		109.8		
BUS: Noxon West 230 kV - No RAS							
BONNERS - MOYIE T 115.00 kV #1 Line	118.1	113.9	114.4		115.9		
LIBBY - LIBBYFEC 115.00 kV #1 Line	109.1	108.2	109.8		111.0		
MOYIE T - YAAK 115.00 kV #1 Line	126.2	123.9	124.1		125.6		
TROY - YAAK 115.00 kV #1 Line	127.0	124.8	125.1		126.6		
N-1: Cabinet - Rathdrum 230 kV - No RAS							
CLRKFORK - ODEN 115.00 kV #1 Line					102.4		
N-1: Columbia Falls - Flathead 230 kV - No RAS							
COL FALL - KALISPEL 115.00 kV #1 Line	104.6	111.3	110.6		109.9		
N-1: Libby - Noxon 230 kV - No RAS							
BONNERS - MOYIE T 115.00 kV #1 Line	119.1	114.9	115.5		116.8		
LIBBY - LIBBYFEC 115.00 kV #1 Line	109.8	109.1	110.7		111.8		
MOYIE T - YAAK 115.00 kV #1 Line	127.2	125.0	125.2		126.6		
TROY - YAAK 115.00 kV #1 Line	128.0	125.9	126.2		127.5		
N-2: Bell - Taft 500 kV and Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV - No RAS							
IDAHO_RD - PLEASANT 115.00 kV #1 Line	107.9						
N-2: Bell - Taft 500 kV and Cabinet - Rathdrum 230 kV and Lancaster - Noxon 230 kV - No RAS							
BRONX - ODEN 115.00 kV #1 Line	128.0	125.3	125.7		128.5		
BRONX - SANDPT A 115.00 kV #1 Line	128.6	125.8	126.2		129.1		
CLRKFORK - ODEN 115.00 kV #1 Line	136.3	134.3	135.2		139.6		
N-2: Columbia Falls - Flathead 230 kV and Conkelley - Libby 230 kV - No RAS							
COL FALL - KALISPEL 115.00 kV #1 Line		102.9					
ELMO - KALISPEL 115.00 kV #1 Line				104.9			104.9
ELMO - KERR 115.00 kV #1 Line				110.0			110.0
N-2: Hot Springs - Noxon #1 230 kV and Libby - Noxon 230 kV - No RAS							
BONNERS - MOYIE T 115.00 kV #1 Line	117.8	113.6	114.2		115.6		
LIBBY - LIBBYFEC 115.00 kV #1 Line	108.8	108.0	109.6		110.8		
MOYIE T - YAAK 115.00 kV #1 Line	125.8	123.6	123.9		125.3		
TROY - YAAK 115.00 kV #1 Line	126.7	124.5	124.8		126.3		
(blank)							

	14HS	18HS	23HS	23HW	32HS	32HSLH	32HW
RES: N-2: Coeur d'Alene 15th St - Ramsey 115 kV & Ramsey - Rathdrum #2 115 kV							
HAYDEN - RATHDRME 115.00 kV #1 Line					104.1	104.0	

Spare Equipment Study

Thermal facility rating overloads from the Spare Equipment Study are provided in Table VI-9.

TABLE VI-9: SPARE EQUIPMENT CONTINGENCY ANALYSIS RESULTS.

	Cabinet	Libby	Pine Creek 1	Pine Creek 2	Rathdrum 1	Rathdrum 2
BF: A501 Rathdrum West 115 kV, Boulder-Rathdrum						
EASTFARM - OTIS 115.00 kV #1 Line						108.6
EASTFARM - POST FLS 115.00 kV #1 Line						100.4
POST FLS - PRAIRIEB 115.00 kV #1 Line						114.2
BF: A502 Rathdrum West 115 kV, Ramsey-Rathdrum #1						
POST FLS - PRAIRIEB 115.00 kV #1 Line						101.0
BF: A506 Rathdrum 115 kV, Pine Street-Rathdrum						
BOULDERE - MOAB 115.00 kV #1 Line					109.4	
EASTFARM - OTIS 115.00 kV #1 Line					120.4	
EASTFARM - POST FLS 115.00 kV #1 Line					111.9	
MOAB - PLEASANT 115.00 kV #1 Line					106.2	
POST FLS - PRAIRIEB 115.00 kV #1 Line					128.0	
BF: R404 Cabinet-Rathdrum, Rathdrum #2 230/115 Transformer						
CLRKFORK - ODEN 115.00 kV #1 Line					101.1	
BF: R504 Cabinet-Rathdrum, Rathdrum #1 230/115 Transformer						
CLRKFORK - ODEN 115.00 kV #1 Line						101.1
BUS: Rathdrum East 115 kV						
BOULDERE - MOAB 115.00 kV #1 Line					109.4	
EASTFARM - OTIS 115.00 kV #1 Line					120.3	
EASTFARM - POST FLS 115.00 kV #1 Line					111.9	
MOAB - PLEASANT 115.00 kV #1 Line					106.2	
POST FLS - PRAIRIEB 115.00 kV #1 Line					128.0	
BUS: Rathdrum West 115 kV						
EASTFARM - OTIS 115.00 kV #1 Line						108.1
POST FLS - PRAIRIEB 115.00 kV #1 Line						113.5

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.

The observed issues with loss of a Rathdrum 230/115 kV 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.

Voltage Stability Study

I PV Analysis

METHODOLOGY

Path 8 – Montana to Northwest borders the eastern edge of the Coeur d'Alene area; therefore, a Transfer Path PV Curve analysis was performed as well as a Load Ramp PV Curve analysis the Coeur d'Alene area.

For the Transfer Path PV Curve analysis, all buses in the Montana and Northwest were monitored while generation was increased in the Western Montana Hydro Complex, Boundary Hydro Project, and in the Montana area and generation was decreased in the Lower Columbia River Hydro system. Transfers across Path 8 were increased until voltage collapse occurred. Path 6 – West of Hatwai is in series with Path 8 therefore the assumed generation increments and decrements increased transfers across Path 6 as well as Path 8.

For the Load Ramp PV Curve analysis, all buses in the Coeur d'Alene area were monitored. All loads within the Coeur d'Alene area were increased until voltage collapse occurred. It was assumed that all additional generation necessary to supply the increase in load came from a distribution of all generation in WECC.

RESULTS

As generation in the Western Montana Hydro Complex, Boundary Hydro project, and in the Montana area is increased, the transfers across Path 6 and Path 8 increases until a theoretical maximum transfer limit was reached. A nose point was reached therefore identifying Path 6 and Path 8 as reliability limited (opposed to flow limited). A balance of generation levels and load on the east side of the paths directly impacts the amount of power transferred across the paths. The load in the Montana and Western Montana areas could be reduced therefore increasing the transfer amounts, but further load reduction may fall outside a realistic simulation approach.

The PV Analysis results for Path 8 showed a theoretical flow limit of 2440 MW for all lines in service condition. Failure of breaker 4119 at Taft Station causing the loss of Bell – Taft and Garrison – Taft #1 500 kV Transmission Lines is the most limiting contingency with a Path 8 flow of 2350 MW (see Figure VI-25). The contingency list studied does not contain an exhaustive list of outages in NorthWestern's Transmission System. The existing East to West Path 8 Transfer Limit is 2200 MW as posted in the *2013 Path Rating Catalog*. The Avista *2013 Summer Operating Studies Report* identifies the nose of the PV curve at 2435 MW for all lines in service.

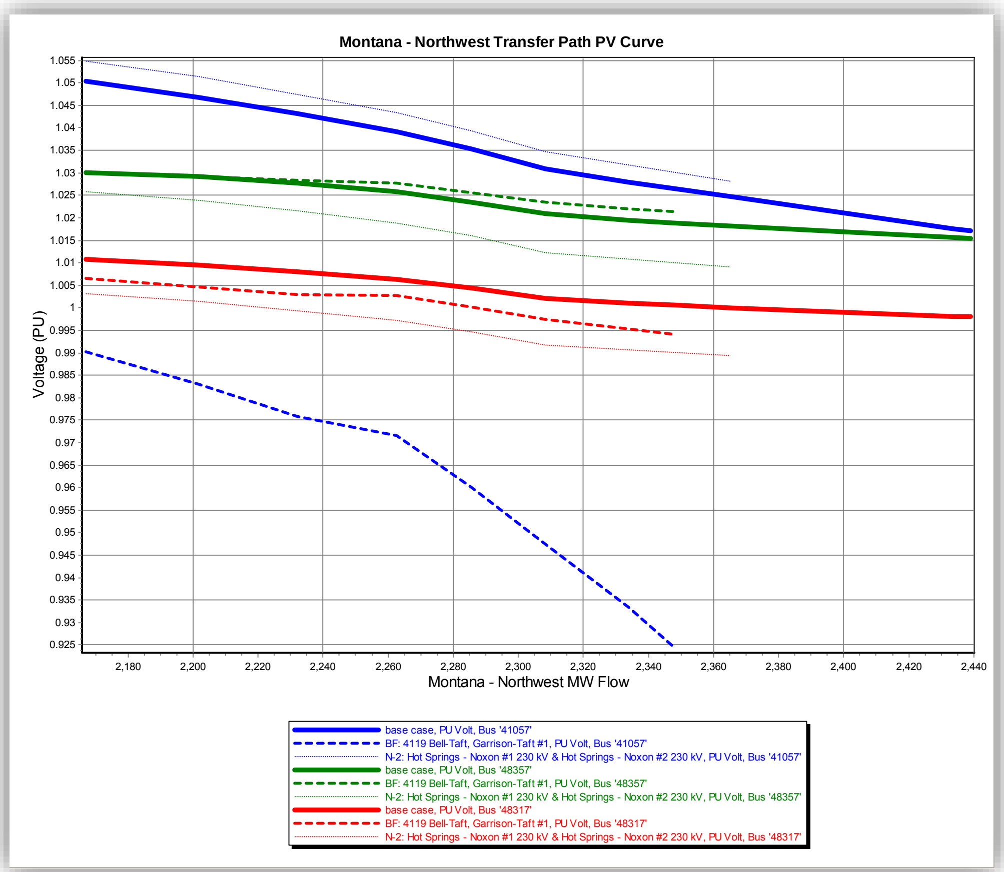


FIGURE VI-25: PATH 8 TRANSFER PATH PV CURVE RESULTS FOR CRITICAL BUSES

The PV Analysis results for Path 6 showed a theoretical flow limit of 4720 MW for all lines in service condition. Failure of breaker 4119 at Taft Station causing the loss of Bell – Taft and Garrison – Taft #1 500 kV transmission lines is the most limiting contingency with a Path 6 flow of 4645 MW (see

Figure VI-26). The existing East to West Path 6 Transfer Limit is 4277 MW as posted in the 2013 Path Rating Catalog. The Avista 2013 Summer Operating Studies Report identifies the nose of the PV curve at 4855 MW for all lines in service.

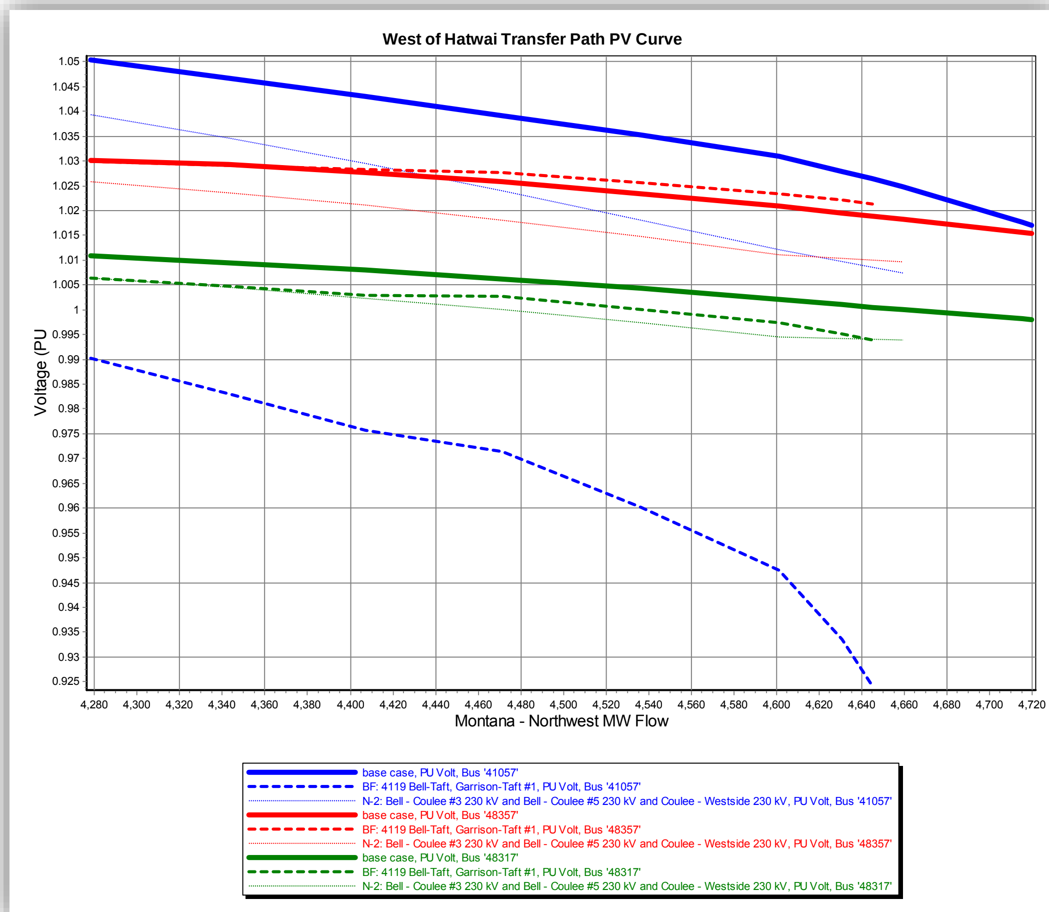


FIGURE VI-26: PATH 6 TRANSFER PATH PV CURVE RESULTS FOR CRITICAL BUSES

The Load Ramp PV Analysis showed a theoretical flow limit of 1915 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 VI-27). The critical bus under the Rathdrum tie breaker failure contingency is Hayden Station.

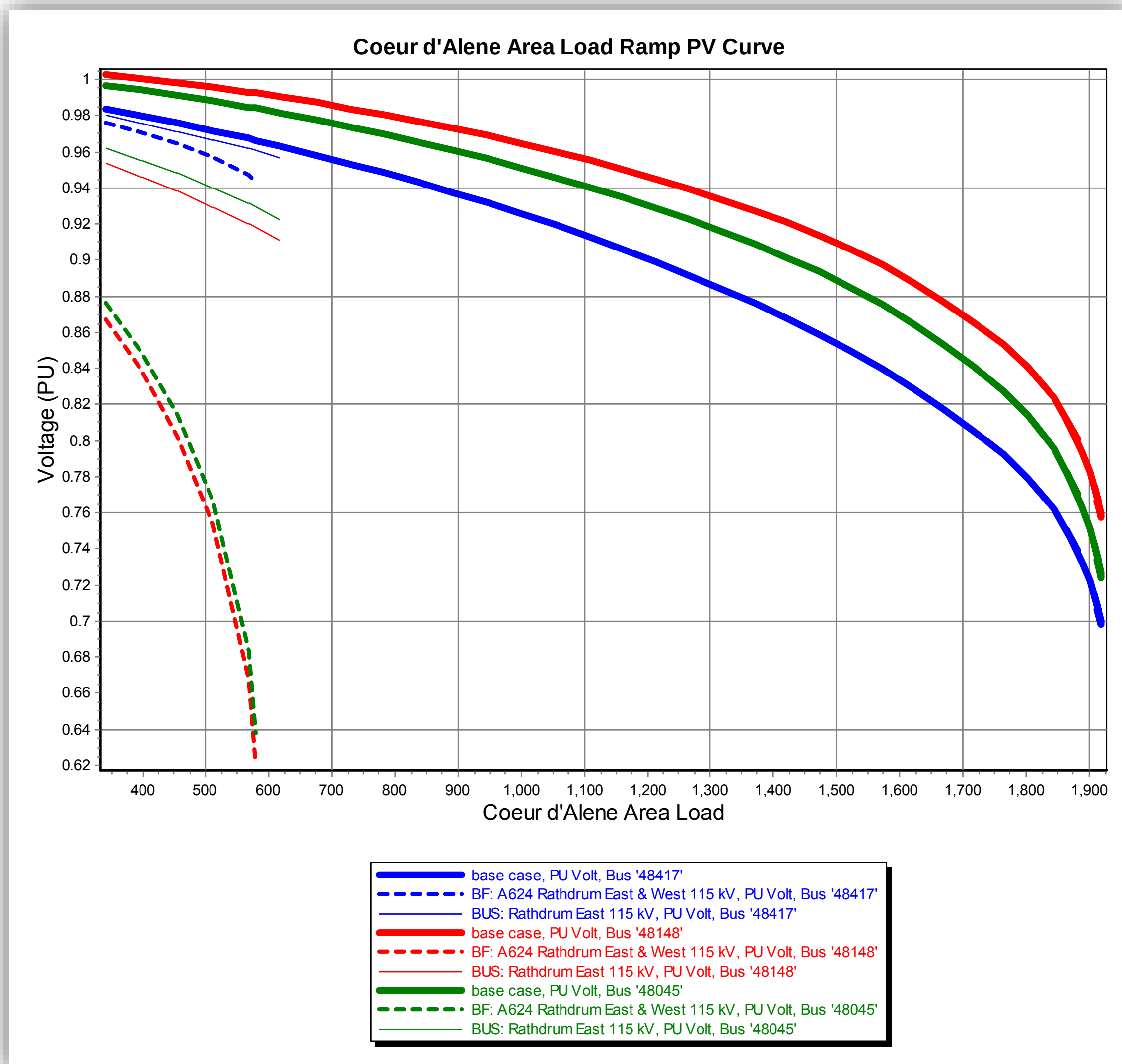


FIGURE VI-27: LOAD RAMP PV CURVE RESULTS FOR CRITICAL BUSES

J QV Analysis

The QV analysis showed there is adequate reactive power margin for the 115 kV source buses and critical buses in the Coeur d'Alene area. Table VI-13 shows the results of the worst performing contingency for each bus analyzed.

The smallest reactive margin at the critical buses analyzed occurred at the Hayden 115 kV bus with a value of 73 MVAr for the tie breaker failure at Rathdrum Station.

TABLE VI-10: QV ANALYSIS RESULTS

Bus Name	Nom kV	Contingency Scenario	Reactive Margin
CAB GORG	115	BASECASE	373.17
CAB GORG	115	BF: 4119 BELL-TAFT, GARRISON-TAFT #1	361.01
CAB GORG	115	BF: A624 RATHDRUM EAST & WEST 115 KV	369.51
CAB GORG	115	BUS: RATHDRUM EAST 115 KV	369.85
HAYDEN	115	BASECASE	536.66
HAYDEN	115	BF: 4119 BELL-TAFT, GARRISON-TAFT #1	507.47
HAYDEN	115	BF: A624 RATHDRUM EAST & WEST 115 KV	73.36
HAYDEN	115	BUS: RATHDRUM EAST 115 KV	170.96
PINE CRK	115	BASECASE	438.68
PINE CRK	115	BF: 4119 BELL-TAFT, GARRISON-TAFT #1	419.24
PINE CRK	115	BF: A624 RATHDRUM EAST & WEST 115 KV	432.73
PINE CRK	115	BUS: RATHDRUM EAST 115 KV	435.09
RATHDRME	115	BASECASE	801.2
RATHDRME	115	BF: 4119 BELL-TAFT, GARRISON-TAFT #1	743.02
RATHDRME	115	BF: A624 RATHDRUM EAST & WEST 115 KV	0
RATHDRME	115	BUS: RATHDRUM EAST 115 KV	0
RATHDRMW	115	BASECASE	801.05
RATHDRMW	115	BF: 4119 BELL-TAFT, GARRISON-TAFT #1	742.9
RATHDRMW	115	BF: A624 RATHDRUM EAST & WEST 115 KV	0
RATHDRMW	115	BUS: RATHDRUM EAST 115 KV	563.97
STMARIES	115	BASECASE	90.92
STMARIES	115	BF: 4119 BELL-TAFT, GARRISON-TAFT #1	89.34
STMARIES	115	BF: A624 RATHDRUM EAST & WEST 115 KV	89.37
STMARIES	115	BUS: RATHDRUM EAST 115 KV	90.18

3.3.2 Stability Analysis

General Observations

Previous studies have shown the loss of both the Hot Springs – Noxon #1 & #2 230 kV transmission lines resulted in slow system recovery. There are presently no remedial actions schemes deployed for the double transmission line outage. The system performance is adequate based on the simulations conducted. Figure VI-28 shows the voltage and frequency response for buses located in the Coeur d’Alene area.

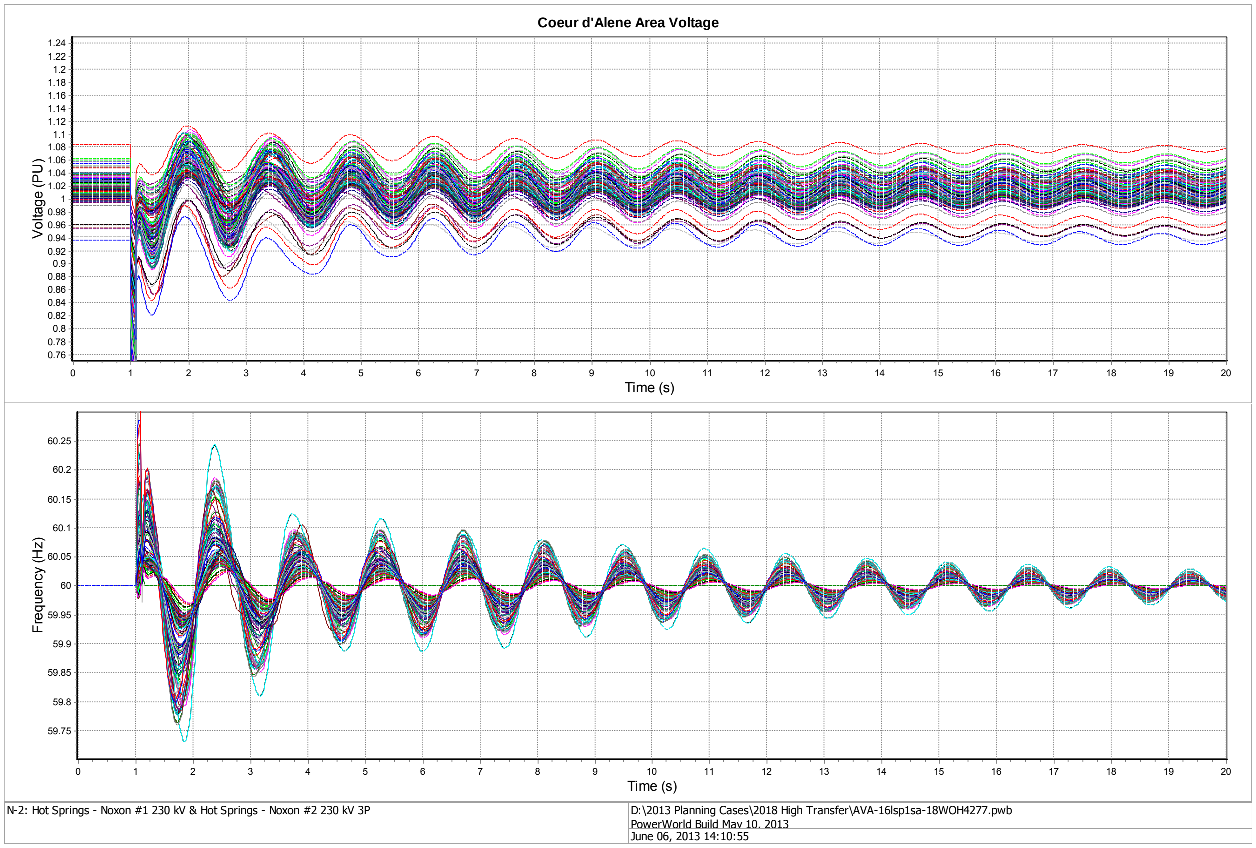


FIGURE VI-28: HOT SPRINGS - NOXON #1 & #2 230 KV OUTAGE RESULTS

Kalispel Area

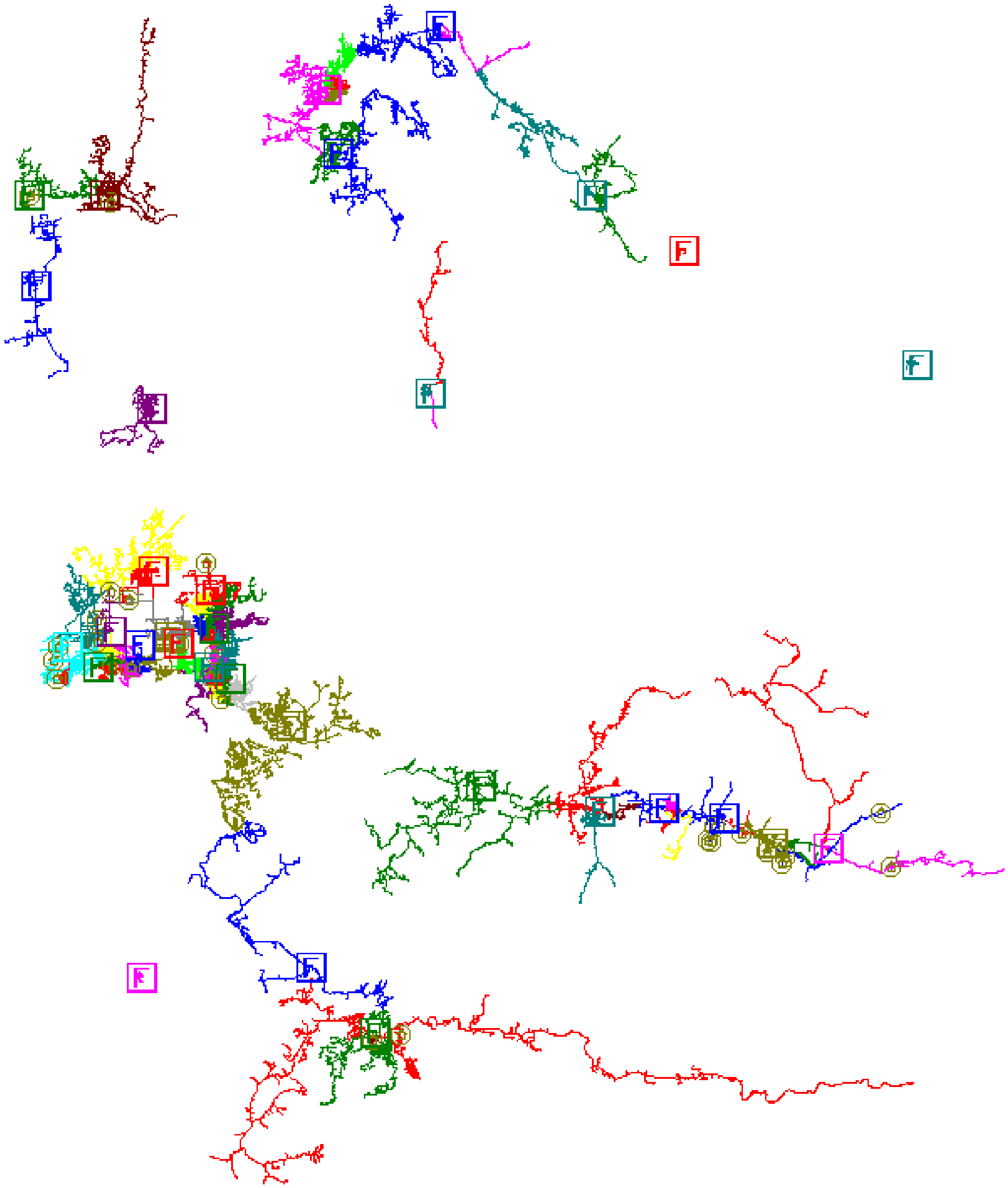
Several contingencies simulated in the Kalispel area caused criteria violations (see Table VI-11). The majority of the violations are voltage dips immediately following the clearing of the fault with slow voltage recovery. The Heavy Winter scenarios tend to show worse voltage dip compared to the Heavy Summer scenarios. Each contingency with a criteria violation occurs in the same area as the contingency and is therefore not a violation of TPL-001-WECC-RBP-2. The Kalispel area is part of the BPA's transmission system.

TABLE VI-11: KALISPEL AREA CRITERIA VIOLATIONS

	14HS		18HS		23HS		14HW		18HW		14HT		18HT	
	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency
N-1: Columbia Falls - Conkelly 230 kV 3P @ COFL														
WECC Category B Voltage Dip Load Bus	1.0833	-29.30	1.0833	-30.19	1.0833	-30.35	1.0833	-35.67	1.0833	-35.81	1.0833	-25.58	1.0833	-28.66
WECC Category B Voltage Dip Non-Load Bus	1.0833	-32.77	1.0833	-33.10	1.0833	-32.96	1.0833	-33.23	1.0833	-32.81	1.0833	-30.78	1.0833	-30.82
N-1: Columbia Falls - Conkelly 230 kV 3P @ COKY														
WECC Category B Voltage Dip Load Bus	1.0833	-29.20	1.0833	-30.10	1.0833	-30.24	1.0833	-35.54	1.0833	-35.68	1.0833	-25.60	1.0833	-28.58
WECC Category B Voltage Dip Non-Load Bus	1.0833	-32.69	1.0833	-33.02	1.0833	-32.88	1.0833	-33.10	1.0833	-32.68	1.0833	-30.71	1.0833	-30.75
N-1: Columbia Falls - Flathead 230 kV @ FLAT														
WECC Category B Frequency											1.6667	59.54	1.6750	59.57
WECC Category B Voltage Dip Load Bus							1.0833	-39.41	1.0833	-37.37				
WECC Category B Voltage Dip Non-Load Bus							1.0833	-34.22	1.0833	-32.26				
N-1: Columbia Falls - Hungry Horse 230 kV 3P @ COFL														
WECC Category B Voltage Dip Load Bus	1.0833	-29.59	1.0833	-30.62	1.0833	-30.62	1.0833	-36.05	1.0833	-35.92	1.0833	-25.74	1.0833	-28.93
WECC Category B Voltage Dip Non-Load Bus	1.0833	-32.87	1.0833	-33.17	1.0833	-32.99	1.0833	-33.26	1.0833	-32.78	1.0833	-30.77	1.0833	-30.80
N-1: Columbia Falls - Hungry Horse 230 kV 3P @ HHSY														
WECC Category B Voltage Dip Load Bus	1.0833	-29.22	1.0833	-30.21	1.0833	-30.22	1.0833	-35.39	1.0833	-35.31	1.0833	-25.89	1.0833	-29.03
WECC Category B Voltage Dip Non-Load Bus	1.0833	-33.31	1.0833	-33.62	1.0833	-33.44	1.0833	-33.19	1.0833	-32.74	1.0833	-31.96	1.0833	-32.00
N-1: Conkelly - Hungry Horse 230 kV 3P @ COKY														
WECC Category B Voltage Dip Load Bus	1.0833	-29.60	1.0833	-30.62	1.0833	-30.58	1.0833	-35.98	1.0833	-35.81	1.0833	-25.74	1.0833	-28.93
WECC Category B Voltage Dip Non-Load Bus	1.0833	-32.58	1.0833	-32.88	1.0833	-32.72	1.0833	-32.89	1.0833	-32.50	1.0833	-30.62	1.0833	-30.65
N-1: Conkelly - Hungry Horse 230 kV 3P @ HHSY														
WECC Category B Voltage Dip Load Bus	1.0833	-29.32	1.0833	-30.30	1.0833	-30.28	1.0833	-35.42	1.0833	-35.30	1.0833	-25.98	1.0833	-29.11
WECC Category B Voltage Dip Non-Load Bus	1.0833	-33.09	1.0833	-33.38	1.0833	-33.24	1.0833	-32.94	1.0833	-32.58	1.0833	-31.86	1.0833	-31.90
N-1: Conkelly - Libby 230 kV 3P @ COKY														
WECC Category B Voltage Dip Load Bus							1.0833	-35.59	1.0833	-37.00				
WECC Category B Voltage Dip Non-Load Bus							1.0833	-32.49	1.0833	-33.36				
N-1: Flathead - Hot Springs 230 kV 3P @ FLAT														
WECC Category B Frequency											1.6667	59.56	1.6750	59.59
WECC Category B Voltage Dip Load Bus							1.0833	-44.37	1.0833	-43.76				
WECC Category B Voltage Dip Non-Load Bus							1.0833	-38.12	1.0833	-37.23				
N-1: Flathead - Hot Springs 230 kV 3P @ HOTS														
WECC Category B Frequency											1.6333	59.52	1.6333	59.53
WECC Category B Voltage Dip Load Bus							1.0833	-40.12	1.0833	-39.50				
WECC Category B Voltage Dip Non-Load Bus							1.0833	-34.28	1.0833	-33.32				
N-1: Hot Springs - Noxon #1 230 kV 3P @ HOT														
WECC Category B Voltage Dip Load Bus							1.0833	-25.34	1.0833	-25.23				
N-1: Hot Springs - Taft 500 kV 3P @ TAFT														
WECC Category B Voltage Dip Load Bus							1.0750	-26.15	1.0750	-26.02				
N-1: Libby - Noxon 230 kV 3P @ NRS														
WECC Category B Voltage Dip Load Bus							1.0833	-26.16	1.0833	-26.08				

3.4 Distribution System Assessment

2013 Coeur d'Alene Distribution Area Assessment



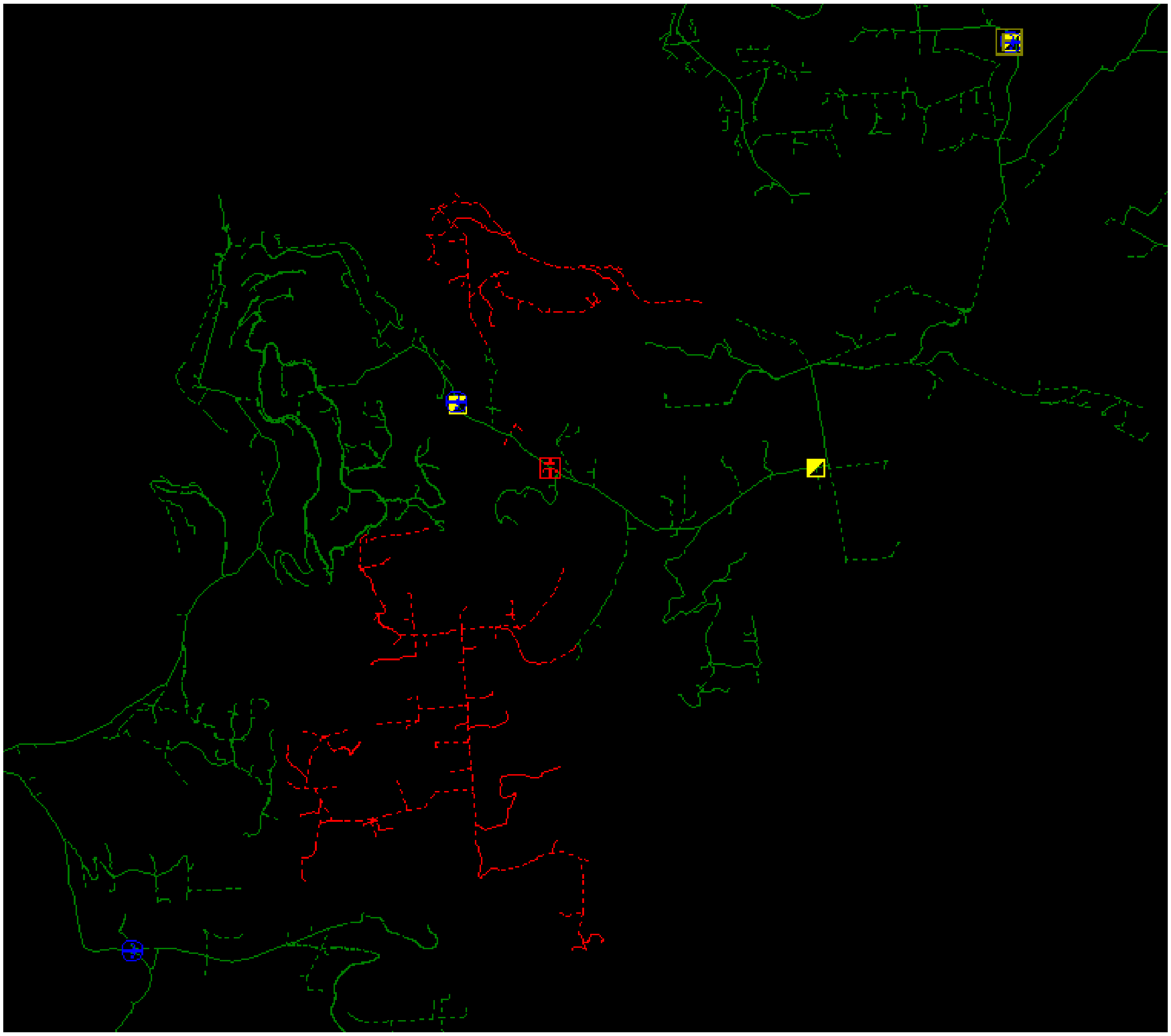
Current 5 year budget items

BLU - Dx Line Integration	2013-2014
RAT231 Grid Modernization	2015
CDA121 Grid Modernization	2013-2014
CDA12X Grid Modernization	2017-2018
HUE 142 - Extend 3ph 0.5 mi	2013
DAL 134- Coldwater Ck Loop	2017
BLU 321 Recond 3 mi (Silver Beach)	2016-2017
LKV 343 - Conv 6 mi to UG	2013-2015
BLU 321- Recond 1.2 mi	2013
RAT 233 - Recond Hwy 41 to 2/0 ACSR	2015-2016
PVW 243 - Cap Bank Riverbend Comm	2014
PF 213 - Recond McGuire Road	2015
BLU 321 - Rbld & UG near Tony's Rest	2014-2015
CDA 125- Recond #6 Crapo Dalton & 17th	2014
CDA 124-Recond NIC Loop	2013
Wood Sub Rbld- Big Creek 411 Sunshine	2014-2016
Carlin Bay - Dx Line Integration	Outyear
LKY Dx Integration	2013
STM 633 - OH/UG Cnv St Joe Rd (8) W. Fdr	2013-2015
WAL 542 (63) Worst Feeders	2013
OSB 521 - Recond/Viper for Coeur Mine	2013
PIN 442- Record 1 mi	2015

WAL 544-Recond for Star Mine	Outyear
OGA 611 - Recond 1.5 mi	2016
PIN 441 - Reconductor FDR Tie	2013
BRX Sub -Dx Line Integration	Outyear
SAG 741 - Record Lignite 9200 ft	2015-2016
SPT 4S21 - River Xing & Reloc at Sundowner	2014
OLD 721 - create UG loop for Ind Pk	2014-2015

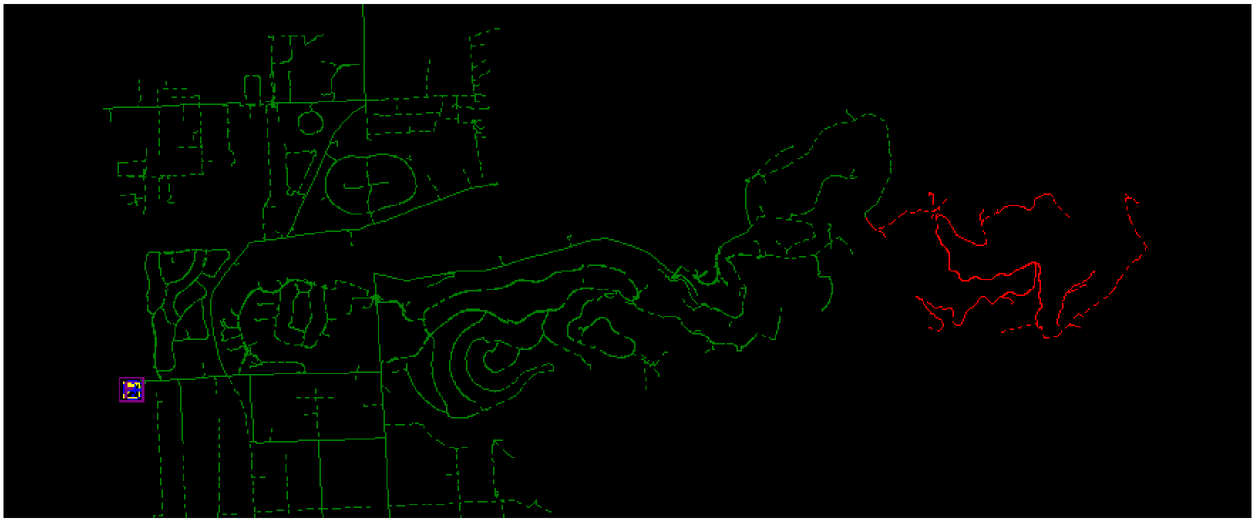
Level of Service Issues

BLU321 shows low voltage in the Moscow Bay and Gozzer Ranch areas, balancing and reconductor work is needed.

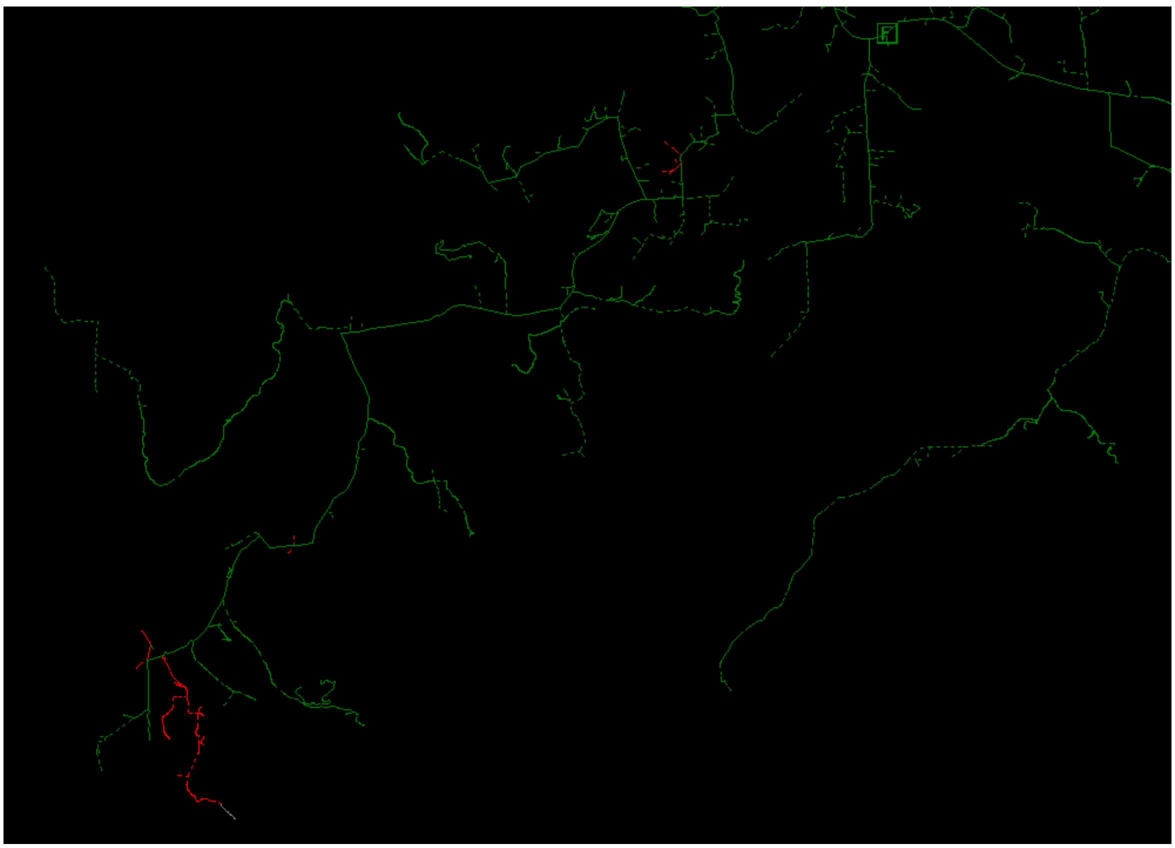


CDA125 shows low voltage at peak in the Erickson Rd area. This 6CR and 6A needs to be reconductored.

DAL133 shows low voltage on the southeast banks of Hayden Lake. This alteral shows 50A on 4ACSR and 6CU. This should be reconductored.

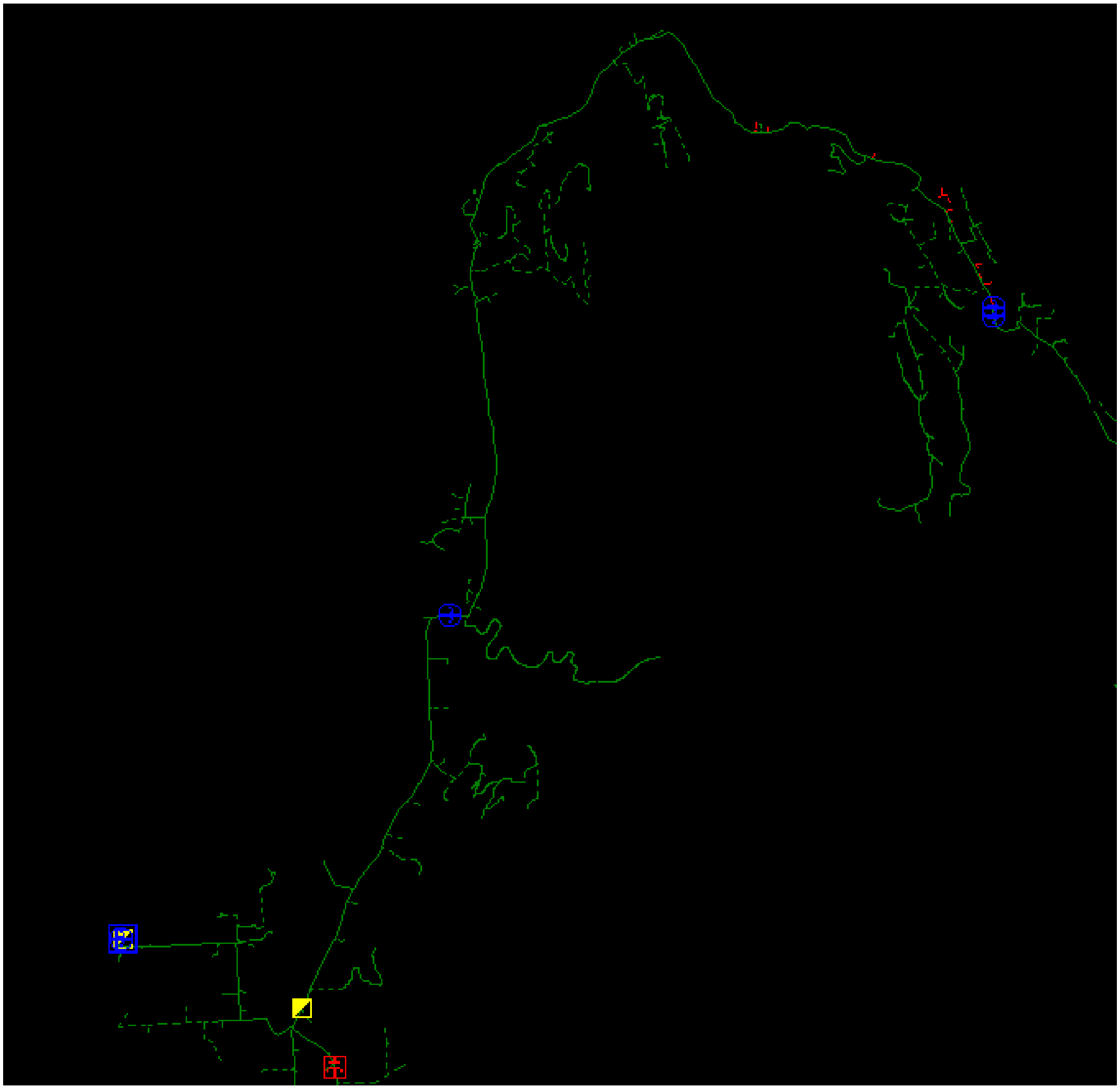


MIS431 shows low voltage at the far southwest corner of the feeder. Another stage of regulation is needed.

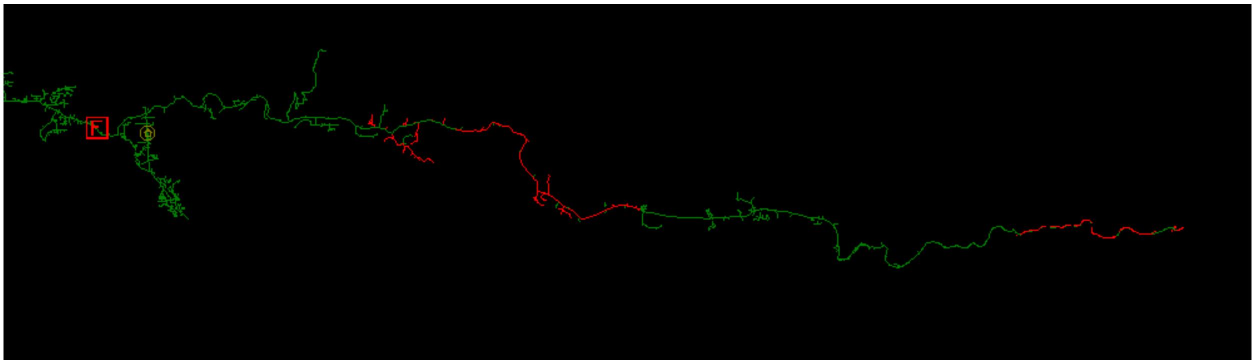


PRA222 shows low voltage on the lateral on Spencer Rd. This has 90A on 2CN15. This lateral could use another phase and some balancing. We may be able to pick up some of the load on PRA221.

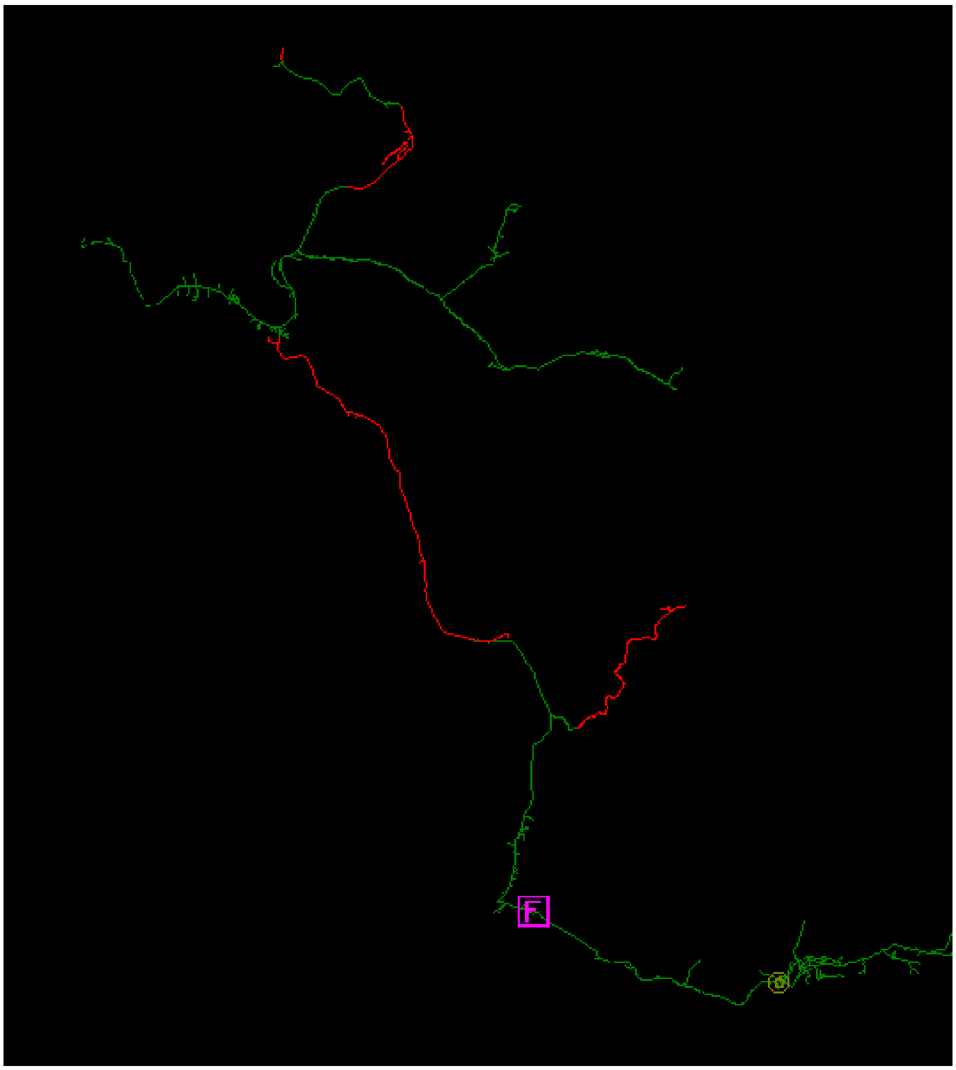
SAG741 shows low voltage before the third stage regulators in the Bottle Bay area. Some balancing here may help, C phase is more highly loaded.



STM633 shows low voltage on the east branch towards Avery along the St Joe. Some of this trunk is being undergrounded and thus reconductored.

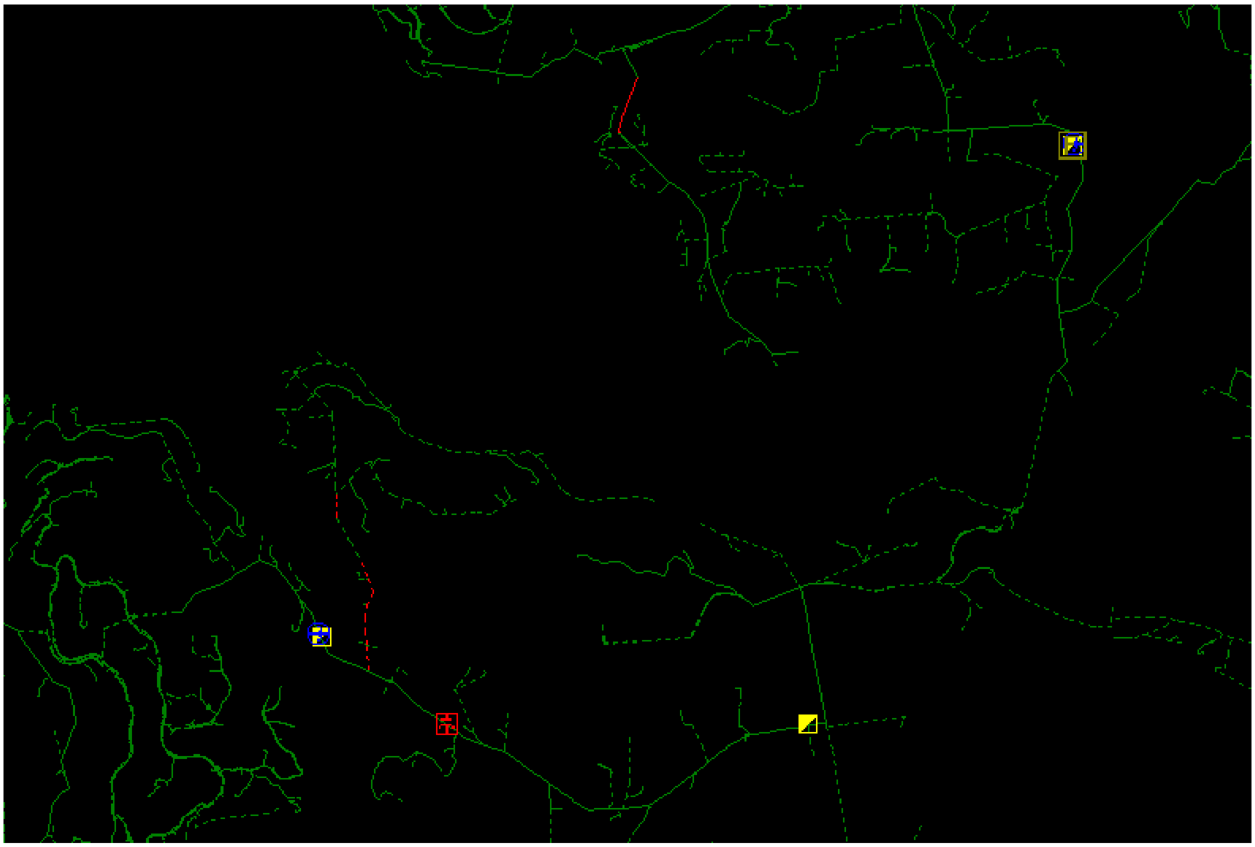


WAL543 shows low voltage north of town. An additional stage of regulation is needed.



