Department of Energy

Bonneville Power Administration
P.O. Box 3621
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PUBLIC AFFAIRS

September 3, 2010

In reply refer to: DK-7

Richard van Dijk
Another Way BPA
19521 NE 212th Avenue
Brush Prairie, WA 98606

RE: BPA-2010-01970-F

Dear Mr. van Dijk:

This is a final response to your request for information that you made to the Bonneville Power Administration (BPA) under the Freedom of Information Act (FOIA), 5 U.S.C. 552.

You requested the following:
An electronic copy of the 2009 Network Open Season Cluster Study Report.

Response:
BPA has provided a copy of the responsive document in its entirety. There is no charge for your request.

I appreciate the opportunity to assist you. Please contact Laura M. Atterbury, FOIA/Privacy Act Specialist at 503-230-7305 with any questions about this letter.

Sincerely,

Christina J Munro
Christina J. Munro
Freedom of Information Act/Privacy Act Officer

Enclosure: Responsive Document

Bonneville Power Administration
Transmission Services

2009 Network Open Season
Cluster Study Report

Version: 1.0
Date: April 20, 2010

Report Number BPA-TS TPP-2010-016
Transmission Planning - TPP

Executive Summary

On June 1, 2009, the Bonneville Power Administration – Transmission Services (BPA-TS) initiated the 2009 Network Open Season (NOS). BPA-TS offered all customers with a completed application for long-term network transmission service in its transmission service queue as of 5:00 p.m. June 30, 2009, a Precedent Transmission Service Agreement (PTSA). BPA-TS offered 83 PTSAs for 4,867 MW of service, and customers signed 34 of those PTSAs for a total of 1,553 MW. BPA-TS removed from its queue the transmission service requests (TSRs) for which customers did not execute PTSAs, and was able to offer service to one TSR as a result of the queue "restack" for NOS 2009. The remaining TSRs were considered for the 2009 NOS Cluster Study pursuant to BPA's Open Access Transmission Tariff.

As part of the NOS process, BPA-TS then performed a Cluster Study to assess the system impacts of the requests and to determine the system reinforcements necessary to support the requested service of multiple TSRs on its network. BPA-TS' Cluster Study process involved several steps. First, BPA-TS used its Available Transfer Capability (ATC) Methodology to identify for each TSR the impact to each established flowgate and other areas of the transmission system that require reinforcement to provide the requested service. BPA-TS then grouped the TSRs into study areas based on these impacts and performed technical studies to determine transmission expansion projects necessary to provide the requested service. Once BPA-TS completed the technical studies, it adds the proposed projects to out-year ATC base cases.

For the 2009 NOS Cluster Study, BPA-TS concluded:

1. 10 TSRs, totaling 293 MW, could be authorized with no further system enhancement beyond any requirements identified in Large Generator Interconnection Procedure (LGIP) studies.
2. 20 TSRs, totaling 1121 MW, require completion of projects defined as part of the 2008 NOS and proceeding under rolled-in rates, as well as system upgrades required by the associated LGIP studies.
3. 1 TSR, totaling 25 MW, requires facilities in the Harney area,
4. 2 TSRs, totaling 100 MW, require completion of projects proposed as part of the 2008 NOS and the reinforcement of the Northern Intertie and West of Garrison.
5. 1 TSR, totaling 14 MW, requires system reinforcement of West of Garrison.

BPA-TS assumed projects identified in the 2008 NOS that could move forward at rolled-in rates were in-service for the 2009 NOS Cluster Study. The 2008 NOS Cluster Study report includes details regarding the plans of service and estimated costs of those projects and is available upon request through BPA-TS' website.

The table below summarizes the projects identified in the 2009 NOS Cluster Study, the estimated direct project costs, and preliminary projected energization dates.

Project Description	Estimated Direct Cost ($M)	Projected Energization Date
Harney Area reinforcement	$242	Sept. 2015
Northern Intertie	$225	Sept. 2016
West of Garrison	$91	Sept. 2014
Total	***$558***	

The projected energization dates assume that the National Environmental Policy Act (NEPA) review can be completed within 3 years after the 2009 NOS BPA Agency decision for rolled-in rates determination is made in May 2010. If NEPA review takes longer or other delays occur, the estimated project completion date will likely move forward in time accordingly.