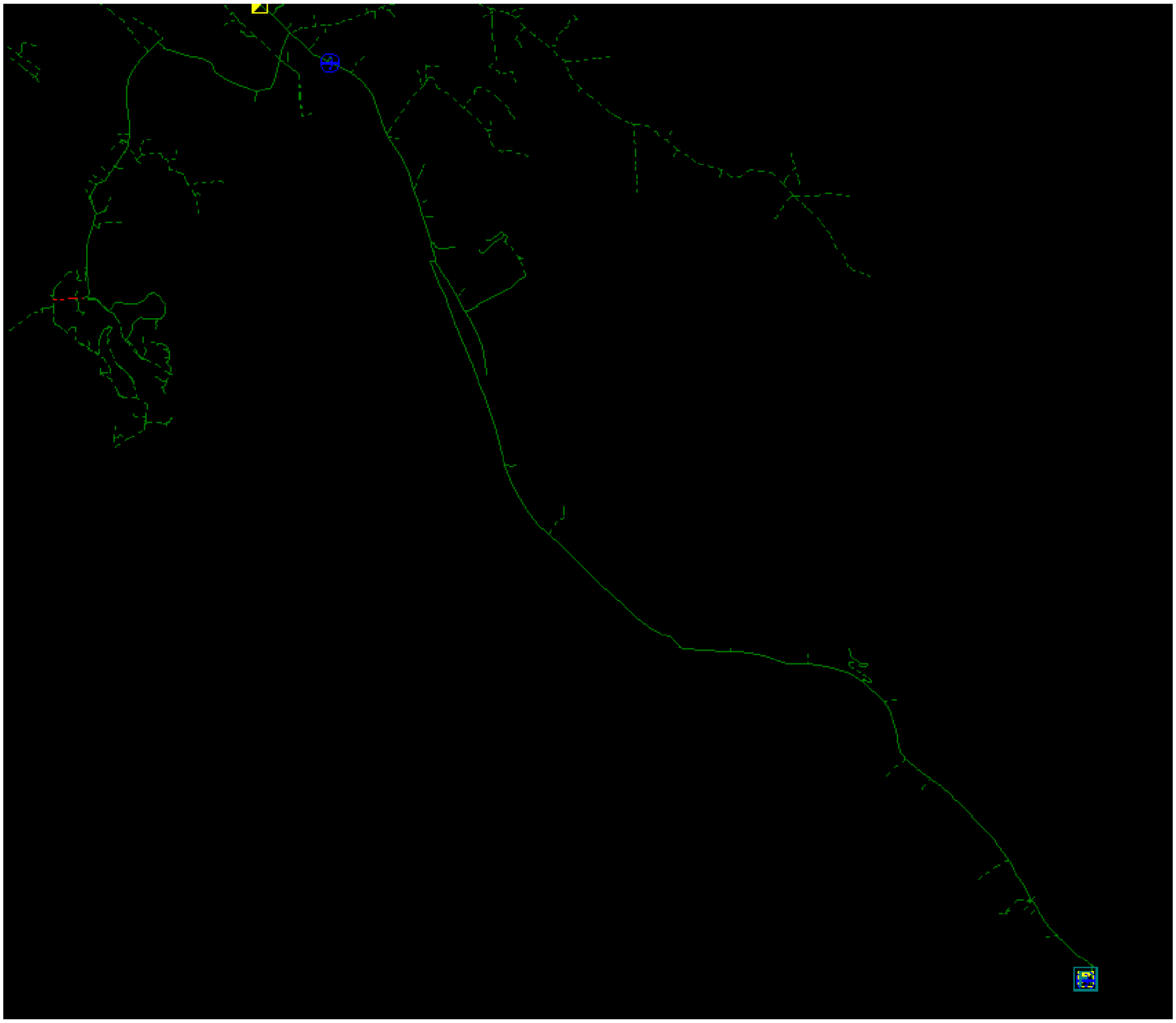
Capacity Issues

BLU321 has several sections of overloaded 6CR. Overloaded Crapo is a system wide theme.

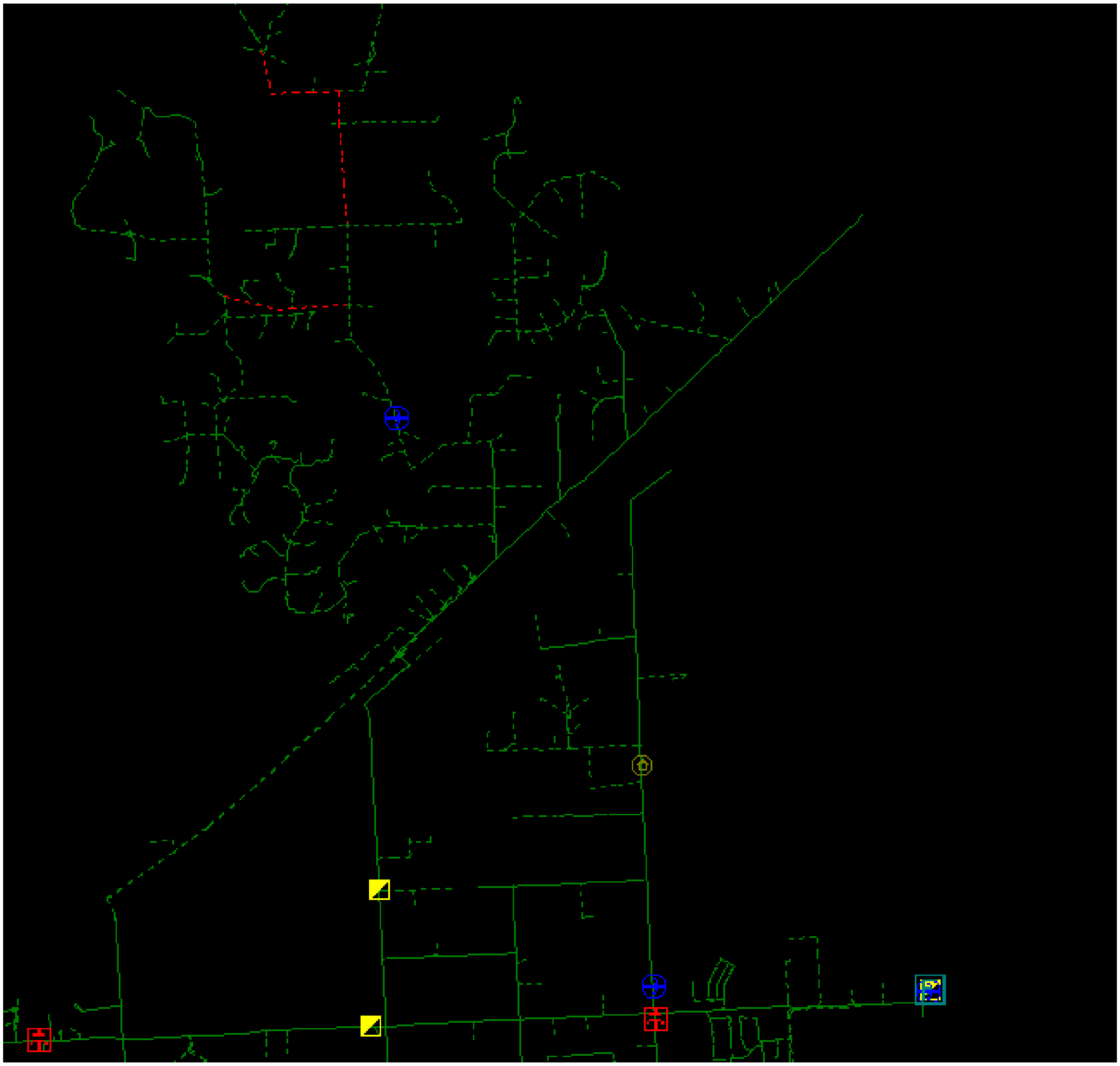


CDA 125 has overloaded 6CR in the neighborhood of the low voltage problems. Reconductoring will fix both issues.

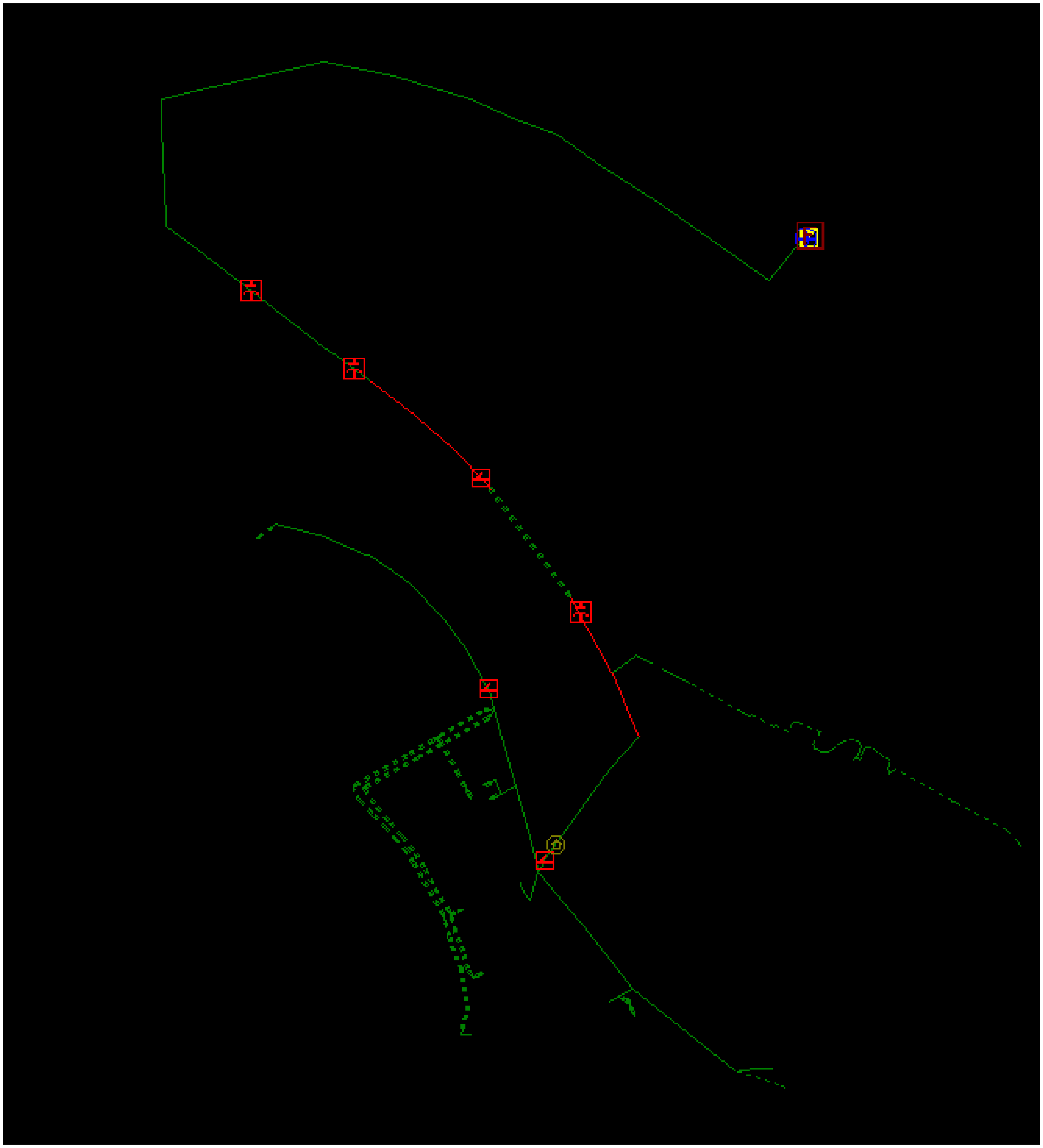
CKF711 has some overloaded 6CR in the Beyond Hope area.



IDR253 has a fair amount of overloaded 6CR in the Church St area. This may also be a candidate for undergrounding.



STM632 has overloaded 2/0ACSR on the trunk.



Reliability

The Coeur d'Alene area has a number of feeders in the 3 yr SAIFI worst feeders list:

STM633
ODN732
MIS431
WAL543
BLA311
SAG741
OLD721

STM633 and WAL542 are on the worst feeder list for projects, and SAG741 and ODN732 will be part of the Sandpoint grid modernization work. Further work is needed to improve reliability on the other feeders. In particular SCADA installs and fault indicators may help increase reliability to these rural areas.

System Wide Programs

The large scale deployment of grid automation in the Sandpoint area will improve operational flexibility in the north area. Grid modernization beginning in the Coeur d'Alene area will also help increase elasticity in our second largest urban area.

SCADA Needs

The following stations need SCADA upgraded to three phase:

CDA(from single phase)
DAL(from single phase)
HUE(from single phase)
LKV
PF(from single phase)
PVW(from single phase)
SPL
WOR
BIG
BUN
MIS
OGA
OSB
STM
WAL
BLA
CGC
NRC
ODN(from single phase)

Future Station needs

Work is underway to rebuild BLU and LKY stations. An additional feeder will be provided out of BLU for increased reliability in the area. Property is secured for the future Carlin Bay station, and work has occurred to begin securing a transmission corridor along the east side of Lake Coeur d'Alene. Part of that project would be to rebuild OGA as a switching station.

At this point in time I do not know of other station needs in the area, again the spatial forecast should help highlight future needs. There is a likelihood more capacity will be needed in the CDA urban area in the 10 year timeframe.

4 LEWISTON/CLARKSTON AREA

2013 PLANNING ASSESSMENT

4.1 Executive Summary

The Lewiston/Clarkston area transmission system assessment demonstrated the area is well positioned to provide the necessary reliability performance in the five and ten year planning horizon.

A list of the Corrective Action Plans proposed for the Lewiston/Clarkston area are provided below. A detailed description of each project can be found in Section 0 of this document.

- 230 kV Capacitor Automatic Switching Project

4.2 General 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.

The major transmission sources in the Lewiston/Clarkston area are: the 500/230 kV, 1,250 MVA transformation at Hatwai Station and the 13.8/115 kV, 150 MVA generator step-up transformer at Dworshak Station. The main transmission lines in the Lewiston/Clarkston area are: the Hatwai – Lolo, Hatwai – North Lewiston, North Lewiston – Dry Creek and Dry Creek – Lolo 230 kV transmission lines (all owned by Avista). The area is connected to surrounding areas by: the Dry Creek – Talbot (AVA/PAC), Lolo – Oxbow (AVA/IPCO), Hatwai – Moscow (AVA) and North Lewiston – Shawnee (AVA) 230 kV transmission lines. Flows on the BPA’s 500 kV system and wind generation in the Walla Walla area can significantly affect the 230 kV and 115 kV transmission systems.

Local load service is provided by: the 230/115 kV, 250 MVA transformer at North Lewiston (AVA), 230/115 kV, 250 MVA transformer at Dry Creek (AVA) and two 230/115 kV, 125 MVA transformers at Lolo (AVA). The local 115 kV transmission system is also connected to the Palouse area and the Walla Walla area.

The WECC transfer path West of Hatwai (Path 6) partially borders the western edge of the Lewiston/Clarkston area. Avista owns three transmission lines and three substation terminals that define the path and the BPA owns the remaining transmission facilities which comprise the West of Hatwai path. The WECC transfer path Idaho to Northwest (Path 14) partially borders the south of edge of the Lewiston/Clarkston area. Avista owns the north half of the Lolo – Oxbow 230 kV Transmission Line included in the path definition; Idaho Power, PacifiCorp and BPA own the remaining transmission lines across the path.

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 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.

The Lewiston/Clarkston area currently has no projects that are in the large generator interconnection study process. These projects typically are not included in the study work conducted for Planning Assessments.

Load growth in the Lewiston/Clarkston area is projected to be 0.7% for summer and 0.8% for winter based on historic load growth data. Total anticipated load not including transmission system losses for peak summer 2014 is 255 MW and 261 MW for peak winter 2014.

4.3 Transmission System Assessment

4.3.1 Steady State Analysis

Contingency Study

The following sections list system deficiencies and the associated actions needed to achieve required system performance.

A Grangeville Area Low Voltage

PROBLEM

Outages related to Orofino Station causing either the loss of the Dworshak – Orofino 115 kV Transmission Line or the Nez Perce – Orofino 115 kV Transmission Line causes low voltages at the stations in the Grangeville sub-area during Heavy Winter conditions (see Figure VI-29). The capacitor bank at Grangeville Station is not placed into service prior to an outage to prevent high voltage issues during an all lines in service condition.

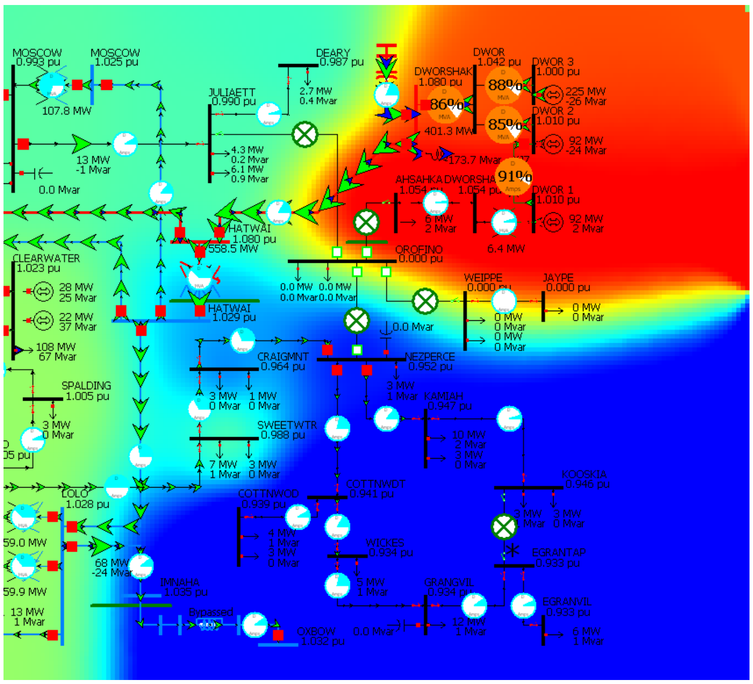


FIGURE VI-29: OROFINO 115 KV BUS OUTAGE IN 2023 HEAVY WINTER

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
Bus Low Volts												
115												
AHSAHKA (40023) 115.00 kV												0.9496
BIGELOW (40113) 115.00 kV												0.9496
COTTNWOD (48089) 115.00 kV			0.9459			0.9425			0.9388			0.9294
EGRANVIL (40383) 115.00 kV			0.9407			0.9369			0.9329			0.9228

GRANGVIL (48141) 115.00 kV			0.9412			0.9375			0.9336			0.9237
JAYPE (48167) 115.00 kV												0.9434
KAMIAH (48171) 115.00 kV									0.9469			0.9386
KOOSKIA (48177) 115.00 kV						0.9491			0.9457			0.9372
NEZPERCE (48261) 115.00 kV												0.9441
WEIPPE (48459) 115.00 kV												0.9446
WICKES (48465) 115.00 kV			0.9415			0.9379			0.9339			0.9241
Change Bus Low Volts												
115												
AHSAHKA (40023) 115.00 kV	0.9650	0.9868	0.9626	0.9808	0.9809	0.9607	0.9816	0.9790	0.9558	0.9752	0.9756	
COTTNWOD (48089) 115.00 kV			0.9507									
EGRANVIL (40383) 115.00 kV	0.9579											
GRANGVIL (48141) 115.00 kV	0.9582											
JAYPE (48167) 115.00 kV	0.9624		0.9575	0.9782	0.9783	0.9552	0.9786	0.9760	0.9502	0.9716	0.9720	0.9512
KAMIAH (48171) 115.00 kV			0.9532			0.9502			0.9507			
KOOSKIA (48177) 115.00 kV			0.9521			0.9507						
NEZPERCE (48261) 115.00 kV			0.9580			0.9551			0.9520			0.9552
WEIPPE (48459) 115.00 kV	0.9626		0.9583	0.9784	0.9785	0.9562	0.9788	0.9762	0.9512	0.9718	0.9722	0.9524

MITIGATION

Automatic insertion of shunt capacitor banks at Grangeville Station will mitigate the low voltages observed in the Grangeville sub-area. The assessment conducted did not assume the 115 kV capacitor banks on Avista's transmission system switched in automatically. Following the review of the assessment results it was determined the 115 kV capacitor banks will switch in at 0.95 pu including at the Grangeville Station. Assessments conducted in the in 2014 will include representing the automatic actions of the 115 kV capacitor banks.

B 230 kV Voltage Control

PROBLEM

The adjacent circuit Central Ferry – Lower Granite and Little Goose – Lower Granite 500 kV transmission lines outage causes high voltages on the 230 kV system in the Lewiston/Clarkston area (see Figure VI-30). Transmission line charging on the Hatwai – Lower Granite and Central Ferry – Lower Granite 500 kV transmission lines with no real power flow causes increased reactive power to transfer into the Lewiston/Clarkston area.

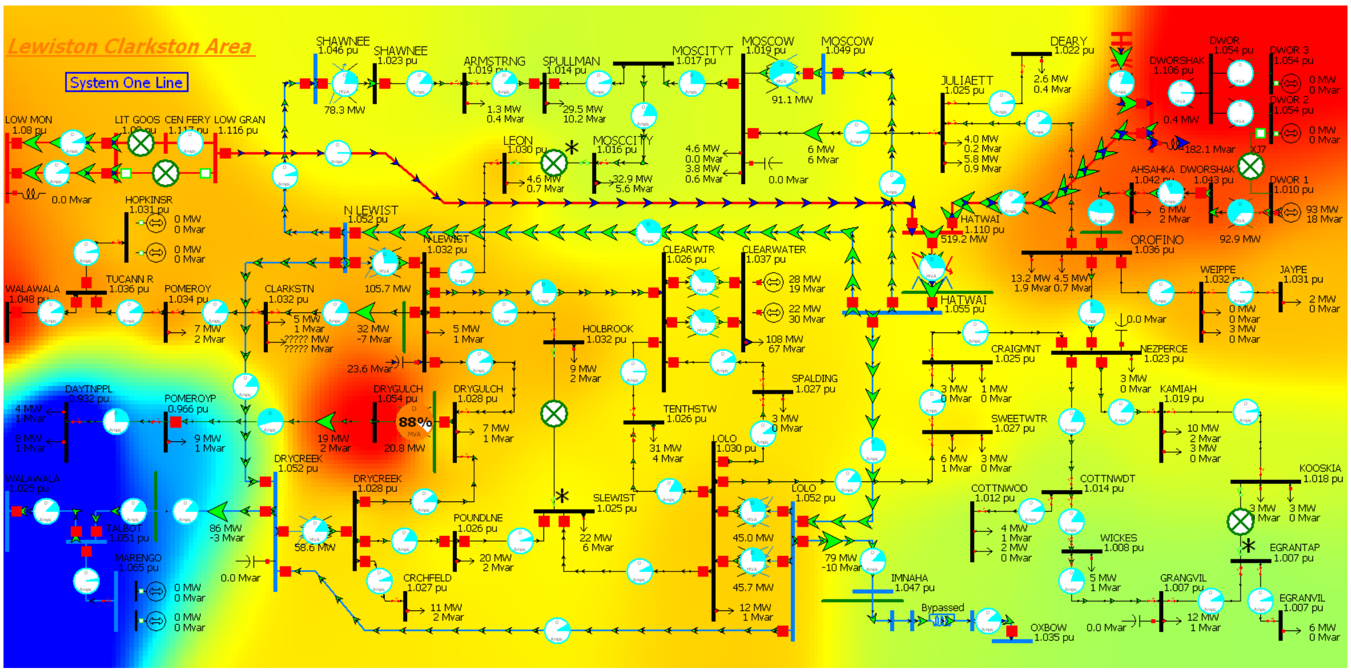


FIGURE VI-30: CENTRAL FERRY – LOWER GRANITE AND LITTLE GOOSE – LOWER GRANITE 500 KV ADJACENT CIRCUIT OUTAGE IN 2018 HEAVY WINTER

Transmission Operations has reported high voltages on the 230 kV system during typical light load conditions. During light load conditions, the 230 kV transmission lines are lightly loaded and line charging contributes to reactive power flowing into the area. Transmission Planning presently does not compile a typical light load case; therefore, the assessment contingency analysis results do not illustrate the issues seen by Transmission Operations.

Low voltages on the 230 kV system in the Lewiston/Clarkston area are caused by outages related to the Hatwai 500/230 kV Transformer (see Figure VI-31). Heavy Summer conditions cause the 230 kV voltage to drop below the low voltage limit of 232.3 kV. Over 400 MW flow on the Hatwai 500/230 kV Transformer to the area. During a contingency causing the loss of the Hatwai 500/230 kV Transformer, the required power to serve the area comes from the north with high voltage drop.

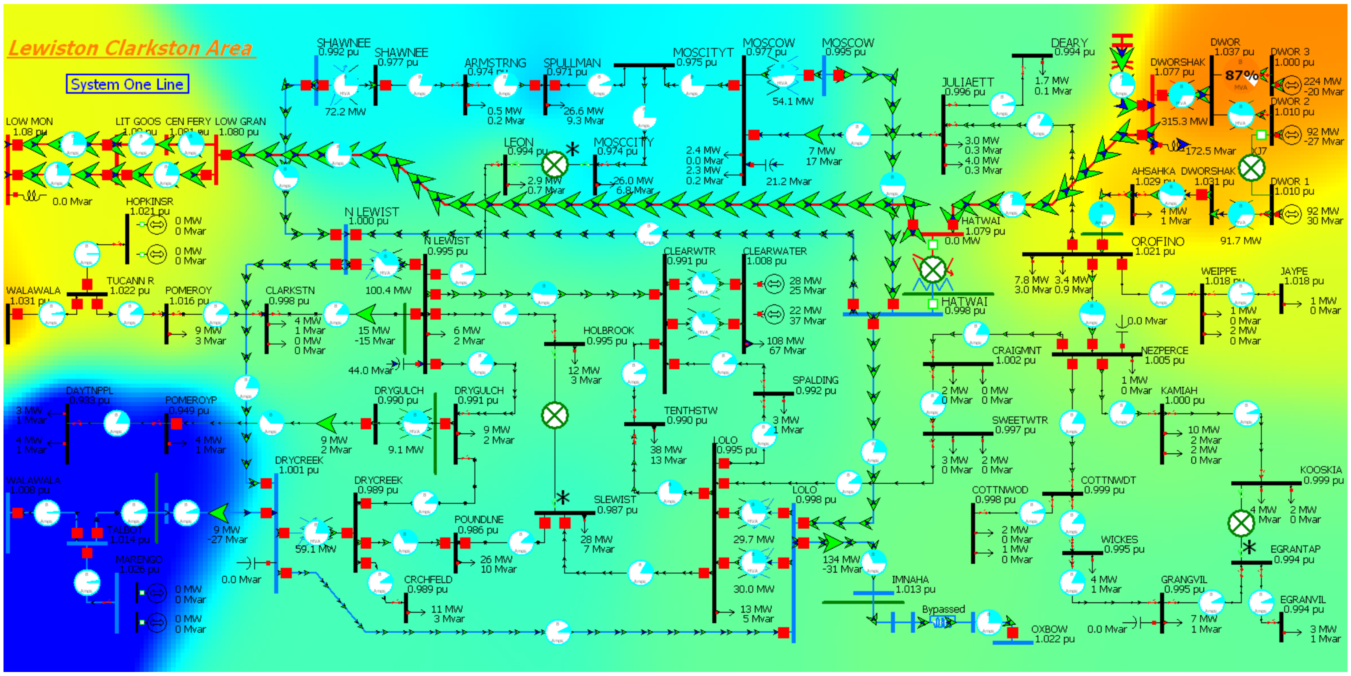


FIGURE VI-31: HATWAI 500/230 KV TRANSFORMER OUTAGE IN 2023 HEAVY SUMMER

	14HS	14HT	14HW	18HS	18HT	18HW	23HS	23HW	32HS	32HW
Bus High Volts										
230										
DRYCREEK (48512) 230.00 kV			1.0522			1.0522				
HATWAI (40519) 230.00 kV		1.0536	1.0565		1.0527	1.0550		1.0543		
LOLO (48197) 230.00 kV			1.0524			1.0524				
N LEWIST (48255) 230.00 kV			1.0528			1.0525				
Bus Low Volts										
230										
DRYCREEK (48512) 230.00 kV	0.9959	0.9935		1.0090	0.9982		0.9930		0.9958	1.0024
HATWAI (40519) 230.00 kV	0.9995	0.9911	1.0095		0.9947		0.9893		0.9932	1.0029
LOLO (48197) 230.00 kV	0.9957	0.9955		1.0096	0.9996		0.9898		0.9934	1.0036
N LEWIST (48255) 230.00 kV	0.9952	0.9909	1.0099		0.9964		0.9911	1.0083	0.9946	0.9979

MITIGATION

High voltages on the 230 kV system in the Lewiston/Clarkston area caused by an adjacent circuit 500 kV outage on the BPA's system will be communicated to the BPA and coordinated corrective action plan will be developed as necessary. The installation of two 50 MVAr reactors on the 230 kV system has been proposed by Avista's Transmission Operations Group. The reactors would mitigate the observed high voltages if they are set to automatically switch into service when applicable voltage limits have been exceeded.

Automatic insertion of shunt capacitor banks at Dry Creek Station will mitigate the low voltages observed on the 230 kV system in the Lewiston/Clarkston area. Avista's 230 kV shunt capacitor banks presently have relay protection settings to switch in single capacitor banks when the voltage drops below 228 kV. Increasing the low voltage set point to the present operating limit of 232.3 kV will help ensure the 230 kV system will be operated within the applicable voltage limits. Until the relay protection settings are modified, the System Operator could manually switch in the shunt capacitor banks and manually change tap positions on the 230/115 kV transformers. Relying on manual operator intervention will cause the applicable facility ratings to be exceeded until the appropriate actions are taken.

C Dry Gulch Transformer

PROBLEM

Several outages in the Walla Walla area of PacifiCorp's transmission system causes the Dry Gulch 115/69 kV Transformer, owned by PacifiCorp, to exceed its applicable facility ratings. The loading on the transformer is impacted by the amount of load in the Walla Walla area. Avista does not forecast the load in PacifiCorp's area; therefore, the load represented in the approved WECC cases is used. There is inconsistency in the observed overloads in the Heavy Winter scenarios with only the 2018 Heavy Winter case showing issues. Inconsistencies between the scenario's included in the assessment may be due to modified forecasts between the time the cases are compiled at WECC.

	14HS	18HS	18HW	23HS	32HS
DRYGULCH 69.00 to 115.00 kV #1 Transformer					
BF: 1W10 Hurricane-Walla Walla, Walla Walla 230/69 kV Transformer			101.4		
BF: 1W18 Talbot-Walla Walla, Walla Walla-Wanapum	106.8	108.0	108.0	107.5	105.9
BF: 1W3 Walla Walla-Wallula, Walla Walla 230/69 kV Transformer			115.4		
BF: 1W4 Walla Walla-Wanapum, Walla Walla 230/69 kV Transformer			101.4		
BF: 1W44 Marengo-Talbot, Dry Creek-Talbot			100.5		
BF: 1W45 Dry Creek-Talbot, Talbot-Walla Walla			101.1		
BF: 1W46 Talbot-Walla Walla, Marengo-Talbot			101.4		
BF: 1W5 Walla Walla-Wallula, Talbot-Walla Walla			111.0	100.7	
BF: 1W6 Walla Walla 230/69 kV Transformer, Hurricane-Walla Walla			116.1		
N-1: Talbot - Walla Walla 230 kV			102.3		
N-2: Dry Creek - Talbot 230 kV and North Lewiston - Tucannon River 115 kV		100.6	102.3		

MITIGATION

The issues observed in the Walla Walla area are the PacifiCorp's transmission system issues. Avista will communicate the observed issues with the PacifiCorp and coordinate the appropriate corrections actions plans as necessary.

D Extreme Events

The worst extreme event observed in the Lewiston/Clarkston area is a breaker failure at the Hatwai 500 kV Station and failure of the Dworshak XJ7 sectionalizing RAS. Thermal overloads on the Dworshak – Orofino 115 kV Transmission Line are caused by excess generation at Dworshak flowing on the 115 kV system. The High Transfer base cases were evaluated for extreme events, the results are not provided as the High Transfer cases represent an extreme scenario.

	14HS	14HW	18HS	18HW	23HS	23HW	32HS	32HW
D.12								
BF: 4652 Dworshak-Taft, Dworshak-Hatwai, Dworshak 500 kV Switched Shunt - No RAS								
AHSAHKA - OROFINO 115.00 kV #1 Line			139.7					
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer - No RAS								
AHSAHKA - DWORSHAK 115.00 kV #1 Line							102.0	
AHSAHKA - OROFINO 115.00 kV #1 Line	135.4	100.9	162.7	101.9	168.8	103.4	173.4	107.9
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai - No RAS								
AHSAHKA - DWORSHAK 115.00 kV #1 Line							102.0	
AHSAHKA - OROFINO 115.00 kV #1 Line	135.4	100.9	162.7	102.0	168.8	103.5	173.5	108.0
BF: 4710 Hatwai-Lower Granite, Hatwai 500/230 kV Transformer - No RAS								
AHSAHKA - DWORSHAK 115.00 kV #1 Line							101.9	
AHSAHKA - OROFINO 115.00 kV #1 Line	135.9	100.8	162.5	101.8	168.6	103.3	173.3	107.8
BUS: Hatwai 230 kV - No RAS								
AHSAHKA - OROFINO 115.00 kV #1 Line			115.9		128.9		134.4	
N-1: Dworshak - Hatwai 500 kV - No RAS								
AHSAHKA - OROFINO 115.00 kV #1 Line	128.7		158.8		153.9		156.3	
N-1: Hatwai 500/230 kV - No RAS								
AHSAHKA - OROFINO 115.00 kV #1 Line			118.0		131.3		137.5	
N-2: Central Ferry - Little Goose 500 kV and Little Goose - Lower Granite #1 500 kV - No RAS								
DRYGULCH 69.00 to 115.00 kV #1 Transformer	101.9			106.7				
N-2: Central Ferry - Lower Granite 500 kV and Little Goose - Lower Granite #1 500 kV - No RAS								
DRYGULCH 69.00 to 115.00 kV #1 Transformer	101.9		104.9	106.7	105.0		103.0	

Spare Equipment Study

Thermal facility rating overloads from the spare equipment study are provided in Table VI-12.

TABLE VI-12: SPARE EQUIPMENT STUDY RESULTS

	Dry Creek	Dworshak	Hatwai	Lolo 1	Lolo 2	North Lewiston
BF: A261 Lolo 115 kV, Lolo-Poundlane						
MOSCOW 230.00 to 115.00 kV #1 Transformer		102.9				
DRYGULCH - N LEWIST 115.00 kV #1 Line						121.3
DRYCREEK - DRYGULCH 115.00 kV #1 Line						138.4
BF: A263 Lolo 115 kV, Clearwater-Lolo #1						
MOSCOW 230.00 to 115.00 kV #1 Transformer		103.2				
DRYGULCH - N LEWIST 115.00 kV #1 Line						118.4
DRYCREEK - DRYGULCH 115.00 kV #1 Line						135.1
BF: A265 Lolo 115 kV, Lolo-Nez Perce						
DRYGULCH - N LEWIST 115.00 kV #1 Line						120.2
DRYCREEK - DRYGULCH 115.00 kV #1 Line						136.9
BF: A445 Lolo 115 kV, Clearwater-Lolo #2						
MOSCOW 230.00 to 115.00 kV #1 Transformer		102.7				
DRYCREEK - DRYGULCH 115.00 kV #1 Line						112.8
BF: A632 Shawnee 115 kV, Shawnee-Terre View						
MOSCOW 230.00 to 115.00 kV #1 Transformer		134.7				
BF: A634 Shawnee 115 kV, Shawnee-South Pullman						
MOSCOW 230.00 to 115.00 kV #1 Transformer		134.3				
BF: R450 Benewah-Boulder, Boulder #2 230/115 Transformer						
BENEWAH - PINE CRK 230.00 kV #1 Line			103.7			
BF: R468 Benewah-Boulder, Benewah 230/115 Transformer						
BENEWAH - PINE CRK 230.00 kV #1 Line			100.0			
BF: R470 Benewah-Thornton, Benewah 230/115 Transformer						
MOSCOW 230.00 to 115.00 kV #1 Transformer		122.7	108.8			
BF: R550 Benewah-Boulder, Boulder #1 230/115 Transformer						
BENEWAH - PINE CRK 230.00 kV #1 Line			103.7			
BF: R621 Dry Creek-Talbot, Dry Creek 230/115 Transformer						
LOLO 230.00 to 115.00 kV #1 Transformer						104.4
BUS: Hatwai 230 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer	139.4	160.4	140.2	139.1	139.1	138.0
BUS: Lolo 115 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		103.3				
DRYGULCH - N LEWIST 115.00 kV #1 Line						120.1
DRYCREEK - DRYGULCH 115.00 kV #1 Line						136.8
BUS: Shawnee 115 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		134.7				
BUS: Shawnee 230 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		150.6	108.2			
N-1: Benewah - Boulder 230 kV						
BENEWAH - PINE CRK 230.00 kV #1 Line			103.7			
N-1: Benewah - Thornton 230 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		121.2	107.5			
N-1: Hatwai - Moscow 230 230 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		109.5	140.9			
N-1: Hatwai - North Lewiston 230 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		104.1				
N-1: Lolo - Nez Perce 115 kV Open @ LOL						
MOSCOW 230.00 to 115.00 kV #1 Transformer		102.4				
N-1: Shawnee - Thornton 230 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		120.9	106.8			
N-1: Shawnee 230/115 kV						
MOSCOW 230.00 to 115.00 kV #1 Transformer		148.7	104.4			

Failure of the North Lewiston 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 at Lolo Station. Establishing a spare transformer strategy for replacing the North Lewiston 230/115 kV Transformer within a one year time frame is recommended. Modification of the Lolo 115 kV bus to prevent loss of both Lolo 230/115 kV #1 and #2 Transformers for a bus outage could be analyzed as an alternative.

Failure of either the Hatwai 500/230 kV Transformer or Dworshak 115/13.8 kV Transformer requiring complete replacement causes thermal overloads on the Moscow 230/115 kV Transformer when various subsequent outages occur in the area. The observed issues will be mitigated by completion of the Moscow Station Rebuild project which includes installing a 250 MVA transformer at Moscow Station. The Hatwai 500/230 kV Transformer is owned by the BPA and the Dworshak 115/13.8 kV Transformer is owned by the Army Corp of Engineers.

Voltage Stability Study

E PV Analysis

METHODOLOGY

No defined WECC paths are located in the Lewiston/Clarkston area; therefore, only a Load Ramp PV Curve analysis was performed.

RESULTS

The Load Ramp PV Analysis showed a theoretical flow limit of 1250 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 outage of the Nez Perce – Orofino 115 kV Transmission Line with total area load of 735 MW (see Figure VI-27). The critical bus under the Nez Perce – Orofino 115 kV Transmission Line contingency is East Grangeville Station.

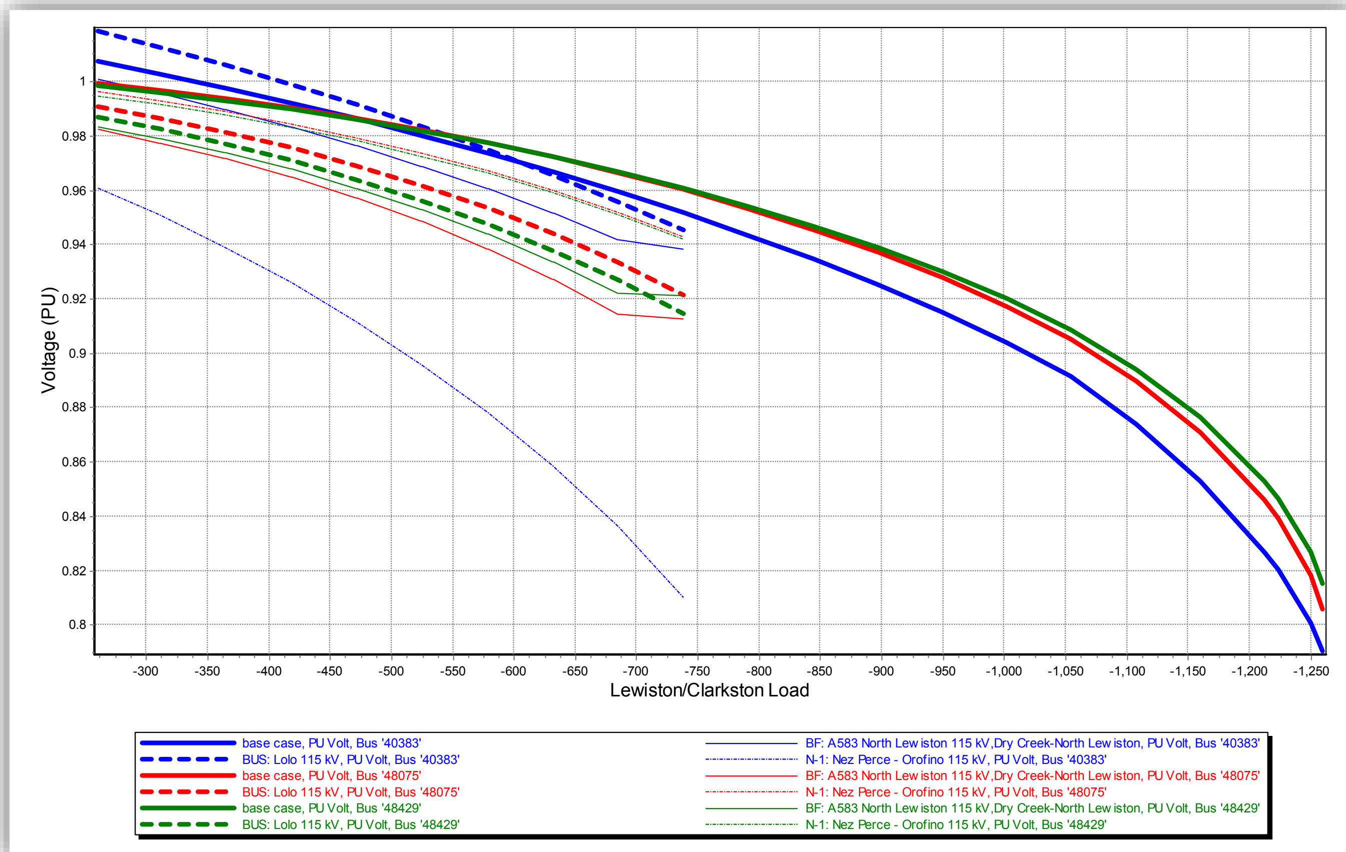


FIGURE VI-32: LOAD RAMP PV CURVE RESULTS FOR CRITICAL BUSES

F QV Analysis

The QV Analysis showed there is adequate reactive margin for the 115 kV source buses and critical buses in the Lewiston/Clarkston area. Table VI-13 shows the results of the worst performing contingency for each bus analyzed.

The smallest reactive margin at the critical buses analyzed occurred at the East Grangeville 115 kV bus with a value of 50 MVAr for the Nez Perce – Orofino 115 kV Transmission Line outage.

TABLE VI-13: QV ANALYSIS RESULTS

Bus Name	Nom kV	Contingency Scenario	Reactive Margin
EGRANVIL	115	BASECASE	98.87
EGRANVIL	115	BF: A583 NORTH LEWISTON 115 KV,DRY CREEK-NORTH LEWISTON	87.29
EGRANVIL	115	BUS: LOLO 115 KV	68.12
EGRANVIL	115	N-1: NEZ PERCE - OROFINO 115 KV	50.33
LOLO	115	BASECASE	1002.09
LOLO	115	BF: A583 NORTH LEWISTON 115 KV,DRY CREEK-NORTH LEWISTON	597.77
LOLO	115	BUS: LOLO 115 KV	0
LOLO	115	N-1: NEZ PERCE - OROFINO 115 KV	707.35
N LEWIST	115	BASECASE	1035.86
N LEWIST	115	BF: A583 NORTH LEWISTON 115 KV,DRY CREEK-NORTH LEWISTON	0
N LEWIST	115	BUS: LOLO 115 KV	647.3
N LEWIST	115	N-1: NEZ PERCE - OROFINO 115 KV	778.7
DRYCREEK	115	BASECASE	958.38
DRYCREEK	115	BF: A583 NORTH LEWISTON 115 KV,DRY CREEK-NORTH LEWISTON	600.8
DRYCREEK	115	BUS: LOLO 115 KV	638.29
DRYCREEK	115	N-1: NEZ PERCE - OROFINO 115 KV	718.54

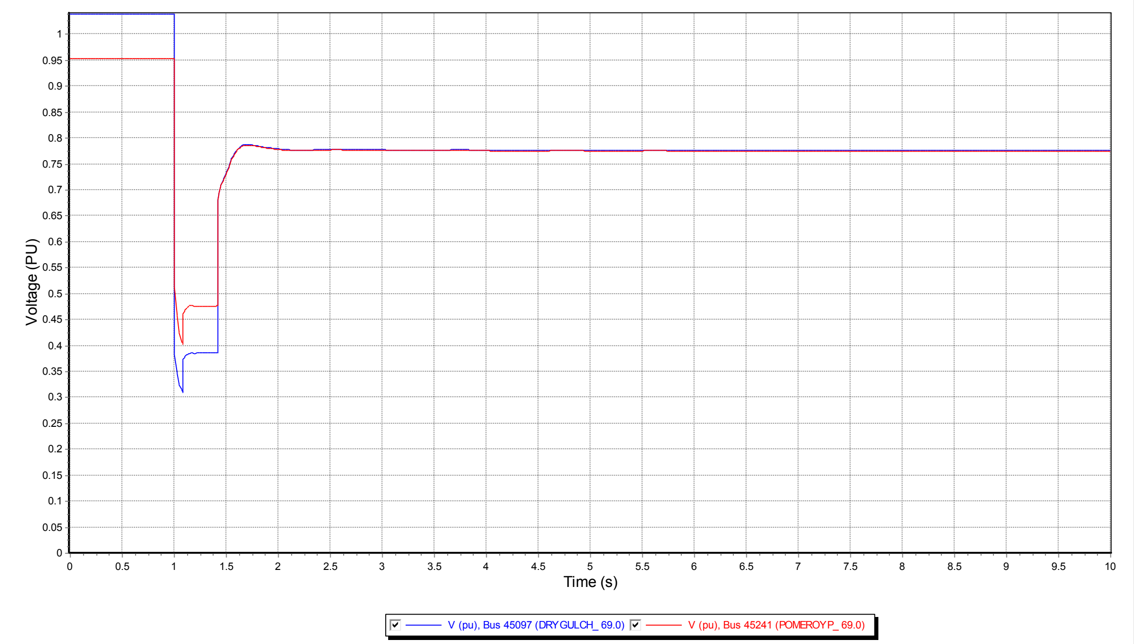
4.3.2 Stability Analysis

Dry Creek – North Lewiston 115 kV Transmission Line Disturbance

In the 2018 Heavy Winter scenario, WECC voltage dip criteria violations were observed for a three phase fault on the Dry Creek – North Lewiston 115 kV Transmission Line (see Table VI-14). The voltage dips occur on PacifiCorp's Pomeroy and Dry Gulch 69 kV Stations, and these dips are caused by loss of the Dry Gulch 115/69 kV Transformer tapped off of the Dry Creek – North Lewiston 115 kV Transmission Line leaving the 69 kV system only connected to the Walla Walla area. The voltage on the 69 kV does not recover, causing a post transient voltage response to exceed applicable facility ratings (see Figure VI-33).

TABLE VI-14: WECC CRITERIA VIOLATIONS IN 2018 HEAVY WINTER

	Initial Voltage	Voltage at Start of Violation	% Voltage Dip	Time of Voltage Dip
N-1: Dry Creek - North Lewiston 115 kV 3P @ DCR				
WECC Category B Voltage Dip Load Bus				
Bus '45241' (POMEROYP_69.0)	0.953	0.693	-27.3	1.4250
WECC Category B Voltage Dip Non-Load Bus				
Bus '45097' (DRYGULCH_69.0)	1.039	0.694	-33.2	1.4250
N-1: Dry Creek - North Lewiston 115 kV 3P @ NLW				
WECC Category B Voltage Dip Non-Load Bus				
Bus '45097' (DRYGULCH_69.0)	1.039	0.718	-30.9	1.4250



N-1: Dry Creek - North Lewiston 115 kV 3P @ DCR

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FIGURE VI-33: VOLTAGE RESPONSE OF 69 KV SYSTEM FOR DCR-NLW THREE PHASE FAULT IN 2018 HEAVY WINTER

There is inconsistency in the observed WECC criteria violations in the Heavy Winter scenarios with only the 2018 Heavy Winter case showing issues. Inconsistencies between the scenario's included in the assessment may be due to modified forecasts between the time the cases are compiled at WECC. The issues observed in the Walla Walla area are the PacifiCorp's transmission system issues. Avista will communicate the observed issues with the PacifiCorp and coordinate the appropriate corrections actions plans as necessary.

Lolo – Oxbow 230 kV Disturbance

WECC voltage dip criteria violations are observed during the voltage recovery for a three phase fault on the Lolo – Oxbow 230 kV Transmission Line near the Oxbow Station followed by subsequent clearing of the fault by opening the transmission line (see Table VI-15 and Figure VI-34). The criteria violations occur primarily in the Heavy Summer scenarios, and they are dependent on the generation levels in the Idaho Power area.