The project descriptions in this table are used throughout this report to collectively refer to multiple components that make up the projects. These estimated direct costs are preliminary and do not include overhead loadings. In some cases, the majority of the substation cost could be part of the generator interconnection costs, which were not considered in the Cluster Study.

BPA-TS conducted the analysis in this report in response to requests for transmission service in the 2009 NOS. The analysis and findings in this report do not represent a determination to classify facilities discussed herein as network transmission facilities, interconnection facilities, or other types of facilities. In addition, this report does not make any determination about network segmentation or direct assignment of any facilities discussed herein. Classifications of facilities and allocations of costs are separate determinations that are outside the scope of this report.

Finally, nothing in this report represents a decision by BPA-TS whether to move forward with any projects at rolled-in rates or to construct any of the projects identified herein. These are separate decisions in the NOS process. BPA will make any decision whether to proceed with construction after determining whether it can provide requested service at rolled-in rates, and, if so, after completing NEPA review, fulfilling other obligations in the PTSA, and considering all relevant factors at the time of the decision.

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1 Introduction

1.1 Purpose

BPA-TS initiated the 2009 NOS as a means of processing and offering service to customers with requests for long-term firm transmission service over the BPA network. As part of the NOS, BPA-TS performs a Cluster Study to determine the transmission system expansion, if any, required to support the requested service. This Cluster Study report describes the results of the 2009 NOS Cluster Study and summarizes the individual technical analysis for each of the studied areas.

The report is organized as follows:

Section 1 provides background on the NOS.
Section 2 summarizes the results of the 2008 NOS.
Section 3 describes the methodology used in the Cluster Study.
Section 4 summarizes the results of the identified study areas.
Section 5 summarizes the results of the out year ATC analysis.

The technical assessments in this document are for long-term firm transmission service requests only. This document does not address generation interconnection capacity or generator balancing services. The studies summarized in this report were conducted using the best available information at the time of study. Findings and recommendations are based on assumptions, which could change. BPA-TS reserves the right to modify any content in this report as necessary.

1.2 Background

Prior to initiating its first NOS in 2008, BPA-TS had a transmission service request queue with several hundred requests for long-term firm transmission service on its network. The purpose of the NOS is to simultaneously address all the requests for long-term firm transmission service across BPA-TS' network. The NOS process includes several steps:

- BPA-TS offers Precedent Transmission Service Agreements (PTSA) to all eligible customers. The PTSAs, if executed, obligate the customer to take the requested service if: (1) BPA-TS determines that it can provide the requested service at the rolled-in rate; and (2) BPA-TS decides to proceed with construction of any necessary facilities after completing NEPA review, other PTSA obligations and considering all relevant factors.
- BPA-TS then "re-stacks" the transmission queue by removing TSRs for which PTSAs were not executed , and BPA-TS determines if removing such requests allows it to make offers of service to the TSRs that remain.
- BPA-TS then commences a Cluster Study to determine the additional facilities, if any, required to support service for those TSRs that could not be offered service following the queue re-stack. BPA-TS prepares a Cluster Study Report that describes the results of the Cluster Study and defines the necessary facilities.
- BPA-TS then conducts analysis based on the commitments to take transmission service in the PTSAs and the results of the Cluster Study to determine whether BPA-TS can

construct the facilities identified and reasonably support the requested service at rolled-in rates.

- BPA-TS determines whether the costs of facilities identified in the Cluster Study are subject to direct assignment to a customer.
- For projects that move forward at rolled-in rates, BPA proceeds with NEPA review. The projects identified in the 2008 NOS Cluster Study that moved forward at rolled-in rates are described in section 2.1 below.
- For projects that do not move forward at rolled-in rates, the PTSAs terminate and are no longer part of the NOS process for that year. Projects from the 2008 NOS Cluster Study that did not move forward at rolled-in rates are described in Section 2.2.

2 Summary of Projects Identified in the 2008 NOS Cluster Study

Sections 2.1 and 2.2, below, describe projects identified in the 2008 NOS Cluster Study. The sections are organized according to whether the proposed projects moved forward at rolled-in rates as part of the 2008 NOS. Detailed information regarding all of the system reinforcements and upgrades identified in the 2008 NOS Cluster Study is available in the 2008 NOS Cluster Study report, which can be requested through BPA-TS' website.

2.1 Projects Identified in the 2008 NOS Cluster Study Recommended to Move Forward at Rolled-In Rates

2.1.1 West-of-McNary Reinforcement Project Group 1

This project includes a new 79 mile 500 kV transmission line between McNary Substation and John Day Substation. This project also includes some line upgrades, shunt capacitors at Jones Canyon Substation, and a remedial action scheme to trip generation for the loss of the McNary 500/230 kV transformer. The project is under construction and the projected energization date is February 2012.

2.1.2 West-of-McNary Reinforcement Project Group 2

This proposed project includes a 28 mile new 500 kV transmission line between a new Knight Substation and Big Eddy Substation. Knight Substation is a new 500 kV substation on the Wautoma-Ostrander 500 kV transmission line. The environmental review of this project is currently under way. If BPA decides to build the project after the environmental review is complete, the projected energization date is February 2013.

2.1.3 Little Goose Area Reinforcement Project

This proposed project includes a new 40 mile 500 kV transmission line between a new Central Ferry Substation located southeast of Little Goose Dam and the existing Lower Monumental Substation. It also includes a 500 kV shunt reactor at Central Ferry. The Central Ferry Substation is a new 500 kV substation adjacent to the existing Little Goose-Lower Granite 500 kV transmission lines. The substation is being developed in response to requests for interconnection for several proposed wind generation projects. The environmental review of Little Goose Area Reinforcement Project is currently under way. If BPA decides to build the project after the environmental review is complete, the projected energization date is July 2013.

2.1.4 I-5 Corridor Reinforcement Project

This proposed project includes a new 70-90 mile 500 kV transmission line between a new substation in the vicinity of Castle Rock, Washington and Troutdale Substation in the Portland, Oregon area. The environmental review of this project is currently under way. If BPA decides to build this project after the environmental review is completed, the projected energization date is October 2015.

2.1.5 West-of-Garrison Remedial Action Scheme

For one TSR from the 2008 NOS, BPA identified expansion of BPA's Western Montana Remedial Action Scheme (RAS). The project required design and installation of communication equipment at the requestor's generation site and at other communication sites in BPA-TS' and NorthWestern Energy's systems. In order to meet the WECC reliability criteria, fully redundant equipment at the generation collector substation, as well as geographically diverse communications paths from BPA-TS' Western Montana RAS controller located at Garrison substation were necessary.

Since completion of the 2008 NOS, other requestors seeking transmission capacity across the West of Garrison path were removed from BPA's transmission queue as their required projects did not move forward at rolled-in rates; those requests did not elect to proceed with their requests. Upon their removal from the transmission queue, BPA determined that the West of Garrison RAS was no longer necessary.

2.2 Projects Identified in the 2008 NOS Cluster Study that did not Move Forward at Rolled-In Rates

2.2.1 Harney Area Reinforcement

There were 800 MW of PTSAs executed during the 2008 NOS with a Point of Receipt (POR) in the Harney area. BPA authorized transmission service for 40 MW of these TSRs because no additional system reinforcement was required. The plan of service for the remaining 760 MW was a proposed 179 mile 500 kV transmission line from the Harney area to Malin Substation.

2.2.2 LaGrande Area Reinforcement

This proposed project, as described in the 2008 NOS Cluster Study, would have included a new BPA 230 kV line from McNary Substation to LaGrande Substation. This plan of service would have also required Idaho Power Company to construct a new 230 kV line from LaGrande Substation to the Boise area.