TABLE VI-15: WECC CRITERIA VIOLATIONS FOR LOLO – OXBOW 230 KV DISTURBANCE

	14HS				14HW				23HS			
	Initial Voltage	Voltage at Start of Violation	% Voltage Dip	Time of Voltage Dip	Initial Voltage	Voltage at Start of Violation	% Voltage Dip	Time of Voltage Dip	Initial Voltage	Voltage at Start of Violation	% Voltage Dip	Time of Voltage Dip
N-1: Lolo - Oxbow 230 kV 3P @ OXB												
WECC Category B Voltage Dip Load Bus												
Bus '61254'					1.030	0.772	-25.0	1.0833	1.008	0.743	-26.3	1.0833
Bus '61203'	1.013	0.759	-25.1	1.0833					1.001	0.730	-27.2	1.0833
Bus '61207'									1.006	0.746	-25.8	1.0833
Bus '61222'									1.003	0.734	-26.9	1.0833
Bus '61227'	1.011	0.750	-25.8	1.0833					0.998	0.721	-27.7	1.0833
Bus '61233'	1.010	0.749	-25.9	1.0833					0.997	0.720	-27.8	1.0833
Bus '61241'									1.009	0.754	-25.3	1.0833
Bus '61242'	1.015	0.760	-25.2	1.0833					1.003	0.733	-26.9	1.0833
Bus '61245'									1.006	0.752	-25.3	1.0833
Bus '61261'									1.005	0.741	-26.2	1.0833
Bus '61277'									1.003	0.738	-26.4	1.0833
Bus '61279'									1.002	0.732	-27.0	1.0833
Bus '61708'	1.014	0.758	-25.2	1.0833					1.002	0.732	-27.0	1.0833
Bus '61709'									1.002	0.730	-27.1	1.0833
Bus '61715'	1.010	0.748	-26.0	1.0833					0.997	0.719	-27.8	1.0833
Bus '61720'									1.003	0.734	-26.9	1.0833
Bus '61757'									1.006	0.752	-25.2	1.0833
Bus '61803'									1.003	0.735	-26.8	1.0833
Bus '61806'									1.005	0.741	-26.3	1.0833
Bus '61840'									1.001	0.729	-27.2	1.0833
Bus '61845'									1.003	0.736	-26.6	1.0833

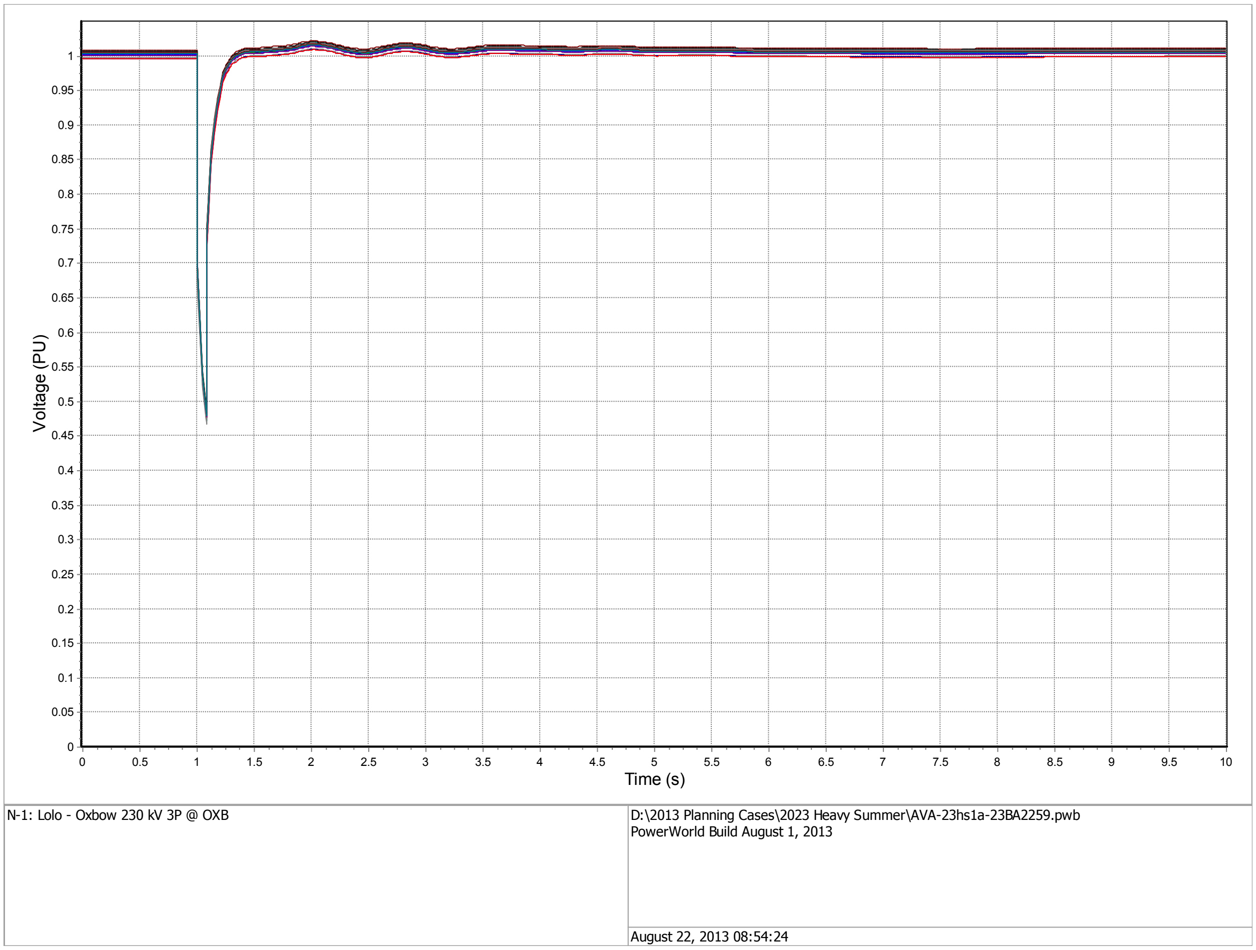
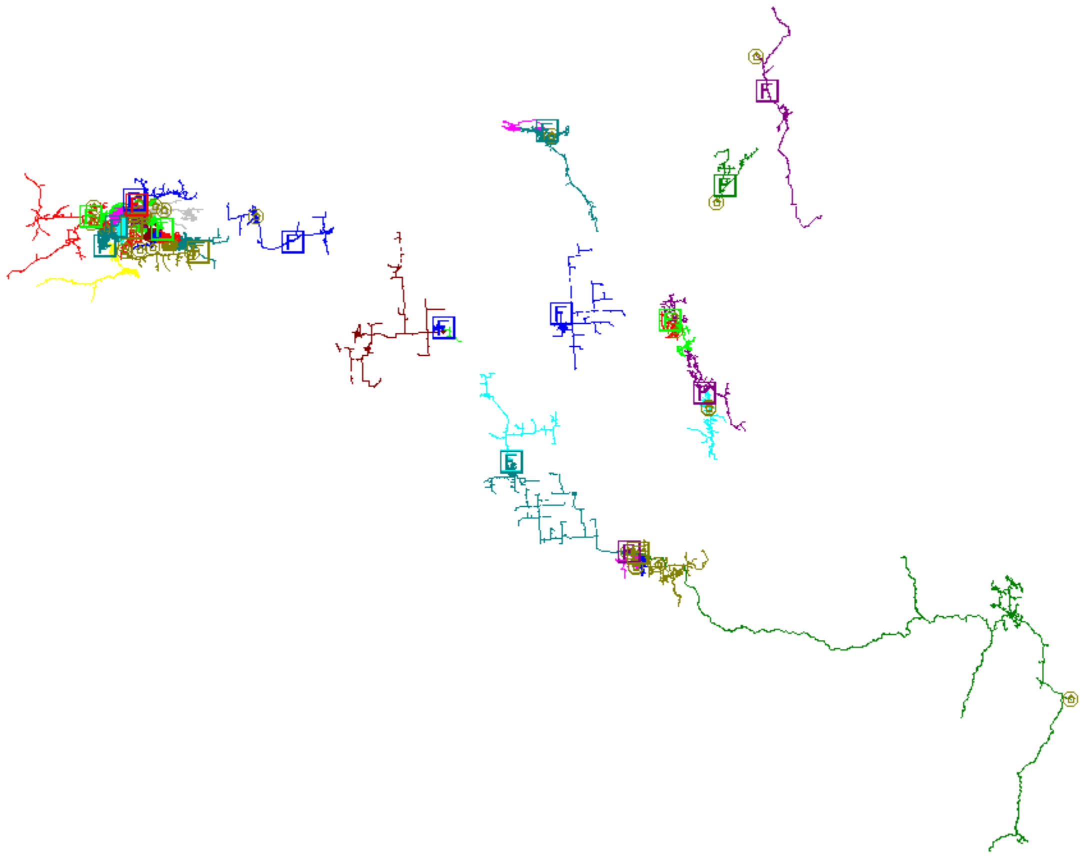


FIGURE VI-34: VOLTAGE RESPONSE OF SYSTEM FOR LOL-OXBO THREE PHASE FAULT IN 2023 HEAVY SUMMER

The issues observed for the Lolo – Oxbow 230 kV Transmission Line disturbance are the Idaho Power's transmission system issues. Avista will communicate the observed issues with the Idaho Power and coordinate the appropriate corrections actions plans as necessary. Recent discussions at WECC have identified a misapplication of the WECC voltage dip criteria by the industry by including slow voltage response following the clearing of a fault. The original intent of the WECC voltage dip criteria was to monitor for power system swings and oscillations. Potential modifications to the existing WECC voltage dip criteria may eliminate the observed issues for the Lolo – Oxbow 230 kV Transmission Line disturbance.

4.4 Distribution System Assessment

2013 Lewiston/Clarkston and Grangeville Distribution Area Assessment



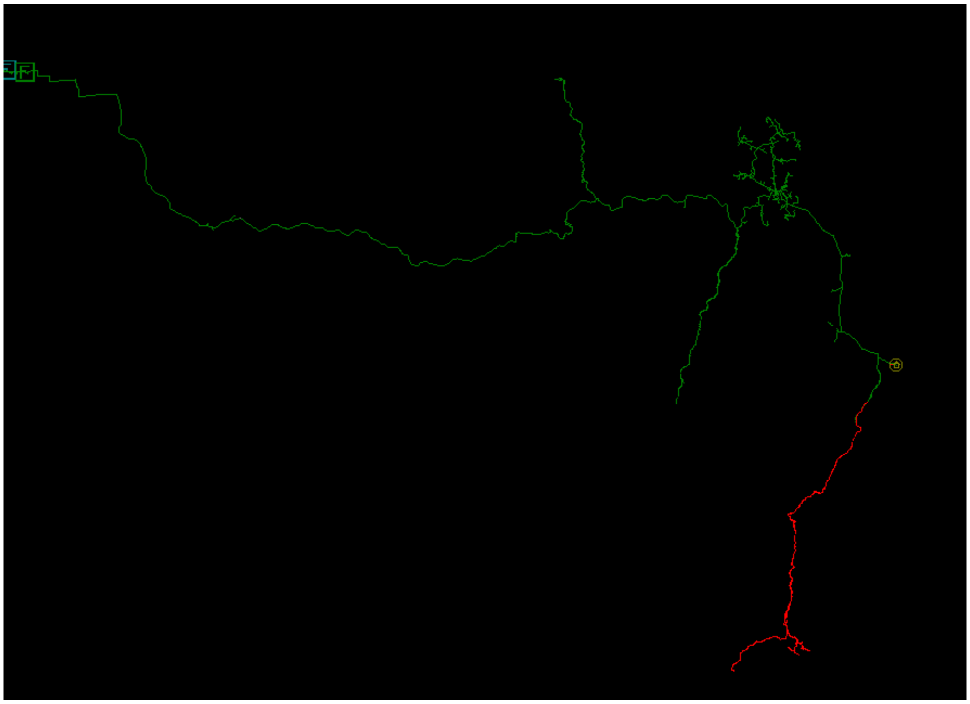
Current 5 year budget items

Wood Sub N Lewiston	2013
Wheatland- Dx Line Integration	Outyear
LMR Sub Integration	2014
COT2402 Worst Feeder	Outyear
JPE1787(4)-WEI1289(5) Worst Feeder	2014-2015
ORO1280 Grid Modernization	2017-2018
HOL1205 Grid Modernization	2017-2018
CFD 1211-ext 556 trunk 2miles	2014
DRY 1209-rebuild 5mi towards Silcott	Outyear
LOL 1359 - 2-3miles of lateral rbld	2017
PDL1201 tie to PDL 1208	2018
PDL 1203 - 3ph loop, so portion	2016
TEN 1255 - recond .75 mi at 5th & Cedar	2014
TEN 1257 - 1 mi lateral rbld	2018
ORO 1281 - 1 mi recond at sub	2018
CFD 1211- Regs at 1.5 miles	2014
GRV 1273- Regs at Orogrande and E City	2013
SWT 2403 - Cap bank at Lapwai	2016
WIK1279 - extend 2 ph Hwy 95 & Denver	2015
GRV 1272 tie to WIK 1278 so of hwy	2018
NLEW13 - addt river xing	Outyear

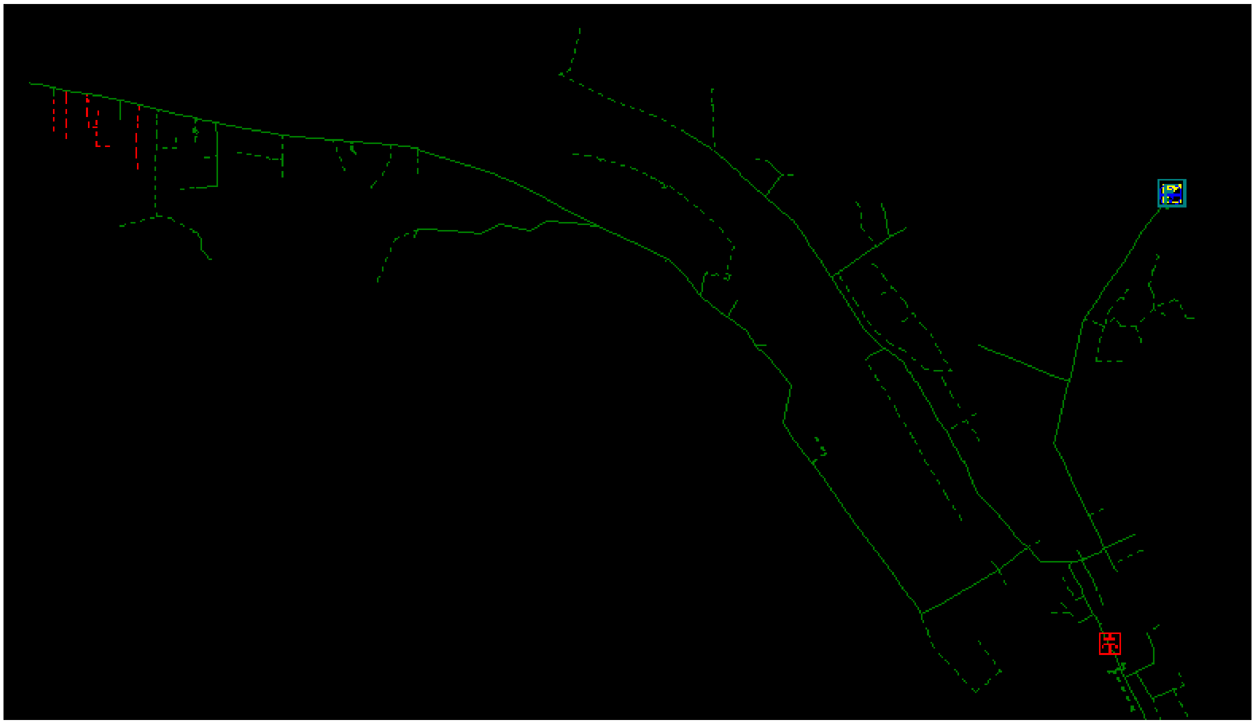
DRY 1208 tie to PDL 1202 - Fair & 13th	2018
SLW 1348 tie to SLW 1358 - 25th & 8th	2015
TEN 1256 - midline	2017
TEN 1257 tie to LOL 1266	2018
ORO 1281-midline	2016
KOO 1299-midline	2016
JPE 1287-midline	2017
KAM-KOO tieline	2015-2016

Level of Service Issues

GRV1273 shows low voltage south of Elk City. The regulator bank in 2013 will solve this.



ORO1281 shows low voltage in the commercial area south of Pink HJouse. This is a 1/0ACSR trunk with 70A peak, likely should be reconductored. The sub reconductor and regulator in 2018 would fix this.

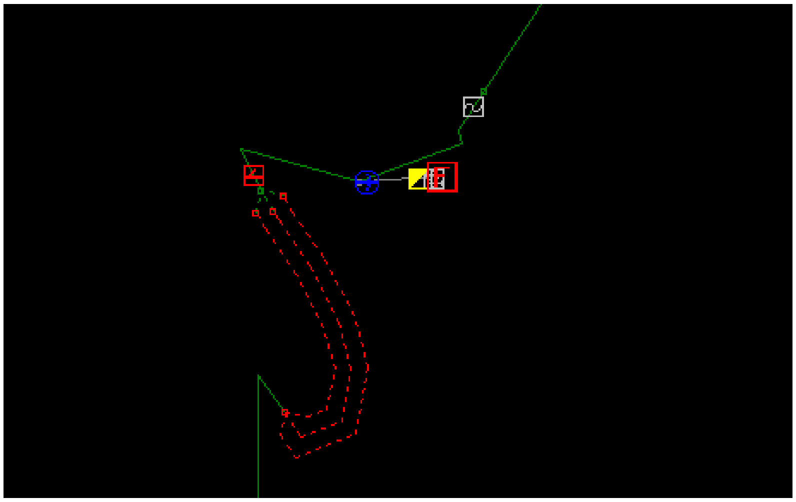


SWT2403 shows low voltage in and around Lapwai. A cap bank in 2016 will help, and some reconductor of small wire in the area is needed.

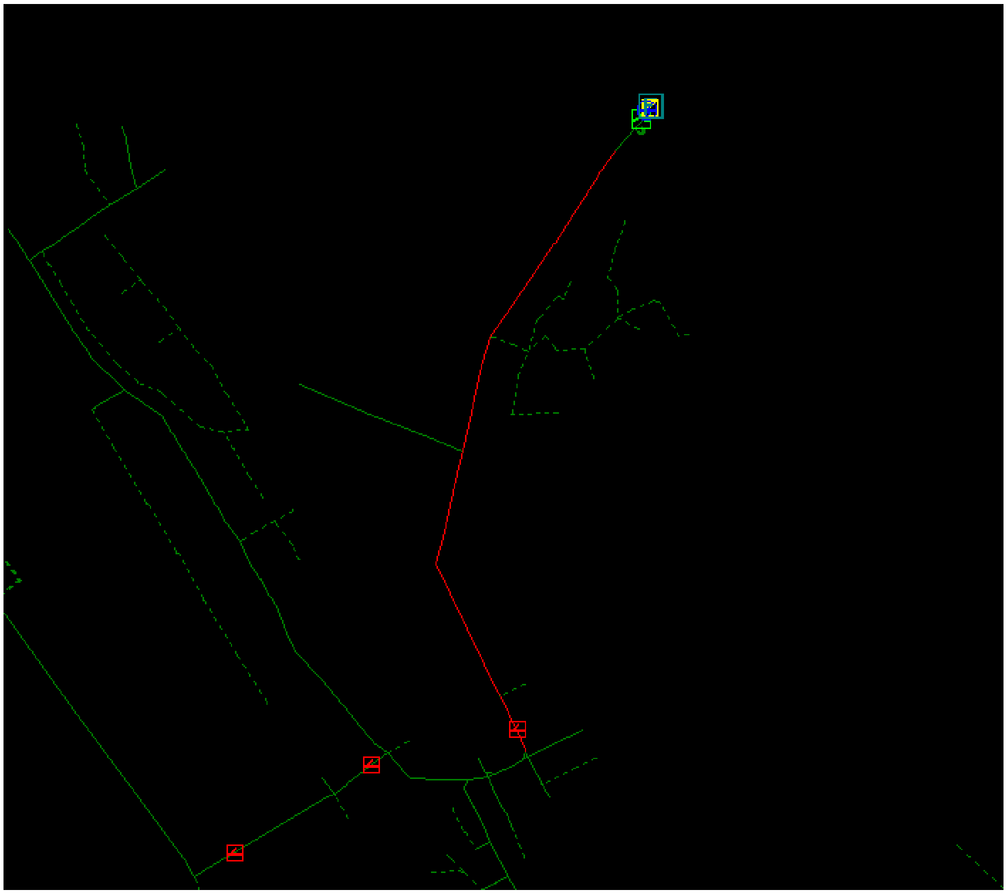
WIK1279 shows low voltage Northwest of town. Some of the trunk out to this area is 6CU and 6A. This needs to be reconductored.

Capacity Issues

KAM1293 has a URD section just outside the sub that is overloaded at peak. This 1CN15 needs to be replaced



ORO1281 shows the trunk overloaded just outside the sub. This 1/0ACSR will be reconductored in 2018, or sooner.



Reliability

GRV1273 remains the most unreliable feeder on our system. Significant work was completed on this feeder in the last several years, it is unlikely we can justify further expense in the immediate future on this feeder. Rural Grid Modernization my help cut drive time on outages.

Other feeders in the top 30 worst SAIFI are JPE1287, WEI1289, and COT2402. These all have worst feeder projects identified. All of these stations need SCADA upgrades, which could be tied to communications for fault indicators as well.

System Wide Programs

Aside from the above mentioned worst feeder projects, we have Grid modernization scheduled for ORO1280 and HOL1205. Depending on standards for rural installations communications and fault indicators may be installed elsewhere. Grid modernization in the Lewiston Clarkston valley will help increase reliability and lower operating expenses in the area.

SCADA Needs

The following stations need upgraded to three phase SCADA

HOL(from single phase)
PDL(from single phase)
SLW(from single phase)
TEN(from single phase)
COT
JPE
KAM
WEI
WIK

Future Station needs

Work is under way to construct LMR station primarily to feed Idaho Forest groups' mill at the Clearwater paper complex. Avista will also construct a feeder out of this station to help offset the need to construct Wheatland Sub at property we purchased previously. We will need Wheatland in the future, but not likely in the 5-10 year timeframe.

North Lewiston will be reconstructed in the near future, and TEN is being rebuilt as a 2 30MVA transformer station. One large distribution project not directly station related is the need for another river crossing tie between Lewiston and Clarkston. If we compare the Snake River corridor to the Spokane River corridor, we have very inadequate ties to support this urban area. This will not be an easy or inexpensive undertaking, but work should begin to secure additional tie capacity.

Spatial load forecasting next year may show additional need for more station capacity in the LC area.

5 PALOUSE AREA

2013 PLANNING ASSESSMENT

5.1 Executive Summary

The Palouse area system assessment has identified possible reliability performance issues. The facility ratings of the Moscow 230/115 kV Transformer are exceeded for several different contingencies. The rebuild of the Moscow 230 Station, scheduled for completion in 2013, will mitigate the possibility of an overload on the Moscow 230/115 kV Transformer. Applicable facility voltage ratings are exceeded at several stations for various contingencies. The relay settings currently utilized for the 230 kV capacitor banks at Benewah and Dry Creek Stations do not provide adequate automatic voltage regulation necessary to avoid exceeding applicable facility ratings. A corrective action plan is provided to address the relay settings of the 230 kV capacitor banks.

A list of the Corrective Action Plans proposed for the Palouse area is provided below. A detailed description of each project can be found in Section IV of this document.

- Moscow 230 kV Station Rebuild
- 230 kV Capacitor Automatic Switching Project

5.2 General 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 main transmission lines in the area are: Benewah – Thornton, Shawnee-Thornton, Benewah – Moscow, Benewah – Pine Creek, Benewah – Boulder, Hatwai – Moscow, and North Lewiston – Shawnee 230 kV transmission lines.

Local load service is provided by the Benewah, Shawnee and Moscow Stations. Each of the stations has 230/115 kV transformation. The Benewah Station is located in the northwest portion of the Palouse area and has a 125 MVA transformer sourced by two 230 kV transmission lines, one from Boulder Station and the other from Pine Creek Station. The Moscow Station is located in the southern portion of the Palouse area and has a 125 MVA transformer sourced by one 230 kV transmission line from the Benewah Station. The Shawnee Station is also located in the southern portion of the Palouse area and has a 250 MVA transformer sourced by one 230 kV transmission line from Benewah Station.

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.

Two projects are in the interconnection study process, but both are still in the proposal phase as no final agreements have been arranged. The projects include the following (as of October 2013):

- Project #35 200 MW Thornton 230 kV Station
- Project #36 105 MW Thornton 230 kV Station

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. The following transmission lines located in the Palouse area have normally open points:

- Benewah – Pine Creek 115 kV Transmission Line
- Moscow City – North Lewiston 115 kV Transmission Line
- Shawnee – Sunset 115 kV Transmission Line
- Latah – Ninth & Central 115 kV Transmission Line
- Latah – Moscow 230 115 kV Transmission Line
- Lind – Shawnee 115 kV Transmission Line

Load growth in the Palouse area is projected to be 1.1% for summer and 1.1% for winter based on historic load growth data. Total anticipated load not including transmission system losses for peak summer 2014 is 148 MW and 215 MW for peak winter 2014.

5.3 Transmission System Assessment

5.3.1 Steady State Analysis

Contingency Study

The following sections list system deficiencies and the associated actions needed to achieve required system performance.

A Moscow 230/115 kV Transformer

PROBLEM

The existing Moscow 230/115 kV Transformer consists of a nominal 125 MVA, 230/115 kV transformer. The transformer overloads for various contingency issues. Outages causing overloads include the N-1 contingency loss of the Shawnee 230/115 kV Transformer, Shawnee 230 kV bus outage, Hatwai 230 kV bus outage, and the loss of both the Hatwai – Lower Granite 500 kV Transmission Line and the Hatwai – North Lewiston 230 kV Transmission Line (see Figure VI-35 and Figure VI-36). The analysis indicated an inability of the system to meet the performance requirements in 2014. Overloading of the Moscow 230/115 kV Transformer is also identified in the Avista 2013 Summer Operating Studies Report and therefore is a TPL-002, R1 violation.

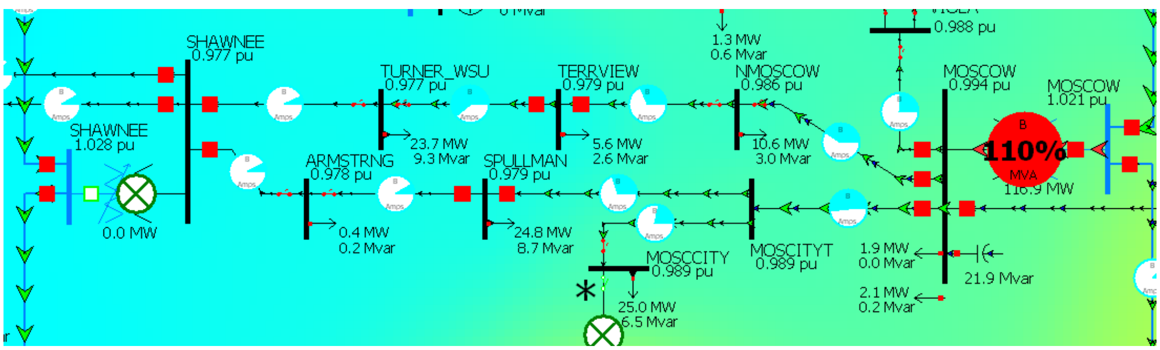


FIGURE VI-35: SHAWNEE 230/115 KV TRANSFORMER OUTAGE IN 2023 HEAVY SUMMER

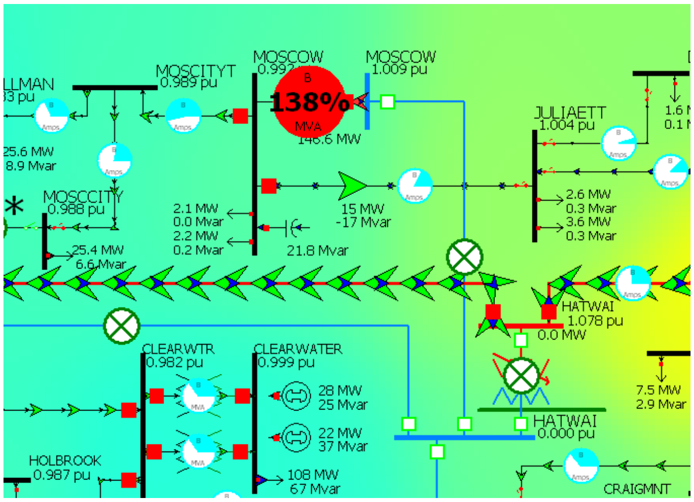


FIGURE VI-36: HATWAI 230 BUS OUTAGE IN 2023 HEAVY SUMMER

MITIGATION

A Correction Action Plan has been developed and is documented in System Planning Memo SP-2010-07 – Moscow 230 kV Sub – 230/115 kV Autotransformer Capacity Increase. The selected Single System Project to mitigate overloading of the Moscow 230/115 kV Transformer is to replace it with a 250 MVA transformer. Station Engineering has identified several issues which warrant a rebuild of the Moscow 230 Station; therefore, a complete rebuild of the station has been coordinated with the replacement of the transformer. Construction began in 2010 and is scheduled to be completed in 2014. The new 250 MVA transformer was delivered to the station in October 2011, and it was put into service in September 2013.

B 115 kV Low Voltage

PROBLEM

Low voltage was observed at Ewan 115 kV bus during the Shawnee 230/115 kV transformer outage or the Shawnee 230 kV bus outage in the 10 year horizon (see Table VI-16). The same outages cause low voltage problems to other 115 kV buses in the area in the 20 year horizon.

TABLE VI-16: 115 KV LOW VOLTAGE

Row Labels	23HW	32HSLH	32HW
Bus Low Volts			
ARMSTRNG (47501) 115.00 kV			
BUS: Shawnee 230 kV			0.9458
N-1: Shawnee 230/115 kV			0.9476
CHAMBERS (47503) 115.00 kV			
BUS: Shawnee 230 kV			0.9418
N-1: Shawnee 230/115 kV			0.9436
DIAMOND (48109) 115.00 kV			
BUS: Shawnee 230 kV			0.9379
N-1: Shawnee 230/115 kV			0.9397
EASCOLFX (48115) 115.00 kV			
BUS: Shawnee 230 kV			0.9402
N-1: Shawnee 230/115 kV			0.9420
EWAN (48121) 115.00 kV			
BUS: Shawnee 230 kV	0.9486	0.9498	0.9355
N-1: Shawnee 230/115 kV			0.9373
SHAWNEE (48383) 115.00 kV			
BUS: Shawnee 230 kV			0.9437
N-1: Shawnee 230/115 kV			0.9455
SPULLMAN (48413) 115.00 kV			
BUS: Shawnee 230 kV			0.9489
TERRVIEW (48430) 115.00 kV			
BUS: Shawnee 230 kV			0.9464
N-1: Shawnee 230/115 kV			0.9482
TURNER_WSU (48291) 115.00 kV			
BUS: Shawnee 230 kV			0.9441
N-1: Shawnee 230/115 kV			0.9458

MITIGATION

The low voltage issues are mitigated by the Moscow 230/115 kV Transformer replacement as part of the Moscow 230 kV Station rebuild project.

C Deary and Juliaetta 115 kV High Voltage

PROBLEM

During the Heavy Summer Low Hydro scenario, high voltages are observed at the Deary 115 kV and Juliaetta 115 kV buses for the line end open of the Moscow 230 – Orofino 115 kV Transmission Line open at the Moscow Station. Juliaetta also shows high voltage during the breaker failure contingency resulting in the loss of the Moscow 230/115 kV Transformer and the Moscow 230 – Terre View 115 kV Transmission Line.

TABLE VI-17: DEARY AND JULIAETTA HIGH VOLTAGE

Row Labels	14HSLH
DEARY (48101) 115.00 kV	
N-1: Moscow 230 - Orofino 115 kV Open @ M23	1.0520
JULIAETT (48169) 115.00 kV	
BF: A112 Moscow 230 115 kV, Moscow 230-Terre View	1.0520
N-1: Moscow 230 - Orofino 115 kV Open @ M23	1.0531

MITIGATION

The high voltage observed resolves itself with load growth in the 5 year horizon.

D Voltage Control

PROBLEM

Several contingencies result in facility voltage violations throughout the Palouse area on the 230 kV system where capacitor banks are available to help control the voltage (see Table VI-18). Avista's 230 kV shunt capacitor banks presently have relay protection settings to switch in and out single capacitor banks when the voltage drops below 228 kV and above 244 kV.

TABLE VI-18: PALOUSE 230 KV BUS VOLTAGES

Row Labels	18HSHH Projects	18HT 10Projects	18HW Projects	32HS 10Projects	32HSLH 10Projects	32HW 10Projects
Bus High Volts						
230						
BENEWAH (48037) 230.00 kV	1.0522	1.0536				
MOSCOW (48249) 230.00 kV	1.0566	1.0546	1.0553			
PALOUSE_WIND (48863) 230.00 kV	1.0525	1.0521	1.0521			
SHAWNEE (48385) 230.00 kV	1.0554	1.0523	1.0559			
THORNTON (48432) 230.00 kV	1.0524	1.0521	1.0551			
Bus Low Volts						
230						
MOSCOW (48249) 230.00 kV						1.0065
PALOUSE_WIND (48863) 230.00 kV				1.0088		
SHAWNEE (48385) 230.00 kV				1.0058	1.0081	1.0049
THORNTON (48432) 230.00 kV				1.0087		

MITIGATION

Automatic insertion of shunt capacitor banks at the Benewah 230 kV Station will mitigate the low voltage observed during these outages. Increasing the low voltage set point to the present operating limit of 232.3 kV and decreasing the high voltage set point to the present equipment limit of 242 kV will help ensure the 230 kV system voltage will be operated in applicable limits. Until the relay protection settings are modified, the System Operator can manually switch in the shunt capacitor banks and manually change tap positions on the Benewah 230/115 kV Transformer. Relying on manual operator intervention will cause the applicable facility ratings to be exceeded until the appropriate actions are taken.

E Extreme Events

The worst extreme event observed in the Palouse area was the loss of the Hatwai 500 kV and 230 kV buses (see Table VI-19). Each of the extreme events results in the overload of the Moscow 230/115 kV Transformer. These issues are mitigated by the Moscow 230 kV Station rebuild project.

TABLE VI-19: EXTREME EVENT ANALYSIS RESULTS

Thermal Rating % Row Labels	14HS	14HS LH	18HS	18HS LH	23HS	23HS LH	32HS	32HS LH
MOSCOW 230.00 to 115.00 kV #1 Transformer								
D.12								
BUS: Hatwai 230 kV - No RAS	136.4	115.5	120.5		123.1	101.7	125.8	103.1
D.8								
SUB: Hatwai 500 & 230 (BPA)	182.7	162.4	139.8	129.5	156.2	132.0	160.4	136.3
(blank)								
RES: N-2: Benewah - Thornton 230 kV & Benewah - Latah 115 kV	101.0							

Spare Equipment Study

Thermal facility rating overloads from the spare equipment study are provided in Table VI-20.

TABLE VI-20: SPARE EQUIPMENT ANALYSIS RESULTS

Row Labels	Benewah	Moscow	Shawnee
BF: A112 Moscow 230 115 kV, Moscow 230-Terre View			
LEON - MOSCCITY 115.00 kV #1 Line			105.1
LEON - N LEWIST 115.00 kV #1 Line			109.4
BF: A586 North Lewiston 115 kV, North Lewiston-Tucannon River			
TERRVIEW - TURNER_WSU 115.00 kV #1 Line			127.1
BF: A604 Beacon North 115 kV, Beacon-Boulder #1			
BEACON S - NINTHCNT 115.00 kV #2 Line	104.3		102.5
WEST 230.00 to 115.00 kV #1 Transformer		100.9	102.7
BF: A632 Shawnee 115 kV, Shawnee-Terre View			
LEON - MOSCCITY 115.00 kV #1 Line		102.0	102.0
LEON - N LEWIST 115.00 kV #1 Line		106.6	106.6
BF: A634 Shawnee 115 kV, Shawnee-South Pullman			
LEON - MOSCCITY 115.00 kV #1 Line		101.2	101.2
LEON - N LEWIST 115.00 kV #1 Line		105.8	105.8
BF: A688 Ninth & Central North & South 115 kV			
ROSSPARK - THIRHACH 115.00 kV #1 Line		105.7	109.3
BF: R463 Benewah 230 kV Switched Shunt, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		106.3	106.5
BF: R468 Benewah-Boulder, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		104.9	104.9
BF: R470 Benewah-Thornton, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		106.9	105.7
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		104.9	105.0
BF: R476 Benewah-Moscow 230, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		105.4	106.6
BUS: Hatwai 230 kV			
MOSCOW 230.00 to 115.00 kV #1 Transformer	127.3		
TERRVIEW - TURNER_WSU 115.00 kV #1 Line			133.3
BUS: Moscow 230 115 kV			
LEON - MOSCCITY 115.00 kV #1 Line			121.5
LEON - N LEWIST 115.00 kV #1 Line			125.8
BUS: North Lewiston 115 kV			
TERRVIEW - TURNER_WSU 115.00 kV #1 Line			127.1
BUS: North Lewiston 230 kV			
TERRVIEW - TURNER_WSU 115.00 kV #1 Line			109.0
BUS: Shawnee 115 kV			
LEON - MOSCCITY 115.00 kV #1 Line		102.0	102.0
LEON - N LEWIST 115.00 kV #1 Line		106.6	106.6
N-1: Benewah 230/115 kV			
MOSCOW - VIOLA 115.00 kV #1 Line		122.5	121.3
PALOUSE - VIOLA 115.00 kV #1 Line		103.8	102.7
N-1: Moscow 230 - Terre View 115 kV (M23-NMO)			
LEON - MOSCCITY 115.00 kV #1 Line			105.0
LEON - N LEWIST 115.00 kV #1 Line			109.3
N-1: Moscow 230 - Terre View 115 kV (TVW-NMO)			
LEON - MOSCCITY 115.00 kV #1 Line			105.0
LEON - N LEWIST 115.00 kV #1 Line			109.2
N-1: Moscow 230 - Terre View 115 kV Open @ M23			
LEON - MOSCCITY 115.00 kV #1 Line			121.4
LEON - N LEWIST 115.00 kV #1 Line			125.7
N-1: Shawnee - South Pullman 115 kV			
LEON - MOSCCITY 115.00 kV #1 Line		101.4	101.2
LEON - N LEWIST 115.00 kV #1 Line		106.0	105.8
N-1: Shawnee - South Pullman 115 kV Open @ SHN			
LEON - MOSCCITY 115.00 kV #1 Line		102.1	102.0
LEON - N LEWIST 115.00 kV #1 Line		106.8	106.6
N-1: Shawnee - South Pullman 115 kV Open @ SPU			
LEON - MOSCCITY 115.00 kV #1 Line		101.4	101.2

Row Labels	Benewah	Moscow	Shawnee
LEON - N LEWIST 115.00 kV #1 Line		106.0	105.8

Failure of any of the three 230/115 kV transformers in the Palouse area requiring complete replacement causes thermal overloads of local 115 kV transmission lines and, in the case of the Benewah or Shawnee 230/115 kV Transformer loss, the Moscow 230/115 kV Transformer overloads.

Many of these issues disappear in the 5 year time frame from planned projects such as the Moscow 230 kV Station rebuild. The issues that remain can be seen in Table VI-21.

TABLE VI-21: REMAINING OVERLOADS AFTER PROJECTS

Row Labels	Benewah-Projects	Moscow-Projects	Shawnee-Projects
BF: A688 Ninth & Central North & South 115 kV			
ROSSPARK - THIRHACH 115.00 kV #1 Line	102.4	110.7	113.9
BF: R463 Benewah 230 kV Switched Shunt, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		104.9	104.4
BF: R468 Benewah-Boulder, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		103.9	103.1
BF: R470 Benewah-Thornton, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		105.3	103.8
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		103.7	103.1
BF: R476 Benewah-Moscow 230, Benewah 230/115 Transformer			
MOSCOW - VIOLA 115.00 kV #1 Line		104.2	104.5
BUS: Hatwai 230 kV			
LATAH - TEKOA 115.00 kV #1 Line		100.0	
N-1: Benewah 230/115 kV			
MOSCOW - VIOLA 115.00 kV #1 Line		120.8	118.4
PALOUSE - VIOLA 115.00 kV #1 Line		102.2	100.1

The overloads observed in Table VI-21 related to the Ross Park – Third & Hatch 115 kV Transmission Line will be addressed in the Spokane Area Assessment. The Latah – Moscow 230 115 kV Transmission Line experiences overloads on different portions of the line during several contingencies involving the loss of the Benewah 230/115 kV Transformer or the loss of the Hatwai 230 kV bus. The Latah – Moscow 230 115 kV Transmission Line has 17.38 miles of 1/0 CW Type F conductor. The Moscow – Viola portion of the line has the worst overloads. It is has 8.37 miles of the 17.38 miles of 1/0 CW Type F conductor.

Voltage Stability Study

F PV Analysis

METHODOLOGY

No defined WECC transfer paths are located in the Palouse area; therefore, only a Load Ramp PV Curve analysis was performed. The Coeur d'Alene Planning Assessment provides PV Analysis for Path 6 – West of Hatwai.

For the Load Ramp PV Curve, all buses in the Palouse area were monitored. All loads within the Palouse area were increased until voltage collapse occurred.

RESULTS

The 2018 Heavy Summer case was used for the voltage stability analysis. The worst Category C contingency is the Moscow 115 kV bus outage. The critical bus for the Moscow 115 kV bus outage is the Moscow City 115 kV bus. Figure VI-37 shows the PV curves for 3 critical buses and the worst performing contingencies.

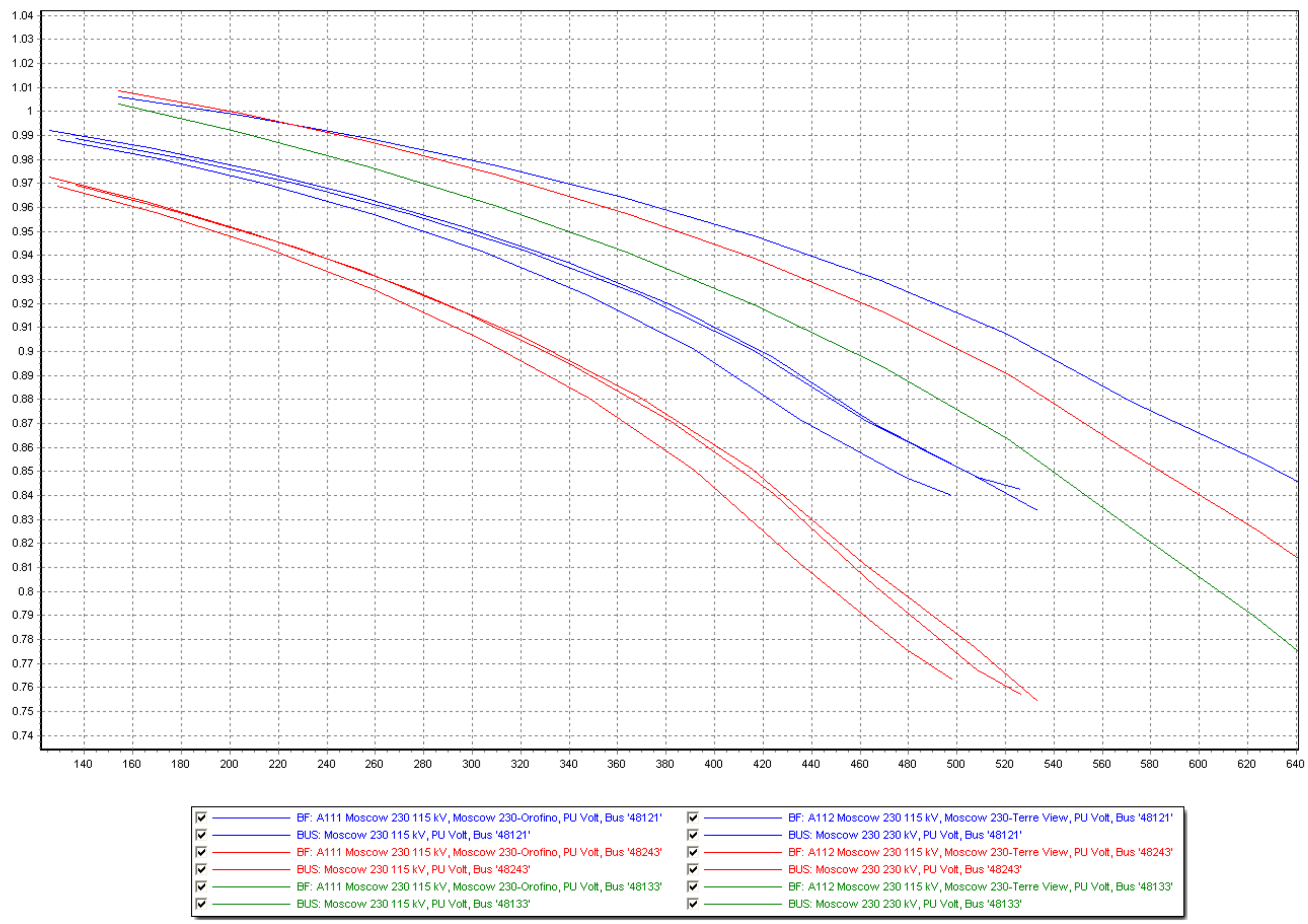


FIGURE VI-37: LOAD RAMP PV CURVE RESULTS FOR CRITICAL BUSES

G QV Analysis

The QV analysis showed there is adequate reactive power margin for the 115 kV source buses and critical buses in the Palouse area. Table VI-22 shows the results of the worst performing contingency for each bus analyzed.

The smallest reactive margin at the critical buses analyzed occurred at the Ewan 115 kV bus with a value of 64.36 MVAr for the loss of the Shawnee 230 kV bus.

TABLE VI-22: QV ANALYSIS RESULTS

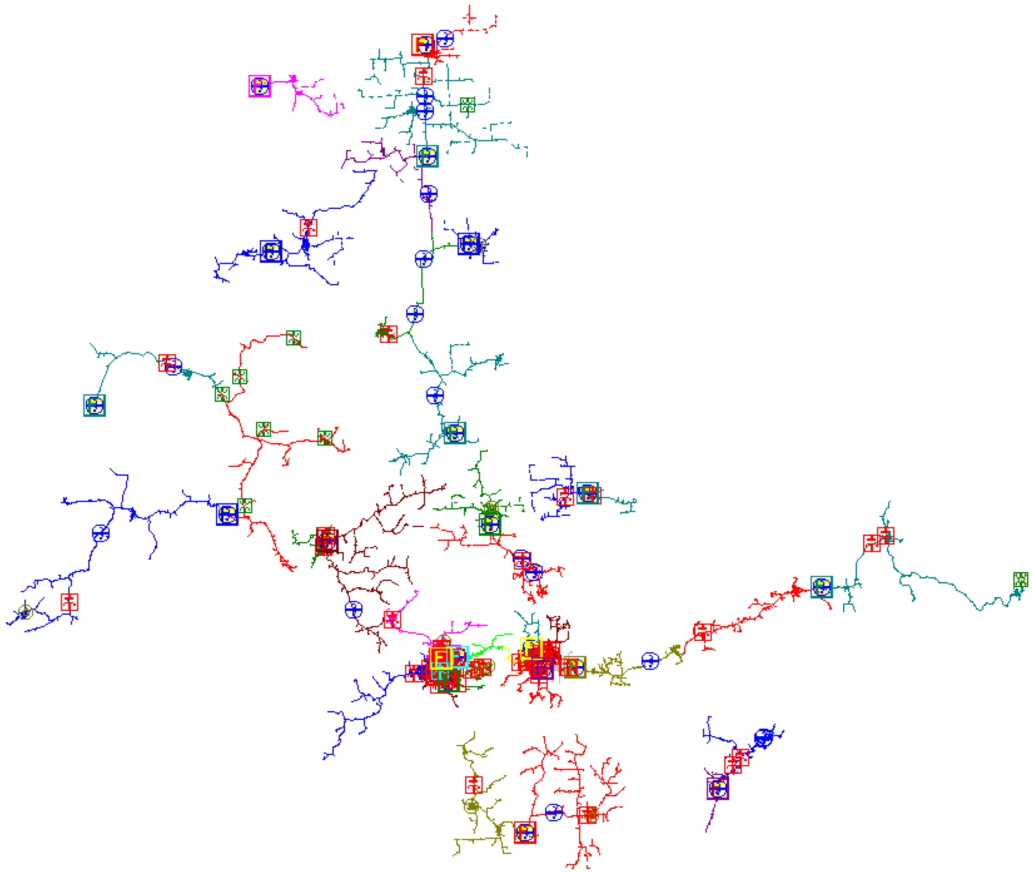
Bus Name	Nom kV	Contingency Scenario	Reactive Margin
BENEWAH	115	BASECASE	-336.56
BENEWAH	115	BUS: MOSCOW 230 115 KV	-305.21
BENEWAH	115	BUS: MOSCOW 230 230 KV	-287.42
BENEWAH	115	BUS: SHAWNEE 230 KV	-297.03
EWAN	115	BASECASE	-102.01
EWAN	115	BUS: MOSCOW 230 115 KV	-81.56
EWAN	115	BUS: MOSCOW 230 230 KV	-87.21
EWAN	115	BUS: SHAWNEE 230 KV	-64.36
GARFIELD	115	BASECASE	-119.1
GARFIELD	115	BUS: MOSCOW 230 115 KV	0
GARFIELD	115	BUS: MOSCOW 230 230 KV	-84.97
GARFIELD	115	BUS: SHAWNEE 230 KV	-95.95
MOSCCITY	115	BASECASE	-500.47
MOSCCITY	115	BUS: MOSCOW 230 115 KV	-109.46
MOSCCITY	115	BUS: MOSCOW 230 230 KV	-211.72
MOSCCITY	115	BUS: SHAWNEE 230 KV	-266.1
MOSCOW	115	BASECASE	-608.95
MOSCOW	115	BUS: MOSCOW 230 115 KV	0
MOSCOW	115	BUS: MOSCOW 230 230 KV	-222.22
MOSCOW	115	BUS: SHAWNEE 230 KV	-321.54
SHAWNEE	115	BASECASE	-594.61
SHAWNEE	115	BUS: MOSCOW 230 115 KV	-307.4
SHAWNEE	115	BUS: MOSCOW 230 230 KV	-364.52
SHAWNEE	115	BUS: SHAWNEE 230 KV	-164.57

5.3.2 Stability Analysis

There were no stability issues identified in the Palouse area.

5.4 Distribution System Assessment

2013 Moscow/Pullman Distribution Area Assessment



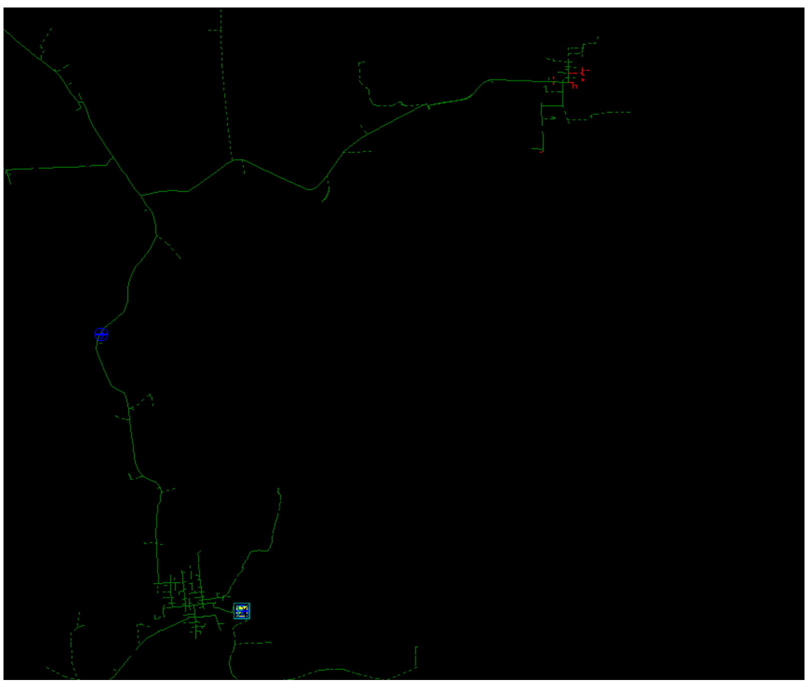
Current 5 year budget items

Tamarack Sub Dx Int	Outyear
Moscow 230 - Dx Line Integration	2014
NMO - New FDR - Commercial Load	2018
BOV Sub Dx Line Integration	~~Outyear~~
COT2401 Worst Feeder	Outyear
JUL 662 -- Julietta City Worst Feeder	2013

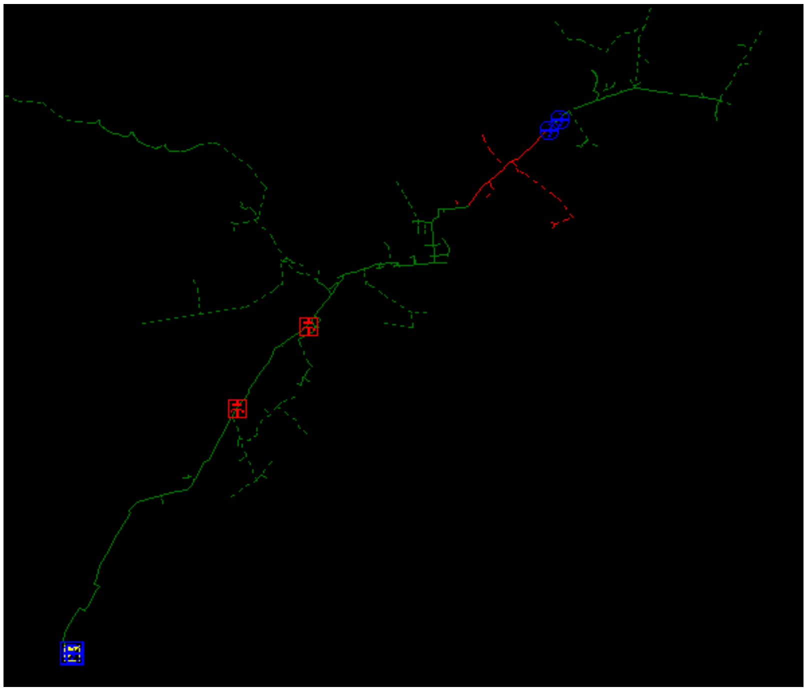
DER 651/652 Elk River (2) Worst Feeder	2013-2015
TUR113 Grid Modernization	2017
TUR112 Grid Modernization	2017-2018
LEO612 Grid Modernization	2017-2018
M23621 Grid Modernization	2014-2015
PAL 312 - Add Phase	2013
MOS 515 tie to 512	2013-2015
WSU Steam plant - cable & conduit	2013-2014
SPU Bishop Blvd URD Inc Cap.	2014

Level of Service Issues

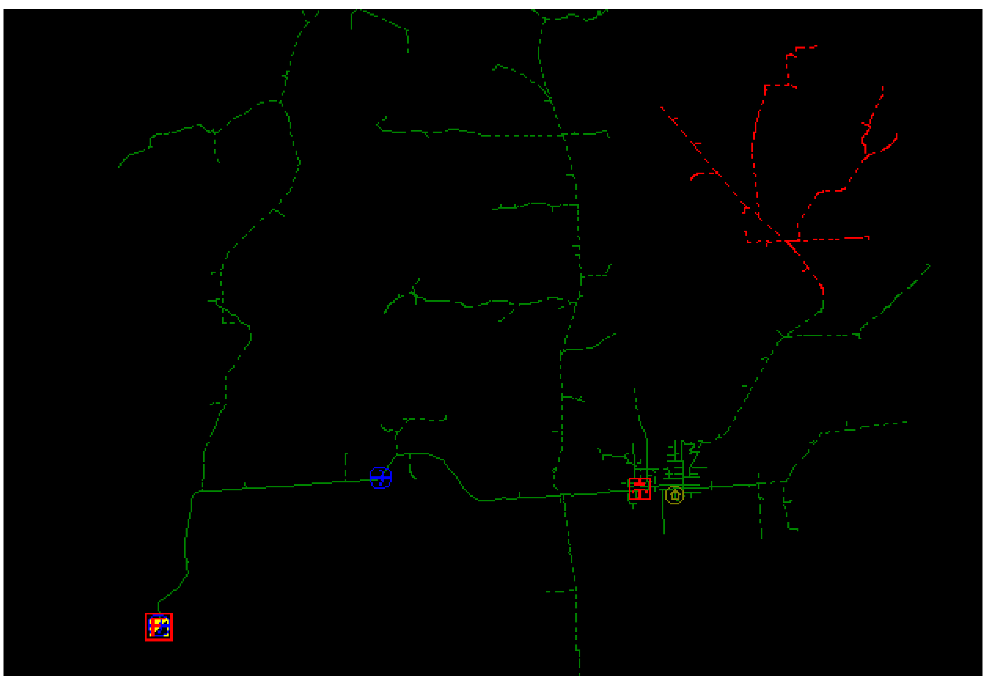
GAR461 – Some low voltage issues in the area of Farmington. Reconductoring the 6A along Farmington Rd should fix this.



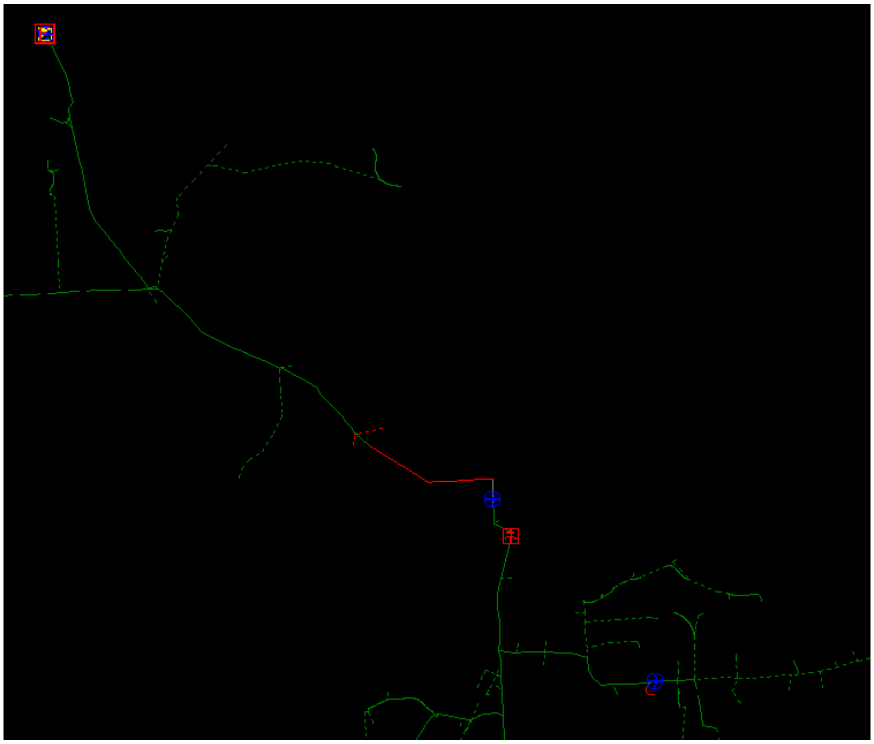
JUL662 – Lov voltage at Cedar Ridge and Southwick Rd before the 2 phase reg bank. Reconductoring the 6CR and possibly moving the reg bank upstream to the 3 phase might fix this.



LEO611 – Low voltage along Old Hwy 95. Reconductoring this single phase 6CU lateral and maybe an additional single phase regulator.

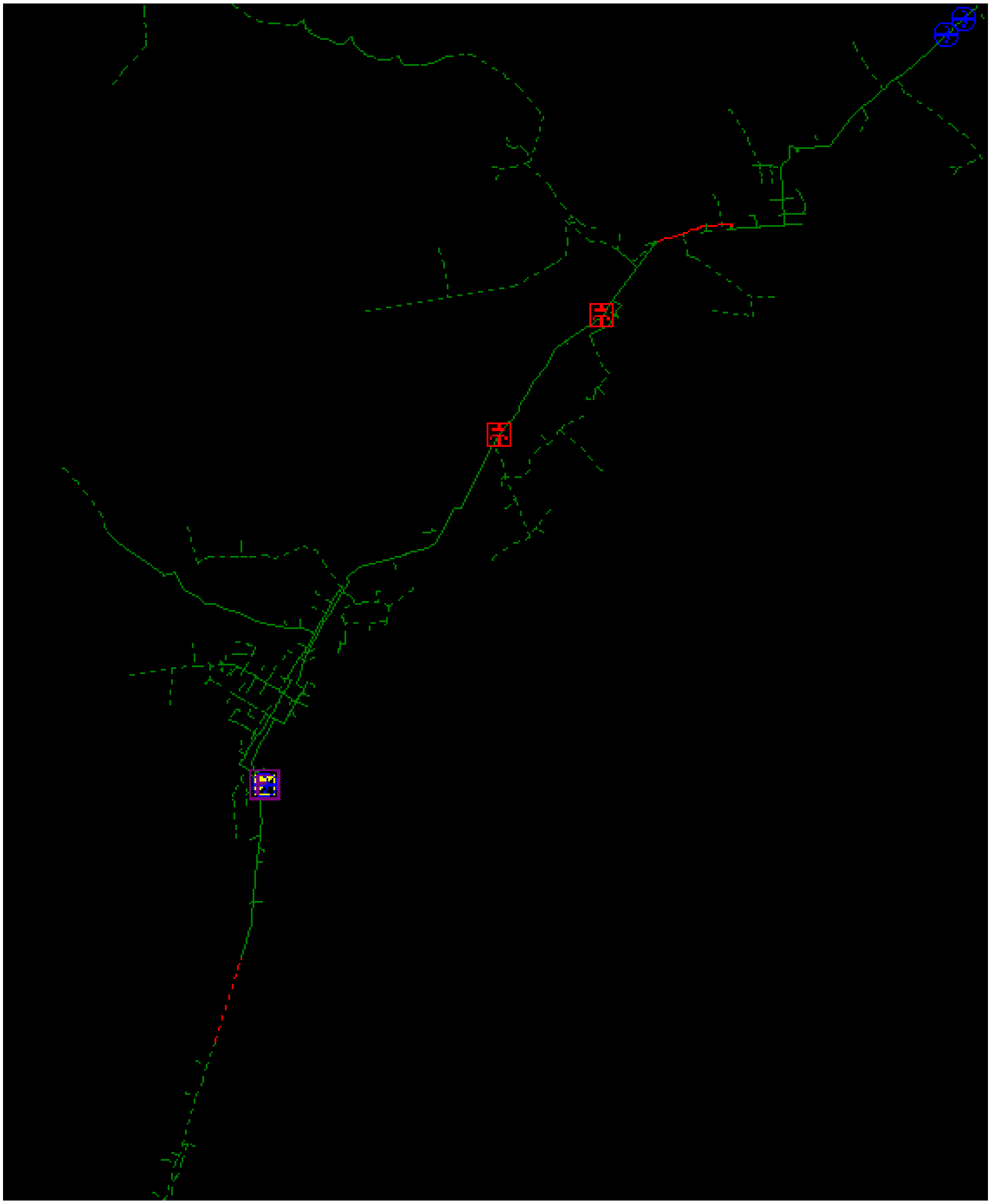


PAL312 – low voltage upstream of both regulator banks. Most of the trunk is 4ACSR or similar. This needs to be reconductored.

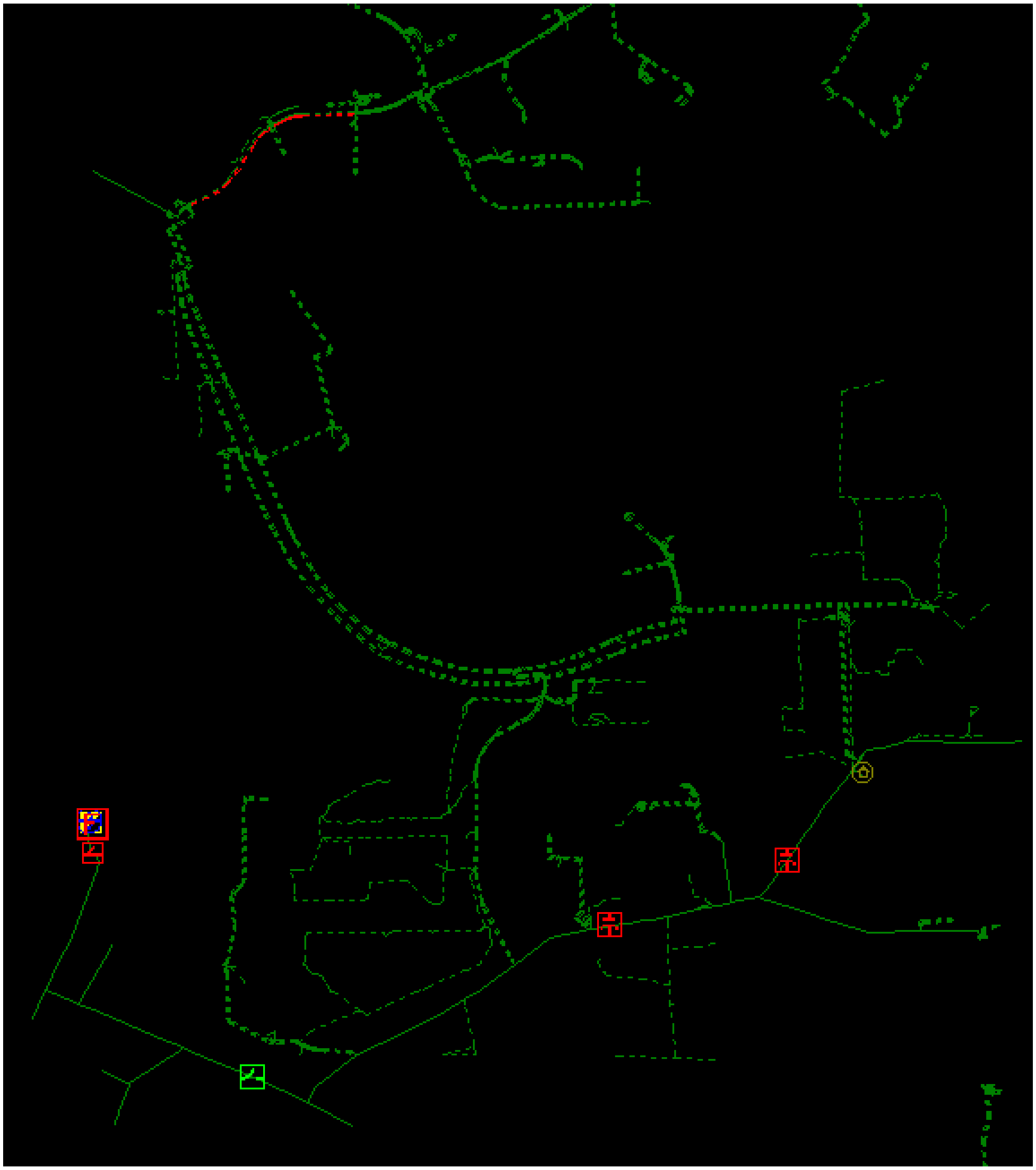


Capacity Issues

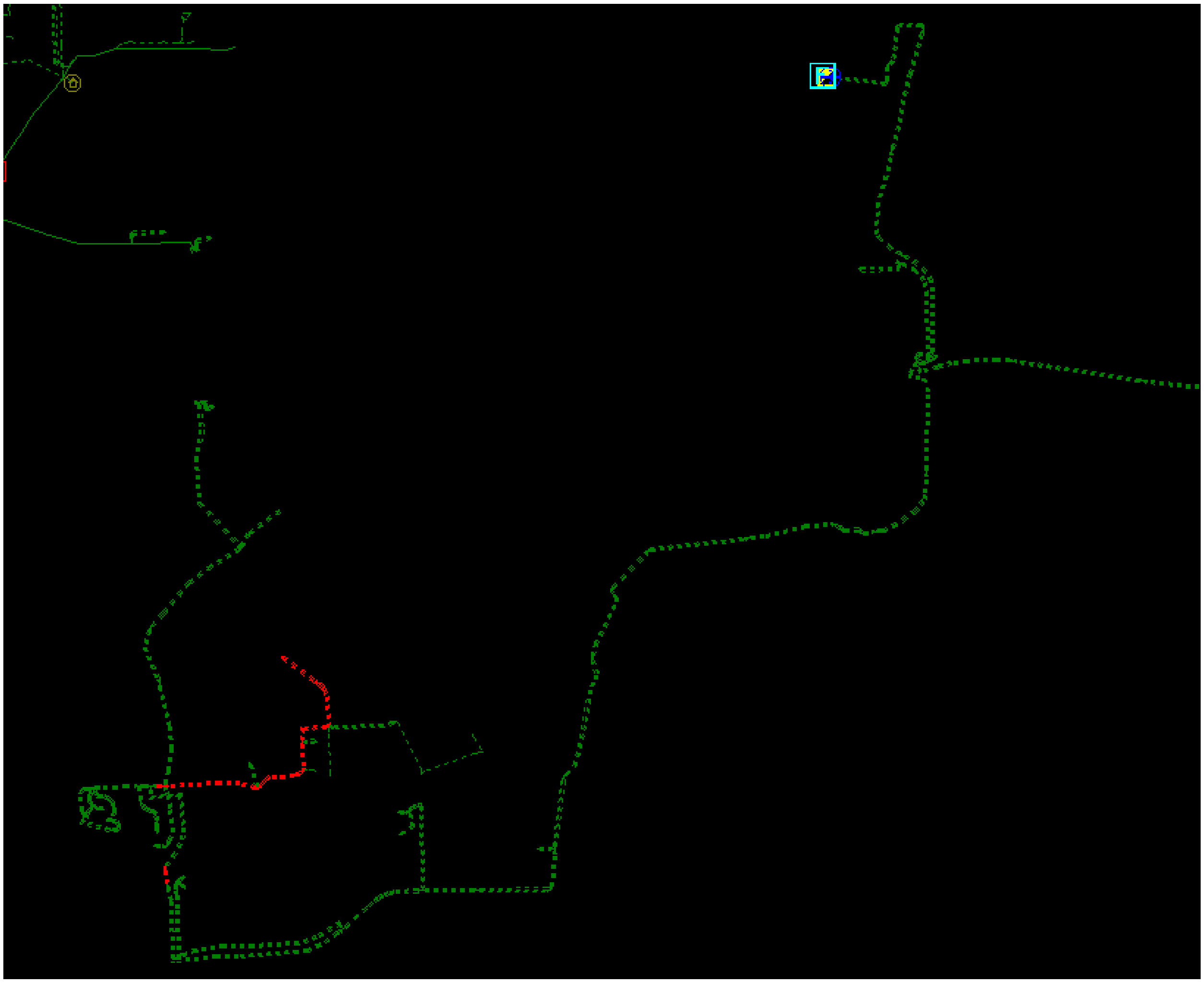
JUL661 and JUL662 have some overloaded 6CR and 6CW. This would be fixed in conjuction with the low voltage fixes on these feeders.



TUR117 has some overloaded 1CN15 and 1/0CN15 on the north end of the feeder on Hopkins Rd. We may want to examine this area as a 600A build out for a tie to TVW132.



TVW131 shows some overloaded 1/0CN15 near Ferdinand's on campus. Further load study may be warranted.



Reliability

Several feeders in the Moscow Pullman area are in the top 30 for worst 3 yr average SAIFI numbers. In order from the worst:

DER651
POT322
DIA232
PAL312

It appears some of the worst feeder program expenditures are taking effect on COT2401 and JUL662. More work is needed, on DER651 in particular. Some of these feeders could benefit greatly from a rural grid modernization initiative.

System Wide Programs

Grid modernization is upcoming on TUR112, TUR113, LEO612, and M23621. Turner feeders are a natural fit as smart grid work has already been complete and the station is prepared. LEO612 will be a full scale rural install, as there are no feeder ties. This will be a good opportunity to rehabilitate a feeder in pretty bad shape, it should remove all high resistance wire and solve low voltage issues while improving reliability. M23621 will also be significant, as this feeder is utilized as a tie to DER several times a year since DER is a radial transmission feed that experiences significant outages. Shortening outage times by using remotely operated tie points will help this area greatly.

SCADA Needs

The following stations/feeders need upgrades to three phase SCADA

DIA
EWN
GAR
JUL
LEO
M15(single phase now)
NMO(single phase

now)
POT
RSA
TKO

Future Station needs

We are currently pursuing property on the northwest corner of Moscow for a new Tamarack station. This will serve increased load from an additional commercial development in this area, and increased residential load as well. It will also allow greater operational flexibility as in fill happens in town.

We currently have a placeholder for a new Bovill substation, dependant on development of a clay mine just east of town. This would serve native industrial load, and also gain some flexibility in the corridor between Moscow, Deary, and Bovill. It may also drive the need for a looped transmission feed in this area.

At this point in time, no further additional stations are needed, the spatial load forecast to be completed next year may show need for more stations and corridors.

6 SPOKANE AREA

2013 PLANNING ASSESSMENT

6.1 Executive Summary

The Spokane area transmission system assessment demonstrated several reliability performance issues. The 230/115 kV transformer capacity is inadequate for the load served. The Westside #1 & #2 230/115 kV Transformers exceed their applicable facility ratings for several outages. The Westside #1 230/115 kV Transformer will exceed its applicable facility ratings by 2018 in a heavy summer scenario for an outage of the Westside #2 230/115 kV Transformer. Two transformers can be taken out of service for several single points of failures causing multiple facilities to exceed their applicable facility ratings. The most severe outage is breaker failure of the Beacon Station 115 kV bus tie breaker.

Completion of the Lancaster Interconnection Project, scheduled for 2013, will improve the transmission system performance, but it does not mitigate all existing operational issues. The long term transmission plan for the Spokane area includes providing 230 kV infrastructure capable of supporting the System during multiple outage scenarios. The addition of the Garden Springs 230 kV Station and a new transmission line to Ninth & Central Station significantly decreases the dependency on Avista's existing 230 kV stations. New facilities will be constructed with no common point of failure causing loss of multiple elements.

A list of the Corrective Action Plans proposed for the Spokane area is provided below. A detailed description of each project can be found in Section IV of this document.

- Westside Transformer Replacement Project
- Garden Springs Station Integration Project
- Spokane Valley Transmission Reinforcement Project
- Ninth & Central Station Configuration Project
- Nine Mile – Westside Protection Upgrade Project

Deferring increasing transformer capacity projects in the Spokane area will continue to cause an inability of the System to not meet the performance requirements.

6.2 General 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.

The major sources to the Spokane area include hydro generation resources located in Northern Idaho and Western Montana, natural gas fired turbines just to the East in Northern Idaho, the 500/230 kV transformer at Bell Station in Northern Spokane, the hydro generation resources located to the North and West from the Pend Oreille and Columbia Rivers, and local hydro generation resources on the Spokane River. Avista owns two 230 kV transmission lines, the Beacon – Rathdrum and Boulder Rathdrum 230 kV transmission lines, which connect the Rathdrum Station, located in Northern Idaho, to 230 kV hubs in the Spokane area. Avista owns two additional 230 kV transmission lines, the Beacon – Bell 4 & 5 230 kV transmission lines, which connect the 500 kV Bell Station source to the Avista Beacon Station. In general the remaining sources are connected to the Spokane area through the BPA Transmission System.

Local load service is provided by the Beacon, Bell, Boulder and Westside Stations. Each of these stations has 230/115 kV transformation. The Westside Station is located on the northwest edge of the Spokane area and has two 125 MVA 230/115 kV transformers sourced by two 230 kV lines, one from Grand Coulee Dam and the other from Bell Station. Because the transmission line into the Westside Station is a double circuit 230 kV transmission line, these sources to the Station are not completely independent. Beacon Station is somewhat centralized in the North part of the Spokane area and has two 250 MVA 230/115 kV transformers sourced from the north by the Bell Station and the East by the Beacon – Boulder and Beacon – Rathdrum 230 kV transmission lines. Boulder Station is located in the northern portion of Spokane Valley and has two 250 MVA 230/115 kV transformers sourced from the West by the Beacon – Boulder 230 kV Transmission Line, the East by the Boulder – Rathdrum 230 kV Transmission Line, and from the south by the Benewah – Boulder 230 kV Transmission Line. The underlying 115 kV transmission system connects these hubs as well as interconnects local generation resources.

The WECC transfer path West of Hatwai (Path 6) includes transmission lines connecting the Spokane area to the West. These lines are the Bell – Coulee #6 500 kV, Bell – Coulee #3 & #5 230 kV, Bell – Creston 115 kV and Coulee – Westside 230 kV transmission lines. The West of Hatwai path definition also includes additional transmission lines not considered to be within the Spokane area. The BPA owns all of the listed transmission lines but Avista owns the last two miles and terminating position at Westside on the Coulee – Westside 230 kV Transmission Line. Presently, one of the limiting contingencies for this path, during high West of Hatwai flows caused by light load and high Western Montana Hydro conditions, is the double transmission line outage of the Bell – Coulee #6 500 kV and

Bell – Westside 230 kV transmission lines as the underlying 115 kV system and 230/115 kV transformers at Westside Station become overloaded.

Local generation facilities within the Spokane area include the following:

- Boulder Park — Unit 1 - 6 @ 4.1 MW each — Avista
- Monroe Street HED — Unit 1 @ 15.6 MW — Avista
- Nine Mile HED — Unit 1 Off Line, Unit 2 @ 4.5 MW, Unit 3 @ 8.2 MW & Unit 4 @ 7.1 MW — Avista
- Northeast CT — Unit 1 @ 68 MW — Avista
- Upper Falls HED — Unit1 @ 10.2 MW — Avista
- 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 presently no generation interconnection requests within the Spokane area. Reardan I 50 MW (LGIR #11) and Reardan II 40 MW (LGIR #22) located in the Big Bend area were in the interconnection queue, but have subsequently been withdrawn. If the LGIR #11 and #22 project developers decide to move forward, they will have an impact to the Spokane area. These projects were not included in the study work conducted for the assessment.

The 115 kV transmission system in the Spokane 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 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 Spokane area, star points switches can be operated open or closed based on outages, specific flow conditions, or due to operational constraints.

Load growth in the Spokane area is projected to be 1.1% for summer and 1.0% for winter based on ten years of historic load growth data. Total anticipated load not including transmission system losses for peak summer 2014 is 822 MW and 875 MW for peak winter 2014.

6.3 Transmission System Assessment

6.3.1 Steady State Analysis

Contingency Study

The following sections list system deficiencies and the associated actions needed to achieve required system performance.

A Westside Transformers

PROBLEM

Outages causing loss of 230/115 kV transformers at Bell or Beacon Stations, or outages causing increased impedance from Bell and/or Beacon Stations to the area's distribution stations cause the Westside #1 & #2 230/115 kV Transformers to exceed their applicable facility ratings. An example where an overload occurs is a tie breaker failure at Bell Station between bus sections S2 and S3 (see Figure -1). Bus tie failures at Beacon Station cause the most severe overloads. The analysis indicated an inability of System to meet the performance requirements in 2014. Westside #1 230/115 kV Transformer will overload by 2017 for an outage of Westside #2 230/115 kV Transformer.

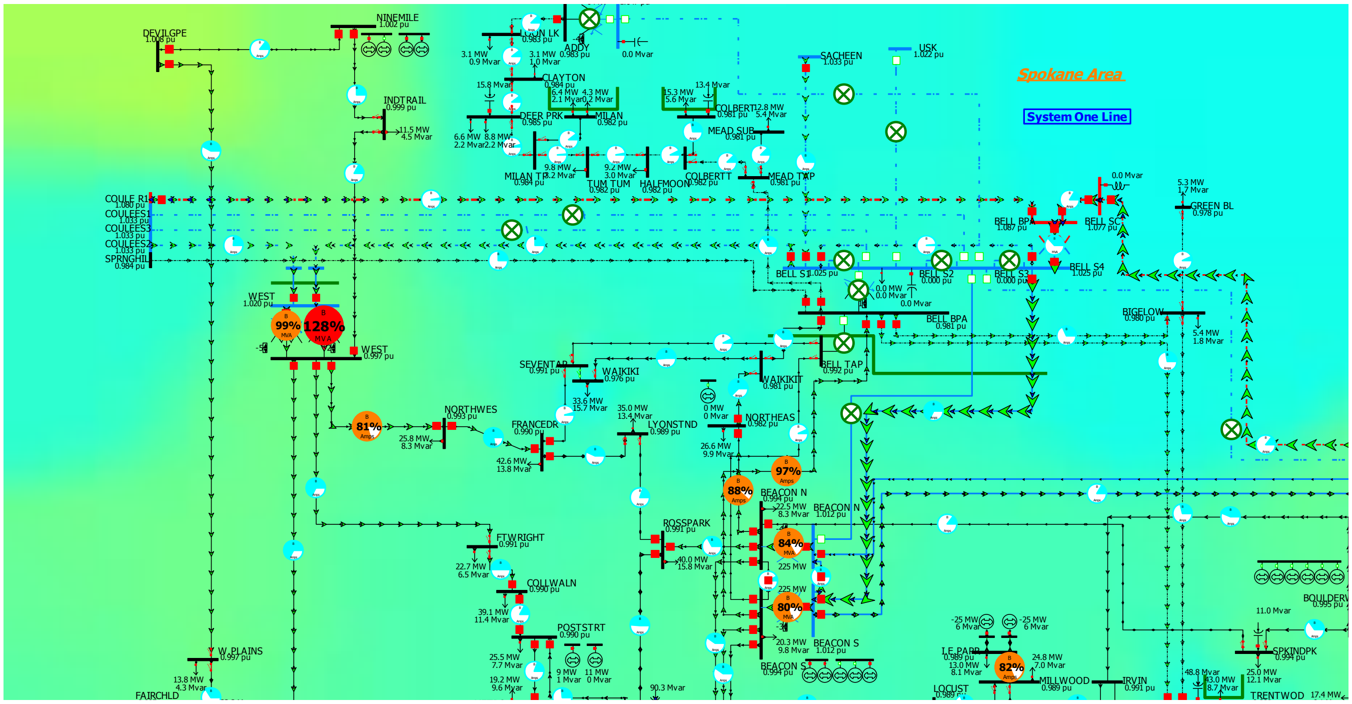


FIGURE -1: BELL S2 & S3 BREAKER FAILURE OUTAGE IN 2023 HEAVY SUMMER

	14HS	14HT	14HW	18HS	18HT	18HW	23HS	23HW
WEST 230.00 to 115.00 kV #1 Transformer								
BF: A375 Bell S1 & S4 230 kV		110.4			117.5			
BF: A388 Bell S2 & S3 230 kV	106.3			114.9			128.0	
BF: A521 Devils Gap East 115 kV, Addy-Devils Gap							104.0	
BF: A526 Devils Gap East 115 kV, Airway Heights-Devils Gap							102.0	
BF: A540 Devil's Gap East & West 115 kV							104.1	
BF: A572 Bell S3 230 kV, Bell-Boundary #3							100.5	
BF: A600 Beacon North & South 115 kV	139.8		112.5	150.2		118.0	167.8	127.8
BF: A604 Beacon North 115 kV, Beacon-Boulder #1							109.9	
BF: R427 Beacon North & South 230 kV	128.8		111.9	136.7		112.3	152.3	123.4
BUS: Beacon North 115 kV							110.9	
BUS: Beacon North 230 kV							103.5	
BUS: Beacon South 230 kV							106.1	
BUS: Bell S3 230 kV							100.5	
BUS: Devils Gap East 115 kV							104.1	
N-1: Bell #6 230/115 kV							101.5	
N-1: Westside #2 230/115 kV				105.8			120.4	
N-2: Airway Heights - Devils Gap 115 kV and Devils Gap - Nine Mile 115 kV							101.2	
N-2: Bell - Coulee #3 230 kV & Bell - Westside 230 kV		100.1			111.2			
N-2: Bell - Coulee #3 230 kV and Bell - Coulee #5 230 kV and Bell - Westside 230 kV		114.9			127.2			
N-2: Bell - Coulee #6 500 kV and Bell - Coulee #3 230 kV and Bell - Westside 230 kV		157.3			171.9			
PSF: Beacon North 115 kV							109.9	
PSF: Devils Gap East 115 kV							101.8	
WEST 230.00 to 115.00 kV #2 Transformer								
BF: A600 Beacon North & South 115 kV	108.0			116.1			129.3	106.3
BF: R427 Beacon North & South 230 kV				105.6			117.3	102.7
N-2: Bell - Coulee #6 500 kV and Bell - Coulee #3 230 kV and Bell - Westside 230 kV		121.9			133.1			

	14HSLH	18HSLH	23HSLH	32HSLH	32HS	32HW
WEST 230.00 to 115.00 kV #1 Transformer						
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer	109.3	115.6	122.8	139.0	105.8	
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai	109.3	115.6	122.8	139.0	105.8	
BF: 4710 Hatwai-Lower Granite, Hatwai 500/230 kV Transformer	109.4	115.6	122.9	139.1	106.0	
BF: A1222 Boundary West 230 kV, Bell-Boundary #3	111.9	119.8	125.3	141.4	109.7	
BF: A1588 Libby 230 kV, Conkelley-Libby	106.8	114.4	119.6	135.2	104.3	
BF: A248 Northeast 115 kV, Bell-Northeast	107.1	115.3	120.4	137.0	104.7	
BF: A388 Bell S2 & S3 230 kV	145.4	155.1	163.2	183.3	147.6	112.0
BF: A506 Rathdrum 115 kV, Pine Street-Rathdrum				134.3	102.8	
BF: A521 Devils Gap East 115 kV, Addy-Devils Gap	106.1	113.6	118.5		120.1	
BF: A526 Devils Gap East 115 kV, Airway Heights-Devils Gap					117.4	
BF: A540 Devil's Gap East & West 115 kV	106.2	113.8	118.7		120.3	
BF: A572 Bell S3 230 kV, Bell-Boundary #3	119.2	127.6	134.0	151.7	118.9	
BF: A600 Beacon North & South 115 kV	192.3	204.1	216.8	247.5	196.4	145.7
BF: A604 Beacon North 115 kV, Beacon-Boulder #1	131.5	140.2	147.2	167.4	128.9	
BF: A612 Beacon South 115 kV, Beacon-Boulder #2	113.1	121.3	127.6	145.2	112.6	
BF: A624 Rathdrum East & West 115 kV	109.7	117.6	122.8	140.2	108.8	
BF: A642 Otis Orchards 115 kV, Otis Orchards-Post Falls	106.2	114.1	119.2	135.6	104.3	
BF: A645 Otis Orchards 115 kV, Boulder-Otis Orchards	105.8	113.7	118.7	135.1	103.8	
BF: A688 Ninth & Central North & South 115 kV	114.6	122.9	128.8	146.3	112.2	
BF: A689 Ninth & Central South 115 kV, Ninth & Central-Otis Orchards	106.4	114.2	119.3	135.3	102.7	
BF: A712 Boulder West 115 kV, Beacon-Boulder #1	106.2	114.3	119.8	136.1	104.4	
BF: A713 Boulder West 115 kV, Boulder-Otis Orchards #1	106.9	115.0	120.4	136.5	104.8	
BF: A717 Boulder East & West 115 kV	110.6	119.0	124.7	141.3	109.7	
BF: B1135 Addy 115 kV, Addy-Bell	111.7	119.6	124.7	141.1	104.9	
BF: B1137 Addy 115 kV, Addy-Devils Gap	111.5	119.2	124.5	140.5	104.4	
BF: B1145 Addy 115 kV, Addy-Kettle Falls	114.4	122.3	127.8	144.3	107.9	
BF: B346 Bell 115 kV, Addy-Bell	109.8	119.0	124.0	141.3	106.6	
BF: B354 Bell 115 kV, Bell-Coulee	112.6	121.7	127.0	144.4	109.7	

	14HSLH	18HSLH	23HSLH	32HSLH	32HS	32HW
BF: B356 Bell 115 kV, Bell-Northeast	114.3	123.6	129.0	146.8	112.2	
BF: R318 Noxon East & West 230 kV	107.7	115.3	120.4	136.3	107.1	
BF: R322 Cabinet 230 kV, Cabinet-Rathdrum	107.3	115.0	120.1	136.1	108.2	
BF: R337 Noxon West 230 kV, Noxon-Hot Springs #1					103.3	
BF: R404 Cabinet-Rathdrum, Rathdrum #2 230/115 Transformer	107.2	114.9	120.1	136.1	107.2	
BF: R427 Beacon North & South 230 kV	184.3	193.4	204.4	231.1	180.0	138.0
BF: R452 Beacon-Boulder, Boulder #2 230/115 Transformer	107.9	115.9	121.1	137.3	104.6	
BF: R454 Boulder-Rathdrum, Boulder #2 230/115 Transformer				134.3	102.7	
BF: R504 Cabinet-Rathdrum, Rathdrum #1 230/115 Transformer	107.1	114.9	120.0	136.0	107.1	
BF: R552 Beacon-Boulder, Boulder #1 230/115 Transformer	107.9	115.8	121.1	137.2	104.6	
BF: R554 Boulder-Rathdrum, Boulder #1 230/115 Transformer					102.7	
BUS: Addy 115 kV	114.6	122.4	127.9	144.4	108.0	
BUS: Beacon North 115 kV	132.6	141.3	148.3	168.5	130.0	
BUS: Beacon North 230 kV	125.9	134.0	140.7	159.8	122.2	
BUS: Beacon South 115 kV	117.6	125.8	132.1	149.9	117.1	
BUS: Beacon South 230 kV	129.5	137.8	144.5	163.3	127.1	
BUS: Bell 115 kV	112.5	121.6	127.0	144.4	109.7	
BUS: Bell S2 230 kV	120.0	128.8	135.1	152.1	117.0	
BUS: Bell S3 230 kV	119.2	127.6	134.0	151.7	118.9	
BUS: Bell S4 230 kV	112.2	120.1	125.7	142.2	108.8	
BUS: Boulder East 115 kV		113.6	118.6	134.6	103.2	
BUS: Boulder West 115 kV	108.0	116.1	121.6	138.0	106.2	
BUS: Cabinet 230 kV	107.3	115.0	120.1	136.0	108.2	
BUS: Conkelley East 230 kV					102.8	
BUS: Devils Gap East 115 kV	106.2	113.8	118.7		120.3	
BUS: Hatwai 230 kV	107.9	115.8	122.3	138.6	105.6	
BUS: Libby 230 kV	107.0	114.7	119.9	135.5	104.5	
BUS: Little Falls 115 kV					104.4	
BUS: Long Lake 115 kV					112.9	
BUS: Nine Mile 115 kV					109.1	
BUS: Ninth & Central North 115 kV	106.4	114.2	119.5	135.5	103.2	
BUS: Noxon East 230 kV	108.2	115.8	120.9	136.8	106.0	
BUS: Noxon West 230 kV					103.3	
BUS: Otis Orchards 115 kV	106.4	114.4	119.4	135.9	104.6	
BUS: Rathdrum East 115 kV				134.5	103.0	
BUS: Ross Park 115 kV	108.1	116.2	121.8	138.9	105.4	
BUS: Third & Hatch 115 kV	106.6	114.4	119.0	136.1		
N-0: All Lines in Service	103.7	111.4	116.5	132.2	100.6	
N-1: 3TM Bell - Boundary #3 230 kV	108.2	116.1	121.6	137.8	106.4	
N-1: 3TM Bell - Boundary #3 230 kV Open @ BOUN	106.4	114.1	119.3	134.9	104.3	
N-1: Addy - Devils Gap 115 kV	109.5	117.3	122.5	138.4		
N-1: Addy - Devils Gap 115 kV Open @ ADD	112.6	120.5	125.9	142.3	105.9	
N-1: Addy - Devils Gap 115 kV Open @ DGP	109.7	117.4	122.6	138.5		
N-1: Addy #3 230/115 kV	108.9	116.8	122.3	138.4	107.4	
N-1: Beacon - Bell #4 230 kV	114.1	122.0	127.8	145.0	110.3	
N-1: Beacon - Bell #5 230 kV	114.6	122.6	128.4	145.6	110.9	
N-1: Beacon - Boulder 230 kV	107.4	115.3	120.3	136.4	103.6	
N-1: Beacon - Ninth & Central #1 115 kV	105.9	113.7	118.9	135.1	103.1	
N-1: Beacon - Ninth & Central #2 115 kV	105.8	113.7	118.9	135.0	103.0	
N-1: Beacon - Ross Park 115 kV	116.5	124.6	130.4	147.9	113.8	
N-1: Beacon #1 230/115 kV	117.2	125.0	131.1	148.9	114.4	
N-1: Beacon #2 230/115 kV	117.1	124.9	131.0	148.2	115.9	
N-1: Bell - Northeast 115 kV	108.9	117.2	122.5	139.4	107.1	
N-1: Bell - Northeast 115 kV Open @ BEL	107.1	115.2	120.4	136.8	104.4	
N-1: Bell - Northeast 115 kV Open @ NE		113.7	118.8	134.8		
N-1: Bell #6 230/115 kV	120.6	129.2	135.5	152.7	118.9	
N-1: Benewah - Pine Creek 230 kV					102.8	
N-1: Cabinet - Noxon 230 kV		113.5	118.5	134.4		
N-1: Cabinet - Rathdrum 230 kV	106.9	114.6	119.7	135.6	106.8	
N-1: Cabinet - Rathdrum 230 kV Open @ CAB	106.9	114.5	119.7	135.6	106.8	
N-1: Cabinet - Rathdrum 230 kV Open @ RAT	106.9	114.6	119.7	135.6	106.8	
N-1: Hatwai 500/230 kV	110.1	117.7	124.3	140.4	108.0	

	14HSLH	18HSLH	23HSLH	32HSLH	32HS	32HW
N-1: Libby - Noxon 230 kV					103.2	
N-1: Ninth & Central - Otis Orchards 115 kV Open @ OTI	106.6	114.6	119.8	136.2	104.8	
N-1: Ninth & Central - Sunset 115 kV Open @ 9CE	110.8	119.0	124.5	141.7	108.8	
N-1: Post Street - Third & Hatch 115 kV	109.6	117.6	123.0	140.1	105.4	
N-1: Ross Park - Third & Hatch 115 kV	107.0	114.9	120.3	136.6	104.0	
N-1: Westside #2 230/115 kV	149.3	160.5	168.3	190.7	144.3	107.3
N-2: Airway Heights - Devils Gap 115 kV and Devils Gap - Nine Mile 115 kV					116.6	
N-2: Beacon - Bell #1 115 kV and Beacon - Francis & Cedar 115 kV	106.2	114.2	119.3	135.4	102.7	
N-2: Beacon - Bell #4 230 kV and Beacon - Bell #1 115 kV	116.0	124.2	130.0	147.4	111.8	
N-2: Beacon - Bell #5 230 kV and Beacon - Francis & Cedar 115 kV	115.7	123.7	129.6	147.0	112.0	
N-2: Beacon - Boulder 230 kV & Beacon - Rathdrum 230 kV	110.4	118.5	123.6	140.2	105.4	
N-2: Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #1 115 kV	107.7	115.8	120.9	137.3	103.3	
N-2: Beacon - Francis & Cedar 115 kV and Beacon - Northeast 115 kV	106.0	114.0	119.1	135.1		
N-2: Beacon - Francis & Cedar 115 kV and Bell - Northeast 115 kV	106.3	114.2	119.3	135.4	102.7	
N-2: Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV and Lancaster - Noxon 230 kV					103.1	
N-2: Bell - Boundary #1 230 kV and Bell - Boundary #3 230 kV	109.4	117.4	122.9	139.1	108.3	
N-2: Bell - Coulee #6 500 kV and Bell - Creston 115 kV	105.7	114.1	118.8	135.0		
N-2: Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV					103.0	
N-2: Cabinet - Noxon 230 kV and Lancaster - Noxon 230 kV				134.3	103.5	
N-2: Conkelley - Libby 230 kV & Libby - Noxon 230 kV	106.8	114.4	119.6	135.3	104.3	
N-2: Devils Gap - Little Falls #1 115 kV and Devils Gap - Little Falls #2 115 kV					104.4	
PSF: Beacon North 115 kV	131.5	140.2	147.2	167.4	128.9	
PSF: Beacon South 115 kV	113.1	121.3	127.6	145.2	112.6	
PSF: Boulder West 115 kV			118.6	134.7	103.0	
PSF: Devils Gap East 115 kV					117.2	
PSF: Ninth & Central North 115 kV	106.4	114.2	119.5	135.5	103.2	
PSF: Ninth & Central South 115 kV	106.7	114.6	119.9	136.3	103.6	
PSF: Northeast 115 kV	107.1	115.3	120.4	137.0	104.7	
N-1: Boulder #2 230/115 kV				134.2		
BF: A655 Ninemile 115 kV, Ninemile-Westside					106.1	
BUS: Devils Gap West 115 kV					103.7	
N-1: Devils Gap - Nine Mile 115 kV					105.5	
N-1: Nine Mile - Westside 115 kV					104.7	
N-1: Nine Mile - Westside 115 kV Open @ NMS					107.7	
N-1: Nine Mile - Westside 115 kV Open @ WES					105.8	
N-2: Devils Gap - Ninemile 115 kV and Ninemile - Westside 115 kV					106.1	
PSF: Nine Mile 115 kV					106.1	
N-2: Boulder - Otis Orchards #1 115 kV & Boulder - Otis Orchards #2 115 kV				134.5		
WEST 230.00 to 115.00 kV #2 Transformer						
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer				106.7		
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai				106.7		
BF: 4710 Hatwai-Lower Granite, Hatwai 500/230 kV Transformer				106.7		
BF: A1222 Boundary West 230 kV, Bell-Boundary #3				108.5		
BF: A1588 Libby 230 kV, Conkelley-Libby				103.8		
BF: A248 Northeast 115 kV, Bell-Northeast				105.0		
BF: A388 Bell S2 & S3 230 kV	112.2	119.4	127.7	141.0	113.3	
BF: A572 Bell S3 230 kV, Bell-Boundary #3			105.2	116.4		
BF: A600 Beacon North & South 115 kV	148.2	157.1	170.2	190.1	150.7	121.3
BF: A604 Beacon North 115 kV, Beacon-Boulder #1	101.2	107.8	115.7	128.4		
BF: A612 Beacon South 115 kV, Beacon-Boulder #2			100.2	111.4		
BF: A624 Rathdrum East & West 115 kV				107.4		
BF: A642 Otis Orchards 115 kV, Otis Orchards-Post Falls				103.9		
BF: A645 Otis Orchards 115 kV, Boulder-Otis Orchards				103.5		
BF: A688 Ninth & Central North & South 115 kV			101.2	112.2		
BF: A689 Ninth & Central South 115 kV, Ninth & Central-Otis Orchards				103.7		
BF: A712 Boulder West 115 kV, Beacon-Boulder #1				104.4		
BF: A713 Boulder West 115 kV, Boulder-Otis Orchards #1				104.7		
BF: A717 Boulder East & West 115 kV				108.4		
BF: B1135 Addy 115 kV, Addy-Bell				108.2		
BF: B1137 Addy 115 kV, Addy-Devils Gap				107.8		
BF: B1145 Addy 115 kV, Addy-Kettle Falls			100.4	110.7		
BF: B346 Bell 115 kV, Addy-Bell				108.5		

	14HSLH	18HSLH	23HSLH	32HSLH	32HS	32HW
BF: B354 Bell 115 kV, Bell-Coulee				110.9		
BF: B356 Bell 115 kV, Bell-Northeast			101.1	112.8		
BF: R318 Noxon East & West 230 kV				104.6		
BF: R322 Cabinet 230 kV, Cabinet-Rathdrum				104.4		
BF: R404 Cabinet-Rathdrum, Rathdrum #2 230/115 Transformer				104.4		
BF: R427 Beacon North & South 230 kV	141.8	148.7	160.7	177.4	137.8	114.8
BF: R452 Beacon-Boulder, Boulder #2 230/115 Transformer				105.3		
BF: R504 Cabinet-Rathdrum, Rathdrum #1 230/115 Transformer				104.3		
BF: R552 Beacon-Boulder, Boulder #1 230/115 Transformer				105.2		
BUS: Addy 115 kV			100.4	110.8		
BUS: Beacon North 115 kV	102.0	108.6	116.5	129.3		
BUS: Beacon North 230 kV		103.0	110.7	122.5		
BUS: Beacon South 115 kV			103.8	115.0		
BUS: Beacon South 230 kV		105.9	113.6	125.3		
BUS: Bell 115 kV				110.9		
BUS: Bell S2 230 kV			105.7	116.9		
BUS: Bell S3 230 kV			105.2	116.4		
BUS: Bell S4 230 kV				109.1		
BUS: Boulder West 115 kV				105.8		
BUS: Cabinet 230 kV				104.3		
BUS: Hatwai 230 kV				106.3		
BUS: Libby 230 kV				104.0		
BUS: Ninth & Central North 115 kV				103.9		
BUS: Noxon East 230 kV				105.0		
BUS: Otis Orchards 115 kV				104.1		
BUS: Ross Park 115 kV				106.5		
BUS: Third & Hatch 115 kV				104.1		
N-0: All Lines in Service				101.4		
N-1: 3TM Bell - Boundary #3 230 kV				105.7		
N-1: 3TM Bell - Boundary #3 230 kV Open @ BOUN				103.5		
N-1: Addy - Devils Gap 115 kV				106.2		
N-1: Addy - Devils Gap 115 kV Open @ ADD				109.2		
N-1: Addy - Devils Gap 115 kV Open @ DGP				106.3		
N-1: Addy #3 230/115 kV				106.2		
N-1: Beacon - Bell #4 230 kV			100.4	111.2		
N-1: Beacon - Bell #5 230 kV			100.9	111.7		
N-1: Beacon - Boulder 230 kV				104.6		
N-1: Beacon - Ninth & Central #1 115 kV				103.6		
N-1: Beacon - Ninth & Central #2 115 kV				103.5		
N-1: Beacon - Ross Park 115 kV			102.4	113.4		
N-1: Beacon #1 230/115 kV			103.1	114.2		
N-1: Beacon #2 230/115 kV			103.0	113.7		
N-1: Bell - Northeast 115 kV				106.9		
N-1: Bell - Northeast 115 kV Open @ BEL				104.9		
N-1: Bell - Northeast 115 kV Open @ NE				103.4		
N-1: Bell #6 230/115 kV			106.1	117.3		
N-1: Cabinet - Rathdrum 230 kV				104.0		
N-1: Cabinet - Rathdrum 230 kV Open @ CAB				104.0		
N-1: Cabinet - Rathdrum 230 kV Open @ RAT				104.0		
N-1: Hatwai 500/230 kV				107.7		
N-1: Ninth & Central - Otis Orchards 115 kV Open @ OTI				104.4		
N-1: Ninth & Central - Sunset 115 kV Open @ 9CE				108.6		
N-1: Post Street - Third & Hatch 115 kV				107.3		
N-1: Ross Park - Third & Hatch 115 kV				104.7		
N-1: Westside #1 230/115 kV	119.9	128.8	136.9	153.0	115.4	
N-2: Beacon - Bell #1 115 kV and Beacon - Francis & Cedar 115 kV				103.8		
N-2: Beacon - Bell #4 230 kV and Beacon - Bell #1 115 kV			102.1	113.1		
N-2: Beacon - Bell #5 230 kV and Beacon - Francis & Cedar 115 kV			101.8	112.7		
N-2: Beacon - Boulder 230 kV & Beacon - Rathdrum 230 kV				107.5		
N-2: Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #1 115 kV				105.3		
N-2: Beacon - Francis & Cedar 115 kV and Beacon - Northeast 115 kV				103.7		
N-2: Beacon - Francis & Cedar 115 kV and Bell - Northeast 115 kV				103.8		

	14HSLH	18HSLH	23HSLH	32HSLH	32HS	32HW
N-2: Bell - Boundary #1 230 kV and Bell - Boundary #3 230 kV				106.8		
N-2: Bell - Coulee #6 500 kV and Bell - Creston 115 kV				103.6		
N-2: Conkelley - Libby 230 kV & Libby - Noxon 230 kV				103.8		
PSF: Beacon North 115 kV	101.2	107.8	115.7	128.4		
PSF: Beacon South 115 kV			100.2	111.4		
PSF: Ninth & Central North 115 kV				103.9		
PSF: Ninth & Central South 115 kV				104.5		
PSF: Northeast 115 kV				105.0		

MITIGATION

Replacing the existing Westside #1 & #2 230/115 kV Transformers with 250 MVA nominally rated transformers will keep the transformers from exceeding their applicable facility ratings. The Lancaster Interconnection Project scheduled for completion in 2013 will provide significant performance improvements and defer the need to replace the Westside #1 & #2 230/115 kV Transformers except for the tie breaker failures at Beacon Station and the tie breaker failure at Bell Station between bus sections S2 and S3. Possible operational mitigation action can be taken through non-consequential load dropping, though applicable facility ratings will be exceeded. Avista Transmission Operations Group has established an operating procedure stating *"IF AN OPERATING LIMIT OR RATED LIMIT ALARM IS PRESENT ON A TRANSFORMER, NO ACTION IS NECESSARY UNLESS A MAJOR ALARM OCCURS ON THAT TRANSFORMER".*

B Beacon Station Breaker Failure and Bus Outages

PROBLEM

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 I-2). The analysis indicated an inability of System to meet the performance requirements in 2014.

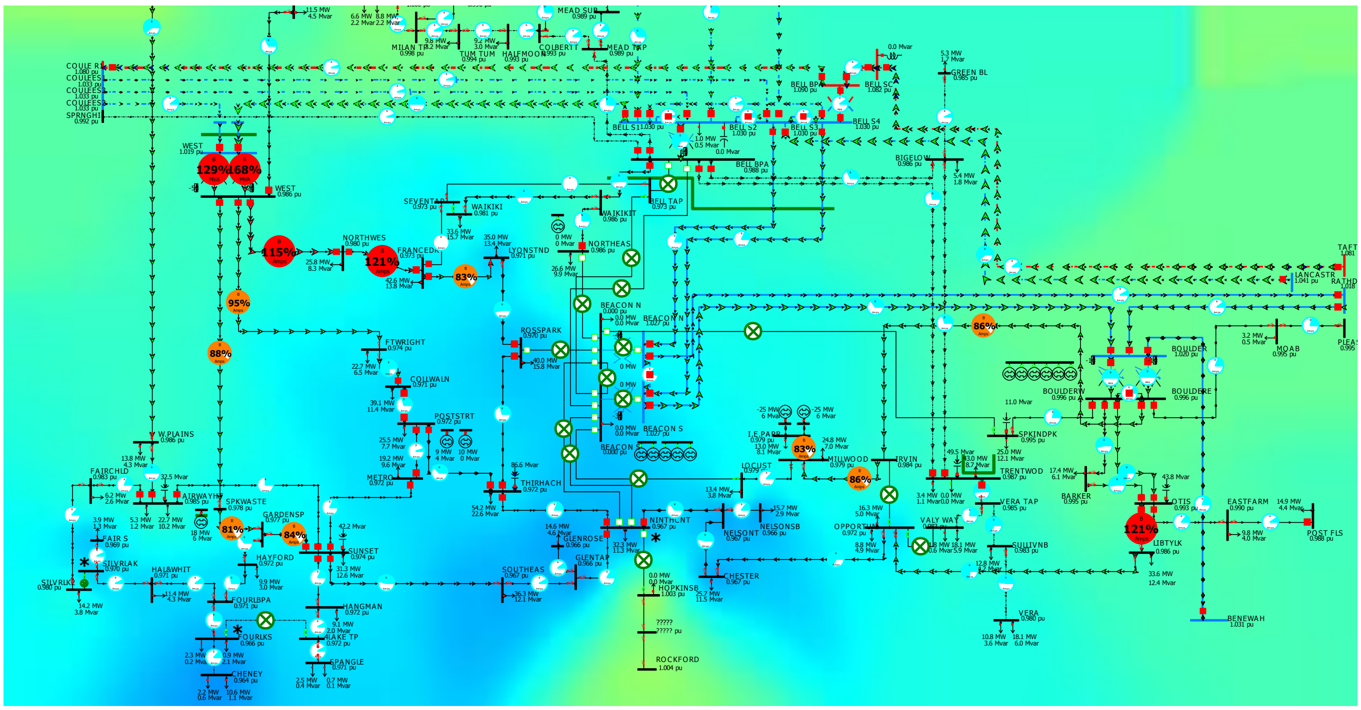


FIGURE I-2: BEACON 115 KV BUS TIE BREAKER FAILURE IN 2023 HEAVY SUMMER

	14HS	14HSL H	14HW	18HS	18HSL H	18HW	23HS	23HSL H	23HW	32HS	32HSL H	32HW
BF: A600 Beacon North & South 115 kV												
COLLWALN - FTWRIGHT 115.00 kV #1 Line											100.6	
FRANCEDR - LYONSTND 115.00 kV #1 Line											103.4	
FRANCEDR - NORTHWES 115.00 kV #1 Line	107.0	115.6		112.1	121.2		120.6	129.7		132.5	143.1	
FTWRIGHT - WEST 115.00 kV #1 Line					100.2			107.8		106.6	120.4	
GARDENSP - SPKWASTE 115.00 kV #1 Line											105.1	
GARDENSP - SUNSET 115.00 kV #1 Line					100.2			105.0			112.6	
NORTHWES - WEST 115.00 kV #1 Line	101.7	108.5		106.8	114.0		114.8	122.2		126.0	134.9	100.5
OTIS - LIBTYLK 115.00 kV #1 Line	103.2	110.6		113.3	119.3		121.3	134.0		138.4	153.8	
SPKWASTE - WEST 115.00 kV #1 Line								103.7		102.4	119.1	
WEST 230.00 to 115.00 kV #1 Transformer	139.8	192.3	112.5	150.2	204.1	118.0	167.8	216.8	127.8	196.4	247.5	145.7
WEST 230.00 to 115.00 kV #2 Transformer	108.0	148.2		116.1	157.1		129.3	170.2	106.3	150.7	190.1	121.3
BF: A604 Beacon North 115 kV, Beacon-Boulder #1												
BEACON S - NINTHCNT 115.00 kV #2 Line		106.3			112.8		104.1	123.4		120.4	140.1	109.0
BEACON S 230.00 to 115.00 kV #1 Transformer											103.1	
WEST 230.00 to 115.00 kV #1 Transformer		131.5			140.2		109.9	147.2		128.9	167.4	

	14HS	14HSLH	14HW	18HS	18HSLH	18HW	23HS	23HSLH	23HW	32HS	32HSLH	32HW
WEST 230.00 to 115.00 kV #2 Transformer		101.2			107.8			115.7			128.4	
BF: A612 Beacon South 115 kV, Beacon-Boulder #2												
BEACON N 230.00 to 115.00 kV #1 Transformer											106.5	
BELL BPA - WAIKIKIT 115.00 kV #1 Line											101.1	
WEST 230.00 to 115.00 kV #1 Transformer		113.1			121.3			127.6		112.6	145.2	
WEST 230.00 to 115.00 kV #2 Transformer								100.2			111.4	
BF: R427 Beacon North & South 230 kV												
BEACON N - NORTHEAS 115.00 kV #1 Line		116.3			122.6			128.6		105.9	143.6	
BEACON S - BELL BPA 115.00 kV #1 Line	106.0	148.3		114.7	156.6		121.5	164.7		138.6	184.3	112.4
BELL BPA - WAIKIKIT 115.00 kV #1 Line	122.6	156.1		132.9	165.9		142.1	176.6	104.7	162.3	199.7	117.9
BELL S2 230.00 to 115.00 kV #1 Transformer	117.4	139.6	124.5	123.2	145.2	125.6	132.6	154.4	135.0	145.5	169.6	151.5
FRANCEDR - NORTHWES 115.00 kV #1 Line	100.3	111.5		102.9	114.7		110.8	121.9		122.8	132.3	
FTWRIGHT - WEST 115.00 kV #1 Line											108.8	
GARDENSP - SUNSET 115.00 kV #1 Line											100.1	
NORTHEAS - WAIKIKIT 115.00 kV #1 Line		132.4		106.3	139.9		112.8	147.7		128.2	165.4	102.2
NORTHWES - WEST 115.00 kV #1 Line		105.5			109.0		107.0	116.0		118.5	126.3	
SPKWASTE - WEST 115.00 kV #1 Line											110.3	
WEST 230.00 to 115.00 kV #1 Transformer	128.8	184.3	111.9	136.7	193.4	112.3	152.3	204.4	123.4	180.0	231.1	138.0
WEST 230.00 to 115.00 kV #2 Transformer		141.8		105.6	148.7		117.3	160.7	102.7	137.8	177.4	114.8
BUS: Beacon North 115 kV												
BEACON S - NINTHCNT 115.00 kV #2 Line		106.9			113.4		104.7	124.0		121.0	140.7	109.4
BEACON S 230.00 to 115.00 kV #1 Transformer											103.8	
WEST 230.00 to 115.00 kV #1 Transformer		132.6			141.3		110.9	148.3		130.0	168.5	
WEST 230.00 to 115.00 kV #2 Transformer		102.0			108.6			116.5			129.3	
BUS: Beacon North 230 kV												
BEACON S 230.00 to 115.00 kV #1 Transformer											103.2	
BELL BPA - WAIKIKIT 115.00 kV #1 Line											111.7	
BELL S2 230.00 to 115.00 kV #1 Transformer								101.8			109.5	100.4
WEST 230.00 to 115.00 kV #1 Transformer		125.9			134.0		103.5	140.7		122.2	159.8	
WEST 230.00 to 115.00 kV #2 Transformer					103.0			110.7			122.5	
BUS: Beacon South 115 kV												
BEACON N 230.00 to 115.00 kV #1 Transformer											109.8	
BELL BPA - WAIKIKIT 115.00 kV #1 Line											108.3	
WEST 230.00 to 115.00 kV #1 Transformer		117.6			125.8			132.1		117.1	149.9	
WEST 230.00 to 115.00 kV #2 Transformer								103.8			115.0	
BUS: Beacon South 230 kV												
BEACON N 230.00 to 115.00 kV #1 Transformer		100.3			100.9			112.2		104.7	122.7	
BELL BPA - WAIKIKIT 115.00 kV #1 Line								100.9			114.9	
BELL S2 230.00 to 115.00 kV #1 Transformer								104.8		100.6	112.8	103.0
WEST 230.00 to 115.00 kV #1 Transformer		129.5			137.8		106.1	144.5		127.1	163.3	
WEST 230.00 to 115.00 kV #2 Transformer					105.9			113.6			125.3	
PSF: Beacon North 115 kV												
BEACON S - NINTHCNT 115.00 kV #2 Line		106.3			112.8		104.1	123.4		120.4	140.1	109.0
BEACON S 230.00 to 115.00 kV #1 Transformer											103.1	
WEST 230.00 to 115.00 kV #1 Transformer		131.5			140.2		109.9	147.2		128.9	167.4	
WEST 230.00 to 115.00 kV #2 Transformer		101.2			107.8			115.7			128.4	
PSF: Beacon South 115 kV												
BEACON N 230.00 to 115.00 kV #1 Transformer											106.5	
BELL BPA - WAIKIKIT 115.00 kV #1 Line											101.1	
WEST 230.00 to 115.00 kV #1 Transformer		113.1			121.3			127.6		112.6	145.2	
WEST 230.00 to 115.00 kV #2 Transformer								100.2			111.4	

Mitigation

The execution of multiple projects in the Spokane area will contribute to mitigating the transmission performance issues caused by breaker failures and bus outage at Beacon Station. The projects include:

1. Lancaster Interconnection scheduled to be completed 2013,
2. Construction of the Garden Springs Station with a new 250 MVA, 230/115 kV transformer and integration of the 115 kV transmission lines with an initial 230 kV transmission line radial tie to Westside Station,
3. Spokane Valley Transmission Reinforcement including the construction of Irvin Station, reconductoring of Beacon – Irvin section of Beacon – Boulder #2 and Irvin – Opportunity 115 kV transmission lines, and installation of circuit breakers at Opportunity Station,
4. Westside Transformer Replacement Project.