2.2.3 Northern Intertie Reinforcement

This proposed project, as described in the 2008 NOS Cluster Study, would have included approximately 33 miles of 500 kV transmission line from Echo Lake Substation to Monroe Substation using a new right of way. This plan of service also would require new 500 kV line terminal additions at Echo Lake and Monroe Substations. The TSRs needing service over the Northern Intertie were withdrawn from the queue following the 2008 NOS.

3 2009 Cluster Study Methodology

3.1 Introduction

BPA-TS received 34 executed PTSAs with an associated demand of 1,553 MW in the 2009 NOS. The Cluster Study that BPA-TS performed to develop plans of service to support the transmission service requested in the PTSAs includes three fundamental elements:

- Determining which requests could be supported by the existing system and which require system reinforcement.
- Developing plans of service for requests that require system reinforcement.
- Demonstrating that the interconnected transmission system, together with the identified reinforcements, would be able to support the requested service.

3.2 ATC and Sub-Grid Assessment

BPA-TS performed two assessments for each TSR – paired with a sub-grid check – to determine which TSRs could be served by the existing system and which requests would require system reinforcement.

The first assessment considered BPA's pending queue for long-term firm transmission service after TSRs that elected not to sign a PTSA have been removed. The remaining TSRs were then evaluated by BPA's Reservation Desk to see if ATC can support any potential offers of service. TSRs with cumulative, non-de minimis impacts that would exceed the ATC for any impacted flow gate were identified for further analysis to determine requirements to support the requested service.

In order to further evaluate the impact of the request on the network, a second assessment is performed which considers the requested POD instead of the Network Composite POD as used in the first assessment for PODs on the internal network. The POR is the same for both assessments. Based on the second assessment, TSRs with impacts which can be supported by the existing ATC were reconsidered for possible offers of service. Based on the assessment using the POR and requested POD, TSRs with cumulative, non-de minimis impacts that still exceed the ATC for any impacted flow gate were identified for further analysis to determine requirements to support the requested service.

For the assessment of TSRs with BPA's pending queue for long-term service or the alternate assessment using the requested POR/POD, it is important to note that individual TSRs could have impacts that require reinforcement on more than one flow gate.

In addition to the assessments described above, BPA performed a sub-grid check on each TSR to consider impacts on other facilities that are not part of the monitored flow gates. The sub-grid assessments rely, to the maximum extent possible, on operational experience and previous studies (such as GI studies) to identify where reliability concerns exist. TSRs with sub-grid impacts that exceed reliability limits require system reinforcement and were analyzed for further determination of requirements needed to support the requested service.

In order for a particular TSR to qualify for service without requiring system reinforcement, BPA-TS must conclude that there is system capability across all monitored network flow gates affected by the request and all sub-grid impacts are within applicable reliability limits. If BPA-TS is unable to conclude that there is system capability across all monitored flow gates or sub-

grid impacts are not within applicable reliability limits for a particular request, further study is needed to identify whether and if so, what system reinforcements may be necessary to increase the Total Transfer Capability (TTC) across all deficient flow gates (with an associated increase in ATC) and address all sub-grid reliability concerns.

3.3 Study Areas for TSRs Needing System Reinforcement

For all TSRs identified in section 3.2 that require further evaluation to determine the requirements to support the requested service, BPA-TS combined TSRs with similar PORs (i.e., those PORs that are close enough to cause similar impacts on the transmission system). These combinations resulted in forming study areas that were studied in more detail to identify whether, and if so what plans of service would support the requested service. A detailed power flow assessment was then performed on each of the study areas to define the actual reinforcements needed. These studies considered expected uses including load growth, interconnection projects, and projects on adjacent systems that are included in traditional planning methods.

These TSR groupings are summarized in Appendix A. A detailed list of TSRs is given in Appendix B. The four study areas addressed in this Cluster Study report are:

1. Harney Area Reinforcement
2. Northern Intertie Reinforcement
3. Mid-Columbia Reinforcement
4. West of Garrison Reinforcement

In addition, BPA-TS assumed projects identified in the 2008 NOS that could move forward at rolled-in rates were in-service for the 2009 NOS Cluster Study and did not define those reinforcements as a separate study area.