The 2010 Spokane Area Planning Assessment identified the modification of the existing bus configurations at Beacon Station to either double bus, double breaker or breaker and a half. The projects listed above are sufficient to mitigate the Beacon Station bus and tie breaker failure outages in the 10 year planning horizon. Beyond the 10 year planning horizon the addition of a 230/115 kV transformer at Ninth & Central Station may be necessary to increase the transformation capacity in the Spokane area and mitigate the Beacon Station outages.

C Ninth & Central

PROBLEM

A tie breaker failure at Ninth & Central Station causes the applicable facility ratings to be exceeded on the Ross Park – Third & Hatch 115 kV Transmission Line (see Figure I-3). The analysis indicated an inability of System to meet the performance requirements in 2014

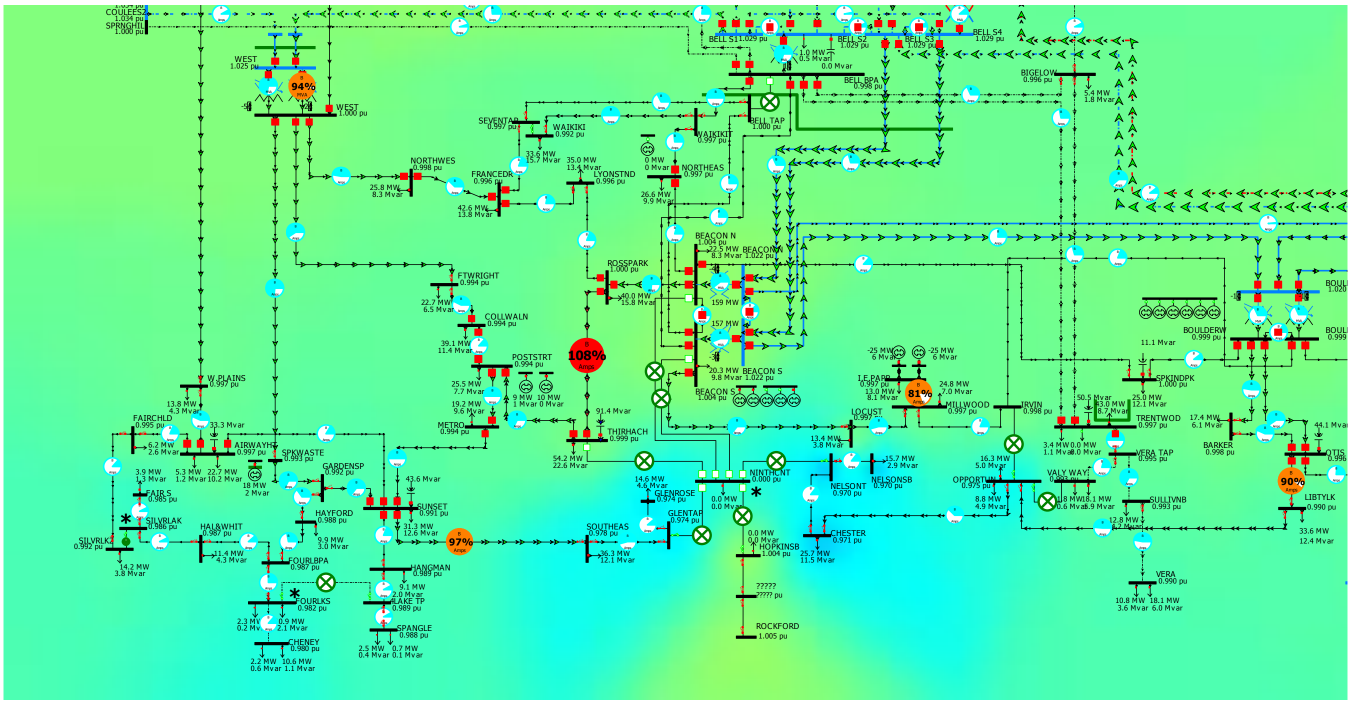


FIGURE I-3: NINTH & CENTRAL BUS TIE FAILURE IN 2023 HEAVY SUMMER

	14HSLH	18HSLH	23HS	23HSLH	32HS	32HSLH
BF: A688 Ninth & Central North & South 115 kV						
OTIS - LIBTYLK 115.00 kV #1 Line					105.2	105.2
POSTSTRT - THIRHACH 115.00 kV #1 Line						106.0
ROSSPARK - THIRHACH 115.00 kV #1 Line	118.0	124.2	107.7	133.7	123.1	150.3
SOUTHEAS - SUNSET 115.00 kV #1 Line					107.8	108.2
WEST 230.00 to 115.00 kV #1 Transformer	114.6	122.9		128.8	112.2	146.3
WEST 230.00 to 115.00 kV #2 Transformer				101.2		112.2
BF: A689 Ninth & Central South 115 kV, Ninth & Central-Otis Orchards						
POSTSTRT - THIRHACH 115.00 kV #1 Line				109.7		124.3
ROSSPARK - THIRHACH 115.00 kV #1 Line						102.6
SOUTHEAS - SUNSET 115.00 kV #1 Line					107.2	107.3
WEST 230.00 to 115.00 kV #1 Transformer	106.4	114.2		119.3	102.7	135.3
WEST 230.00 to 115.00 kV #2 Transformer						103.7
BF: A692 Ninth & Central South 115 kV, Ninth & Central-Sunset						
OTIS - LIBTYLK 115.00 kV #1 Line					104.8	104.6
PSF: Ninth & Central North 115 kV						
ROSSPARK - THIRHACH 115.00 kV #1 Line						105.5
WEST 230.00 to 115.00 kV #1 Transformer	106.4	114.2		119.5	103.2	135.5
WEST 230.00 to 115.00 kV #2 Transformer						103.9
PSF: Ninth & Central South 115 kV						
BEACON S - NINTHCNT 115.00 kV #2 Line				105.9	112.0	120.4

	14HSLH	18HSLH	23HS	23HSLH	32HS	32HSLH
NELSONT - NINTHCNT 115.00 kV #1 Line					106.0	105.9
ROSSPARK - THIRHACH 115.00 kV #1 Line						106.4
WEST 230.00 to 115.00 kV #1 Transformer	106.7	114.6		119.9	103.6	136.3
WEST 230.00 to 115.00 kV #2 Transformer						104.5

MITIGATION

The distribution load at Ninth & Central Station is presently served as a tap from the Ninth & Central – Sunset 115 kV Transmission Line. During bus outages at Ninth & Central Station, the distribution load will remain in service. Reconstructing the distribution facilities within Ninth & Central Station to tie a distribution transformer to each 115 kV bus will mitigate the thermal overload issues in the 10 year planning horizon. Beyond the 10 year planning horizon, the proposed Garden Springs Station Integration Project will be required to mitigate thermal overloads for Ninth & Central Station bus tie failure. The Garden Springs Station Integration Project includes constructing a new 230 kV substation at the existing Garden Springs site with a 230 kV transmission line to Westside Station or a station constructed to replace the existing Westside Station.

D Spokane Valley

PROBLEM

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. Details of the issues and description of potential mitigation approaches are provided in the System Planning Study The Irvin Project – Final dated May 6, 2009. The preferred projects and summary of work required is provided in the System Planning interoffice memorandum SP-2009-03 – Summary – Irvin (Spokane Valley Transmission Reinforcement) Project.

MITIGATION

The 2013 Planning Assessment studies show improved transmission system performance compared to previous years studies. Performance requirement violations are not observed until the 2030 timeframe. Figure I-4 shows the simulation results for an open terminal on the Ninth & Central – Otis Orchards 115 kV Transmission Line in the 2023 Heavy Summer case. The Spokane Valley Transmission Reinforcement Project provides several benefits to the transmission system not typically represented by the historical screening process in steady state contingency analysis. Construction of the Irvin Station and new 115 kV transmission line to serve the Inland Empire Paper facility improves reliability to the customers served by the Beacon – Boulder #2 115 kV Transmission Line and allows the ability to take portions of the transmission line out of service for maintenance while preserving the Inland Empire Paper's ability to operate its 30,000 horse power synchronous motors. The addition of circuit breakers at Opportunity Station improves reliability to the customers served off the Ninth & Central – Otis Orchards 115 kV Transmission Line. It is not recommended the schedule for Spokane Valley Transmission Reinforcement Project be delayed due to the reliability benefits it provides even though improved transmission system performance based on planning criteria has been observed.

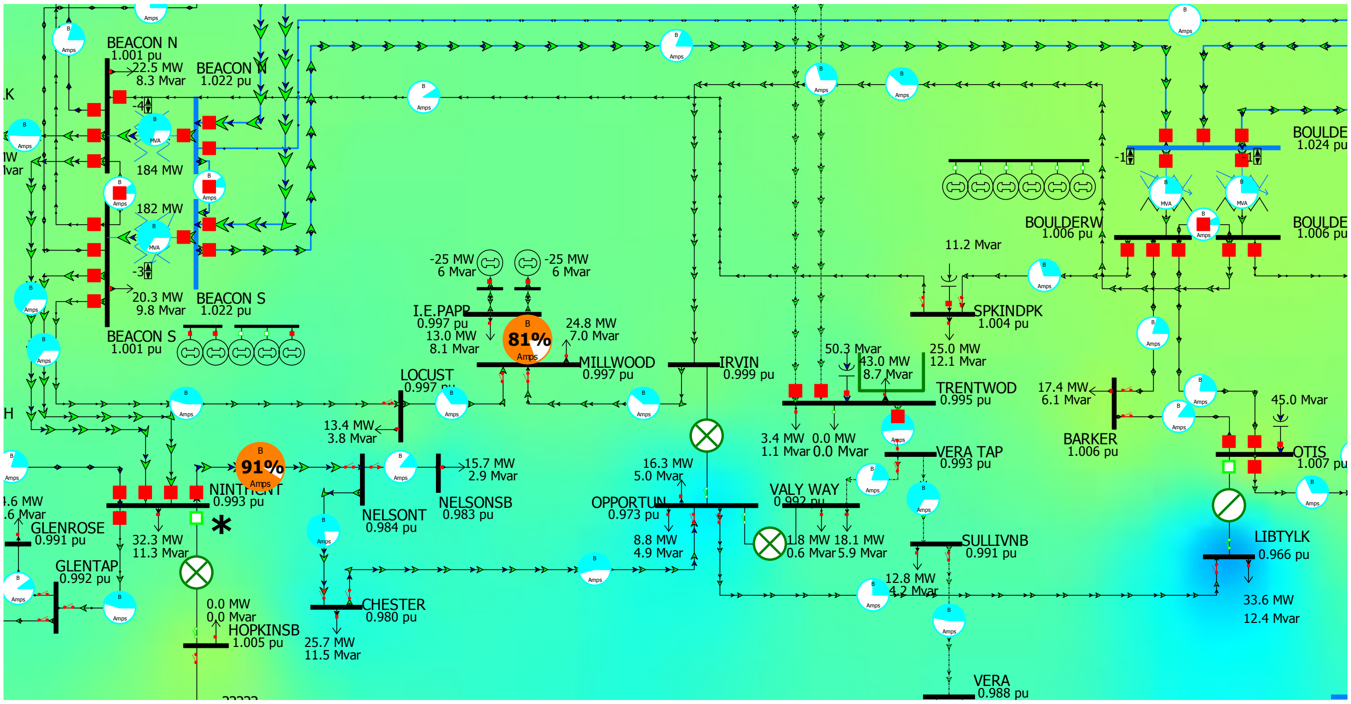


FIGURE I-4: OPEN TERMINAL ON THE NINTH & CENTRAL - OTIS ORCHARDS LINE IN 2023 HEAVY SUMMER

E 230 kV Voltage

PROBLEM

Several regional outages cause low voltage on the 230 kV buses at Beacon, Boulder, and Westside Stations. Bus outages and tie breaker failures at Bell Station are the primary contributors to the low voltage issues (see Figure I-5). The analysis indicated an inability of System to meet the performance requirements in 2014

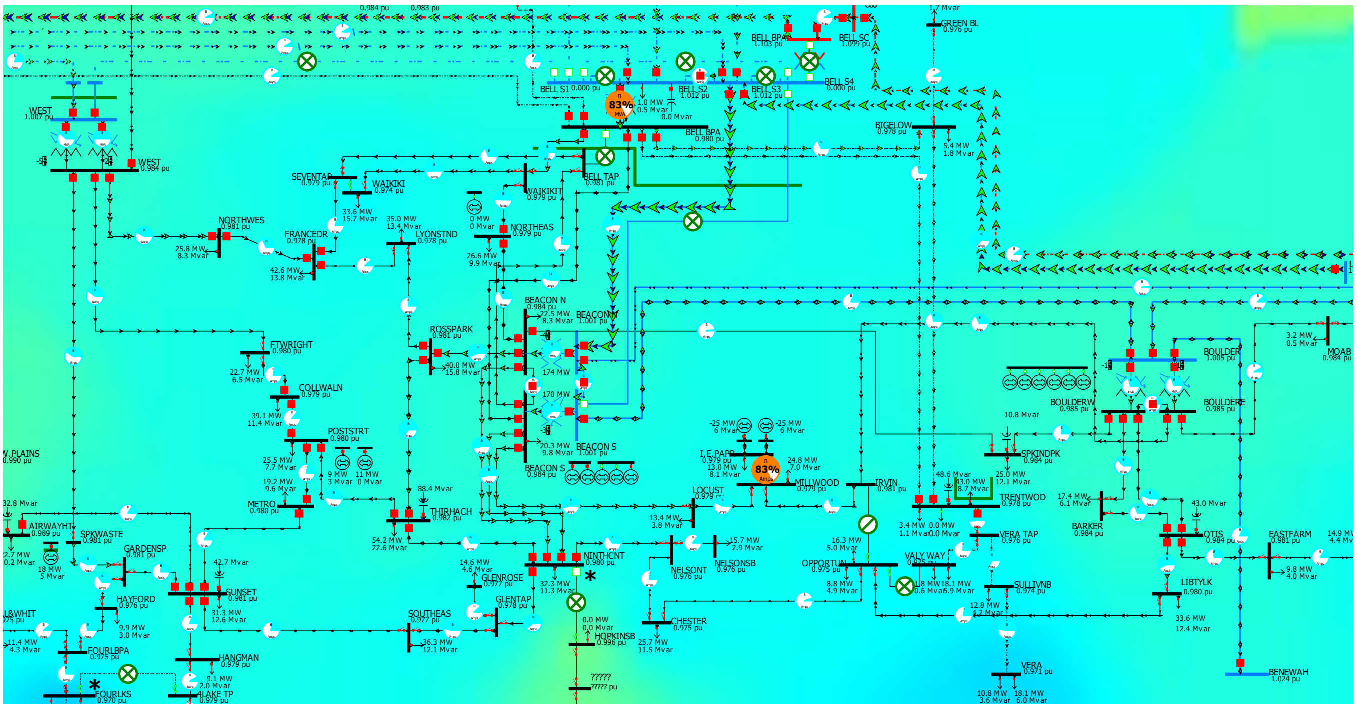


FIGURE I-5: BELL S1 & S4 OUTAGE IN 2023 HEAVY SUMMER

	18HS	18HSLH	18HT	18HW	23HS	23HSLH	23HW
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer							
BEACON N (48025) 230.00 kV						1.0100	
BEACON S (48031) 230.00 kV						1.0099	
BOULDER (48524) 230.00 kV					1.0052	1.0036	
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai							
BEACON N (48025) 230.00 kV						1.0099	
BEACON S (48031) 230.00 kV						1.0099	
BOULDER (48524) 230.00 kV						1.0035	
BF: 4710 Hatwai-Lower Granite, Hatwai 500/230 kV Transformer							
BOULDER (48524) 230.00 kV					1.0065	1.0050	
BF: A370 Bell S1 & S2 230 kV							
BEACON N (48025) 230.00 kV			1.0065	1.0079			1.0075
BEACON S (48031) 230.00 kV			1.0066	1.0079			1.0075
WEST (48463) 230.00 kV		1.0051	1.0057			1.0040	
BF: A374 Bell S1 230 kV, Bell-Boundary #1							
WEST (48463) 230.00 kV		1.0082	1.0088			1.0069	
BF: A375 Bell S1 & S4 230 kV							
BEACON N (48025) 230.00 kV	1.0052	1.0020			1.0014	0.9903	
BEACON S (48031) 230.00 kV	1.0051	1.0020			1.0014	0.9901	
BOULDER (48524) 230.00 kV	1.0068	1.0040			1.0050	0.9936	
WEST (48463) 230.00 kV		0.9908	1.0060		1.0068	0.9845	

	18HS	18HSLH	18HT	18HW	23HS	23HSLH	23HW
BF: A388 Bell S2 & S3 230 kV							
BEACON N (48025) 230.00 kV		1.0084	1.0054	0.9918		0.9976	0.9918
BEACON S (48031) 230.00 kV		1.0084	1.0053	0.9919		0.9977	0.9919
BOULDER (48524) 230.00 kV				0.9977		1.0009	0.9974
WEST (48463) 230.00 kV			1.0018	1.0086		1.0064	1.0092
BF: A572 Bell S3 230 kV, Bell-Boundary #3							
BEACON N (48025) 230.00 kV				1.0079		1.0045	
BEACON S (48031) 230.00 kV				1.0080		1.0046	
BOULDER (48524) 230.00 kV						1.0065	
BF: A600 Beacon North & South 115 kV							
WEST (48463) 230.00 kV						1.0086	
BF: R427 Beacon North & South 230 kV							
BEACON N (48023) 115.00 kV						0.9588	0.9638
BEACON S (48029) 115.00 kV						0.9588	0.9638
BOULDER (48524) 230.00 kV	0.9978	0.9965		0.9964	0.9995	0.9852	0.9948
WEST (48463) 230.00 kV						1.0094	
BUS: Beacon South 230 kV							
BOULDER (48524) 230.00 kV						1.0090	
BUS: Bell S1 230 kV							
WEST (48463) 230.00 kV		1.0082	1.0088			1.0069	
BUS: Bell S2 230 kV							
BEACON N (48025) 230.00 kV			0.9991	1.0079			1.0094
BEACON S (48031) 230.00 kV			0.9992	1.0079			1.0094
BOULDER (48524) 230.00 kV			1.0078				
WEST (48463) 230.00 kV			0.9953				
BUS: Bell S3 230 kV							
BEACON N (48025) 230.00 kV						1.0045	
BEACON S (48031) 230.00 kV						1.0046	
BOULDER (48524) 230.00 kV						1.0065	
BUS: Bell S4 230 kV							
BEACON N (48025) 230.00 kV	1.0094	1.0066			1.0055	0.9955	
BEACON S (48031) 230.00 kV	1.0093	1.0065			1.0055	0.9954	
BOULDER (48524) 230.00 kV	1.0100	1.0082			1.0084	0.9984	
WEST (48463) 230.00 kV						1.0038	
BUS: Hatwai 230 kV							
BOULDER (48524) 230.00 kV						1.0073	
N-1: Bell - Westside 230 kV							
WEST (48463) 230.00 kV		1.0094	1.0082			1.0080	
N-1: Bell #1 500/230 kV							
BEACON N (48025) 230.00 kV					1.0095	1.0012	
BEACON S (48031) 230.00 kV					1.0095	1.0012	
BOULDER (48524) 230.00 kV						1.0031	
WEST (48463) 230.00 kV						1.0048	
N-1: Bell 230kV Switched Shunt							
BEACON N (48025) 230.00 kV			1.0030				
BEACON S (48031) 230.00 kV			1.0030				
BOULDER (48524) 230.00 kV			1.0100				
WEST (48463) 230.00 kV			1.0003				
N-1: Hatwai 500/230 kV							
BOULDER (48524) 230.00 kV					1.0093	1.0054	
N-2: Bell - Coulee #3 230 kV & Bell - Westside 230 kV							
WEST (48463) 230.00 kV		1.0081	1.0045			1.0065	
N-2: Bell - Coulee #3 230 kV and Bell - Coulee #5 230 kV and Bell - Westside 230 kV							
WEST (48463) 230.00 kV		1.0068	0.9996			1.0049	
N-2: Bell - Coulee #6 500 kV and Bell - Coulee #3 230 kV and Bell - Westside 230 kV							
WEST (48463) 230.00 kV		1.0073	0.9817			1.0021	
N-2: Bell - Taft 500 kV and Bell - Lancaster 230 kV							
BEACON N (48025) 230.00 kV						1.0091	
BEACON S (48031) 230.00 kV						1.0091	
BOULDER (48524) 230.00 kV						1.0096	
N-2: Bell - Westside 230 kV & Coulee - Westside 230 kV							
WEST (48463) 230.00 kV		0.9920	1.0032		1.0049	0.9911	

	18HS	18HSLH	18HT	18HW	23HS	23HSLH	23HW
N-2: Bell - Westside 230 kV and Coulee - Westside 230 kV and Ninemile - Westside 115 kV							
WEST (48463) 230.00 kV		0.9932	0.9987		0.9972	0.9927	

MITIGATION

Execution of previously identified projects including the Lancaster Interconnection, Spokane Valley Transmission Reinforcement, and Garden Springs Integration contribute to improving the voltage performance on the 230 kV system in the Spokane area. No specific project is necessary to mitigate the observed low 230 kV voltage issues. Future planning assessments will continue to monitor the voltage performance in the area, and a project will be pursued as appropriate.

Improved representation of the 230 kV shunt capacitor banks at Bell Station will be included in future planning assessments. The 2013 Planning Assessment modeled all of the capacitors as a single element on the S3 bus section. The new representation more closely models the actual system configuration and performance.

F High Transfer

PROBLEM

In 2014 and 2018 High Transfer cases, thermal overloads are observed on the underlying 115 kV transmission lines for the outage of the double circuit Beacon – Rathdrum and Boulder – Rathdrum 230 kV transmission lines (see Figure I-6). The transmission system performance issues related to the double circuit outage are also identified in the 2013 Coeur d'Alene Planning Assessment.

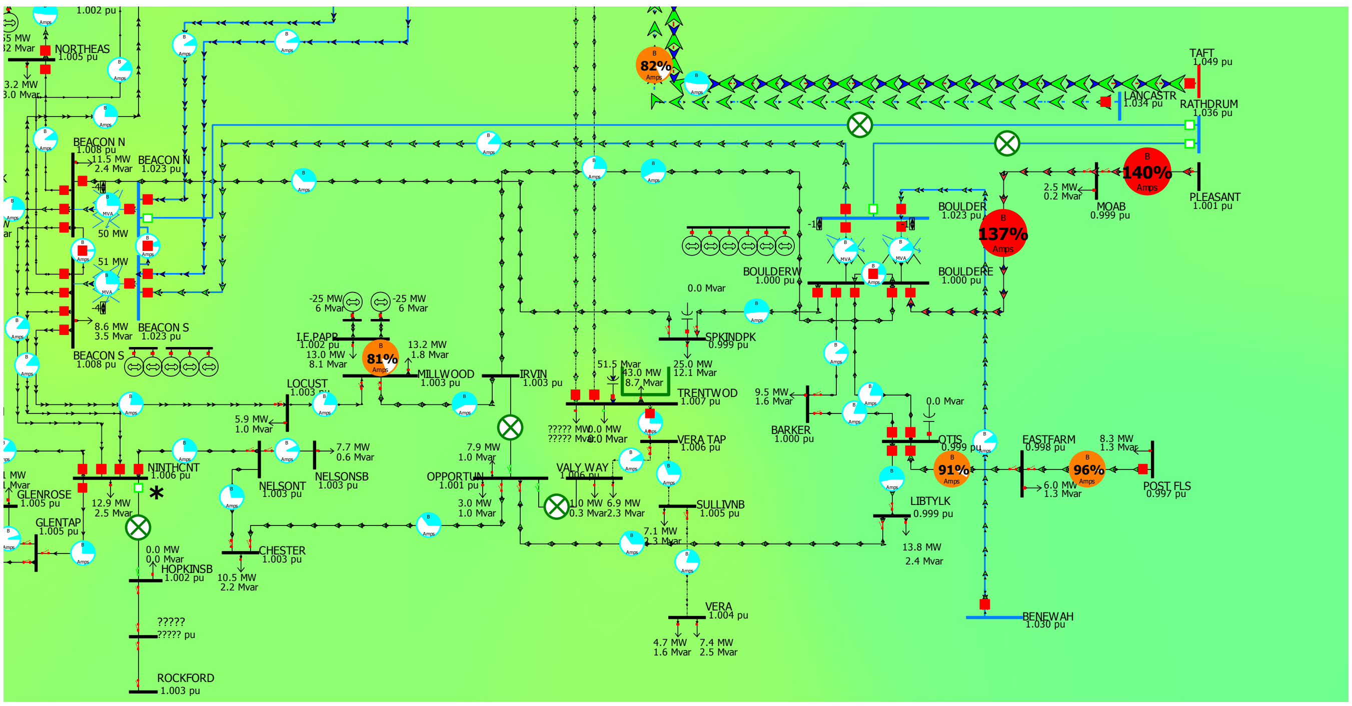


FIGURE I-6: BEACON - RATHDRUM & BOULDER - RATHDRUM DOUBLE CIRCUIT OUTAGE IN 2018 HIGH TRANSFER

Adjacent circuit outages in the Bell – Coulee corridor cause applicable facility ratings to be exceeded on the Westside #1 & #2 230/115 kV transformers and 115 kV transmission lines in the Spokane area (see Figure I-7).

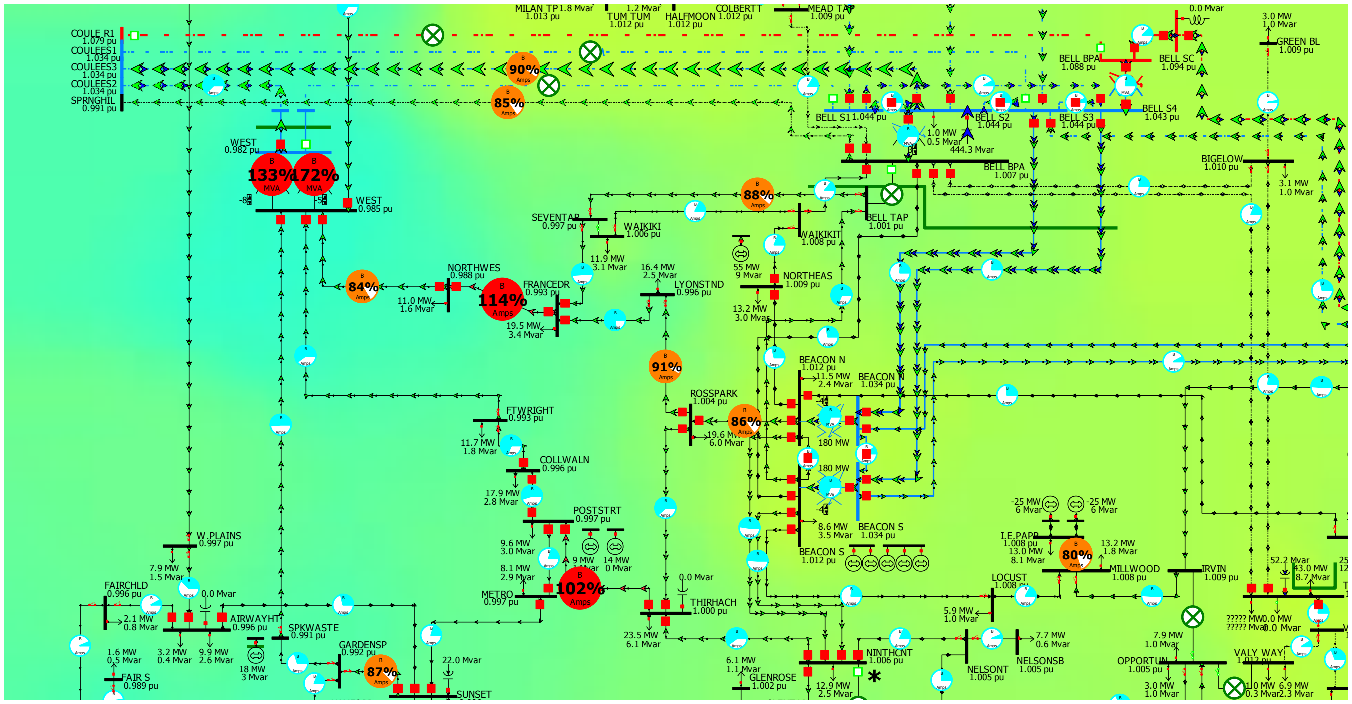


FIGURE I-7: ADJACENT CIRCUIT OUTAGE OF BELL - COULEE #6 500 KV AND DOUBLE CIRCUIT BELL - COULEE #3 AND BELL - WESTSIDE IN 2018 HIGH TRANSFER

	14HT	18HT
BF: A375 Bell S1 & S4 230 kV		
WEST 230.00 to 115.00 kV #1 Transformer	110.4	117.5
N-1: Bell - Coulee #6 500 kV		
WEST - WESTBPA2 230.00 kV #1 Line		102.6
N-2: Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #1 115 kV		
BOULDERE - IRVIN 115.00 kV #1 Line		112.0
IRVIN - MILLWOOD 115.00 kV #1 Line		111.9
N-2: Beacon - Boulder 230 kV and Beacon - Rathdrum 230 kV and Beacon - Boulder #2 115 kV		
BOULDERW - SPKINDPK 115.00 kV #1 Line		106.3
N-2: Beacon - Rathdrum 230 kV & Boulder - Rathdrum 230 kV		
BOULDERE - MOAB 115.00 kV #1 Line	138.7	137.1
MOAB - PLEASANT 115.00 kV #1 Line	141.2	139.7
N-2: Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV and Lancaster - Noxon 230 kV		
BOULDERE - MOAB 115.00 kV #1 Line	135.3	134.5
MOAB - PLEASANT 115.00 kV #1 Line	137.8	137.1
N-2: Bell - Coulee #3 230 kV & Bell - Westside 230 kV		
WEST 230.00 to 115.00 kV #1 Transformer	100.1	111.2
N-2: Bell - Coulee #3 230 kV and Bell - Coulee #5 230 kV and Bell - Westside 230 kV		
WEST 230.00 to 115.00 kV #1 Transformer	114.9	127.2
N-2: Bell - Coulee #6 500 kV and Bell - Coulee #3 230 kV and Bell - Westside 230 kV		
FRANCEDR - NORTHWES 115.00 kV #1 Line	100.3	113.7
POSTSTRT - THIRHACH 115.00 kV #1 Line		102.4
WEST 230.00 to 115.00 kV #1 Transformer	157.3	171.9
WEST 230.00 to 115.00 kV #2 Transformer	121.9	133.1
N-2: Bell - Coulee #6 500 kV and Bell - Coulee #3 230 kV and Coulee - Westside 230 kV		
BELCOU51 - COULEES3 230.00 kV #5 Line		103.8
BELL S2 - BELCOU51 230.00 kV #5 Line		103.8
N-2: Bell - Coulee #6 500 kV and Bell - Creston 115 kV		
WEST - WESTBPA2 230.00 kV #1 Line		106.4
N-2: Bell - Lancaster 230 kV and Beacon - Rathdrum 230 kV and Boulder - Rathdrum 230 kV		
BOULDERE - MOAB 115.00 kV #1 Line	138.7	137.8

	14HT	18HT
MOAB - PLEASANT 115.00 kV #1 Line	141.2	140.4

MITIGATION

Mitigating actions documented in the 2013 Coeur d'Alene Planning Assessment related to the Beacon – Rathdrum & Boulder – Rathdrum 230 kV Double Circuit transmission line outages will also mitigate observed issues in the Spokane area for the same outages.

The issues observed for the Bell – Coulee corridor outages are partially mitigated by the execution of the Westside #1 & #2 230/115 kV Transformer Replacement and Garden Springs Station Integration projects.

G Extreme Events

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

Spare Equipment Study

Thermal facility rating overloads from the spare equipment study are provided in Table I-1

TABLE I-1: SPARE EQUIPMENT CONTINGENCY ANALYSIS RESULTS

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
BF: 4028 Dworshak-Taft, Taft 500 kV Switched Shunt							
WEST 230.00 to 115.00 kV #1 Transformer							112.9
BF: 4111 Dworshak-Taft, Hot Springs-Taft							
WEST 230.00 to 115.00 kV #1 Transformer							113.2
BF: 4119 Bell-Taft, Garrison-Taft #1							
WEST 230.00 to 115.00 kV #1 Transformer							111.2
BF: 4122 Bell-Taft, Hot Springs-Taft							
WEST 230.00 to 115.00 kV #1 Transformer							110.8
BF: 4148 Garrison-Taft #2, Hot Springs-Taft							
WEST 230.00 to 115.00 kV #1 Transformer							110.5
BF: 4652 Dworshak-Taft, Dworshak-Hatwai, Dworshak 500 kV Switched Shunt							
WEST 230.00 to 115.00 kV #1 Transformer							113.0
BF: 4656 Dworshak-Taft, Dworshak Gen							
WEST 230.00 to 115.00 kV #1 Transformer							113.0
BF: 4666 Dworshak-Hatwai, Dworshak Gen							
WEST 230.00 to 115.00 kV #1 Transformer							113.0
BF: 4700 Dworshak-Hatwai, Hatwai 500/230 kV Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							116.2
BF: 4708 Hatwai-Lower Granite, Dworshak-Hatwai							
WEST 230.00 to 115.00 kV #1 Transformer							116.2
BF: 4710 Hatwai-Lower Granite, Hatwai 500/230 kV Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							116.2
BF: A1182 Bell-Lancaster, Lancaster Generator #1 & #2							
WEST 230.00 to 115.00 kV #1 Transformer							108.8
BF: A1184 Lancaster-Noxon, Bell-Lancaster							
WEST 230.00 to 115.00 kV #1 Transformer							108.8
BF: A1186 Lancaster-Noxon, Lancaster Generator #1 & #2							
WEST 230.00 to 115.00 kV #1 Transformer							108.8
BF: A1222 Boundary West 230 kV, Bell-Boundary #3							
WEST 230.00 to 115.00 kV #1 Transformer	100.2	100.1	101.7				118.3
BF: A1234 Boundary East 230 kV, Bell-Boundary #1							
WEST 230.00 to 115.00 kV #1 Transformer							108.0
BF: A1235 Boundary 230 kV, Boundary-Usk							
WEST 230.00 to 115.00 kV #1 Transformer							108.2
BF: A1588 Libby 230 kV, Conkelley-Libby							
WEST 230.00 to 115.00 kV #1 Transformer							111.1
BF: A248 Northeast 115 kV, Bell-Northeast							
BEACON S - BELL BPA 115.00 kV #1 Line			111.9				
WEST 230.00 to 115.00 kV #1 Transformer							110.4
BF: A286 Hot Springs 230 kV, Flathead-Hot Springs							
WEST 230.00 to 115.00 kV #1 Transformer							111.3
BF: A288 Hot Springs 230 kV, Hot Springs-Noxon Rapids #1							
WEST 230.00 to 115.00 kV #1 Transformer							111.8
BF: A290 Hot Springs 230 kV, Hot Springs-Rattlesnake							
WEST 230.00 to 115.00 kV #1 Transformer							112.8
BF: A370 Bell S1 & S2 230 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		140.0					
BEACON S 230.00 to 115.00 kV #1 Transformer	137.1						
BF: A388 Bell S2 & S3 230 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		113.8					
BEACON S 230.00 to 115.00 kV #1 Transformer	112.0						
WEST 230.00 to 115.00 kV #1 Transformer	138.3	138.6	114.9	117.3	117.2		168.5
WEST 230.00 to 115.00 kV #2 Transformer	106.4	106.6				136.2	
BF: A410 Westside 115 kV, Sunset-Westside							
BEACON N 230.00 to 115.00 kV #1 Transformer		110.2	102.6				

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
BEACON S 230.00 to 115.00 kV #1 Transformer	107.9		100.2				
BF: A413 Westside 115 kV, Ninemile-Westside							
BEACON N 230.00 to 115.00 kV #1 Transformer		113.4	105.2				
BEACON S 230.00 to 115.00 kV #1 Transformer	111.0		102.8				
BF: A470 Westside 115 kV, College & Walnut-Westside							
BEACON N 230.00 to 115.00 kV #1 Transformer		111.0	103.2				
BEACON S 230.00 to 115.00 kV #1 Transformer	108.6		100.9				
BF: A506 Rathdrum 115 kV, Pine Street-Rathdrum							
HERN - HUETTER 115.00 kV #1 Line				101.1	100.9		
HERN - RAMSEY 115.00 kV #1 Line				100.2			
HUETTER - RATHDRMW 115.00 kV #1 Line	110.0	110.0	109.7	111.9	111.7	108.3	108.2
WEST 230.00 to 115.00 kV #1 Transformer							108.8
BF: A521 Devils Gap East 115 kV, Addy-Devils Gap							
WEST 230.00 to 115.00 kV #1 Transformer	112.7	112.6	111.6				136.2
WEST 230.00 to 115.00 kV #2 Transformer						109.8	
BF: A526 Devils Gap East 115 kV, Airway Heights-Devils Gap							
WEST 230.00 to 115.00 kV #1 Transformer	110.9	110.8	110.1				134.0
WEST 230.00 to 115.00 kV #2 Transformer						108.0	
BF: A540 Devil's Gap East & West 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer	112.9	112.8	111.8				136.4
WEST 230.00 to 115.00 kV #2 Transformer						110.0	
BF: A572 Bell S3 230 kV, Bell-Boundary #3							
WEST 230.00 to 115.00 kV #1 Transformer	104.5	104.6	113.8				129.5
WEST 230.00 to 115.00 kV #2 Transformer						104.4	
BF: A600 Beacon North & South 115 kV							
FRANCEDR - NORTHWES 115.00 kV #1 Line	112.0	112.0	Local Voltage Collapse	115.7	115.6	103.0	104.2
NORTHWES - WEST 115.00 kV #1 Line	106.5	106.5		109.7	109.6		100.6
OTIS - LIBTYLK 115.00 kV #1 Line	108.4	108.4		102.8	103.0	143.7	139.3
WEST 230.00 to 115.00 kV #1 Transformer	154.6	154.6		156.2	156.0		250.9
WEST 230.00 to 115.00 kV #2 Transformer	118.7	118.7		120.7	120.6	206.6	
BF: A604 Beacon North 115 kV, Beacon-Boulder #1							
BEACON S - BELL BPA 115.00 kV #1 Line		108.2	157.1				
BEACON S - NINTHCNT 115.00 kV #2 Line						111.0	109.1
BEACON S 230.00 to 115.00 kV #1 Transformer			110.4				
WEST 230.00 to 115.00 kV #1 Transformer	102.6	130.8	116.1				145.7
WEST 230.00 to 115.00 kV #2 Transformer		100.2				118.0	
BF: A612 Beacon South 115 kV, Beacon-Boulder #2							
BEACON N - NORTHEAS 115.00 kV #1 Line			123.9				
BEACON N 230.00 to 115.00 kV #1 Transformer			108.7				
BELL BPA - WAIKIKIT 115.00 kV #1 Line	117.0						
NORTHEAS - WAIKIKIT 115.00 kV #1 Line			100.8				
WEST 230.00 to 115.00 kV #1 Transformer	116.8		102.5				120.0
BF: A624 Rathdrum East & West 115 kV							
BOULDERW - OTIS 115.00 kV #1 Line	117.5	117.5	116.6	107.6	107.8	114.6	114.4
EASTFARM - OTIS 115.00 kV #1 Line	188.4	188.4	188.2	190.4	190.3	188.1	188.0
EASTFARM - POST FLS 115.00 kV #1 Line	179.8	179.8	179.6	181.7	181.7	179.5	179.4
POST FLS - PRAIRIEB 115.00 kV #1 Line	215.1	215.1	214.9	217.4	217.3	214.7	214.7
PRAIRIEB - RAMSEY 115.00 kV #1 Line	148.1	148.1	147.9	149.7	149.7	147.8	147.8
WEST 230.00 to 115.00 kV #1 Transformer							115.0
BF: A642 Otis Orchards 115 kV, Otis Orchards-Post Falls							
WEST 230.00 to 115.00 kV #1 Transformer							110.0
BF: A645 Otis Orchards 115 kV, Boulder-Otis Orchards							
WEST 230.00 to 115.00 kV #1 Transformer							109.5
BF: A655 Ninemile 115 kV, Ninemile-Westside							
WEST 230.00 to 115.00 kV #1 Transformer							116.3
BF: A688 Ninth & Central North & South 115 kV							
ROSSPARK - THIRHACH 115.00 kV #1 Line						113.4	111.5
WEST 230.00 to 115.00 kV #1 Transformer							121.3
BF: A689 Ninth & Central South 115 kV, Ninth & Central-Otis Orchards							
WEST 230.00 to 115.00 kV #1 Transformer							109.2
BF: A712 Boulder West 115 kV, Beacon-Boulder #1							
WEST 230.00 to 115.00 kV #1 Transformer							110.0

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
BF: A713 Boulder West 115 kV, Boulder-Otis Orchards #1							
WEST 230.00 to 115.00 kV #1 Transformer							111.1
BF: A717 Boulder East & West 115 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		108.1					
BEACON S 230.00 to 115.00 kV #1 Transformer	105.9						
WEST 230.00 to 115.00 kV #1 Transformer	104.7	104.6	101.7				117.6
BF: A720 Boulder East 115 kV, Boulder-Rathdrum							
WEST 230.00 to 115.00 kV #1 Transformer							108.5
BF: B1135 Addy 115 kV, Addy-Bell							
WEST 230.00 to 115.00 kV #1 Transformer							112.1
BF: B1137 Addy 115 kV, Addy-Devils Gap							
BEACON S - BELL BPA 115.00 kV #1 Line			112.0				
WEST 230.00 to 115.00 kV #1 Transformer							111.7
BF: B1145 Addy 115 kV, Addy-Kettle Falls							
BEACON S - BELL BPA 115.00 kV #1 Line			112.0				
WEST 230.00 to 115.00 kV #1 Transformer			101.1				116.1
BF: B1398 Boundary 115 kV, Boundary-Box Canyon-Colville BPA, Boundary 230/115 kV Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							108.7
BF: B1766 Colville BPA 115 kV, Boundary-Box Canyon-Colville BPA							
WEST 230.00 to 115.00 kV #1 Transformer							108.7
BF: B1768 Colville BPA 115 kV, Colville BPA-Kettle Falls							
WEST 230.00 to 115.00 kV #1 Transformer							107.9
BF: B346 Bell 115 kV, Addy-Bell							
BEACON N 230.00 to 115.00 kV #1 Transformer		102.7					
BEACON S 230.00 to 115.00 kV #1 Transformer	100.5						
WEST 230.00 to 115.00 kV #1 Transformer	101.8	101.7					114.1
BF: B354 Bell 115 kV, Bell-Coulee							
BEACON N 230.00 to 115.00 kV #1 Transformer		103.7					
BEACON S 230.00 to 115.00 kV #1 Transformer	101.5						
WEST 230.00 to 115.00 kV #1 Transformer	104.7	104.5					118.1
BF: B356 Bell 115 kV, Bell-Northeast							
BEACON N 230.00 to 115.00 kV #1 Transformer		102.7					
BEACON S 230.00 to 115.00 kV #1 Transformer	100.5						
WEST 230.00 to 115.00 kV #1 Transformer	106.4	106.2					120.5
BF: R318 Noxon East & West 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							115.2
BF: R322 Cabinet 230 kV, Cabinet-Rathdrum							
WEST 230.00 to 115.00 kV #1 Transformer							117.1
BF: R337 Noxon West 230 kV, Noxon-Hot Springs #1							
WEST 230.00 to 115.00 kV #1 Transformer							109.6
BF: R404 Cabinet-Rathdrum, Rathdrum #2 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							115.6
BF: R408 Boulder-Rathdrum, Rathdrum #2 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							108.0
BF: R427 Beacon North & South 230 kV							
BEACON N - NORTHEAS 115.00 kV #1 Line						106.4	104.0
BEACON S - BELL BPA 115.00 kV #1 Line	112.6	112.6		118.0	117.9	137.1	134.3
BELL BPA - WAIKIKIT 115.00 kV #1 Line	130.2	130.2		135.6	135.5	151.0	148.7
BELL S2 230.00 to 115.00 kV #1 Transformer	121.8	121.8		124.9	124.9	136.0	134.4
COLLWALN - FTWRIGHT 115.00 kV #1 Line			104.4				
FRANCEDR - LYONSTND 115.00 kV #1 Line			109.3				
FRANCEDR - NORTHWES 115.00 kV #1 Line	105.5	105.5	183.8	104.8	104.7		
FTWRIGHT - WEST 115.00 kV #1 Line			123.3				
GARDENSP - SUNSET 115.00 kV #1 Line			119.4				
NORTHEAS - WAIKIKIT 115.00 kV #1 Line	104.3	104.3		109.0	108.9	124.5	122.2
NORTHWES - WEST 115.00 kV #1 Line	101.6	101.6	164.6	101.0	100.9		
SPKWASTE - WEST 115.00 kV #1 Line			109.6				
WEST - WESTBPA1 230.00 kV #1 Line			104.2				
WEST 230.00 to 115.00 kV #1 Transformer	143.2	143.2	229.1	138.8	138.8		206.3
WEST 230.00 to 115.00 kV #2 Transformer	109.8	109.8	177.1	107.3	107.2	167.2	
BF: R452 Beacon-Boulder, Boulder #2 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							110.9

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
BF: R454 Boulder-Rathdrum, Boulder #2 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							108.5
BF: R474 Benewah-Pine Creek, Benewah 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							108.5
BF: R504 Cabinet-Rathdrum, Rathdrum #1 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							115.4
BF: R552 Beacon-Boulder, Boulder #1 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							111.0
BF: R554 Boulder-Rathdrum, Boulder #1 230/115 Transformer							
WEST 230.00 to 115.00 kV #1 Transformer							108.6
BUS: Addy 115 kV							
BEACON S - BELL BPA 115.00 kV #1 Line			111.8				
WEST 230.00 to 115.00 kV #1 Transformer			101.2				116.3
BUS: Beacon North 115 kV							
BEACON S - BELL BPA 115.00 kV #1 Line		111.2	156.2				
BEACON S - NINTHCNT 115.00 kV #2 Line						111.7	109.8
BEACON S 230.00 to 115.00 kV #1 Transformer			111.4				
WEST 230.00 to 115.00 kV #1 Transformer	103.6	132.2	117.3	100.3	100.3		147.3
WEST 230.00 to 115.00 kV #2 Transformer		101.3				119.3	
BUS: Beacon North 230 kV							
BEACON S 230.00 to 115.00 kV #1 Transformer			111.1				
BELL BPA - WAIKIKIT 115.00 kV #1 Line		104.9					
BELL S2 230.00 to 115.00 kV #1 Transformer		103.9					
WEST 230.00 to 115.00 kV #1 Transformer		122.3	121.5				133.0
WEST 230.00 to 115.00 kV #2 Transformer						107.3	
BUS: Beacon South 115 kV							
BEACON N - NORTHEAS 115.00 kV #1 Line			121.3				
BEACON N 230.00 to 115.00 kV #1 Transformer			112.7				
BELL BPA - WAIKIKIT 115.00 kV #1 Line	126.4						
NORTHEAS - WAIKIKIT 115.00 kV #1 Line	101.5						
WEST 230.00 to 115.00 kV #1 Transformer	122.5		107.5				126.6
WEST 230.00 to 115.00 kV #2 Transformer						102.3	
BUS: Beacon South 230 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer			129.9				
BELL BPA - WAIKIKIT 115.00 kV #1 Line	118.2						
BELL S2 230.00 to 115.00 kV #1 Transformer	113.2						
WEST 230.00 to 115.00 kV #1 Transformer	133.2	100.2	126.1				137.7
WEST 230.00 to 115.00 kV #2 Transformer	102.0					111.1	
BUS: Bell 115 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		103.7					
BEACON S 230.00 to 115.00 kV #1 Transformer	101.5						
WEST 230.00 to 115.00 kV #1 Transformer	104.6	104.5					118.1
BUS: Bell S2 230 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		117.1					
BEACON S 230.00 to 115.00 kV #1 Transformer	114.7						
WEST 230.00 to 115.00 kV #1 Transformer	113.4	113.3					128.6
WEST 230.00 to 115.00 kV #2 Transformer						103.8	
BUS: Bell S3 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer	104.5	104.6	113.8				129.5
WEST 230.00 to 115.00 kV #2 Transformer						104.4	
BUS: Bell S4 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer			103.0				117.5
BUS: Boulder East 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.4
BUS: Boulder West 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							112.7
BUS: Cabinet 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							117.0
BUS: Colville 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.8
BUS: Conkelley East 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.1

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
BUS: Devils Gap East 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer	112.9	112.8	111.8				136.4
WEST 230.00 to 115.00 kV #2 Transformer						110.0	
BUS: Devils Gap West 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							110.8
BUS: Hatwai 230 kV							
MOSCOW 230.00 to 115.00 kV #1 Transformer	138.9	138.9	138.1	139.3	139.3	138.7	138.7
WEST 230.00 to 115.00 kV #1 Transformer							110.3
BUS: Hot Springs 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.9
BUS: Libby 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.6
BUS: Little Falls 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.8
BUS: Long Lake 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer	104.2	104.1	103.9				124.2
WEST 230.00 to 115.00 kV #2 Transformer						100.1	
BUS: Nine Mile 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer	100.6	100.5					119.8
BUS: Ninth & Central North 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.6
BUS: Northeast 115 kV							
BEACON S - BELL BPA 115.00 kV #1 Line			139.5				
BUS: Noxon East 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							113.7
BUS: Noxon West 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.6
BUS: Otis Orchards 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							110.4
BUS: Pine Creek 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.2
BUS: Post Street 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.7
BUS: Rathdrum East 115 kV							
HERN - HUETTER 115.00 kV #1 Line				101.0	100.8		
HERN - RAMSEY 115.00 kV #1 Line				100.1			
HUETTER - RATHDRMW 115.00 kV #1 Line	110.0	109.9	109.7	111.9	111.7	108.3	108.2
WEST 230.00 to 115.00 kV #1 Transformer							109.0
BUS: Ross Park 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							113.2
BUS: Westside 115 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		114.3	106.0				
BEACON S 230.00 to 115.00 kV #1 Transformer	111.9		103.6				
BUS: Westside 230 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		110.6	103.3				
BEACON S 230.00 to 115.00 kV #1 Transformer	108.2		100.9				
N-0: All Lines in Service							
WEST 230.00 to 115.00 kV #1 Transformer							105.8
N-1: 3TM Bell - Boundary #3 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							113.6
N-1: 3TM Bell - Boundary #3 230 kV Open @ BOUN							
WEST 230.00 to 115.00 kV #1 Transformer							111.6
N-1: 3TM Boundary - Box Canyon - Colville BPA 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.7
N-1: 3TM Boundary - Box Canyon - Colville BPA 115 kV Open @ COLV							
WEST 230.00 to 115.00 kV #1 Transformer							108.7
N-1: Addy - Bell 115 kV Open @ ADD							
BEACON N - NORTHEAS 115.00 kV #1 Line			100.0				
BEACON S - BELL BPA 115.00 kV #1 Line			112.1				
N-1: Addy - Devils Gap 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.6
N-1: Addy - Devils Gap 115 kV Open @ ADD							

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
WEST 230.00 to 115.00 kV #1 Transformer							113.2
N-1: Addy - Devils Gap 115 kV Open @ DGP							
WEST 230.00 to 115.00 kV #1 Transformer							108.8
N-1: Addy #3 230/115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							115.0
N-1: Beacon - Bell #1 115 kV							
BEACON N - NORTHEAS 115.00 kV #1 Line			126.6				
NORTHEAS - WAIKIKIT 115.00 kV #1 Line			103.4				
N-1: Beacon - Bell #4 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer			102.6				117.3
N-1: Beacon - Bell #5 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer			103.5				118.1
N-1: Beacon - Boulder 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.8
N-1: Beacon - Francis & Cedar 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.5
N-1: Beacon - Ninth & Central #1 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.6
N-1: Beacon - Ninth & Central #2 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.7
N-1: Beacon - Northeast 115 kV							
BEACON S - BELL BPA 115.00 kV #1 Line			162.4				
N-1: Beacon - Ross Park 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							124.2
WEST 230.00 to 115.00 kV #2 Transformer						100.3	
N-1: Beacon #1 230/115 kV							
BEACON S 230.00 to 115.00 kV #1 Transformer			118.6				
BELL BPA - WAIKIKIT 115.00 kV #1 Line		101.2					
BELL S2 230.00 to 115.00 kV #1 Transformer		101.3					
WEST 230.00 to 115.00 kV #1 Transformer		119.3	110.7				123.9
N-1: Beacon #2 230/115 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer			121.1				
BELL BPA - WAIKIKIT 115.00 kV #1 Line	101.2						
BELL S2 230.00 to 115.00 kV #1 Transformer	101.3						
WEST 230.00 to 115.00 kV #1 Transformer	119.3		110.6				123.7
N-1: Bell - Coulee #6 500 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.7
N-1: Bell - Lancaster 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.8
N-1: Bell - Northeast 115 kV							
BEACON S - BELL BPA 115.00 kV #1 Line			110.7				
WEST 230.00 to 115.00 kV #1 Transformer							113.1
N-1: Bell - Northeast 115 kV Open @ BEL							
BEACON S - BELL BPA 115.00 kV #1 Line			110.5				
WEST 230.00 to 115.00 kV #1 Transformer							110.5
N-1: Bell - Northeast 115 kV Open @ NE							
BEACON S - BELL BPA 115.00 kV #1 Line			138.3				
WEST 230.00 to 115.00 kV #1 Transformer							108.4
N-1: Bell - Taft 500 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.3
N-1: Bell #6 230/115 kV							
BEACON N 230.00 to 115.00 kV #1 Transformer		119.1					
BEACON S 230.00 to 115.00 kV #1 Transformer	116.6						
WEST 230.00 to 115.00 kV #1 Transformer	115.4	115.3					130.8
WEST 230.00 to 115.00 kV #2 Transformer						105.5	
N-1: Benewah - Pine Creek 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.5
N-1: Bonner Ferry - Libby 115 kV Open @ LIB							
CLRKFORK - ODEN 115.00 kV #1 Line	102.8	102.8	102.5	103.0	103.0	102.7	102.7
N-1: Boulder #1 230/115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.1
N-1: Boulder #2 230/115 kV							

	Beacon 1	Beacon 2	Bell	Boulder 1	Boulder 2	Westside 1	Westside 2
WEST 230.00 to 115.00 kV #1 Transformer							108.1
N-1: Cabinet - Noxon 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.0
N-1: Cabinet - Rathdrum 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							115.1
N-1: Cabinet - Rathdrum 230 kV Open @ CAB							
WEST 230.00 to 115.00 kV #1 Transformer							115.1
N-1: Cabinet - Rathdrum 230 kV Open @ RAT							
WEST 230.00 to 115.00 kV #1 Transformer							115.1
N-1: Conkelley - Libby 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.0
N-1: Devils Gap - Nine Mile 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							114.8
N-1: Dworshak - Hatwai 500 kV							
WEST 230.00 to 115.00 kV #1 Transformer							113.0
N-1: Dworshak - Taft 500 kV							
WEST 230.00 to 115.00 kV #1 Transformer							112.8
N-1: Francis & Cedar - Ross Park 115 kV Open @ ROS							
WEST 230.00 to 115.00 kV #1 Transformer							107.8
N-1: Hatwai 500/230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							113.8
N-1: Hot Springs - Taft 500 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.0
N-1: Hot Springs 500/230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.0
N-1: Lancaster - Noxon 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.6
N-1: Libby - Noxon 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							109.6
N-1: Libby 230/115 kV							
CLRKFORK - ODEN 115.00 kV #1 Line	103.0	103.0	102.7	103.2	103.2	102.9	102.9
N-1: Nine Mile - Westside 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							114.2
N-1: Nine Mile - Westside 115 kV Open @ NMS							
WEST 230.00 to 115.00 kV #1 Transformer							117.7
N-1: Nine Mile - Westside 115 kV Open @ WES							
WEST 230.00 to 115.00 kV #1 Transformer							115.6
N-1: Ninth & Central - Otis Orchards 115 kV Open @ OTI							
WEST 230.00 to 115.00 kV #1 Transformer							110.6
N-1: Ninth & Central - Sunset 115 kV Open @ 9CE							
WEST 230.00 to 115.00 kV #1 Transformer							115.4
N-1: Ninth & Central - Third & Hatch 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.2
N-1: Noxon - Pine Creek 230 kV							
WEST 230.00 to 115.00 kV #1 Transformer							108.3
N-1: Pine Street - Rathdrum 115 kV Open @ PNST							
WEST 230.00 to 115.00 kV #1 Transformer							108.1
N-1: Post Street - Third & Hatch 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							111.9
N-1: Ross Park - Third & Hatch 115 kV							
WEST 230.00 to 115.00 kV #1 Transformer							110.1
N-1: Westside #1 230/115 kV							
WEST 230.00 to 115.00 kV #2 Transformer	105.8	105.7	105.5				
N-1: Westside #2 230/115 kV							
WEST 230.00 to 115.00 kV #1 Transformer	132.0	131.8	130.8	108.1	108.1		

H 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, Lancaster Interconnection, Garden Springs Station Integration, Westside Transformer Replacement, and Spokane Valley Transmission Reinforcement Project. 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.

I 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 Rathdrum Stations are made slightly worse.

J 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 prior to any additional outage occurring.

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, Lancaster Interconnection, Garden Springs Station Integration, Westside Transformer Replacement, and Spokane Valley Transmission Reinforcement Project.

K 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 #62 230/115 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.

Voltage Stability Study

A PV Analysis

Methodology

No defined WECC transfer paths are located in the Spokane area; therefore, only a Load Ramp PV Curve analysis was performed. The Coeur d'Alene Planning Assessment provides PV Analysis for Path 6 – West of Hatwai.

For the Load Ramp PV Curve analysis, all buses in the Spokane area were monitored. All loads within the Spokane area were increased until voltage collapse occurred.

Results

The Load Ramp PV Analysis showed a theoretical flow limit of 2800 MW for all lines in service condition. The critical bus under all lines in service condition is Cheney Station. As load increase in the Spokane area, the limiting contingency is the tie breaker failure on the 115 kV buses at Beacon Station with total area load of 1700 MW (see Figure I-8). The critical bus under the Beacon tie breaker failure contingency is the Cheney Station.

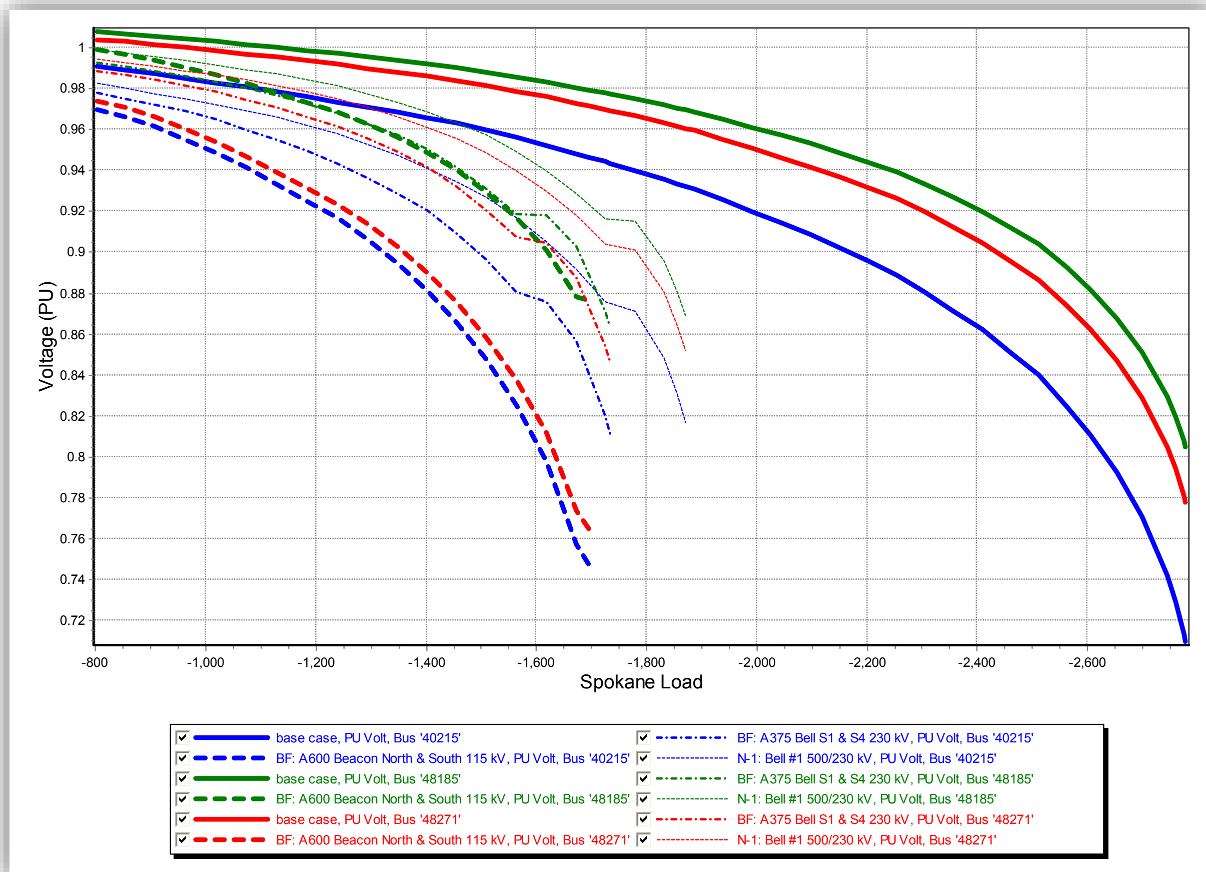


FIGURE I-8: LOAD RAMP PV CURVE RESULTS FOR CRITICAL BUSES

B QV Analysis

The QV Analysis showed there is adequate reactive margin for the 115 kV source buses and critical buses in the Spokane area. Table I-2 shows the results of the worst performing contingency for each bus analyzed.

The smallest reactive margin at the critical buses analyzed occurred at the Cheney 115 kV bus with a value of 168 MVAr for the Beacon 115 kV bus tie breaker failure.

TABLE I-2: QV ANALYSIS RESULTS

Bus Name	Nom kV	Contingency Scenario	Reactive Margin
BELL BPA	115	BASECASE	-1052.05
BELL BPA	115	BF: A375 BELL S1 & S4 230 KV	-578.62
BELL BPA	115	BF: A600 BEACON NORTH & SOUTH 115 KV	-723.6
BELL BPA	115	N-1: BELL #1 500/230 KV	-628.19
CHENEY	115	BASECASE	-212.92
CHENEY	115	BF: A375 BELL S1 & S4 230 KV	-187.29
CHENEY	115	BF: A600 BEACON NORTH & SOUTH 115 KV	-168.7
CHENEY	115	N-1: BELL #1 500/230 KV	-197.44
BEACON N	115	BASECASE	-1223.88
BEACON N	115	BF: A375 BELL S1 & S4 230 KV	-609.85
BEACON N	115	BF: A600 BEACON NORTH & SOUTH 115 KV	0
BEACON N	115	N-1: BELL #1 500/230 KV	-673.42
BEACON S	115	BASECASE	-1223.37
BEACON S	115	BF: A375 BELL S1 & S4 230 KV	-609.8
BEACON S	115	BF: A600 BEACON NORTH & SOUTH 115 KV	0
BEACON S	115	N-1: BELL #1 500/230 KV	-673.37
LIBTYLK	115	BASECASE	-730.8
LIBTYLK	115	BF: A375 BELL S1 & S4 230 KV	-487.53
LIBTYLK	115	BF: A600 BEACON NORTH & SOUTH 115 KV	-581.04
LIBTYLK	115	N-1: BELL #1 500/230 KV	-528.35
WEST	115	BASECASE	-919.54
WEST	115	BF: A375 BELL S1 & S4 230 KV	-505.16
WEST	115	BF: A600 BEACON NORTH & SOUTH 115 KV	-515.79
WEST	115	N-1: BELL #1 500/230 KV	-587.1
BOULDERW	115	BASECASE	-1019.1
BOULDERW	115	BF: A375 BELL S1 & S4 230 KV	-589.45
BOULDERW	115	BF: A600 BEACON NORTH & SOUTH 115 KV	-770.09
BOULDERW	115	N-1: BELL #1 500/230 KV	-649.21
BOULDERE	115	BASECASE	-1018.61
BOULDERE	115	BF: A375 BELL S1 & S4 230 KV	-589.43
BOULDERE	115	BF: A600 BEACON NORTH & SOUTH 115 KV	-769.6
BOULDERE	115	N-1: BELL #1 500/230 KV	-649.18

6.3.2 Stability Analysis

Voltage Recovery

Three phase faults on the Beacon – Bell #4 & #5 and Bell – Westside 230 kV transmission lines cause slow voltage recovery for several buses in the Spokane area. The slow voltage recovery results in violation of the TPL-001-WECC-RMP-2.1 criteria for voltage dip at load and non-load buses. Figure I-9 plots the voltage and frequency response for buses in the Spokane area for a three phase fault near Bell Station on the Beacon – Bell #5 230 kV Transmission Line. The system is stable and no indication of a power swing is present.

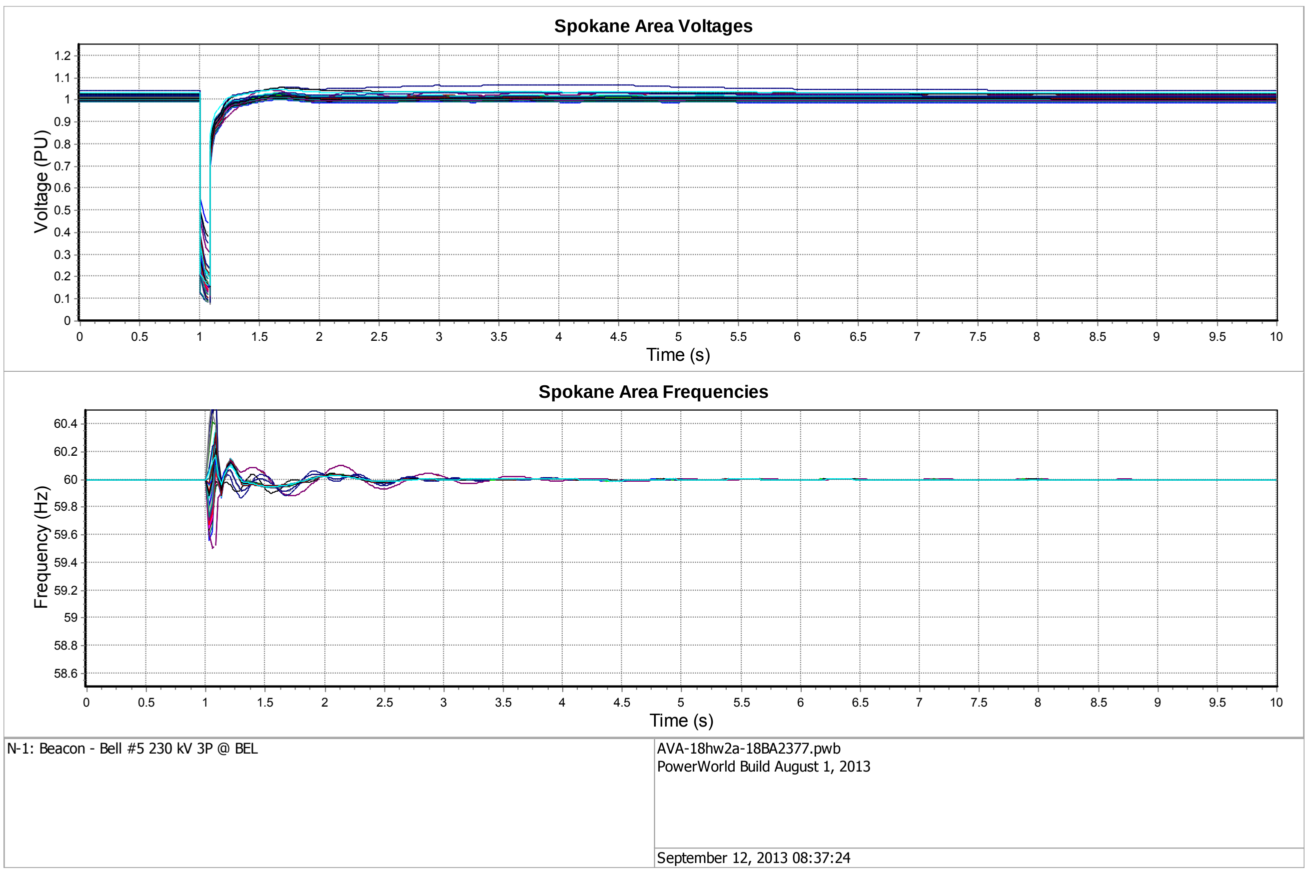


FIGURE I-9: SIMULATION RESULTS FOR A THREE PHASE FAULT ON BEACON – BELL #6 NEAR BELL

	14HS Time of Violation	% Voltage Dip or Frequency	14HW Time of Violation	% Voltage Dip or Frequency	18HS Time of Violation	% Voltage Dip or Frequency	18HW Time of Violation	% Voltage Dip or Frequency	23HS Time of Violation	% Voltage Dip or Frequency
N-1: Beacon - Bell #4 230 kV 3P @ BEA										
WECC Category B Voltage Dip Load Bus			**1.0833**	**-26.49**			**1.0833**	**-27.13**		
N-1: Beacon - Bell #4 230 kV 3P @ BEL										
WECC Category B Voltage Dip Load Bus	**1.0833**	**-25.36**	**1.0833**	**-28.99**	**1.0833**	**-25.67**	**1.0833**	**-29.62**	**1.0833**	**-26.75**
WECC Category B Voltage Dip Non-Load Bus			**1.0833**	**-30.40**			**1.0833**	**-30.87**		
N-1: Beacon - Bell #5 230 kV 3P @ BEA										
WECC Category B Voltage Dip Load Bus			**1.0833**	**-26.55**			**1.0833**	**-27.20**		

	14HS Time of Violation	% Voltage Dip or Frequency	14HW Time of Violation	% Voltage Dip or Frequency	18HS Time of Violation	% Voltage Dip or Frequency	18HW Time of Violation	% Voltage Dip or Frequency	23HS Time of Violation	% Voltage Dip or Frequency
N-1: Beacon - Bell #5 230 kV 3P @ BEL										
WECC Category B Voltage Dip Load Bus	1.0833	-25.40	1.0833	-29.03	1.0833	-25.72	1.0833	-29.67	1.0833	-26.79
WECC Category B Voltage Dip Non-Load Bus			1.0833	-30.44			1.0833	-30.90		
N-1: Bell - Westside 230 kV 3P @ BEL										
WECC Category B Voltage Dip Load Bus	1.0833	-25.34	1.0833	-28.76	1.0833	-25.61	1.0833	-29.49	1.0833	-26.85
WECC Category B Voltage Dip Non-Load Bus			1.0833	-30.30			1.0833	-30.84		

The Technical Studies Subcommittee of the Planning Coordination Committee at WECC has discussed the desire to modify the existing criteria in TPL-001-WECC-RBP-2.1 to exclude the initial voltage recovery (see Figure I-10) by monitoring for voltage dips after a time delay. The original intent of the criteria was to detect the potential for a power swing. Voltage dips caused by motor re-acceleration after a fault is cleared is not typically mitigated at the transmission level. Improving the transmission system performance through construction of new facilities will provide a stiffer voltage response. The proposed Garden Springs Integration Project will mitigate the observed voltage recovery issues.

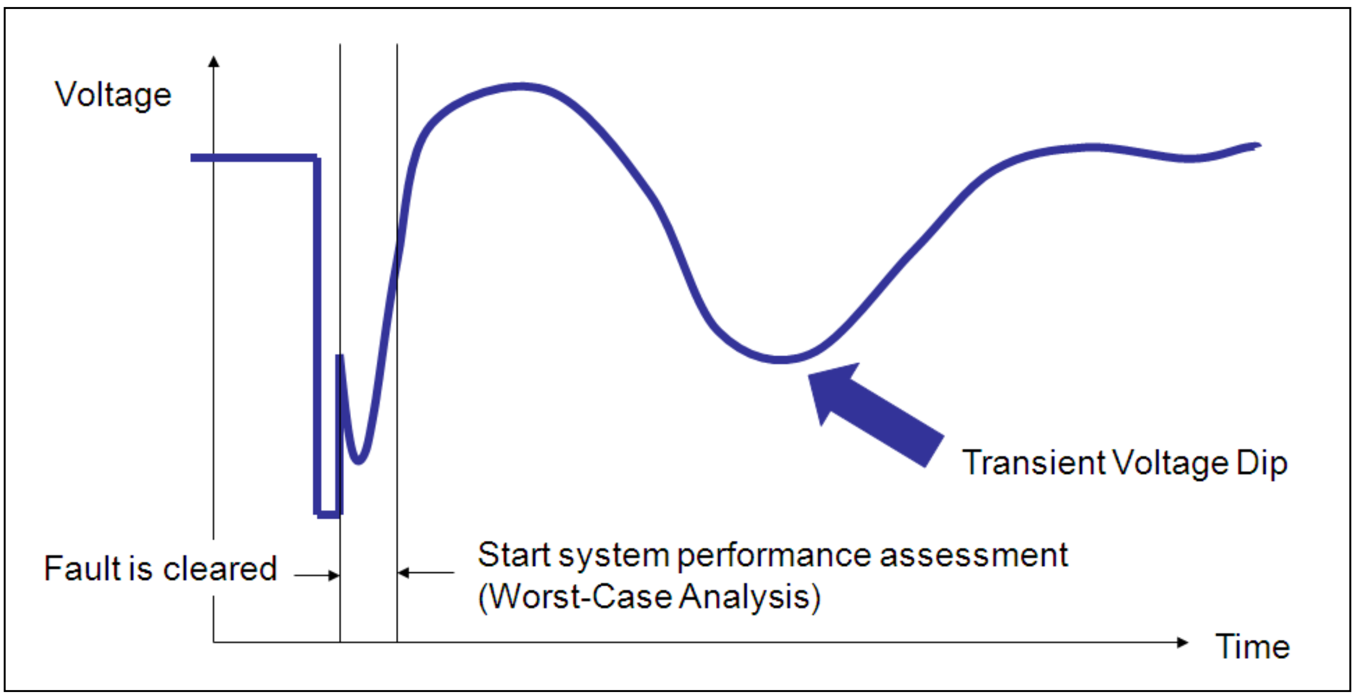


FIGURE I-10: PROPOSED MODIFICATION TO THE TPL-001-WECC-RMP-2.1 CRITERIA

Nine Mile

The Nine Mile Generator Units 3 and 4 were observed going out of step for a three phase fault on the Nine Mile – Westside 115 kV Transmission Line with time delayed clearing by the Nine Mile terminal. The Zone 2 time delay on the Nine Mile terminal is set to twenty cycles to coordinate with other transmission line protection schemes in the area. The out of step condition was observed in all of the scenarios simulated. Examination of Figure I-11 reveals the opening of the Westside terminal on the Nine Mile – Westside 115 kV Transmission Line leaves the Nine Mile generators connected to a very weak transmission system.

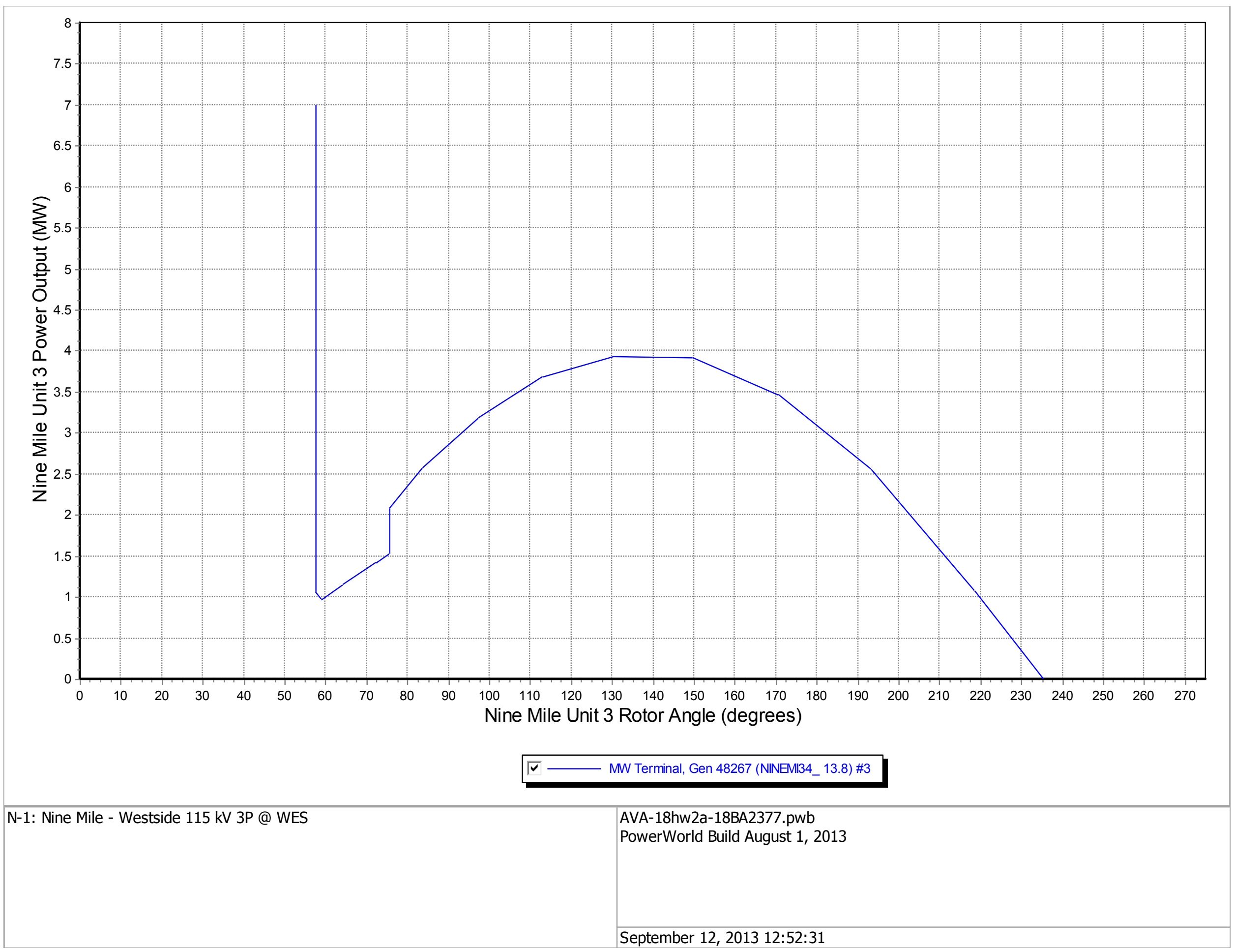


FIGURE I-11: NINE MILE POWER-ANGLE OUT OF STEP PLOT

	14HS Time of Violation	% Voltage Dip or Frequency	14HT Time of Violation	% Voltage Dip or Frequency	14HW Time of Violation	% Voltage Dip or Frequency	18HS Time of Violation	% Voltage Dip or Frequency	18HT Time of Violation	% Voltage Dip or Frequency	18HW Time of Violation	% Voltage Dip or Frequency
N-1: Nine Mile - Westside 115 kV 3P @ WES												
Out of Step Generator												
Gen '48267' '3'	1.3583	263.52	1.3583	269.79	1.3583	266.51	1.3583	262.82	1.3583	303.43	1.3583	273.35
Gen '48267' '4'	1.3583	264.40	1.3583	270.68	1.3583	267.38	1.3583	263.71	1.3583	304.04	1.3583	274.26
WECC Category B Voltage Dip Non-Load Bus												
Bus '48265'					9.3667	-30.19					8.7083	-30.05
Bus '48267'	1.3583	-30.93	1.3583	-31.90	1.4583	-37.20	1.3583	-30.81	1.4417	-32.29	1.4500	-31.27
Bus '48269'					9.3667	-30.19					8.7083	-30.05
N-2: Bell - Westside 230 kV and Coulee - Westside												

	14HS Time of Violation	% Voltage Dip or Frequency	14HT Time of Violation	% Voltage Dip or Frequency	14HW Time of Violation	% Voltage Dip or Frequency	18HS Time of Violation	% Voltage Dip or Frequency	18HT Time of Violation	% Voltage Dip or Frequency	18HW Time of Violation	% Voltage Dip or Frequency
230 kV and Ninemile - Westside 115 kV 2LG												
Out of Step Generator												
Gen '48267' '3'									1.4000	185.28		
Gen '48267' '4'									1.4000	185.43		
WECC Category C Voltage Dip Any Bus												
Bus '48267'	1.3583	-33.01	1.3583	-36.35	1.3583	-34.27	1.3583	-32.64	1.3583	-50.83	1.3583	-37.83

The Nine Mile HED is presently under construction for complete replacement of Units 1 and 2. An upgrade of the governor and excitation system on Units 3 and 4 are included in the project. Upgraded generation controls will improve the performance of the units during fault conditions but will not be sufficient to mitigate the loss of synchronism issue. Implementation of a POTT protection scheme on the Nine Mile – Westside 115 kV Transmission Line allowing for 5 to 7 cycle clearing times for faults within Zone 2 of the distance elements will mitigate the loss of synchronism issue.

Monroe St. and Upper Falls

Monroe Street and Upper Falls HED show sensitivity to three phase faults on the Metro – Sunset 115 kV Transmission Line. The Monroe Street generator is represented by models derived through the WECC generator testing process. The models are presently not submitted to WECC for inclusion in the WECC Master Dynamics File because Monroe Street does not meet the existing inclusion criteria to the WECC Generator Unit Validation Policy. Upper Falls generator was not represented with a dynamics model therefore the simulation software treats it as negative load. Definitive identification of an issue cannot be made without detailed dynamic representation of both generation facilities.

	14HS		14HT		14HW		18HS		18HT		18HW	
	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency	Time of Violation	% Voltage Dip or Frequency
N-1: Metro - Sunset 115 kV 3P @ MTR												
Out of Step Generator												
Gen '48407' '1'	2.1250	183.20	2.0833	198.58	2.1167	182.08	2.1333	182.05	2.0833	244.84	2.0917	184.31
WECC Category B Voltage Dip Non-Load Bus												
Bus '48407'	2.0833	-60.48	2.0833	-50.34	2.0833	-60.91	2.0833	-61.35	2.0833	-38.74	2.0833	-57.21
N-1: Metro - Sunset 115 kV 3P @ SUN												
Out of Step Generator												
Gen '48241' '1'			1.4667	181.93	1.4667	181.63			1.4750	187.35	1.4667	181.48
WECC Category B Voltage Dip Non-Load Bus												
Bus '48241'			1.4250	-59.33	1.4250	-58.53			1.4250	-59.35	1.4250	-58.76
Bus '48335'			1.4250	-40.08	1.4250	-38.87			1.4250	-40.22	1.4250	-39.15
Bus '48337'			1.4250	-40.08	1.4250	-38.90			1.4250	-40.21	1.4250	-39.14

Simulations show outages causing the loss of the Post Street Station 115 kV bus will create a separate island with the Monroe Street and Upper Falls generation and load served by the Post Street 13 kV buses. Protection schemes are installed to prevent the islanding condition from occurring. Improved modeling of how the system will actually performed will be examined for future Transmission Planning simulations.

6.3.3 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.

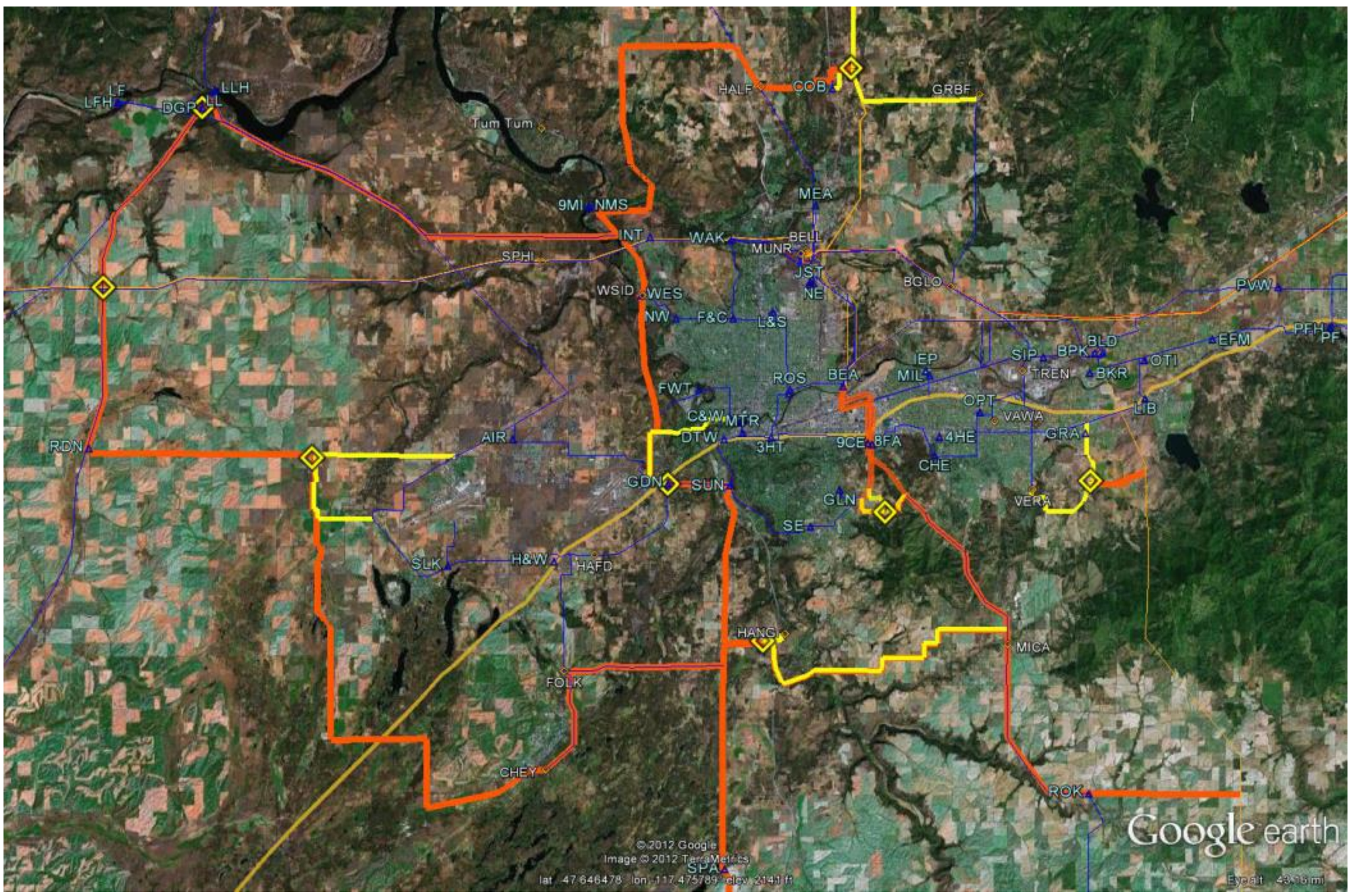
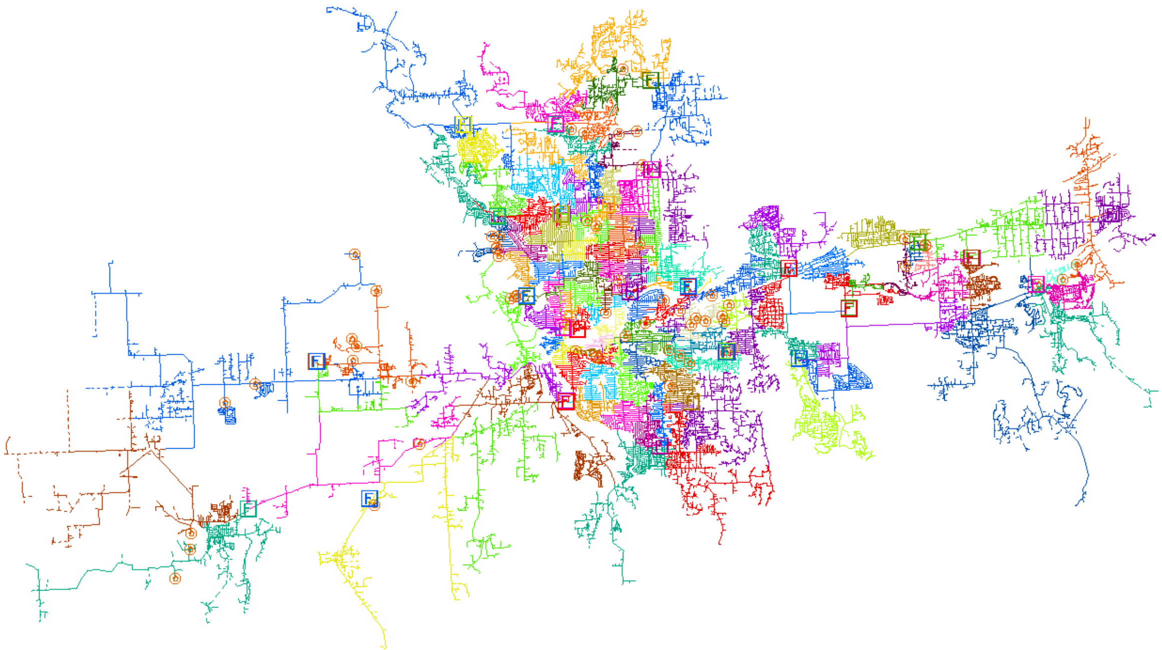


FIGURE I-12: SPOKANE AREA LONG TERM COMCEPTUAL TRANSMISSION PLAN

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.

6.3.4 Distribution Assessment

2013 Spokane Distribution Area Assessment



Current 5 year budget items

MIL - Dx Line Integration	2013
SUN-Dx Line Integration	Outyear
L&S 12F6 - Cx FDR	2016
Spokane West - Sub Dx Integration	Outyear
9CE - New FDR 12F5	2015
SE 12F6 - New FDR	Outyear
Greenacres - Dx Line Integration	2014
Irvin - Dx Line Integration	Outyear
Hillyard Sub- Dx Line Integration	Outyear
MEA 12F3 - New FDR	Outyear

OPT 12F2 - New FDR	2013
SIP 12F6 - New FDR	Outyear
BEA12F5 Grid Modernization	2013
BEA12F3 Grid Modernization	2015
FWT12F3 Grid Modernization	2015
ROS12F1 Grid Modernization	2015
BEA12F2 Grid Modernization	2015
WAK12F2 Grid Modernization	2014
F&C12F6 Grid Modernization	2017

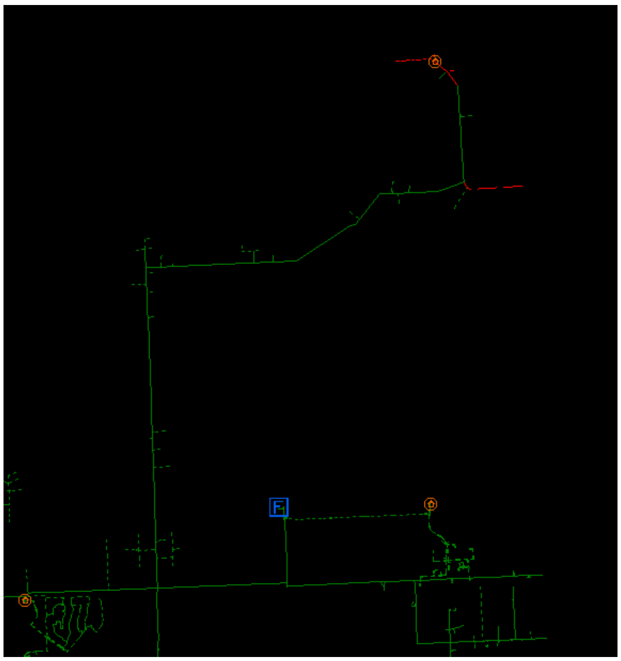
Mica Peak Cnv to URD	2015
LIB 12F2 - Henry Rd Tie	2014/2015
U District FDR Tie Trent Ave	Outyear
LIB 12F1-EFM 12F2 Rocky Hill Tie	2017
BKR 12F2 - Tie to EFM 12F1	2018
3HT 12F7 Tie U District Loop	2014
BKR 12F2 Recond 2/0 CU on Mission	2015
EFM 12F1 - State Ln Bridge - Conv OH/UG	Outyear
9CE 12F4 Recond 336	2013
C&W 12F4 - Tie to 3HT 12F7	Outyear
9CE 12F3 Thierman/Mission Rcd 1 mi	2017
BKR 12F1 - Liberty Lk 12F2 on Mission	2016
LIB 12F3 Rcd W Side Lib Lk	2017
NW 12F3 tie INT 12F1 Strong Rd URD	2017
3HT 12F1-12F5 Tie at Iron Bridge	Outyear
BKR 12F3 Recond 1 mi-Central Premix	Outyear
BKR 12F3 & SIP 12F3 Recond 1mi	2016
3HT 12F3 Recond 2/0 Switch #980	2016
MIL 12F2 ti to 12F3 Northwoods URD	2015
SIP General Upg	2015
WAK 12F1-12F4 Tie	2015
MIL12F4 tie OPT12F2 Mirabeau URD	2018
BEA 12F6-9CE 12F1 Hav. Rcd 1/0 ACSR	2018
FWT 12F4 - C&W 12F5 River Xing	2018

INT 12F2 Recond 2 mile-Rutter Pkwy	Outyear
INT 12F2 - DEE 12F1 Improve Tie	2014
SUN 12F4 - Reconductor 2/0 @ SIA	2015
SUN 12F2 - Replace Sw 475 w/ Recloser	2014
SUN 12F4 replace midline 249R	2013
SIP 12F3 to BKR (Central Premix)	Outyear
LIB 12F1 - EFM 12F2 Rocky Hill Tie	Outyear
BKR 12F3 Recond 2/0 ACSR 1 mi	Outyear

Level of Service Issues

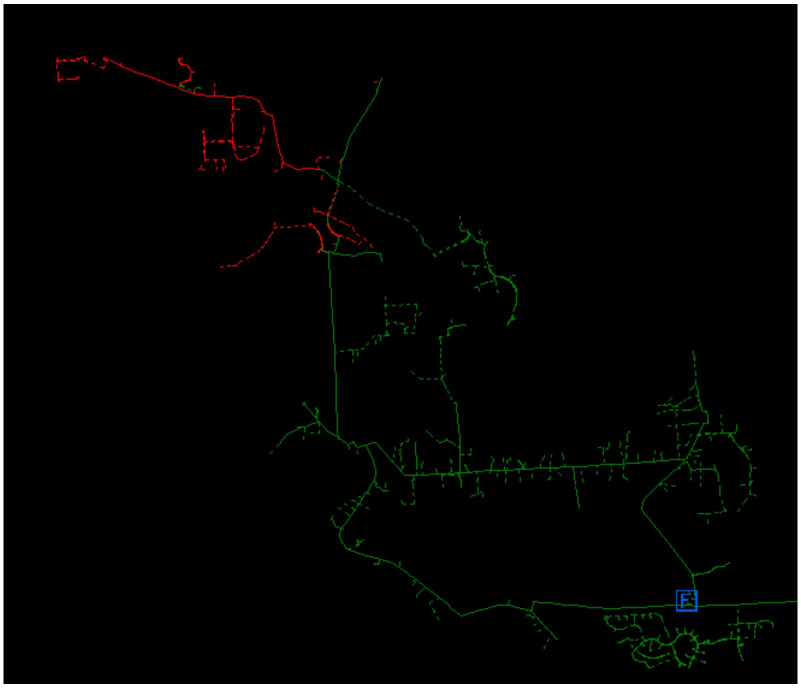
Spokane does not have any major level of service issues at peak load. There are a few feeders with voltage below 118V at peak though:

AIR12F1 – down around 118V at Newkirk and Old Lyons Rd. This is a 6.5 mile lateral of 6CU/4ACSR with about 35 peak amps, could be reconductored



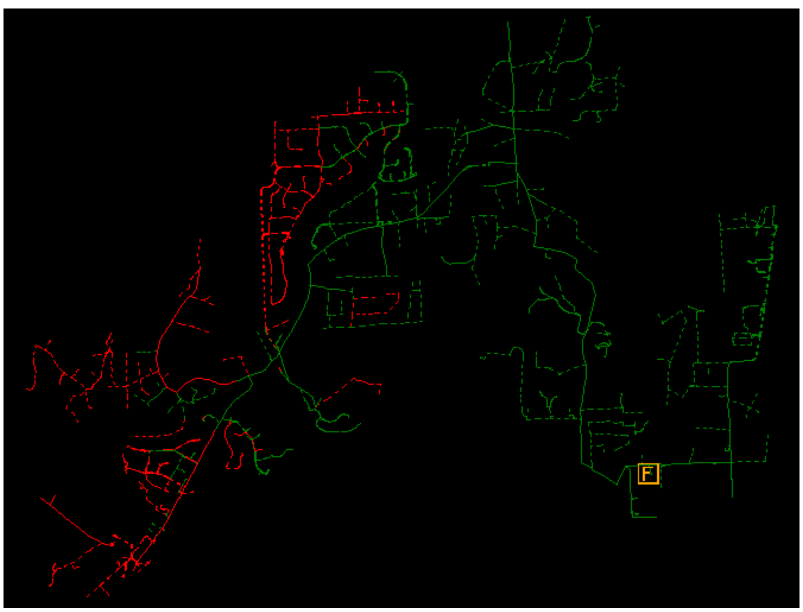
CHE12F4 – down around 115V at Mohawk Rd on the south end of the feeder – there's a fair amount of load there on a 4ACSR lateral. Could reconductor about 2 miles of 4ACSR here.

INT12F2 – Low voltage around 116V at peak in the Suncrest area. The Rutter Pkwy reconductor in outyear would fix this – there's a good chunk of 2CU there.



LIB12F2 – Voltage approx 117.5 at south end of feeder down Henry Rd. Roughly 50A peak on 2ACSR section. Greenacres picking up some of the feeder load should help, might be a candidate for reconductor as well.

MEA12F2 – Low voltage about 116.5 at peak on the west end of the feeder. Mostly 556 and decent URD, just a lot of load at the end of the feeder. Adding a feeder to reduce load would help, a capacitor bank or regulator bank are likely needed as well.



SLK12F3 – Low voltage around 116V before the midline regs at peak. It's already 556, just a lot of load a long ways from the sub. Cap bank might help.

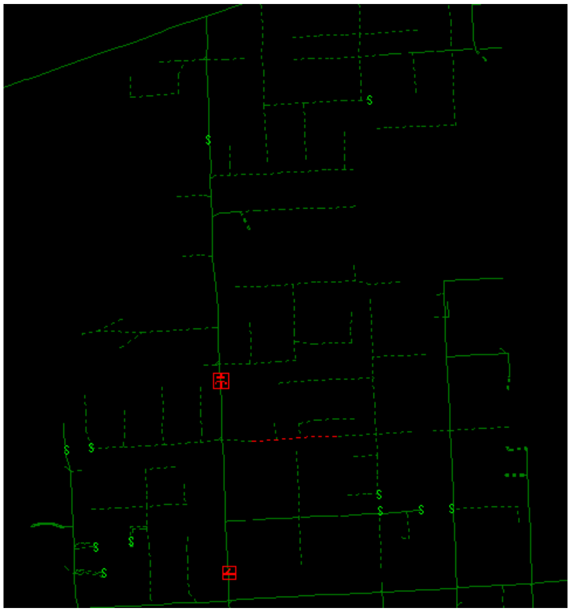
SUN12F5 – Low voltage 117.5V at far south end of feeder. Might bump the middline reg bank up a bit, and could reconductor some of the 1/0ACSR and 4ACSR on this lateral.

Capacity Issues

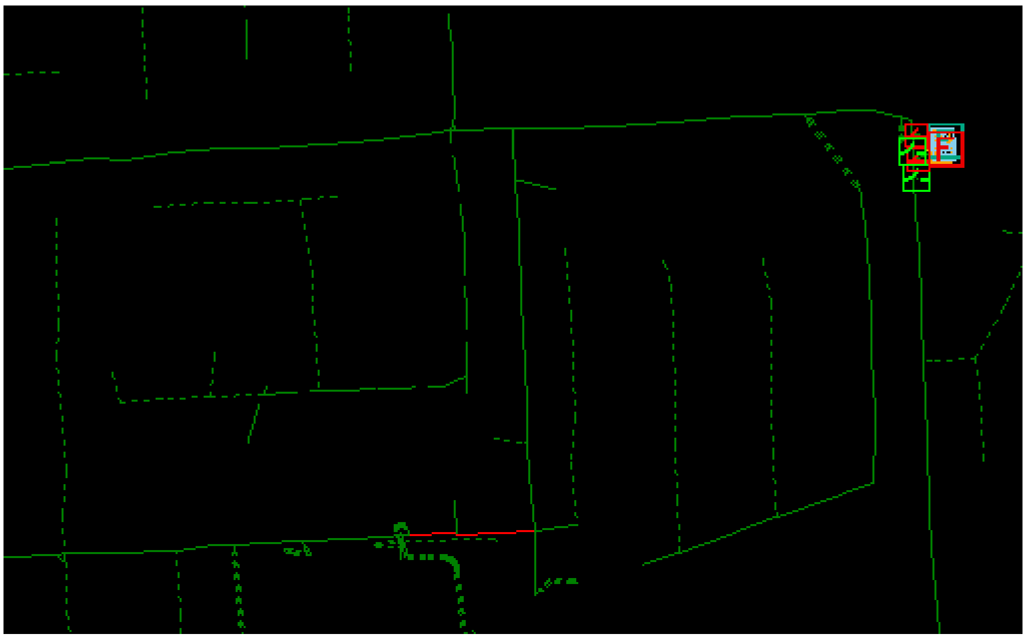
EFM12F2 has an overload on the Heather Rd lateral – some 6CR and 6CU should be reconductored.

MEA12F2 – overloaded 6CR on lateral off Little Spokane Rd north of Golden.

MIL12F1 – overloaded 6CR on Boone east of Vista.



MIL12F2 – Overloaded 6CU on Buckeye east of Argonne.



SIP12F4 – Several sections of overloaded Crapo conductor. SIP upgrade in 2015 should fix this.

WAK12F2 – overloaded 6CR, with some 6A there too at Whittier and Graves. Grid modernization 2014 will fix this.

WAK12F4 – overloaded 6CR and 6A at Edna and Johannsen. This needs reconductored.

Reliability

Spokane is likely the most reliable part of our system. The 3 year average SAIFI is below 2.5 for all feeders. The advent of Smart Grid and FDIR being enabled will enhance this further. This explains why none of the worst feeder projects are in Spokane.

System Wide Programs

Grid modernization will expand in the Spokane area in the coming years. It is relatively straightforward to add adjacent feeders to the Smart Grid network, so naturally effort will be made to expand radially. Where possible some of the above issues should be addressed in conjunction with Grid Modernization, Wood Pole Management, or Transformer changeout.

SCADA Needs

Spokane has the broadest install of SCADA in our system from a distribution standpoint. There are a number of feeders that still only have single phase reads though – these should be a priority to upgrade relaying such that 3 phase reads are available. Where possible regulator tap positions should also be captured. This also enables future grid modernization work.

The following feeders need upgraded to 3 phase from single phase:

9CE12F2	CHE12F4	SIP12F3
9CE12F3	LIB12F1	SIP12F4
AIR12F1	LIB12F2	SIP12F5
AIR12F2	LIB12F3	SUN12F2
AIR12F3	LIB12F4	SUN12F4
BKR12F1	NW12F1	SUN12F5
BKR12F2	NW12F3	WAK12F1
BKR12F3	NW13T23	WAK12F2
CHE12F1	OPT12F1	WAK12F3
CHE12F2	SIP12F1	WAK12F4

CHE12F3	SIP12F2	

Future Station needs

Construction has already begun at Greenacres, which has been needed for some time. Irvin is in design, and will be available as a distribution substation in outyears when needed. We already have property at Downtown East and West and also for Hillyard. We'll have a better idea after the spatial load forecast is complete on further property and corridor needs. The already identified additional feeder needs out of existing stations should be sufficient for the 5 year budget as identified now, again the spatial load forecasting tool may identify further work and help prioritize previously identified projects.

Appendix A - Planning Case Summary

2013 PLANNING ASSESSMENT

A.1 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. No planned transmission expansion project facilities. During previous studies, inclusion of non-committed planned transmission facilities has incorrectly hidden potential reliability and load-service requirements. Subsequently, a Corrective Action Plan was not developed as required.
- 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.
- Real and reactive load forecasts and resources required for load. Load forecasts for Network Customers and Point-to-Point Customers are requested at a Study Development Meeting as part of Avista's Transmission Planning Process. Typically, the BPA submits its forecast load information as a Network Customer to Avista for inclusion in the technical studies. Avista's Transmission Planning Group incorporates the forecasted load data for its Load Serving Entity ("Avista LSE") into the technical studies.
- Known commitments for Firm Transmission Service and Interchange. Modeling WECC Rated Paths at their limits represents all existing known commitments. Future commitments exceeding the limits of WECC Rated Paths are not presently studied.

The following scenarios are developed to represent various seasonal conditions:

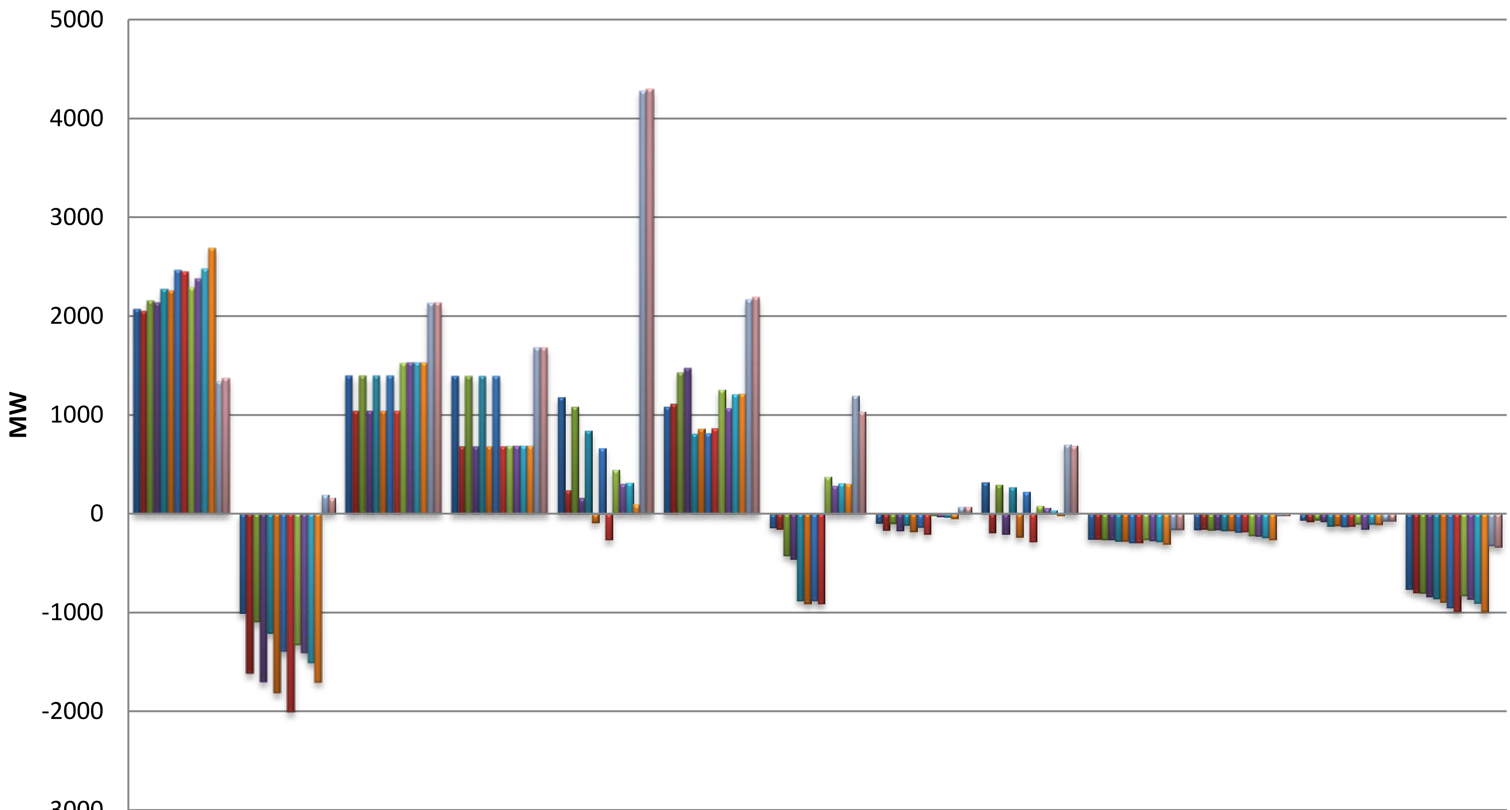
- Heavy Summer: typical summer peak scenario where the Avista Balancing Authority Area load is near peak and the local hydro generation is at a typical mid-summer output. This scenario represents Avista's heavy summer loading with moderate transfers into Avista's Balancing Authority Area. This scenario is limited by the summer thermal limits on various elements of the Transmission System, which helps to define where the System is near capacity.