3.4 Final System Assessment

The following section describes how the plans of service identified in the 2009 Cluster Study demonstrated that the transmission system, together with the required system reinforcements identified in the 2008 NOS, would be able to provide the requested service.

Once BPA-TS determined the full set of system reinforcements needed to support service to the 2009 TSRs, BPA-TS incorporated the plans of service into an out-year ATC base case using power flow analysis to demonstrate that the plans and all PTSAs would perform together and remain within the new TTCs of all flow gates. BPA-TS' current ATC base case covers the 2011 timeframe, but BPA-TS selected a 2014 timeframe for this study to account for several years of load growth in the Pacific Northwest. The load growth allows resources associated with the TSRs to deliver to load within the Pacific Northwest on a firm basis in the out-year ATC base case using power flow analysis. BPA-TS added the main grid reinforcements, including projects recommended as part of the 2008 NOS, to the base case along with their associated expected increases in TTC. The assessment included these projects to demonstrate that the flow gates within BPA's ATC Methodology would be within their TTC with existing firm commitments and the addition of resources associated with the TSRs in the out-year ATC base case using power flow analysis.

4 Cluster Study Results

The following section describes the system reinforcements or operation changes necessary to support the requested service.

Several of the 2009 NOS TSRs were from proposed new generation sources. These new generation sources are presently in BPA-TS' Large Generator Interconnection Procedure (LGIP) process. Through the LGIP study process, BPA-TS identified transmission system upgrades that are requirements for interconnection. For purposes of the 2009 NOS Cluster Study, BPA-TS assumed that those system upgrades required for interconnection will be completed as part of the interconnection process. Those system upgrades were therefore not included in the NOS plans of service. Both TSR requirements and Interconnection requirements must be met for long-term firm transmission service to be granted for the relevant TSRs.

The following summarizes the findings of the Cluster Study:

1. 10 TSRs, totaling 293 MW, could be authorized with no further system enhancement beyond any applicable requirements identified as part of any LGIP.
2. 20 TSRs, totaling 1121 MW, require completion of projects proposed as part of the 2008 NOS (See section 2.1 above), and contingent on system upgrades completed as required by the interconnection process.
3. 1 TSR, totaling 25 MW, requires completion of the Harney Area Reinforcement,
4. 2 TSRs, totaling 100 MW, require completion of projects proposed to move forward at rolled-in rate as part of the 2008 NOS and the Northern Intertie and West of Garrison Reinforcements,
5. 1 TSR, totaling 14 MW, requires completion of the West of Garrison Reinforcement.

4.1 I-5 Corridor, McNary-John Day, and Big Eddy-Knight Reinforcements

BPA-TS analyzed 20 TSRs, totaling 1121 MW of transmission service, in the 2009 NOS Cluster Study that had impacts similar to those TSRs that caused the need for the I-5, McNary-John Day, and Big Eddy-Knight reinforcements in the 2008 NOS Cluster Study. The 2008 Cluster Study Report and Section 2.1, above, describes the plans of service for these projects. As part of the 2009 Cluster Study, BPA-TS determined that system upgrades were necessary to provide service to these 20 TSRs and that the plans of service identified in the 2008 NOS Cluster Study were sufficient to serve the 2009 TSRs. BPA-TS is not changing any conclusions from the 2008 NOS Cluster Study report with respect to these projects and relied on its analysis and cost estimates from 2008 for purposes of the 2009 Cluster Study.

4.2 Harney Area Reinforcement

4.2.1 Summary of TSRs for Harney Area

During the 2008 NOS, BPA-TS received 800 MW of executed PTSAs for transmission service in the Harney area. The 2008 NOS authorized 40 MW of transmission service and proposed a 500 kV plan of service for the remaining 760 MW (see section 2.2.1 above). The 500 kV plan of service for the Harney area did not move forward at rolled-in rates, and the PTSAs from the 2008 NOS were terminated.

After those PTSAs terminated, the customer withdrew 575 MW of the 760 MW of TSRs that were in the 2008 NOS, leaving 185 MW of TSRs in the queue prior to the 2009 NOS. The customer elected to "opt out" 125 MW of TSRs from NOS eligibility and no PTSAs were offered or executed for them. The TSRs that opted out will be addressed outside of the 2009 NOS. The remaining 60 MW of TSRs were included in the 2009 NOS, and the customer executed PTSAs for those requests.

As a result of refinements in the interconnection studies associated with these requests and the 2009 NOS Cluster Study, BPA-TS determined that the 115 kV system in the Harney Area could serve 35 MW of the 60 MW, contingent on completion of certain system upgrades identified in the generation interconnection process. As a result, BPA-TS developed a plan of service to support the remaining 25 MW in the 2009 NOS Cluster Study.

4.2.2 Proposed Harney Area Plan of Service

The Cluster Study determined that supporting service in excess of the 75 MW recommended for authorization in 2008 and 2009 NOS requires a higher voltage plan of service than the existing 115 kV system in the Harney area. Previous BPA studies of the Harney area revealed that a 230 kV plan of service would have limited expansion capability due to the length of line required and the lack of a developed 230 kV network in the area. As a result, given the long distances to the rest of the BPA network, BPA-TS determined that a plan of service similar to the 500 kV plan of service identified in the 2008 NOS Cluster Study Report was required. This 2009 Cluster Study Report addresses only the facilities proposed for the Harney Area Reinforcement to meet the remaining request for 25 MW.

The Cluster Study analysis assumes that a 500/230 kV collector substation will be constructed in the Harney area as part of the generator interconnection process (see simplified drawing in Appendix C). The proposed plan of service would be a new 500 kV line from this 500/230 kV substation to the Summer Lake Substation. Specific facilities associated with the overall plan of service include:

- Additions to the 500/230 kV interconnection substation in the vicinity of BPA-TS' existing 115 kV Harney Substation, including a 500 kV circuit breaker and two 110 MVA shunt reactors, each with separate circuit breakers. The interconnection substation will have no electrical connection to the 115 kV Substation.
- A new 500 kV transmission line of approximately 108 miles between the 500/230 kV interconnection substation and Summer Lake Substation. The line would include redundant fiber optic cables to meet WECC redundancy requirements for communications circuits. The plan of service for the 2009 NOS differs from the 2008 NOS plan of service. In the 2008 NOS, there were 760 MW of TSRs associated with the plan of service. Because there are only 25 MW associated with the 2009 NOS, BPA does not require additional facilities between Summer Lake and Malin as identified in the 2008 NOS.
- Additions to Summer Lake Substation, including a bay addition with two new circuit breakers to create a line terminal for the new 500 kV line and two additional circuit breakers to allow the Summer Lake to be operated as a break-and-a-half instead of a ring bus.
- Additional protection, control and associated communications for the project.

4.3 Northern Intertie

4.3.1 Northern Intertie TSRs

BPA-TS received two PTSAs for a total of 100 MW of service from Garrison 500 kV (POR) with PODs on the west side of the Northern Intertie (NI) at Custer. The requests for service on the Northern Intertie mirror the requests from NOS 2008. The following description and results also mirror the results in the 2008 NOS Cluster Study.

The existing west side NI transmission system consists of two 500 kV lines from Custer substation to Ingledow substation in British Columbia. The existing NI south to north Total Transfer Capacity (TTC) is 2000 MW. However, this capacity is being used to deliver the south to north Canadian Entitlement Return Obligation that continues through 2024. In addition, Puget Sound Energy has a share of the south to north capacity. The NI south to north TTC varies widely due to fluctuating operating conditions of the existing system in the Puget Sound area, such as generation pattern, load levels, and planned and unplanned outage conditions.

BPA and other Puget Sound utilities have completed several low voltage system reinforcements to the existing system. BPA-TS also has concluded that a 500 kV transmission project beyond the smaller fixes is required to reliably support requests for long-term firm transmission service.

4.3.2 Proposed Northern Intertie Plan of Service

The proposed plan of service is to build a 33 mile (approximately) 500 kV transmission line from Echo Lake 500 kV substation in King County, Washington to Monroe 500 kV substation in Snohomish County, Washington using a new right of way. The proposed plan also requires a 500 kV line terminal addition at Echo Lake and Monroe substation with the corresponding 500 kV breaker additions. Environmental considerations and routing options could change the length of the transmission line and cost of the project considerably.