  - Year two (next year, i.e. 2014 case if case is created and used in 2013).
  - Year five
  - Year ten

- Heavy Summer with Low Local Hydro Generation (Heavy Summer, Low Hydro case): 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.
  - Year two (next year, i.e. 2014 case if case is created and used in 2013).
  - Year five
  - Year ten
- Heavy Winter: typical winter peak scenario where the Avista Balancing Authority Area load is heavy but the lower ambient temperature increases the operating limits of the various elements of the Transmission System. Local hydro generation is at a moderate level and there are significant transfers into Avista's Balancing Authority Area from regional thermal resources.
  - Year two (next year, i.e. 2014 case if case is created and used in 2013).
  - Year five
  - Year ten
- Light Summer with High West of Hatwai Flows (High Transfer case): during light summer (night time loading) with high Western Montana Hydro and high Montana thermal generation, the WECC rated path "West of Hatwai" (WECC Path #6) reaches its heaviest loading. During this scenario, portions of the Transmission System are nearing their stability limits. These limits define some of the operating constraints for the region and also establish some of the arming levels for remedial action schemes (RAS). This scenario is also limited by the summer thermal limits on various elements of the transmission system, which helps to define where the system is near capacity.
  - Year two (next year, i.e. 2014 case if case is created and used in 2013).
  - Year five

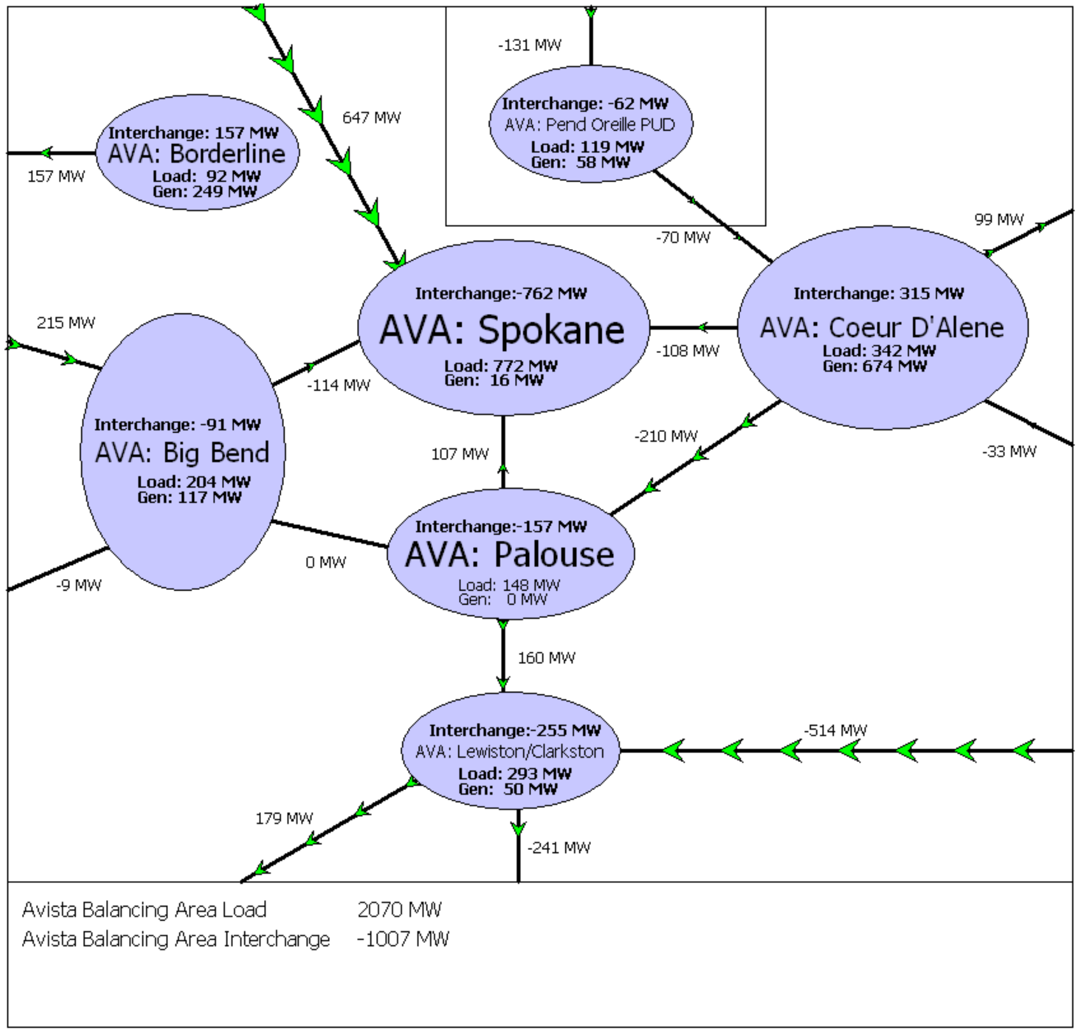
A.2 Planning Cases

2013 Planning Cases Summary



	Avista Balancing Area Load	Avista Balancing Area Interchange	Avista Generation	Western Montana Hydro	WEST OF HATWAI	MONTANA - NORTHWEST	IDAHO - NORTHWEST	Big Bend Area Interchange	Coeur d'Alene Area Interchange	Lewiston - Clarkston Area Interchange	Palouse Area Interchange	Pend Oreille Area Interchange	Spokane Area Interchange
14HSHH	2070	-1007	1397	1390	1180	1084	-139	-91	315	-255	-157	-62	-762
14HSLH	2051	-1618	1040	682	239	1113	-153	-163	-186	-253	-152	-76	-796
18HSHH	2155	-1090	1394	1390	1083	1425	-423	-99	295	-261	-163	-62	-803
18HSLH	2137	-1702	1038	682	159	1469	-454	-170	-207	-259	-158	-77	-838
23HSHH	2272	-1205	1396	1390	837	809	-876	-110	268	-275	-169	-126	-857
23HSLH	2255	-1818	1039	682	-88	859	-908	-181	-234	-273	-165	-118	-892
32HSHH	2465	-1393	1396	1390	664	814	-878	-130	221	-291	-182	-129	-948
32HSLH	2449	-2007	1039	682	-262	864	-909	-201	-281	-289	-178	-122	-983
14HW	2288	-1325	1523	688	442	1256	372	-15	80	-261	-219	-101	-825
18HW	2377	-1410	1524	688	300	1069	284	-24	58	-270	-227	-154	-861
23HW	2479	-1507	1527	688	309	1207	306	-31	34	-280	-238	-103	-903
32HW	2686	-1706	1527	688	93	1214	303	-47	-15	-303	-261	-106	-989
14HT	1340	191	2133	1680	4278	2167	1194	70	696	-158	-19	-68	-320
18HT	1372	161	2134	1680	4296	2189	1032	67	687	-159	-19	-69	-335

2014 Heavy Summer



WESTERN ELECTRICITY COORDINATING COUNCIL
2013 HS2-OP BASE CASE
NOVEMBER 30, 2012
[pre-title comments]
history file date Fri Nov 30 11:14:05 2012
present file date Fri Nov 30 12:52:44 2012
Version 18.1_01
[comments]
ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

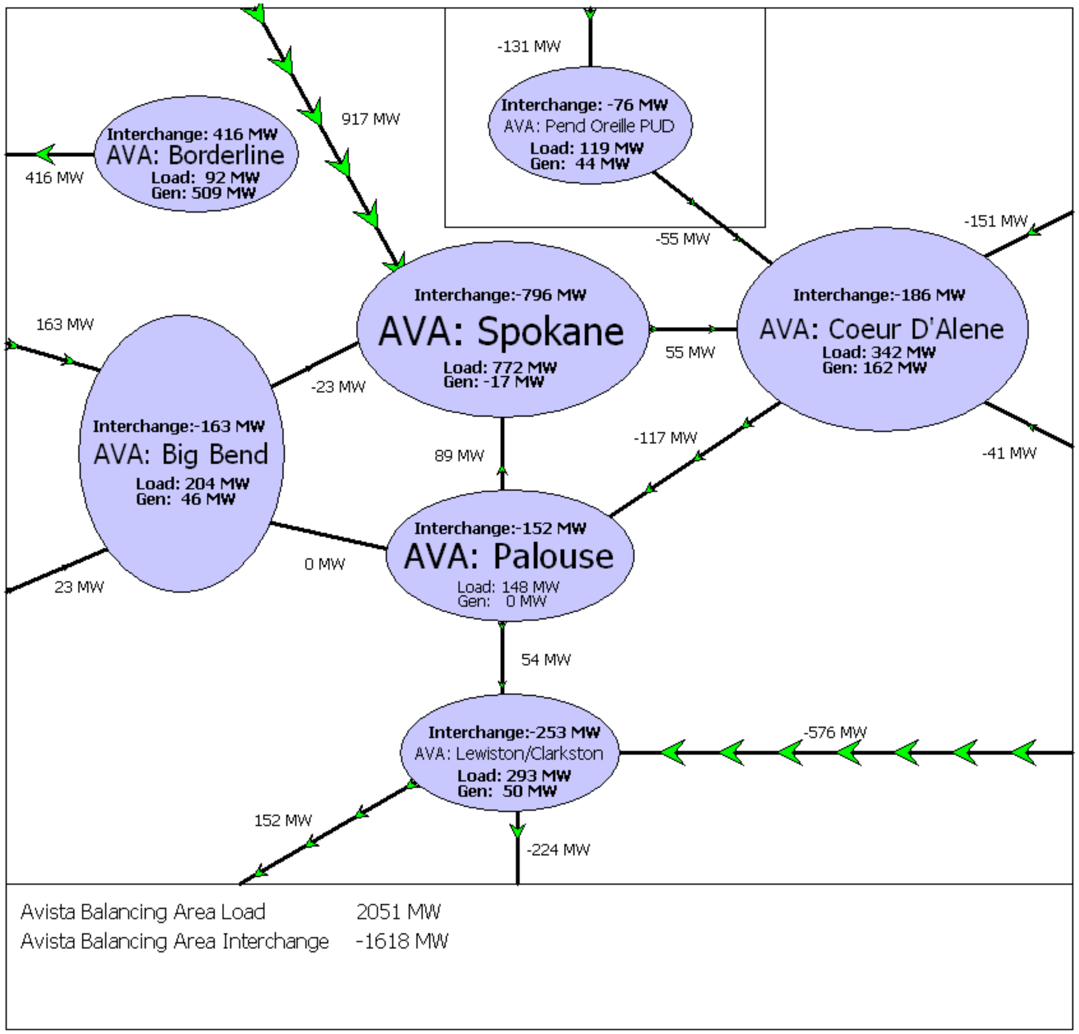
	Total Output	% of Max
Western Montana Hydro	1390.0 MW	72.82
Noxon Rapids (567 MW)	420.0 MW	71.62
Cabinet Gorge (276 MW)	240.0 MW	83.54
Libby (605MW)	540.0 MW	89.26
Hungry Horse (430MW)	190.0 MW	44.19
Spokane River	172.8 MW	83.05
Post Falls (18 MW)	9.8 MW	54.17
Upriver(22.6 MW)	11.5 MW	65.34
Monroe St. (15.6 MW)	10.5 MW	67.31
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	16.0 MW	65.84
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	13364.9 MW	62.42
Grand Coulee	4469.3 MW	65.26
Chief Joseph	1629.8 MW	62.51
Wells	648.0 MW	75.79
Rocky Reach	1110.0 MW	81.56
Rock Island	405.0 MW	60.09
Wanapum	852.4 MW	76.36
Priest Rapids	701.7 MW	69.75
McNary	637.9 MW	56.95
John Day	1107.8 MW	44.67
The Dalles	1125.3 MW	54
Bonneville	677.8 MW	53.8

	Total Output	% of Max
Pend Oreille River	693.0 MW	62.62
Boundary	635.0 MW	61.07
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	1468.0 MW	45.2
Dworshak (458MW)	224.3 MW	48.97
Lower Granite (930MW)	415.6 MW	44.69
Little Goose (930MW)	416.1 MW	44.74
Lower Monumental (930MW)	412.0 MW	44.3
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2267.6 MW	98.33
Avista Colstrip	241.1 MW	97.67%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	0.0 MW	0
Kettle Falls	0.0 MW	0
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1396.7 MW	
Total Hydro	832.8 MW	76.99
Total Thermal	508.1 MW	50.54%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1579.7 MW	
Avista Balancing Area Load	2070.0 MW	
Avista BA Loads w/o Losses	-2019.1 MW	
Avista BA Loss Percentage	0.0252	

Western Montana Hydro	1390.0 MW
Noxon Rapids (586MW)	420.0 MW
Cabinet Gorge (271MW)	240.0 MW
Libby (605MW)	540.0 MW
Hungry Horse (430MW)	190.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	802.6 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	172.8 MW
Boundary Hydro (1040MW)	635.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	224.3 MW
Lower Granite (930MW)	415.6 MW
Little Goose (930MW)	416.1 MW
Lower Monumental (930MW)	412.0 MW
Coulee Generation	
Coulee 500 kV	3391.0 MW
Coulee 230 kV	1078.4 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	1179.7 MW
Lolo-Oxbow 230kV	246.7 MW
Dry Creek-Walla Walla 230kV	165.4 MW
West of Cabinet	2017.6 MW
Montana-Northwest (Path 8)	1084.4 MW
Idaho-Northwest (Path 14)	-138.6 MW
Midpoint-Summer Lake (Path 75)	182.7 MW
Idaho-Montana (Path 18)	-275.1 MW
South of Boundary	631.6 MW
North of John Day (Path 73)	7229.7 MW
TOT 4A (Path 37)	406.0 MW
Miles City DC	142.0 MW
Path C (Path 20)	-797.2 MW
Borah West (Path 17)	797.8 MW
Bridger West (Path 19)	2155.0 MW
Pacific AC Intertie (Path 66)	3855.6 MW
Pacific DC Intertie (Path 65)	2979.4 MW
Northwest Load	24977.4 MW
Idaho Load	3382.2 MW
Montana Load	1819.2 MW
Avista Native Load	-1579.7 MW
Avista Balancing Area Load	2070.0 MW
Clearwater Load	58.2 MW

2014 Heavy Summer, Low Hydro



WESTERN ELECTRICITY COORDINATING COUNCIL
2013 HS2-OP BASE CASE
NOVEMBER 30, 2012
[pre-title comments]
history file date Fri Nov 30 11:14:05 2012
present file date Fri Nov 30 12:52:44 2012
Version 18.1_01
[comments]
ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

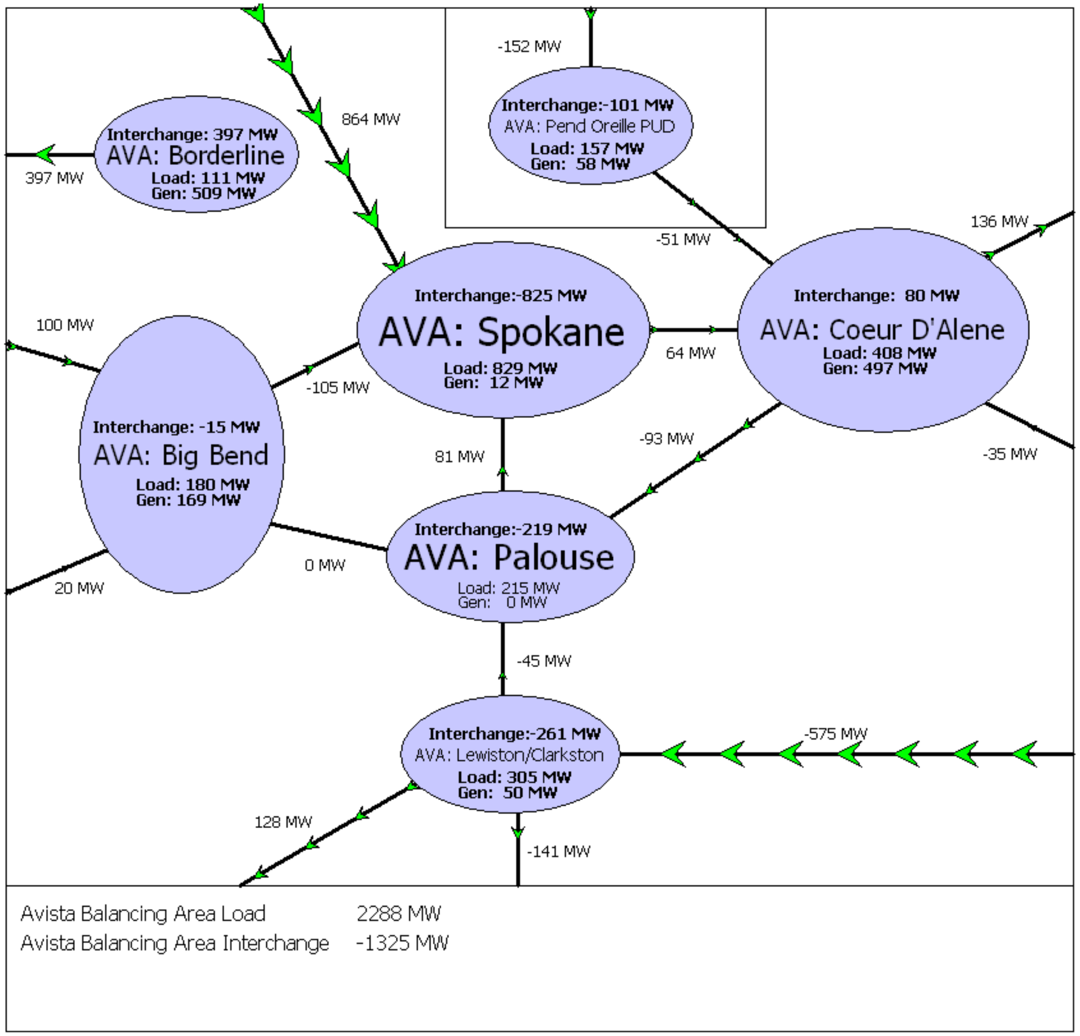
	Total Output	% of Max
Western Montana Hydro	682.0 MW	35.73
Noxon Rapids (567 MW)	100.0 MW	17.05
Cabinet Gorge (276 MW)	55.0 MW	19.14
Libby (605MW)	432.0 MW	71.4
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	16.8 MW	8.05
Post Falls (18 MW)	2.3 MW	12.5
Upriver(22.6 MW)	3.0 MW	17.05
Monroe St. (15.6 MW)	0.0 MW	0
Upper Falls (10.2 MW)	4.5 MW	44.12
Nine Mile (24.3 MW)	7.0 MW	28.81
Long Lake (88 MW)	0.0 MW	0
Little Falls (32 MW)	0.0 MW	0
Columbia River	14138.0 MW	66.03
Grand Coulee	5242.5 MW	76.55
Chief Joseph	1629.8 MW	62.51
Wells	648.0 MW	75.79
Rocky Reach	1110.0 MW	81.56
Rock Island	405.0 MW	60.09
Wanapum	852.4 MW	76.36
Priest Rapids	701.7 MW	69.75
McNary	637.9 MW	56.95
John Day	1107.8 MW	44.67
The Dalles	1125.3 MW	54
Bonneville	677.8 MW	53.8

	Total Output	% of Max
Pend Oreille River	493.5 MW	44.6
Boundary	450.0 MW	43.28
Box Canyon	43.5 MW	65.12
Lower Snake/N.F. Clearwater	1468.0 MW	45.2
Dworshak (458MW)	224.3 MW	48.97
Lower Granite (930MW)	415.6 MW	44.69
Little Goose (930MW)	416.1 MW	44.74
Lower Monumental (930MW)	412.0 MW	44.3
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2262.5 MW	98.12
Avista Colstrip	240.4 MW	97.36%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1039.9 MW	
Total Hydro	171.8 MW	15.88
Total Thermal	812.4 MW	80.80%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1579.7 MW	
Avista Balancing Area Load	2050.7 MW	
Avista BA Loads w/o Losses	-2019.1 MW	
Avista BA Loss Percentage	0.0156	

Western Montana Hydro	682.0 MW
Noxon Rapids (586MW)	100.0 MW
Cabinet Gorge (271MW)	55.0 MW
Libby (605MW)	432.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	797.5 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	16.8 MW
Boundary Hydro (1040MW)	450.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	224.3 MW
Lower Granite (930MW)	415.6 MW
Little Goose (930MW)	416.1 MW
Lower Monumental (930MW)	412.0 MW
Coulee Generation	
Coulee 500 kV	4164.1 MW
Coulee 230 kV	1078.4 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	239.1 MW
Lolo-Oxbow 230kV	229.4 MW
Dry Creek-Walla Walla 230kV	139.4 MW
West of Cabinet	1356.0 MW
Montana-Northwest (Path 8)	1112.8 MW
Idaho-Northwest (Path 14)	-152.6 MW
Midpoint-Summer Lake (Path 75)	157.9 MW
Idaho-Montana (Path 18)	-253.8 MW
South of Boundary	448.9 MW
North of John Day (Path 73)	7055.8 MW
TOT 4A (Path 37)	403.9 MW
Miles City DC	142.0 MW
Path C (Path 20)	-791.6 MW
Borah West (Path 17)	782.1 MW
Bridger West (Path 19)	2154.4 MW
Pacific AC Intertie (Path 66)	3868.7 MW
Pacific DC Intertie (Path 65)	2979.4 MW
Northwest Load	24977.4 MW
Idaho Load	3382.2 MW
Montana Load	1819.2 MW
Avista Native Load	-1579.7 MW
Avista Balancing Area Load	2050.7 MW
Clearwater Load	58.2 MW

2014 Heavy Winter



WESTERN ELECTRICITY COORDINATING COUNCIL
2012-13 HW2 OPERATING CASE
May 24, 2012
[pre-title comments]
history file date Thu Aug 23 15:02:49 2012
present file date Thu Aug 23 15:03:09 2012
Version 18.0_01
[comments]
ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Winter Dispatch

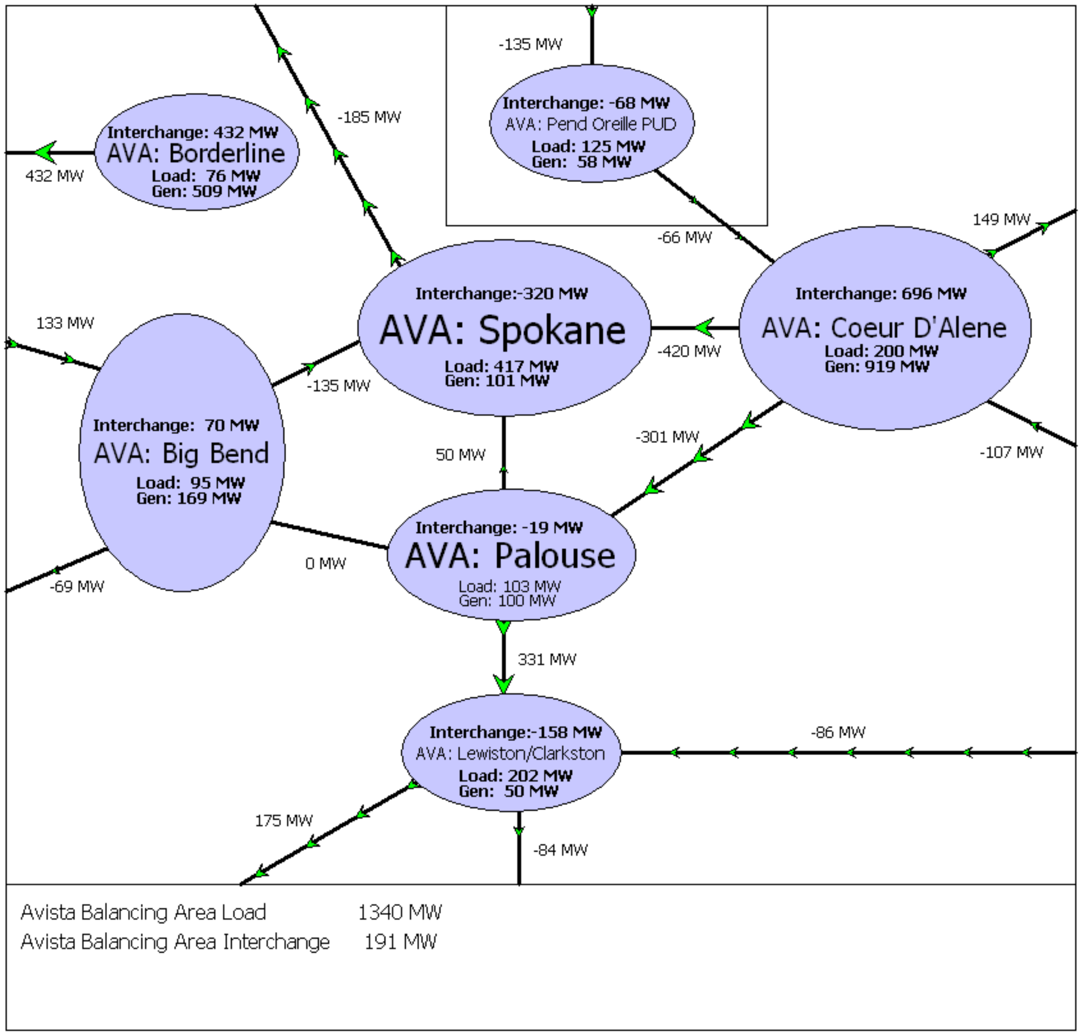
	Total Output	% of Max
Western Montana Hydro	688.0 MW	36.05
Noxon Rapids (567 MW)	300.0 MW	51.16
Cabinet Gorge (276 MW)	185.0 MW	64.39
Libby (605MW)	108.0 MW	17.85
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	167.0 MW	80.29
Post Falls (18 MW)	7.5 MW	41.67
Upriver(22.6 MW)	6.5 MW	36.93
Monroe St. (15.6 MW)	14.0 MW	89.74
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	14.0 MW	57.61
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	18282.1 MW	85.46
Grand Coulee	6494.8 MW	94.84
Chief Joseph	2185.2 MW	83.82
Wells	576.0 MW	67.37
Rocky Reach	988.0 MW	72.22
Rock Island	401.5 MW	59.57
Wanapum	852.4 MW	78.21
Priest Rapids	787.7 MW	78.3
McNary	924.9 MW	82.58
John Day	2216.0 MW	89.36
The Dalles	1776.4 MW	85.24
Bonneville	1079.1 MW	85.66

	Total Output	% of Max
Pend Oreille River	723.0 MW	65.34
Boundary	665.0 MW	63.95
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	1641.7 MW	50.54
Dworshak (458MW)	316.0 MW	68.98
Lower Granite (930MW)	415.6 MW	44.69
Little Goose (930MW)	416.1 MW	44.74
Lower Monumental (930MW)	494.0 MW	53.12
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2239.1 MW	97.1
Avista Colstrip	236.9 MW	95.93%
Coyote Springs I	247.8 MW	100
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1523.4 MW	
Total Hydro	652.0 MW	60.28
Total Thermal	815.9 MW	81.15%
Total Other	55.5 MW	61.74
Avista Native Load w/o Losses	-1722.0 MW	
Avista Balancing Area Load	2287.8 MW	
Avista BA Loads w/o Losses	-2255.7 MW	
Avista BA Loss Percentage	0.0142	

Western Montana Hydro	688.0 MW
Noxon Rapids (586MW)	300.0 MW
Cabinet Gorge (271MW)	185.0 MW
Libby (605MW)	108.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	774.1 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	167.0 MW
Boundary Hydro (1040MW)	665.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	316.0 MW
Lower Granite (930MW)	415.6 MW
Little Goose (930MW)	416.1 MW
Lower Monumental (930MW)	494.0 MW
Coulee Generation	
Coulee 500 kV	4544.0 MW
Coulee 230 kV	1950.8 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	441.8 MW
Lolo-Oxbow 230kV	142.7 MW
Dry Creek-Walla Walla 230kV	110.7 MW
West of Cabinet	1327.6 MW
Montana-Northwest (Path 8)	1256.2 MW
Idaho-Northwest (Path 14)	371.8 MW
Midpoint-Summer Lake (Path 75)	548.3 MW
Idaho-Montana (Path 18)	-103.1 MW
South of Boundary	662.6 MW
North of John Day (Path 73)	5182.2 MW
TOT 4A (Path 37)	349.2 MW
Miles City DC	146.0 MW
Path C (Path 20)	-101.1 MW
Borah West (Path 17)	1270.7 MW
Bridger West (Path 19)	2131.7 MW
Pacific AC Intertie (Path 66)	3226.2 MW
Pacific DC Intertie (Path 65)	2500.1 MW
Northwest Load	30739.1 MW
Idaho Load	2548.8 MW
Montana Load	1925.1 MW
Avista Native Load	-1722.0 MW
Avista Balancing Area Load	2287.8 MW
Clearwater Load	58.2 MW

2014 High Transfer



WESTERN ELECTRICITY COORDINATING COUNCIL
2013 LS1 OPERATING CASE
NOVEMBER 15, 2012
[pre-title comments]
history file date Fri Nov 16 08:53:42 2012
present file date Fri Nov 16 10:28:15 2012
Version 18.1_01
[comments]
ALL COMMENTS FROM TSS AND OC REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to High Transfer Dispatch

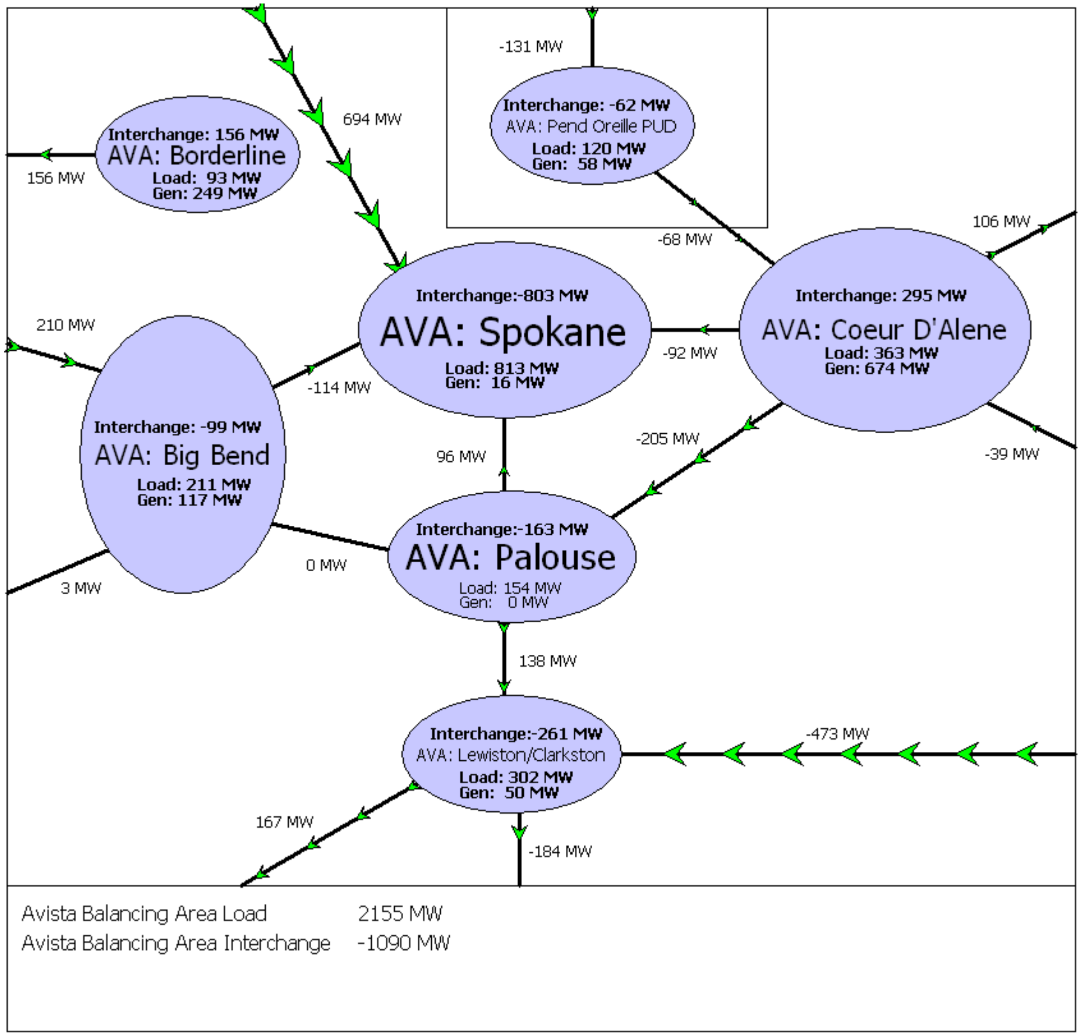
	Total Output	% of Max
Western Montana Hydro	1680.0 MW	88.02
Noxon Rapids (567 MW)	520.0 MW	88.68
Cabinet Gorge (276 MW)	240.0 MW	83.54
Libby (605MW)	540.0 MW	89.26
Hungry Horse (430MW)	380.0 MW	88.37
Spokane River	183.8 MW	88.34
Post Falls (18 MW)	14.3 MW	79.17
Upriver(22.6 MW)	14.5 MW	82.39
Monroe St. (15.6 MW)	14.0 MW	89.74
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	16.0 MW	65.84
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	4168.7 MW	19.47
Grand Coulee	781.6 MW	11.41
Chief Joseph	230.2 MW	8.83
Wells	504.0 MW	58.95
Rocky Reach	175.0 MW	12.86
Rock Island	212.0 MW	31.45
Wanapum	378.7 MW	33.92
Priest Rapids	263.1 MW	26.16
McNary	351.8 MW	31.41
John Day	554.2 MW	22.35
The Dalles	396.2 MW	19.01
Bonneville	321.9 MW	25.55

	Total Output	% of Max
Pend Oreille River	1033.0 MW	93.35
Boundary	975.0 MW	93.77
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	867.0 MW	26.69
Dworshak (458MW)	315.9 MW	68.98
Lower Granite (930MW)	138.5 MW	14.9
Little Goose (930MW)	139.0 MW	14.95
Lower Monumental (930MW)	273.5 MW	29.41
Area Thermal		
Boulder	24.0 MW	97.56
Colstrip	2227.3 MW	96.59
Avista Colstrip	235.1 MW	95.22%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	140.0 MW	91.15
Avista Generation w/o Mid C	2132.7 MW	
Total Hydro	943.8 MW	87.25
Total Thermal	1033.1 MW	102.76%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-939.3 MW	
Avista Balancing Area Load	1339.5 MW	
Avista BA Loads w/o Losses	-1267.3 MW	
Avista BA Loss Percentage	0.057	

Western Montana Hydro	1680.0 MW
Noxon Rapids (586MW)	520.0 MW
Cabinet Gorge (271MW)	240.0 MW
Libby (605MW)	540.0 MW
Hungry Horse (430MW)	380.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	762.3 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	140.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	183.8 MW
Boundary Hydro (1040MW)	975.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	315.9 MW
Lower Granite (930MW)	138.5 MW
Little Goose (930MW)	139.0 MW
Lower Monumental (930MW)	273.5 MW
Coulee Generation	
Coulee 500 kV	461.6 MW
Coulee 230 kV	320.0 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	4278.5 MW
Lolo-Oxbow 230kV	85.0 MW
Dry Creek-Walla Walla 230kV	164.1 MW
West of Cabinet	3491.9 MW
Montana-Northwest (Path 8)	2167.2 MW
Idaho-Northwest (Path 14)	1194.4 MW
Midpoint-Summer Lake (Path 75)	1061.2 MW
Idaho-Montana (Path 18)	-149.5 MW
South of Boundary	970.1 MW
North of John Day (Path 73)	4219.2 MW
TOT 4A (Path 37)	475.3 MW
Miles City DC	138.0 MW
Path C (Path 20)	-328.2 MW
Borah West (Path 17)	1614.9 MW
Bridger West (Path 19)	2216.6 MW
Pacific AC Intertie (Path 66)	2931.6 MW
Pacific DC Intertie (Path 65)	1999.2 MW
Northwest Load	16784.5 MW
Idaho Load	2214.5 MW
Montana Load	1100.0 MW
Avista Native Load	-939.3 MW
Avista Balancing Area Load	1339.5 MW
Clearwater Load	58.2 MW

2018 Heavy Summer



WESTERN ELECTRICITY COORDINATING COUNCIL
2018 HS2 BASE CASE
JULY 19, 2012
[pre-title comments]
history file date Thu Jul 19 15:26:15 2012
present file date Thu Jul 19 15:26:24 2012
Version 18.0_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

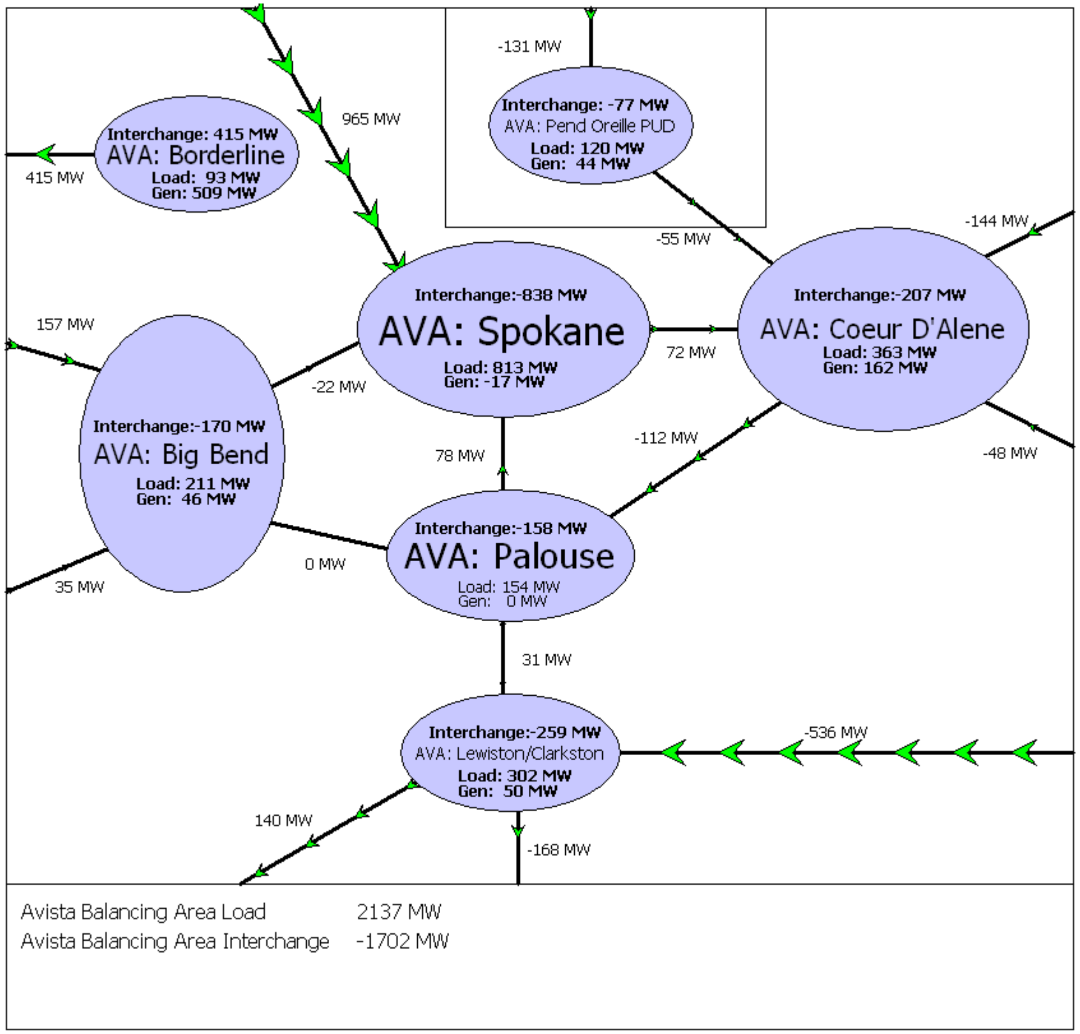
	Total Output	% of Max
Western Montana Hydro	1390.0 MW	72.82
Noxon Rapids (567 MW)	420.0 MW	71.62
Cabinet Gorge (276 MW)	240.0 MW	83.54
Libby (605MW)	540.0 MW	89.26
Hungry Horse (430MW)	190.0 MW	44.19
Spokane River	172.8 MW	83.05
Post Falls (18 MW)	9.8 MW	54.17
Upriver(22.6 MW)	11.5 MW	65.34
Monroe St. (15.6 MW)	10.5 MW	67.31
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	16.0 MW	65.84
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	14323.9 MW	66.94
Grand Coulee	4480.6 MW	65.43
Chief Joseph	2062.0 MW	79.09
Wells	576.0 MW	67.37
Rocky Reach	985.0 MW	72.37
Rock Island	388.0 MW	57.57
Wanapum	852.4 MW	77.27
Priest Rapids	700.0 MW	69.58
McNary	650.0 MW	58.04
John Day	1500.0 MW	60.48
The Dalles	1294.5 MW	62.12
Bonneville	835.3 MW	66.3

	Total Output	% of Max
Pend Oreille River	693.0 MW	62.62
Boundary	635.0 MW	61.07
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	1041.4 MW	32.06
Dworshak (458MW)	181.4 MW	39.61
Lower Granite (930MW)	310.0 MW	33.33
Little Goose (930MW)	310.0 MW	33.33
Lower Monumental (930MW)	240.0 MW	25.81
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2251.1 MW	97.62
Avista Colstrip	238.7 MW	96.67%
Coyote Springs I	220.0 MW	87.03
Coyote Springs II	0.0 MW	0
Kettle Falls	0.0 MW	0
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1394.2 MW	
Total Hydro	832.8 MW	76.99
Total Thermal	505.7 MW	50.30%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1642.9 MW	
Avista Balancing Area Load	2155.2 MW	
Avista BA Loads w/o Losses	-2105.0 MW	
Avista BA Loss Percentage	0.0238	

Western Montana Hydro	1390.0 MW
Noxon Rapids (586MW)	420.0 MW
Cabinet Gorge (271MW)	240.0 MW
Libby (605MW)	540.0 MW
Hungry Horse (430MW)	190.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	786.1 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	172.8 MW
Boundary Hydro (1040MW)	635.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	181.4 MW
Lower Granite (930MW)	310.0 MW
Little Goose (930MW)	310.0 MW
Lower Monumental (930MW)	240.0 MW
Coulee Generation	
Coulee 500 kV	2752.6 MW
Coulee 230 kV	1728.0 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	1082.5 MW
Lolo-Oxbow 230kV	187.3 MW
Dry Creek-Walla Walla 230kV	152.4 MW
West of Cabinet	1988.8 MW
Montana-Northwest (Path 8)	1425.2 MW
Idaho-Northwest (Path 14)	-422.7 MW
Midpoint-Summer Lake (Path 75)	367.9 MW
Idaho-Montana (Path 18)	-247.3 MW
South of Boundary	632.7 MW
North of John Day (Path 73)	6342.9 MW
TOT 4A (Path 37)	474.3 MW
Miles City DC	144.0 MW
Path C (Path 20)	-600.1 MW
Borah West (Path 17)	798.9 MW
Bridger West (Path 19)	1818.9 MW
Pacific AC Intertie (Path 66)	3419.6 MW
Pacific DC Intertie (Path 65)	2800.8 MW
Northwest Load	26326.8 MW
Idaho Load	3841.3 MW
Montana Load	1894.7 MW
Avista Native Load	-1642.9 MW
Avista Balancing Area Load	2155.2 MW
Clearwater Load	58.2 MW

2018 Heavy Summer, Low Hydro



WESTERN ELECTRICITY COORDINATING COUNCIL
2018 HS2 BASE CASE
JULY 19, 2012
[pre-title comments]
history file date Thu Jul 19 15:26:15 2012
present file date Thu Jul 19 15:26:24 2012
Version 18.0_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

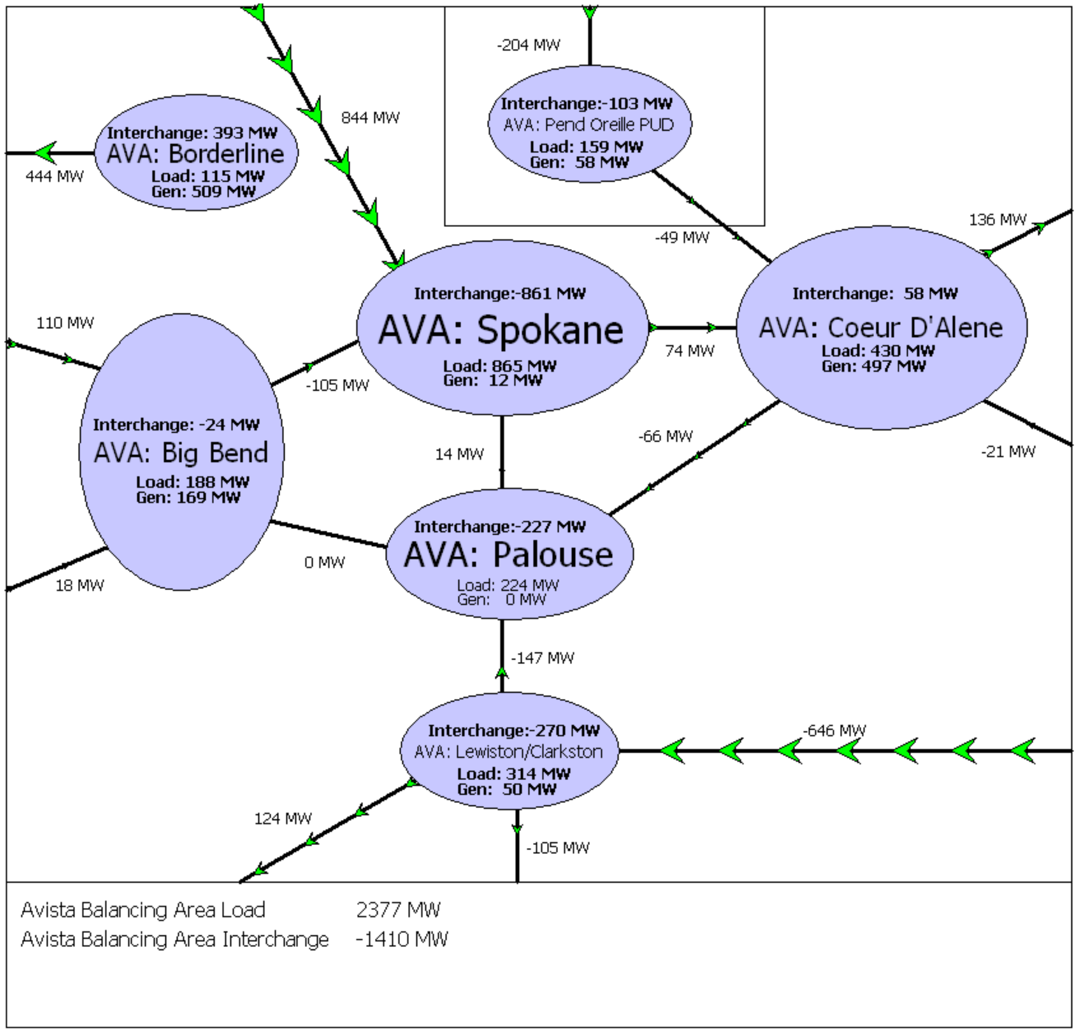
	Total Output	% of Max
Western Montana Hydro	682.0 MW	35.73
Noxon Rapids (567 MW)	100.0 MW	17.05
Cabinet Gorge (276 MW)	55.0 MW	19.14
Libby (605MW)	432.0 MW	71.4
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	16.8 MW	8.05
Post Falls (18 MW)	2.3 MW	12.5
Upriver(22.6 MW)	3.0 MW	17.05
Monroe St. (15.6 MW)	0.0 MW	0
Upper Falls (10.2 MW)	4.5 MW	44.12
Nine Mile (24.3 MW)	7.0 MW	28.81
Long Lake (88 MW)	0.0 MW	0
Little Falls (32 MW)	0.0 MW	0
Columbia River	15103.8 MW	70.58
Grand Coulee	5260.5 MW	76.82
Chief Joseph	2062.0 MW	79.09
Wells	576.0 MW	67.37
Rocky Reach	985.0 MW	72.37
Rock Island	388.0 MW	57.57
Wanapum	852.4 MW	77.27
Priest Rapids	700.0 MW	69.58
McNary	650.0 MW	58.04
John Day	1500.0 MW	60.48
The Dalles	1294.5 MW	62.12
Bonneville	835.3 MW	66.3

	Total Output	% of Max
Pend Oreille River	493.5 MW	44.6
Boundary	450.0 MW	43.28
Box Canyon	43.5 MW	65.12
Lower Snake/N.F. Clearwater	1041.4 MW	32.06
Dworshak (458MW)	181.4 MW	39.61
Lower Granite (930MW)	310.0 MW	33.33
Little Goose (930MW)	310.0 MW	33.33
Lower Monumental (930MW)	240.0 MW	25.81
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2247.9 MW	97.48
Avista Colstrip	238.2 MW	96.47%
Coyote Springs I	220.0 MW	87.03
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1037.7 MW	
Total Hydro	171.8 MW	15.88
Total Thermal	810.2 MW	80.58%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1642.9 MW	
Avista Balancing Area Load	2137.0 MW	
Avista BA Loads w/o Losses	-2105.0 MW	
Avista BA Loss Percentage	0.0152	

Western Montana Hydro	682.0 MW
Noxon Rapids (586MW)	100.0 MW
Cabinet Gorge (271MW)	55.0 MW
Libby (605MW)	432.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	782.9 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	16.8 MW
Boundary Hydro (1040MW)	450.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	181.4 MW
Lower Granite (930MW)	310.0 MW
Little Goose (930MW)	310.0 MW
Lower Monumental (930MW)	240.0 MW
Coulee Generation	
Coulee 500 kV	3532.5 MW
Coulee 230 kV	1728.0 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	159.3 MW
Lolo-Oxbow 230kV	170.6 MW
Dry Creek-Walla Walla 230kV	126.5 MW
West of Cabinet	1348.1 MW
Montana-Northwest (Path 8)	1469.4 MW
Idaho-Northwest (Path 14)	-454.3 MW
Midpoint-Summer Lake (Path 75)	350.6 MW
Idaho-Montana (Path 18)	-225.2 MW
South of Boundary	448.7 MW
North of John Day (Path 73)	6187.5 MW
TOT 4A (Path 37)	459.9 MW
Miles City DC	144.0 MW
Path C (Path 20)	-603.0 MW
Borah West (Path 17)	789.0 MW
Bridger West (Path 19)	1814.4 MW
Pacific AC Intertie (Path 66)	3440.0 MW
Pacific DC Intertie (Path 65)	2800.8 MW
Northwest Load	26326.8 MW
Idaho Load	3841.3 MW
Montana Load	1894.7 MW
Avista Native Load	-1642.9 MW
Avista Balancing Area Load	2137.0 MW
Clearwater Load	58.2 MW

2018 Heavy Winter



WESTERN ELECTRICITY COORDINATING COUNCIL
2017-18 HW2 BASE CASE
JANUARY 30, 2013
[pre-title comments]
history file date Wed Jan 30 13:44:28 2013
present file date Wed Jan 30 15:10:02 2013
Version 18.1_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Winter Dispatch

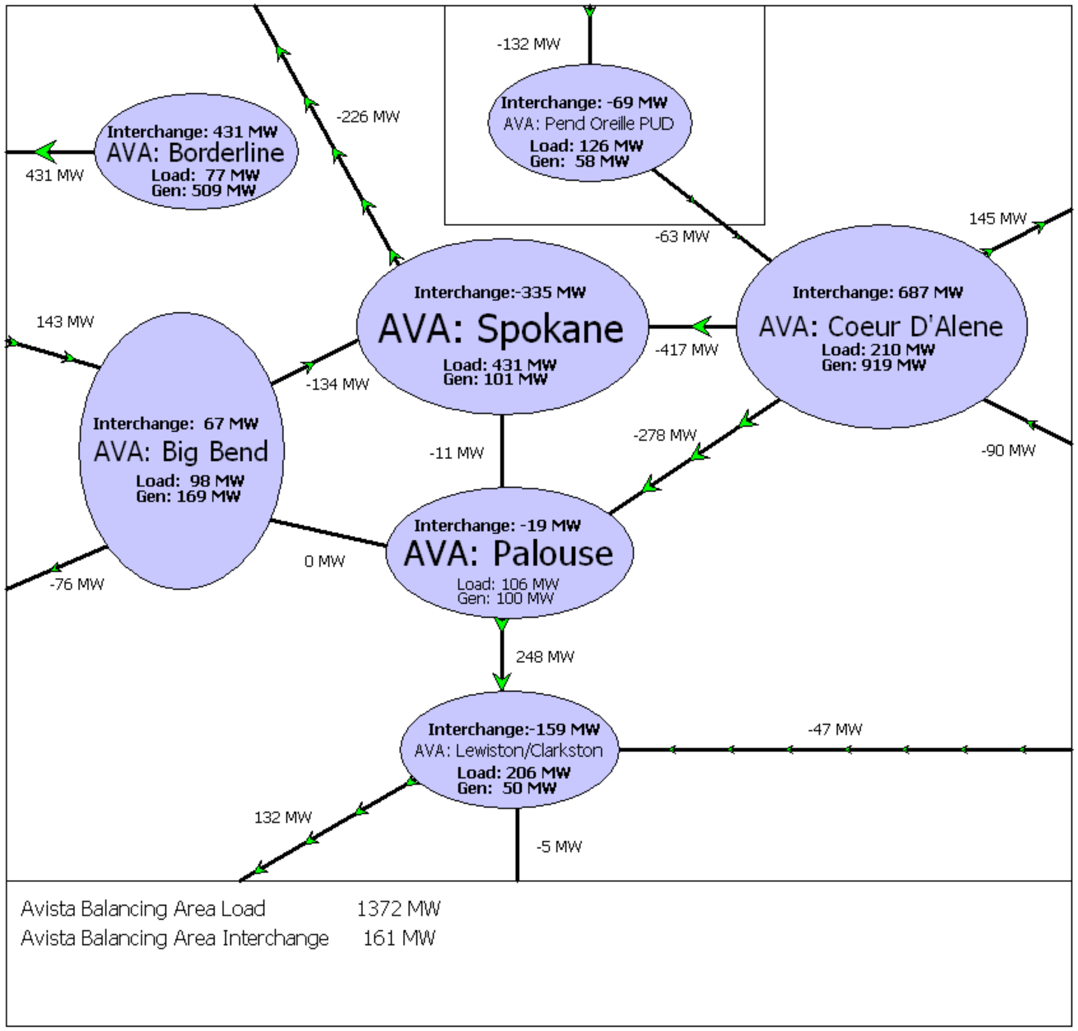
	Total Output	% of Max
Western Montana Hydro	688.0 MW	36.05
Noxon Rapids (567 MW)	300.0 MW	51.16
Cabinet Gorge (276 MW)	185.0 MW	64.39
Libby (605MW)	108.0 MW	17.85
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	167.0 MW	80.29
Post Falls (18 MW)	7.5 MW	41.67
Upriver(22.6 MW)	6.5 MW	36.93
Monroe St. (15.6 MW)	14.0 MW	89.74
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	14.0 MW	57.61
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	17153.6 MW	80.11
Grand Coulee	5861.5 MW	85.59
Chief Joseph	2185.2 MW	83.82
Wells	576.0 MW	67.37
Rocky Reach	819.0 MW	60.18
Rock Island	302.0 MW	44.81
Wanapum	947.4 MW	84.87
Priest Rapids	877.1 MW	87.19
McNary	924.9 MW	82.58
John Day	2042.4 MW	82.35
The Dalles	1610.0 MW	77.26
Bonneville	1008.1 MW	80.02