4.4 Mid-Columbia

BPA-TS received one signed PTSA in the amount of 150 MW for service from Midway 230 kV to Columbia 115 kV in Grant County, Washington.

Based on the results of power flow contingency analysis studies, BPA-TS concluded that the change in generation does not result in local system limitations or deficiencies that BPA-TS does not already manage for existing obligations and thus do not require system reinforcements for this TSR.

In addition to the contingency analysis, the major path flow impacts of the TSR were studied for the expected generation re-dispatch. The analysis showed de minimis impacts across the monitored paths including West of Slatt and West of McNary. The de minimis impacts support the conclusion that no system reinforcements are necessary to provide the requested service.

4.5 West of Garrison

4.5.1 Background

BPA-TS received three signed PTSAs for total of 114 MW of transmission service with PORs in the western Montana area and PODs to the west. Of these 114 MW, two requests totaling 100 MW also require the Northern Intertie reinforcement (see section 4.2).

The Montana to Northwest path (WECC path 8) is a multiple owner path that included tie lines from the Northwest Energy (NWE) system to BPA and Avista Corp. This path has an accepted rating of 2200 MW. BPA owns 1818 MW and Avista owns 382 MW of east-to-west transfer capacity on the west side of the path. From a technical perspective the west side of the Montana-Northwest path is considered the West-of-Garrison (WOG) flowgate. Use of the upper 200 MW of BPA-TS' share of the 2200 MW capacity is dependent on tripping of 200 MW of import to the Northwest on the Miles City DC tie in eastern Montana. Since this is not a firm transfer, BPA assumes a TTC of 1618 MW for long-term firm transmission service. Firm transmission service up to BPA's TTC of 1818 MW requires a physical generator to be identified in the Montana area to be tripped as part of a Remedial Action Scheme (RAS). The identified generator must disconnect from the system via high speed communication from the BPA-TS Western Montana RAS controller for predetermined outages between Garrison and Grand Coulee and Lower Granite Substations.

4.5.2 Assumptions

This report assumes that the three requests, totaling 114 MW, cross the Montana-Northwest path using BPA-TS' east-to-west capacity. The three TSRs did not identify a physical generator supporting the request that could be tripped for RAS. Based on the assumed TTC of 1618 MW and analysis of ATC conducted for signed PTSAs during the 2009 NOS, the study determined that BPA-TS has 9 MW of ATC across the West of Garrison (WOG) path. Therefore, the remaining 105 MW of requested service cannot be served with the existing system.

4.5.3 Existing Performance

BPA-TS last reviewed the transfer capability of the Montana-Northwest path in a joint planning study with Avista in 2004 and 2005. The purpose of that study was to plan the addition of the new Grand Coulee-Bell 500 kV line, to identify other system reinforcements required on both BPA-TS' and Avista's systems to serve load, and determine a rating and allocation across the West-of-Hatwai Path based on those system additions. In addition, the West-of-Garrison Path (Montana-Northwest path) was investigated to verify that the existing rating was appropriate. The 2200 MW rating for the West of Garrison path was confirmed by assuming tripping of the Miles City DC tie with a 200 MW import.

4.5.4 West of Garrison Plan of Service

NorthWestern Energy, Avista, PacifiCorp, Portland General Electric Company, Puget Sound Energy, and BPA-TS commissioned an exploratory study in 2009 (Colstrip 500 kV Upgrade Exploratory Study) to evaluate the potential for upgrading the Colstrip transmission system and other Pacific Northwest transmission facilities to increase transmission capacity from Colstrip to the Northwest without constructing new transmission lines.

The study looked at three points of injection for new generation that would support the increased transfer capability: Eastside (near Colstrip), Broadview, and Townsend. The study increased the series compensation on each 500 kV line segment to 70%. This study showed that it is feasible to increase the transfer capability from Montana to the Northwest by increasing series compensation.