	Total Output	% of Max
Pend Oreille River	723.0 MW	63.99
Boundary	665.0 MW	63.95
Box Canyon	58.0 MW	64.44
Lower Snake/N.F. Clearwater	2719.8 MW	83.74
Dworshak (458MW)	408.0 MW	89.07
Lower Granite (930MW)	831.7 MW	89.43
Little Goose (930MW)	693.6 MW	74.58
Lower Monumental (930MW)	786.5 MW	84.57
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2240.7 MW	97.17
Avista Colstrip	237.1 MW	96.04%
Coyote Springs I	247.8 MW	96.42
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1523.6 MW	
Total Hydro	652.0 MW	60.28
Total Thermal	816.1 MW	81.17%
Total Other	55.5 MW	61.74
Avista Native Load w/o Losses	-1785.3 MW	
Avista Balancing Area Load	2377.1 MW	
Avista BA Loads w/o Losses	-2344.1 MW	
Avista BA Loss Percentage	0.0141	

Western Montana Hydro	688.0 MW
Noxon Rapids (586MW)	300.0 MW
Cabinet Gorge (271MW)	185.0 MW
Libby (605MW)	108.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	775.7 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	167.0 MW
Boundary Hydro (1040MW)	665.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	408.0 MW
Lower Granite (930MW)	831.7 MW
Little Goose (930MW)	693.6 MW
Lower Monumental (930MW)	786.5 MW
Coulee Generation	
Coulee 500 kV	4020.3 MW
Coulee 230 kV	1841.2 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	300.2 MW
Lolo-Oxbow 230kV	106.0 MW
Dry Creek-Walla Walla 230kV	103.5 MW
West of Cabinet	1126.4 MW
Montana-Northwest (Path 8)	1069.3 MW
Idaho-Northwest (Path 14)	284.4 MW
Midpoint-Summer Lake (Path 75)	356.9 MW
Idaho-Montana (Path 18)	-37.8 MW
South of Boundary	661.6 MW
North of John Day (Path 73)	3514.3 MW
TOT 4A (Path 37)	300.8 MW
Miles City DC	145.0 MW
Path C (Path 20)	-536.6 MW
Borah West (Path 17)	916.8 MW
Bridger West (Path 19)	2112.1 MW
Pacific AC Intertie (Path 66)	1176.1 MW
Pacific DC Intertie (Path 65)	1199.9 MW
Northwest Load	32951.9 MW
Idaho Load	2772.6 MW
Montana Load	1993.7 MW
Avista Native Load	-1785.3 MW
Avista Balancing Area Load	2377.1 MW
Clearwater Load	58.2 MW

2018 High Transfer



WESTERN ELECTRICITY COORDINATING COUNCIL
2016 LSP1-S BASE CASE
SEPTEMBER 4, 2012
[pre-title comments]
history file date Tue Sep 04 14:21:18 2012
present file date Tue Sep 04 14:56:57 2012
Version 18.0_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to High Transfer Dispatch

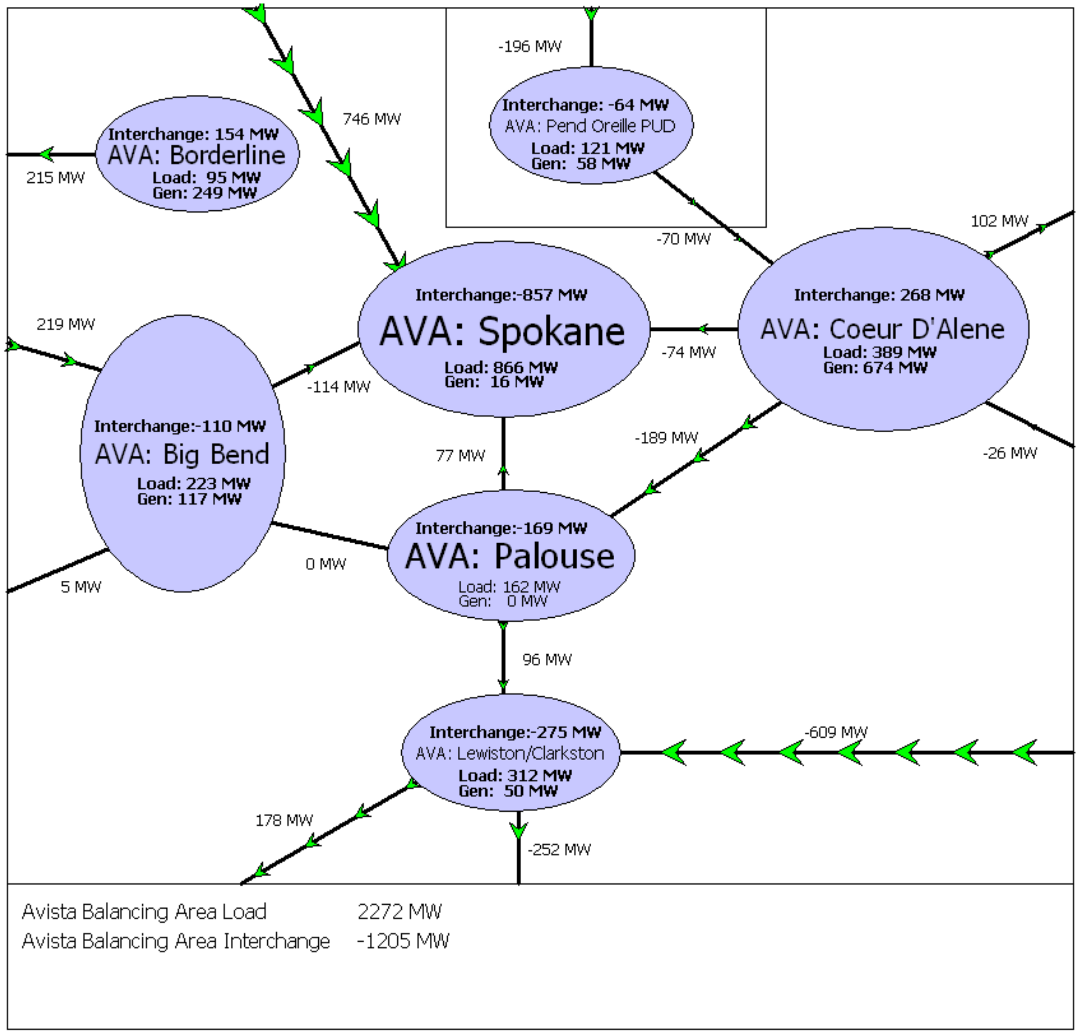
	Total Output	% of Max
Western Montana Hydro	1680.0 MW	88.02
Noxon Rapids (567 MW)	520.0 MW	88.68
Cabinet Gorge (276 MW)	240.0 MW	83.54
Libby (605MW)	540.0 MW	89.26
Hungry Horse (430MW)	380.0 MW	88.37
Spokane River	183.8 MW	88.34
Post Falls (18 MW)	14.3 MW	79.17
Upriver(22.6 MW)	14.5 MW	82.39
Monroe St. (15.6 MW)	14.0 MW	89.74
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	16.0 MW	65.84
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	4476.7 MW	20.92
Grand Coulee	946.0 MW	13.81
Chief Joseph	153.5 MW	5.89
Wells	432.0 MW	50.53
Rocky Reach	330.0 MW	24.25
Rock Island	164.0 MW	24.33
Wanapum	473.4 MW	42.91
Priest Rapids	350.8 MW	34.87
McNary	280.0 MW	25
John Day	831.2 MW	33.52
The Dalles	318.4 MW	15.28
Bonneville	197.3 MW	15.66

	Total Output	% of Max
Pend Oreille River	1033.0 MW	93.35
Boundary	975.0 MW	93.77
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	867.0 MW	26.69
Dworshak (458MW)	315.9 MW	68.98
Lower Granite (930MW)	138.5 MW	14.9
Little Goose (930MW)	139.0 MW	14.95
Lower Monumental (930MW)	273.5 MW	29.41
Area Thermal		
Boulder	24.0 MW	97.56
Colstrip	2159.5 MW	93.65
Avista Colstrip	236.9 MW	95.96%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	140.0 MW	91.15
Avista Generation w/o Mid C	2134.5 MW	
Total Hydro	943.8 MW	87.25
Total Thermal	1034.9 MW	102.94%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-966.1 MW	
Avista Balancing Area Load	1371.6 MW	
Avista BA Loads w/o Losses	-1304.7 MW	
Avista BA Loss Percentage	0.0512	

Western Montana Hydro	1680.0 MW
Noxon Rapids (586MW)	520.0 MW
Cabinet Gorge (271MW)	240.0 MW
Libby (605MW)	540.0 MW
Hungry Horse (430MW)	380.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	250.0 MW
Colstrip 3 (823MW)	774.5 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	140.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	183.8 MW
Boundary Hydro (1040MW)	975.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	315.9 MW
Lower Granite (930MW)	138.5 MW
Little Goose (930MW)	139.0 MW
Lower Monumental (930MW)	273.5 MW
Coulee Generation	
Coulee 500 kV	846.0 MW
Coulee 230 kV	100.0 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	4296.2 MW
Lolo-Oxbow 230kV	5.1 MW
Dry Creek-Walla Walla 230kV	121.4 MW
West of Cabinet	3486.3 MW
Montana-Northwest (Path 8)	2188.8 MW
Idaho-Northwest (Path 14)	1031.7 MW
Midpoint-Summer Lake (Path 75)	721.3 MW
Idaho-Montana (Path 18)	-132.4 MW
South of Boundary	928.2 MW
North of John Day (Path 73)	2269.0 MW
TOT 4A (Path 37)	521.4 MW
Miles City DC	136.0 MW
Path C (Path 20)	-349.6 MW
Borah West (Path 17)	797.1 MW
Bridger West (Path 19)	1767.9 MW
Pacific AC Intertie (Path 66)	782.5 MW
Pacific DC Intertie (Path 65)	1400.0 MW
Northwest Load	17558.6 MW
Idaho Load	2252.2 MW
Montana Load	1150.3 MW
Avista Native Load	-966.1 MW
Avista Balancing Area Load	1371.6 MW
Clearwater Load	58.2 MW

2023 Heavy Summer



WESTERN ELECTRICITY COORDINATING COUNCIL
2023 HS1 BASE CASE
OCTOBER 22, 2012
[pre-title comments]
history file date Mon Oct 22 07:33:48 2012
present file date Mon Oct 22 11:03:40 2012
Version 18.0_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

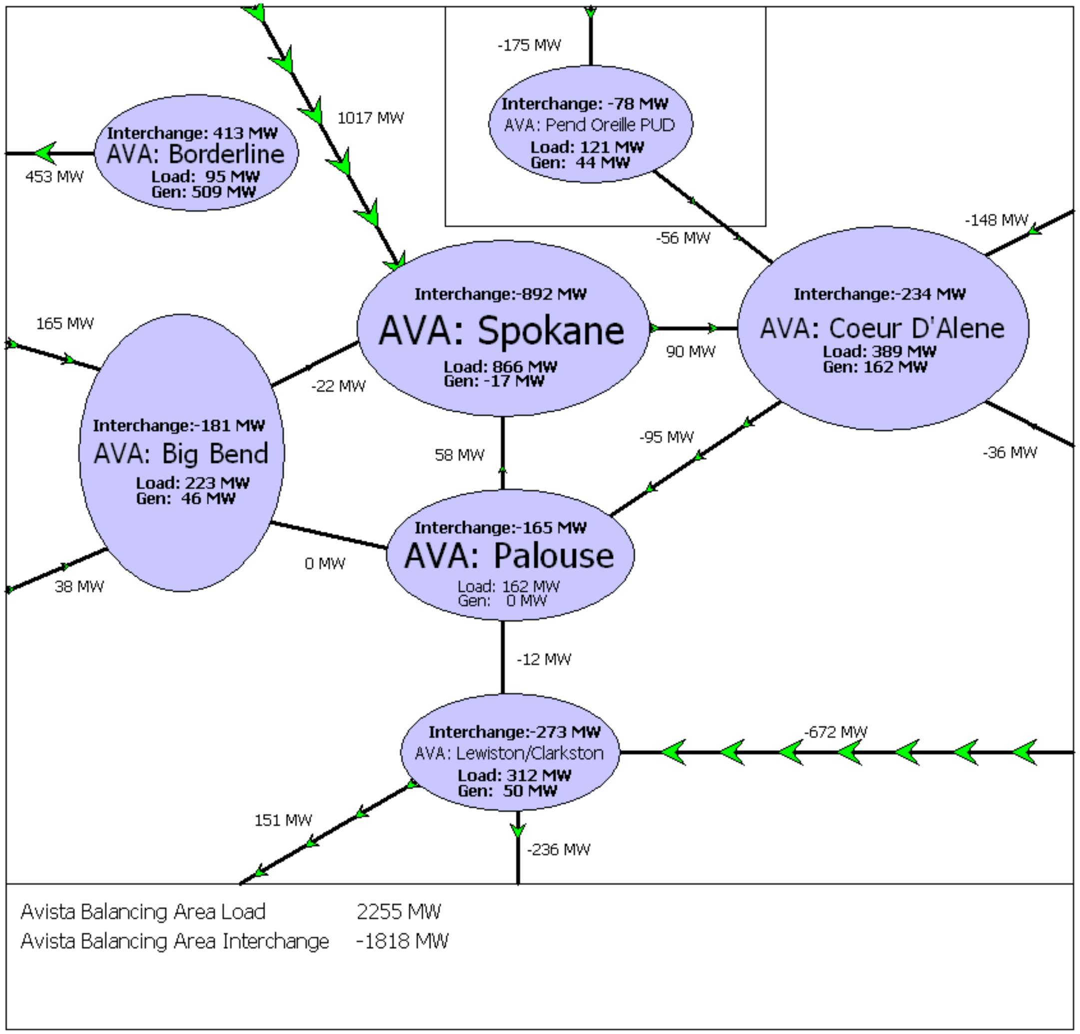
	Total Output	% of Max
Western Montana Hydro	1390.0 MW	72.82
Noxon Rapids (567 MW)	420.0 MW	71.62
Cabinet Gorge (276 MW)	240.0 MW	83.54
Libby (605MW)	540.0 MW	89.26
Hungry Horse (430MW)	190.0 MW	44.19
Spokane River	172.8 MW	83.05
Post Falls (18 MW)	9.8 MW	54.17
Upriver(22.6 MW)	11.5 MW	65.34
Monroe St. (15.6 MW)	10.5 MW	67.31
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	16.0 MW	65.84
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	16576.3 MW	77.47
Grand Coulee	5356.8 MW	78.22
Chief Joseph	2089.5 MW	80.15
Wells	576.0 MW	67.37
Rocky Reach	985.0 MW	72.37
Rock Island	388.0 MW	57.57
Wanapum	852.4 MW	77.27
Priest Rapids	700.0 MW	69.58
McNary	924.9 MW	82.58
John Day	2077.0 MW	83.75
The Dalles	1685.2 MW	80.86
Bonneville	941.3 MW	74.72

	Total Output	% of Max
Pend Oreille River	693.0 MW	62.31
Boundary	635.0 MW	61.07
Box Canyon	58.0 MW	80.11
Lower Snake/N.F. Clearwater	2461.8 MW	75.79
Dworshak (458MW)	408.0 MW	89.07
Lower Granite (930MW)	692.7 MW	74.48
Little Goose (930MW)	693.6 MW	74.58
Lower Monumental (930MW)	667.5 MW	71.78
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2262.4 MW	98.11
Avista Colstrip	240.4 MW	97.35%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	0.0 MW	0
Kettle Falls	0.0 MW	0
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1395.9 MW	
Total Hydro	832.8 MW	76.99
Total Thermal	507.4 MW	50.46%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1720.8 MW	
Avista Balancing Area Load	2272.2 MW	
Avista BA Loads w/o Losses	-2217.3 MW	
Avista BA Loss Percentage	0.0248	

Western Montana Hydro	1390.0 MW
Noxon Rapids (586MW)	420.0 MW
Cabinet Gorge (271MW)	240.0 MW
Libby (605MW)	540.0 MW
Hungry Horse (430MW)	190.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	797.4 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	172.8 MW
Boundary Hydro (1040MW)	635.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	408.0 MW
Lower Granite (930MW)	692.7 MW
Little Goose (930MW)	693.6 MW
Lower Monumental (930MW)	667.5 MW
Coulee Generation	
Coulee 500 kV	3515.7 MW
Coulee 230 kV	1841.2 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	837.0 MW
Lolo-Oxbow 230kV	259.0 MW
Dry Creek-Walla Walla 230kV	164.0 MW
West of Cabinet	1693.7 MW
Montana-Northwest (Path 8)	808.9 MW
Idaho-Northwest (Path 14)	-876.3 MW
Midpoint-Summer Lake (Path 75)	229.1 MW
Idaho-Montana (Path 18)	-260.2 MW
South of Boundary	632.3 MW
North of John Day (Path 73)	7432.5 MW
TOT 4A (Path 37)	467.4 MW
Miles City DC	143.0 MW
Path C (Path 20)	-607.5 MW
Borah West (Path 17)	747.3 MW
Bridger West (Path 19)	1860.1 MW
Pacific AC Intertie (Path 66)	3524.1 MW
Pacific DC Intertie (Path 65)	2603.8 MW
Northwest Load	27968.5 MW
Idaho Load	4089.1 MW
Montana Load	1967.5 MW
Avista Native Load	-1720.8 MW
Avista Balancing Area Load	2272.2 MW
Clearwater Load	58.2 MW

2023 Heavy Summer, Low Hydro



WESTERN ELECTRICITY COORDINATING COUNCIL
2023 HS1 BASE CASE
OCTOBER 22, 2012
[pre-title comments]
history file date Mon Oct 22 07:33:48 2012
present file date Mon Oct 22 11:03:40 2012
Version 18.0_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

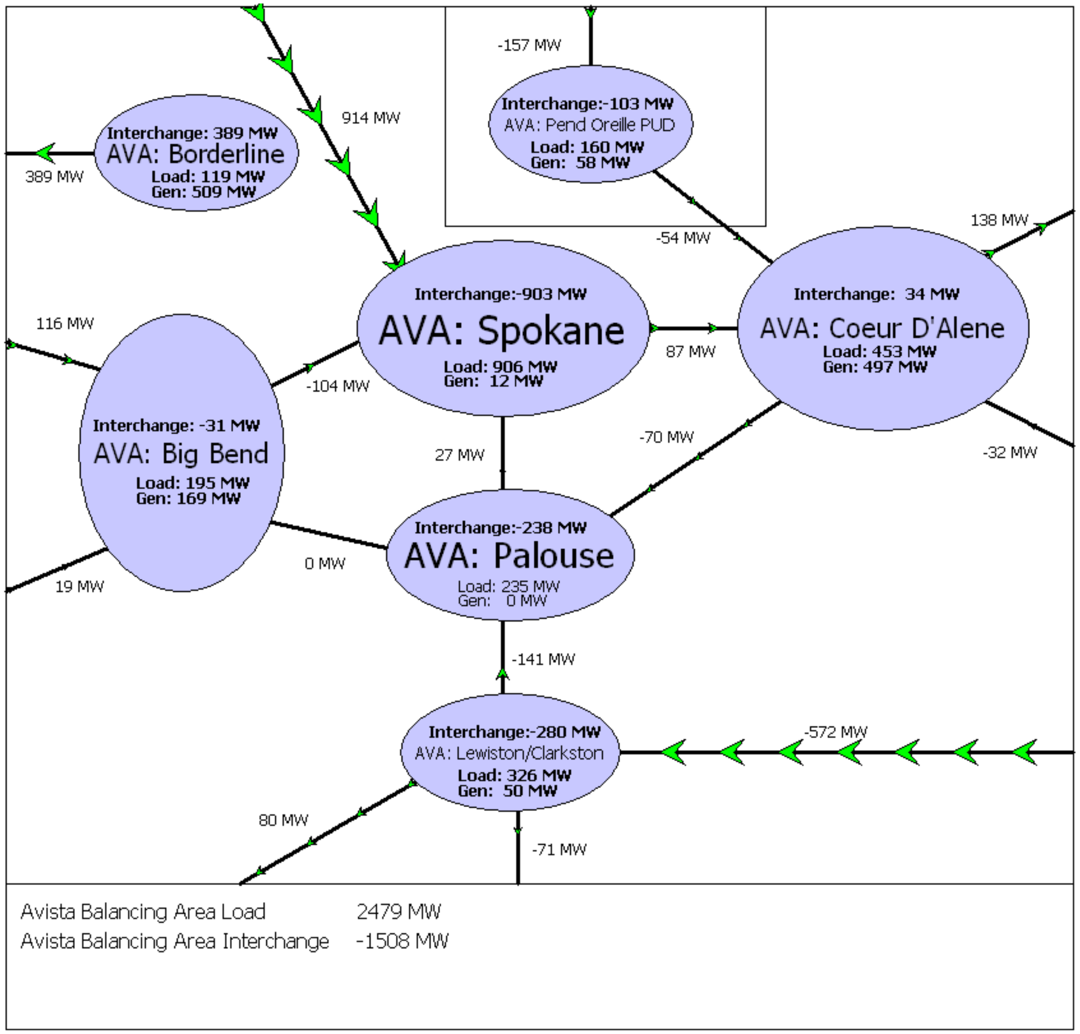
	Total Output	% of Max
Western Montana Hydro	682.0 MW	35.73
Noxon Rapids (567 MW)	100.0 MW	17.05
Cabinet Gorge (276 MW)	55.0 MW	19.14
Libby (605MW)	432.0 MW	71.4
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	16.8 MW	8.05
Post Falls (18 MW)	2.3 MW	12.5
Upriver(22.6 MW)	3.0 MW	17.05
Monroe St. (15.6 MW)	0.0 MW	0
Upper Falls (10.2 MW)	4.5 MW	44.12
Nine Mile (24.3 MW)	7.0 MW	28.81
Long Lake (88 MW)	0.0 MW	0
Little Falls (32 MW)	0.0 MW	0
Columbia River	17359.0 MW	81.12
Grand Coulee	6139.6 MW	89.65
Chief Joseph	2089.5 MW	80.15
Wells	576.0 MW	67.37
Rocky Reach	985.0 MW	72.37
Rock Island	388.0 MW	57.57
Wanapum	852.4 MW	77.27
Priest Rapids	700.0 MW	69.58
McNary	924.9 MW	82.58
John Day	2077.0 MW	83.75
The Dalles	1685.2 MW	80.86
Bonneville	941.3 MW	74.72

	Total Output	% of Max
Pend Oreille River	493.5 MW	44.37
Boundary	450.0 MW	43.28
Box Canyon	43.5 MW	60.08
Lower Snake/N.F. Clearwater	2461.8 MW	75.79
Dworshak (458MW)	408.0 MW	89.07
Lower Granite (930MW)	692.7 MW	74.48
Little Goose (930MW)	693.6 MW	74.58
Lower Monumental (930MW)	667.5 MW	71.78
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2258.4 MW	97.94
Avista Colstrip	239.8 MW	97.11%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1039.3 MW	
Total Hydro	171.8 MW	15.88
Total Thermal	811.8 MW	80.74%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1720.8 MW	
Avista Balancing Area Load	2255.2 MW	
Avista BA Loads w/o Losses	-2217.3 MW	
Avista BA Loss Percentage	0.0171	

Western Montana Hydro	682.0 MW
Noxon Rapids (586MW)	100.0 MW
Cabinet Gorge (271MW)	55.0 MW
Libby (605MW)	432.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	793.4 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	16.8 MW
Boundary Hydro (1040MW)	450.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	408.0 MW
Lower Granite (930MW)	692.7 MW
Little Goose (930MW)	693.6 MW
Lower Monumental (930MW)	667.5 MW
Coulee Generation	
Coulee 500 kV	4188.4 MW
Coulee 230 kV	1951.2 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	-87.9 MW
Lolo-Oxbow 230kV	241.3 MW
Dry Creek-Walla Walla 230kV	138.0 MW
West of Cabinet	1053.0 MW
Montana-Northwest (Path 8)	859.2 MW
Idaho-Northwest (Path 14)	-907.6 MW
Midpoint-Summer Lake (Path 75)	211.2 MW
Idaho-Montana (Path 18)	-240.2 MW
South of Boundary	448.3 MW
North of John Day (Path 73)	7275.1 MW
TOT 4A (Path 37)	452.4 MW
Miles City DC	143.0 MW
Path C (Path 20)	-610.6 MW
Borah West (Path 17)	726.2 MW
Bridger West (Path 19)	1854.9 MW
Pacific AC Intertie (Path 66)	3541.6 MW
Pacific DC Intertie (Path 65)	2603.8 MW
Northwest Load	27968.5 MW
Idaho Load	4089.1 MW
Montana Load	1967.5 MW
Avista Native Load	-1720.8 MW
Avista Balancing Area Load	2255.2 MW
Clearwater Load	58.2 MW

2023 Heavy Winter



WESTERN ELECTRICITY COORDINATING COUNCIL
2021-22 HW1 APPROVED BASE CASE
MARCH 14, 2012
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present file date Wed Mar 14 10:19:01 2012
Version 18.0_01
[comments]
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Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Winter Dispatch

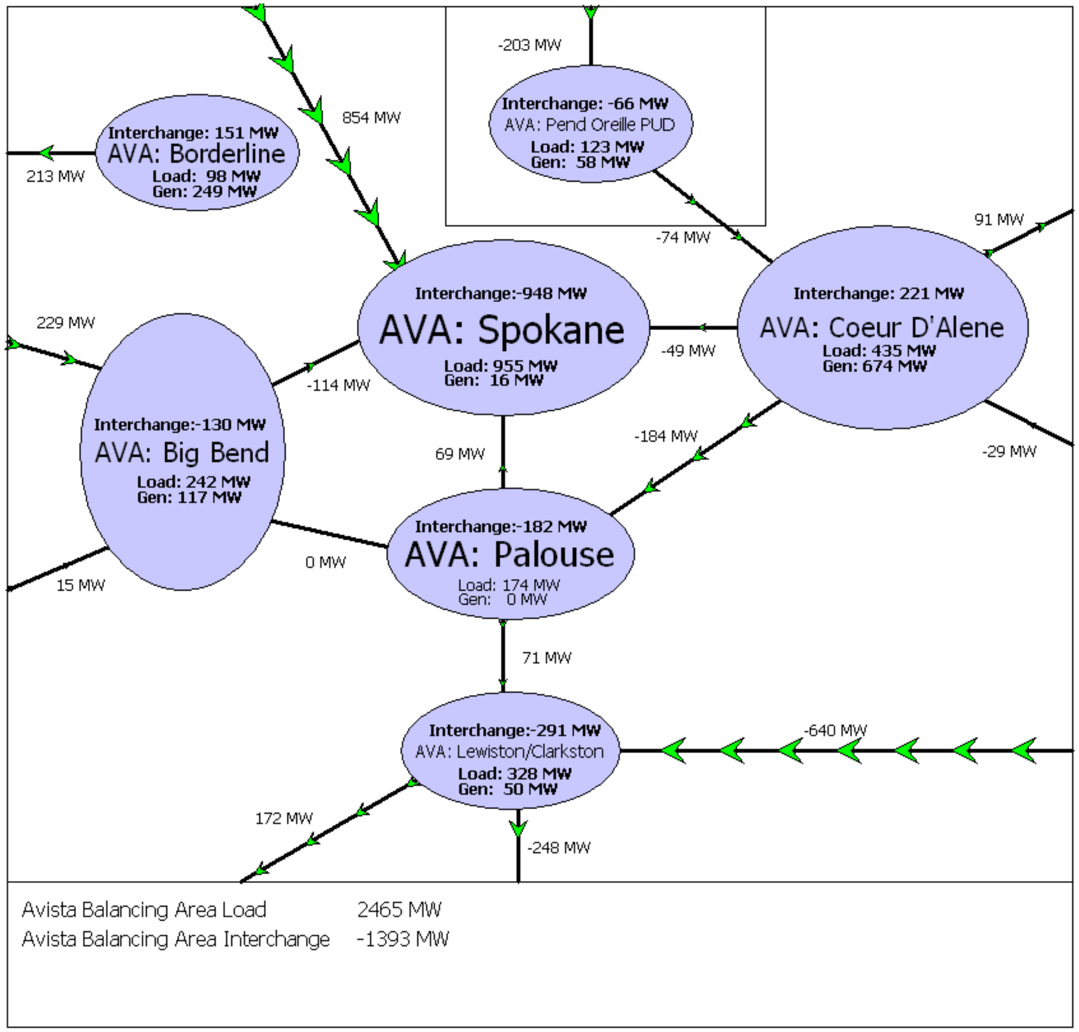
	Total Output	% of Max
Western Montana Hydro	688.0 MW	36.05
Noxon Rapids (567 MW)	300.0 MW	51.16
Cabinet Gorge (276 MW)	185.0 MW	64.39
Libby (605MW)	108.0 MW	17.85
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	167.0 MW	80.29
Post Falls (18 MW)	7.5 MW	41.67
Upriver(22.6 MW)	6.5 MW	36.93
Monroe St. (15.6 MW)	14.0 MW	89.74
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	14.0 MW	57.61
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	17222.2 MW	81.02
Grand Coulee	6053.2 MW	88.39
Chief Joseph	2205.0 MW	84.58
Wells	560.0 MW	65.5
Rocky Reach	818.0 MW	60.73
Rock Island	304.0 MW	45.53
Wanapum	760.0 MW	77.47
Priest Rapids	792.0 MW	78.73
McNary	910.0 MW	81.25
John Day	1984.0 MW	80
The Dalles	1754.0 MW	84.17
Bonneville	1082.0 MW	85.89

	Total Output	% of Max
Pend Oreille River	723.0 MW	65.34
Boundary	665.0 MW	63.95
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	1417.0 MW	43.63
Dworshak (458MW)	409.0 MW	89.3
Lower Granite (930MW)	336.0 MW	36.13
Little Goose (930MW)	336.0 MW	36.13
Lower Monumental (930MW)	336.0 MW	36.13
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2266.0 MW	98.27
Avista Colstrip	240.9 MW	97.57%
Coyote Springs I	247.8 MW	100
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1527.4 MW	
Total Hydro	652.0 MW	60.28
Total Thermal	819.9 MW	81.55%
Total Other	55.5 MW	61.74
Avista Native Load w/o Losses	-1854.5 MW	
Avista Balancing Area Load	2479.0 MW	
Avista BA Loads w/o Losses	-2444.2 MW	
Avista BA Loss Percentage	0.0142	

Western Montana Hydro	688.0 MW
Noxon Rapids (586MW)	300.0 MW
Cabinet Gorge (271MW)	185.0 MW
Libby (605MW)	108.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	801.0 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	167.0 MW
Boundary Hydro (1040MW)	665.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	409.0 MW
Lower Granite (930MW)	336.0 MW
Little Goose (930MW)	336.0 MW
Lower Monumental (930MW)	336.0 MW
Coulee Generation	
Coulee 500 kV	4163.2 MW
Coulee 230 kV	1890.0 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	308.2 MW
Lolo-Oxbow 230kV	71.3 MW
Dry Creek-Walla Walla 230kV	66.4 MW
West of Cabinet	1206.5 MW
Montana-Northwest (Path 8)	1207.4 MW
Idaho-Northwest (Path 14)	305.7 MW
Midpoint-Summer Lake (Path 75)	387.0 MW
Idaho-Montana (Path 18)	-43.3 MW
South of Boundary	662.9 MW
North of John Day (Path 73)	2357.4 MW
TOT 4A (Path 37)	254.4 MW
Miles City DC	146.0 MW
Path C (Path 20)	-193.4 MW
Borah West (Path 17)	1017.3 MW
Bridger West (Path 19)	2537.1 MW
Pacific AC Intertie (Path 66)	-123.4 MW
Pacific DC Intertie (Path 65)	0.0 MW
Northwest Load	34721.7 MW
Idaho Load	3034.3 MW
Montana Load	2112.7 MW
Avista Native Load	-1854.5 MW
Avista Balancing Area Load	2479.0 MW
Clearwater Load	58.2 MW

2032 Heavy Summer



WESTERN ELECTRICITY COORDINATING COUNCIL
2023 HS1 BASE CASE
OCTOBER 22, 2012
[pre-title comments]
history file date Mon Oct 22 07:33:48 2012
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Version 18.0_01
[comments]
ALL COMMENTS FROM TSS REVIEW ARE INCLUDED
Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

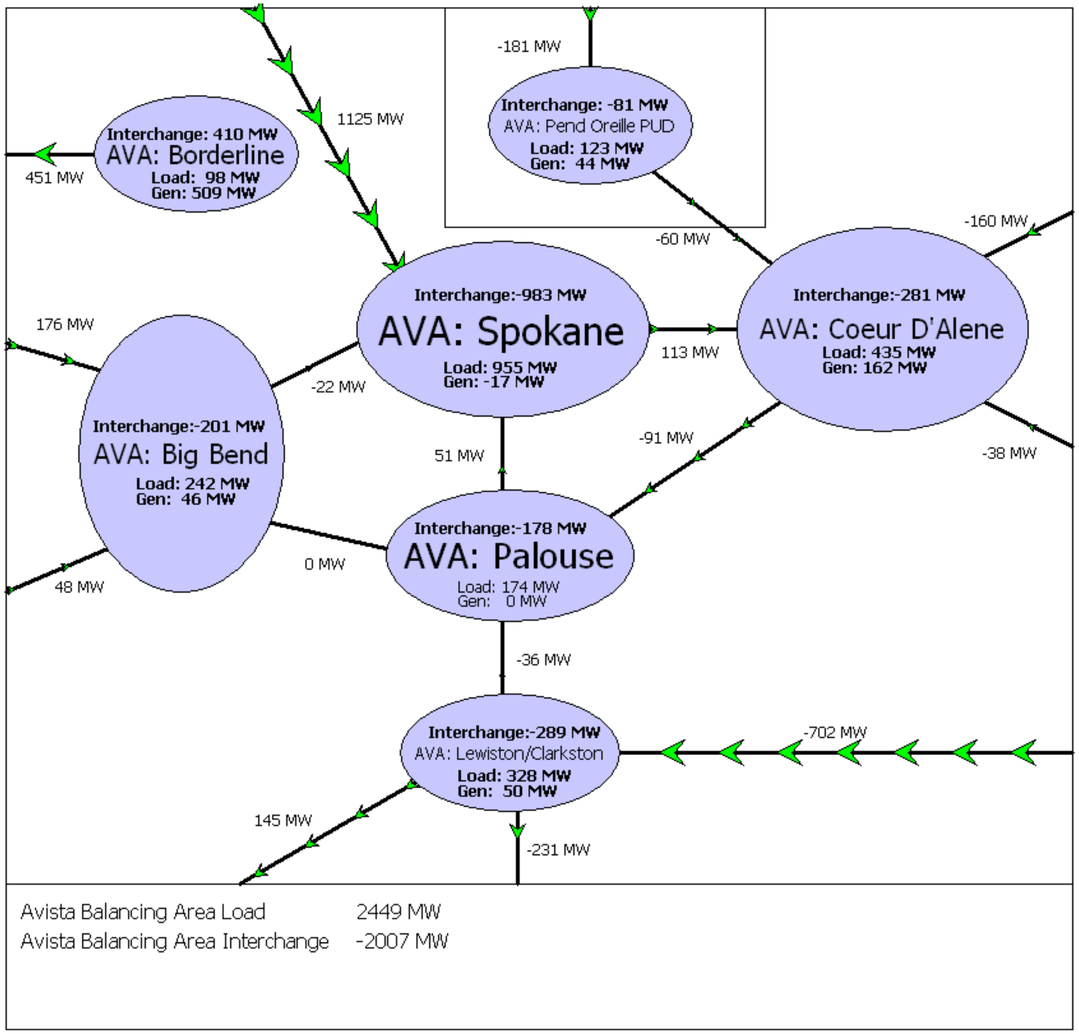
	Total Output	% of Max
Western Montana Hydro	1390.0 MW	72.82
Noxon Rapids (567 MW)	420.0 MW	71.62
Cabinet Gorge (276 MW)	240.0 MW	83.54
Libby (605MW)	540.0 MW	89.26
Hungry Horse (430MW)	190.0 MW	44.19
Spokane River	172.8 MW	83.05
Post Falls (18 MW)	9.8 MW	54.17
Upriver(22.6 MW)	11.5 MW	65.34
Monroe St. (15.6 MW)	10.5 MW	67.31
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	16.0 MW	65.84
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	16774.7 MW	78.39
Grand Coulee	5555.3 MW	81.12
Chief Joseph	2089.5 MW	80.15
Wells	576.0 MW	67.37
Rocky Reach	985.0 MW	72.37
Rock Island	388.0 MW	57.57
Wanapum	852.4 MW	77.27
Priest Rapids	700.0 MW	69.58
McNary	924.9 MW	82.58
John Day	2077.0 MW	83.75
The Dalles	1685.2 MW	80.86
Bonneville	941.3 MW	74.72

	Total Output	% of Max
Pend Oreille River	693.0 MW	62.31
Boundary	635.0 MW	61.07
Box Canyon	58.0 MW	80.11
Lower Snake/N.F. Clearwater	2461.8 MW	75.79
Dworshak (458MW)	408.0 MW	89.07
Lower Granite (930MW)	692.7 MW	74.48
Little Goose (930MW)	693.6 MW	74.58
Lower Monumental (930MW)	667.5 MW	71.78
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2262.4 MW	98.11
Avista Colstrip	240.4 MW	97.35%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	0.0 MW	0
Kettle Falls	0.0 MW	0
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1395.9 MW	
Total Hydro	832.8 MW	76.99
Total Thermal	507.4 MW	50.46%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1845.0 MW	
Avista Balancing Area Load	2464.7 MW	
Avista BA Loads w/o Losses	-2405.8 MW	
Avista BA Loss Percentage	0.0245	

Western Montana Hydro	1390.0 MW
Noxon Rapids (586MW)	420.0 MW
Cabinet Gorge (271MW)	240.0 MW
Libby (605MW)	540.0 MW
Hungry Horse (430MW)	190.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	797.4 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	172.8 MW
Boundary Hydro (1040MW)	635.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	408.0 MW
Lower Granite (930MW)	692.7 MW
Little Goose (930MW)	693.6 MW
Lower Monumental (930MW)	667.5 MW
Coulee Generation	
Coulee 500 kV	3714.1 MW
Coulee 230 kV	1841.2 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	663.7 MW
Lolo-Oxbow 230kV	254.8 MW
Dry Creek-Walla Walla 230kV	158.0 MW
West of Cabinet	1688.1 MW
Montana-Northwest (Path 8)	814.0 MW
Idaho-Northwest (Path 14)	-878.1 MW
Midpoint-Summer Lake (Path 75)	226.1 MW
Idaho-Montana (Path 18)	-258.6 MW
South of Boundary	632.6 MW
North of John Day (Path 73)	7445.2 MW
TOT 4A (Path 37)	465.9 MW
Miles City DC	143.0 MW
Path C (Path 20)	-607.6 MW
Borah West (Path 17)	745.7 MW
Bridger West (Path 19)	1859.6 MW
Pacific AC Intertie (Path 66)	3528.0 MW
Pacific DC Intertie (Path 65)	2603.8 MW
Northwest Load	28160.4 MW
Idaho Load	4089.1 MW
Montana Load	1967.5 MW
Avista Native Load	-1845.0 MW
Avista Balancing Area Load	2464.7 MW
Clearwater Load	58.2 MW

2032 Heavy Summer, Low Hydro



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Albeni Falls - Sandcreek Rebuild Project added
Benton - Othello SS BPA Rebuild Project added
Generators set to Heavy Summer Dispatch

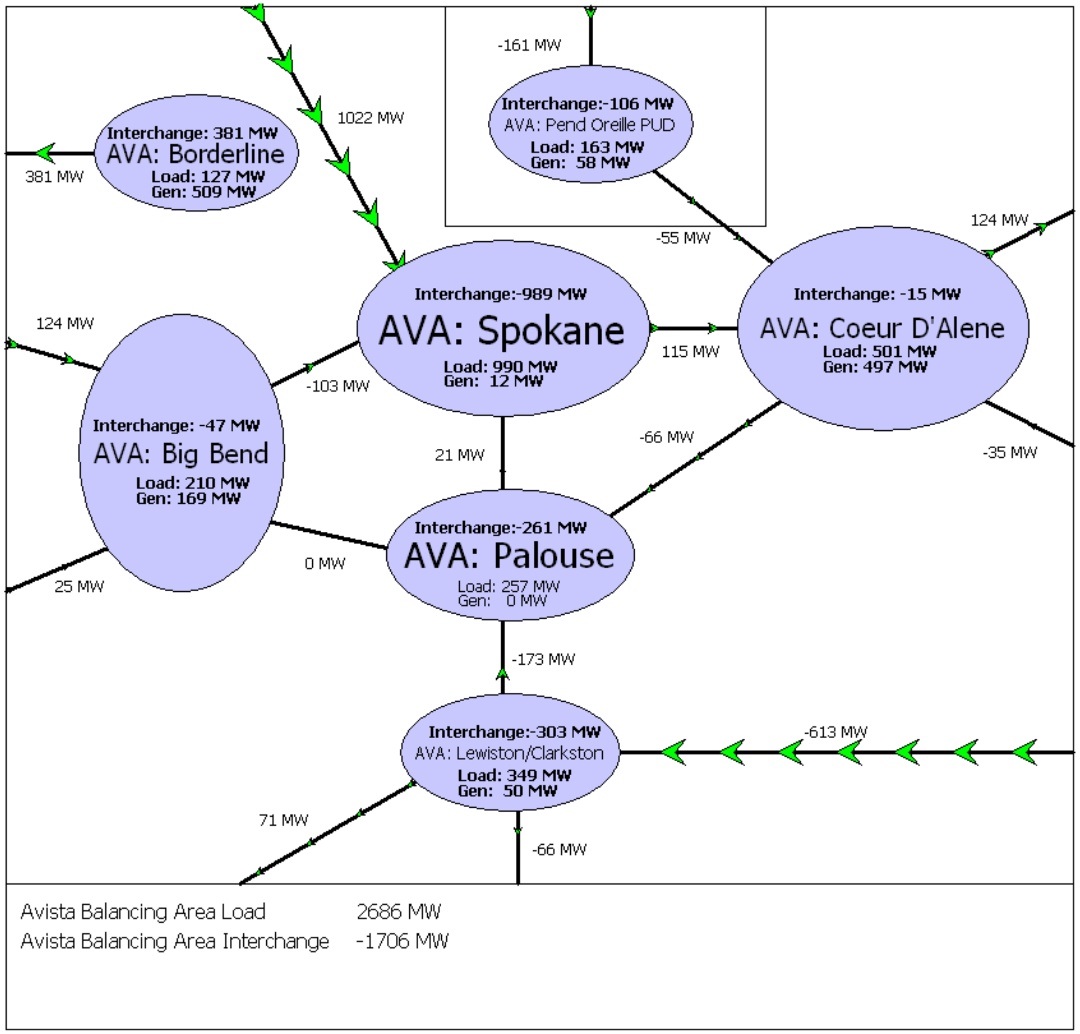
	Total Output	% of Max
Western Montana Hydro	682.0 MW	35.73
Noxon Rapids (567 MW)	100.0 MW	17.05
Cabinet Gorge (276 MW)	55.0 MW	19.14
Libby (605MW)	432.0 MW	71.4
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	16.8 MW	8.05
Post Falls (18 MW)	2.3 MW	12.5
Upriver(22.6 MW)	3.0 MW	17.05
Monroe St. (15.6 MW)	0.0 MW	0
Upper Falls (10.2 MW)	4.5 MW	44.12
Nine Mile (24.3 MW)	7.0 MW	28.81
Long Lake (88 MW)	0.0 MW	0
Little Falls (32 MW)	0.0 MW	0
Columbia River	17559.0 MW	82.06
Grand Coulee	6339.6 MW	92.57
Chief Joseph	2089.5 MW	80.15
Wells	576.0 MW	67.37
Rocky Reach	985.0 MW	72.37
Rock Island	388.0 MW	57.57
Wanapum	852.4 MW	77.27
Priest Rapids	700.0 MW	69.58
McNary	924.9 MW	82.58
John Day	2077.0 MW	83.75
The Dalles	1685.2 MW	80.86
Bonneville	941.3 MW	74.72

	Total Output	% of Max
Pend Oreille River	493.5 MW	44.37
Boundary	450.0 MW	43.28
Box Canyon	43.5 MW	60.08
Lower Snake/N.F. Clearwater	2461.8 MW	75.79
Dworshak (458MW)	408.0 MW	89.07
Lower Granite (930MW)	692.7 MW	74.48
Little Goose (930MW)	693.6 MW	74.58
Lower Monumental (930MW)	667.5 MW	71.78
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2258.4 MW	97.94
Avista Colstrip	239.8 MW	97.11%
Coyote Springs I	220.0 MW	86.79
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1039.3 MW	
Total Hydro	171.8 MW	15.88
Total Thermal	811.8 MW	80.74%
Total Other	55.8 MW	62.07
Avista Native Load w/o Losses	-1845.0 MW	
Avista Balancing Area Load	2448.5 MW	
Avista BA Loads w/o Losses	-2405.8 MW	
Avista BA Loss Percentage	0.0178	

Western Montana Hydro	682.0 MW
Noxon Rapids (586MW)	100.0 MW
Cabinet Gorge (271MW)	55.0 MW
Libby (605MW)	432.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	793.4 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	16.8 MW
Boundary Hydro (1040MW)	450.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	408.0 MW
Lower Granite (930MW)	692.7 MW
Little Goose (930MW)	693.6 MW
Lower Monumental (930MW)	667.5 MW
Coulee Generation	
Coulee 500 kV	4388.4 MW
Coulee 230 kV	1951.2 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	-262.3 MW
Lolo-Oxbow 230kV	237.0 MW
Dry Creek-Walla Walla 230kV	132.0 MW
West of Cabinet	1047.2 MW
Montana-Northwest (Path 8)	864.5 MW
Idaho-Northwest (Path 14)	-909.4 MW
Midpoint-Summer Lake (Path 75)	208.0 MW
Idaho-Montana (Path 18)	-238.3 MW
South of Boundary	448.2 MW
North of John Day (Path 73)	7286.9 MW
TOT 4A (Path 37)	450.9 MW
Miles City DC	143.0 MW
Path C (Path 20)	-610.6 MW
Borah West (Path 17)	724.6 MW
Bridger West (Path 19)	1854.4 MW
Pacific AC Intertie (Path 66)	3544.4 MW
Pacific DC Intertie (Path 65)	2603.8 MW
Northwest Load	28160.4 MW
Idaho Load	4089.1 MW
Montana Load	1967.5 MW
Avista Native Load	-1845.0 MW
Avista Balancing Area Load	2448.5 MW
Clearwater Load	58.2 MW

2032 Winter



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Generators set to Heavy Winter Dispatch

	Total Output	% of Max
Western Montana Hydro	688.0 MW	36.05
Noxon Rapids (567 MW)	300.0 MW	51.16
Cabinet Gorge (276 MW)	185.0 MW	64.39
Libby (605MW)	108.0 MW	17.85
Hungry Horse (430MW)	95.0 MW	22.09
Spokane River	167.0 MW	80.29
Post Falls (18 MW)	7.5 MW	41.67
Upriver(22.6 MW)	6.5 MW	36.93
Monroe St. (15.6 MW)	14.0 MW	89.74
Upper Falls (10.2 MW)	9.0 MW	88.24
Nine Mile (24.3 MW)	14.0 MW	57.61
Long Lake (88 MW)	84.0 MW	94.92
Little Falls (32 MW)	32.0 MW	94.67
Columbia River	17461.9 MW	82.15
Grand Coulee	6292.9 MW	91.89
Chief Joseph	2205.0 MW	84.58
Wells	560.0 MW	65.5
Rocky Reach	818.0 MW	60.73
Rock Island	304.0 MW	45.53
Wanapum	760.0 MW	77.47
Priest Rapids	792.0 MW	78.73
McNary	910.0 MW	81.25
John Day	1984.0 MW	80
The Dalles	1754.0 MW	84.17
Bonneville	1082.0 MW	85.89

	Total Output	% of Max
Pend Oreille River	723.0 MW	65.34
Boundary	665.0 MW	63.95
Box Canyon	58.0 MW	86.83
Lower Snake/N.F. Clearwater	1417.0 MW	43.63
Dworshak (458MW)	409.0 MW	89.3
Lower Granite (930MW)	336.0 MW	36.13
Little Goose (930MW)	336.0 MW	36.13
Lower Monumental (930MW)	336.0 MW	36.13
Area Thermal		
Boulder	0.0 MW	0
Colstrip	2266.0 MW	98.27
Avista Colstrip	240.9 MW	97.57%
Coyote Springs I	247.8 MW	100
Coyote Springs II	260.0 MW	89.59
Kettle Falls	45.0 MW	97.83
Lancaster	249.0 MW	92.22
Rathdrum	0.0 MW	0
Avista Generation w/o Mid C	1527.4 MW	
Total Hydro	652.0 MW	60.28
Total Thermal	819.9 MW	81.55%
Total Other	55.5 MW	61.74
Avista Native Load w/o Losses	-1991.3 MW	
Avista Balancing Area Load	2685.7 MW	
Avista BA Loads w/o Losses	-2646.6 MW	
Avista BA Loss Percentage	0.0148	

Western Montana Hydro	688.0 MW
Noxon Rapids (586MW)	300.0 MW
Cabinet Gorge (271MW)	185.0 MW
Libby (605MW)	108.0 MW
Hungry Horse (430MW)	95.0 MW
Colstrip Total	
Colstrip 1 (330MW)	330.0 MW
Colstrip 2 (330MW)	330.0 MW
Colstrip 3 (823MW)	801.0 MW
Colstrip 4 (823MW)	805.0 MW
Rathdrum Thermal (175MW)	0.0 MW
Lancaster Thermal (270MW)	249.0 MW
Spokane River Hydro	167.0 MW
Boundary Hydro (1040MW)	665.0 MW
Lower Snake/N.F. Clearwater	
Dworshak (458MW)	409.0 MW
Lower Granite (930MW)	336.0 MW
Little Goose (930MW)	336.0 MW
Lower Monumental (930MW)	336.0 MW
Coulee Generation	
Coulee 500 kV	4402.9 MW
Coulee 230 kV	1890.0 MW
Wind: Central Washington	0.0 MW
Wind: Columbia River Gorge	0.0 MW
Wind: SE Washington/NE Oregon	0.0 MW

West of Hatwai (Path 6)	92.4 MW
Lolo-Oxbow 230kV	66.1 MW
Dry Creek-Walla Walla 230kV	57.7 MW
West of Cabinet	1195.3 MW
Montana-Northwest (Path 8)	1213.8 MW
Idaho-Northwest (Path 14)	302.7 MW
Midpoint-Summer Lake (Path 75)	382.1 MW
Idaho-Montana (Path 18)	-40.2 MW
South of Boundary	663.8 MW
North of John Day (Path 73)	2372.1 MW
TOT 4A (Path 37)	252.8 MW
Miles City DC	146.0 MW
Path C (Path 20)	-193.3 MW
Borah West (Path 17)	1014.5 MW
Bridger West (Path 19)	2535.5 MW
Pacific AC Intertie (Path 66)	-120.2 MW
Pacific DC Intertie (Path 65)	0.0 MW
Northwest Load	34954.3 MW
Idaho Load	3034.3 MW
Montana Load	2112.7 MW
Avista Native Load	-1991.3 MW
Avista Balancing Area Load	2685.7 MW
Clearwater Load	58.2 MW

AVISTA CORP.
RESPONSE TO REQUEST FOR INFORMATION

JURISDICTION:	WASHINGTON	DATE PREPARED:	03/28/2014
CASE NO:	UE-140188 & UG-140189	WITNESS:	Elizabeth Andrews
REQUESTER:	WUTC Staff - Gomez	RESPONDER:	Jennifer S. Smith
TYPE:	Data Request	DEPT:	State & Federal Regulation
REQUEST NO.:	Staff – 102	TELEPHONE:	(509) 495-2098
		EMAIL:	jennifer.smith@avistacorp.com

REQUEST:

Please provide 2006-2013 actual expenditures (on a system basis) for FERC Operation and Expense Accounts: Transmission Expense, Maintenance (Nos. 568-574). Also, provide the forecasted expenditure amounts for these accounts for the years 2014-2016.

RESPONSE:

Please see Staff_DR_102 Attachment A for the 2006-2013 actual expenditures (on a system basis) for FERC Operation and Expense Accounts: Transmission Expense, Maintenance (Nos. 568-574).

Please see Staff_DR_102 Attachment B for the 2014-2016 forecasted expenditures (on a system basis) for FERC Operation and Expense Accounts: Transmission Expense, Maintenance (Nos. 568-574).

AVISTA CORP.
RESPONSE TO REQUEST FOR INFORMATION

JURISDICTION:	WASHINGTON	DATE PREPARED:	03/28/2014
CASE NO:	UE-140188 & UG-140189	WITNESS:	Elizabeth Andrews
REQUESTER:	WUTC Staff - Gomez	RESPONDER:	Jennifer S. Smith
TYPE:	Data Request	DEPT:	State & Federal Regulation
REQUEST NO.:	Staff – 103	TELEPHONE:	(509) 495-2098
		EMAIL:	jennifer.smith@avistacorp.com

REQUEST:

Provide 2006-2013 actual expenditures (on a system basis) for FERC Operation and Expense Accounts: Distribution Expense, Maintenance (Nos. 590-598). Also, provide the forecasted expenditure amounts for these accounts for the years 2014-2016.

RESPONSE:

Please see Staff_DR_103 Attachment A for the 2006-2013 actual expenditures (on a system basis) for FERC Operation and Expense Accounts: Distribution Expense, Maintenance (Nos. 590-598).

Please see Staff_DR_103 Attachment B for the 2014-2016 forecasted expenditures (on a system basis) for FERC Operation and Expense Accounts: Distribution Expense, Maintenance (Nos. 590-598).