A second phase of studies is planned to be conducted in 2010 to further identify the simultaneous increase in real power transfer capability across the system west of Garrison and across the West-of-Hatwai path which is connected in series. The study will also confirm the size and location of the proposed 500 kV series compensation, as well as identify further system expansion that may be required for simultaneous Montana-Northwest and West-of-Hatwai path operation. Although the second phase of study will examine both West-of-Garrison and West-of-Hatwai paths, there is enough capacity across BPA's existing capacity allocation across West-of-Hatwai for the requested service in the 2009 NOS. The plan-of-service in this report is required to provide increased capacity required across West-of-Garrison.

The preliminary plan-of-service on the BPA-TS transmission system as a result of the exploratory study discussed above is as follows:

- Rebuild series capacitors at Garrison on the Townsend-Garrison #1 and #2 500 kV lines to 17 ohms. Although these series capacitors are included for completeness, they may not be required to provide the requested service.
- Add 35% (28.9 ohms) series compensation on the Garrison-Taft #1 and #2 500 kV lines at a new series compensation station east of Taft substation.
- Add 20% (11.2 ohms) series compensation on the Taft-Dworshak #1 500 kV line at a new series compensation station west of Taft substation.
- Add 20% (11.2 ohms) series compensation on the Taft-Bell #1 500 kV line at a new series compensation station west of Taft substation.
- Add a 500 kV, 300 Mvar shunt capacitor at Garrison substation.
- Add a 500 kV, 300 Mvar shunt capacitor at Bell substation.

The earliest projected energization date for this plan of service is 2014.

5 ATC Analysis of Proposed Additions

5.1 ATC Base Case

As described in Section 2, BPA-TS developed out-year ATC base cases that would simultaneously include the plans of service going forward under the terms of the PTSA at rolled-in rates for 2008 NOS and those proposed in this Cluster Study for 2009 NOS study areas and associated TSRs. Planning selected an August and January 2014 timeframe for these base cases. BPA-TS selected 2014 in order to allow for several years of regional load growth; the 2014 timeframe also allows for a reasonable time for most of the required infrastructure to be put in place if BPA-TS makes the decision to build.

The base cases included details for the following infrastructure additions:

- McNary – John Day 500 kV line
- Big Eddy – Knight 500 kV line
- Castle Rock – Troutdale 500 kV line
- Central Ferry – Lower Monumental 500 kV line

Other elements of the plans of service for the study areas were not included in the ATC base case since the additional facilities have minimal influence on the assessment of BPA-TS' existing flow gates. The projects include the Harney Area Plan of Service, Northern Intertie, West of Garrison; any generation associated with the TSRs for these projects was, however, included.

The out-year base cases form the basis for inclusion of the TSRs in the 2009 NOS. The base cases are essentially the same cases that defined the end-point of the 2008 NOS. Two modifications were the removal of any TSRs from the 2008 NOS whose PTSAs subsequently terminated and did not proceed in the study process. Additionally, the base cases include an updated load forecast for the region. The August base case showed an increased load of approximately 300 MW, while the January base case showed an increased load of approximately 550 MW.

5.2 Cross Cascades South and Cross Cascades North Flowgates

Evaluating the NOS 2009 TSRs using the Network Composite PUF analysis described in BPA-TS's ATC Methodology, and described in Section 3.2, shows ATC impacts on the CCN and CCS flow gates. However, when BPA-TS analyzed these TSRs using power flow for the January 2014 out-year ATC base case, the results showed that the existing system is sufficient to accommodate all of the TSRs without expansion of either the CCN or CCS flowgate.

In order to understand the difference between the impacts indicated by the Network Composite PUF analysis and the power flow analysis, it is helpful to consider the following:

- The Network Composite PUF assessment that BPA-TS uses to assess requests for long-term firm transmission service is best applied to individual, or at most, a limited number of requests for service. The Network Composite PUF assessment assumes that for each TSR, there is an equal increase of generation at the POR and load throughout the Northwest that matches the demand of the requests. The corresponding increase in load used by the PUF assessment is not supported by a forecast or expected load growth, but rather, is an increase to match the demand associated with requests. When considering the aggregate impacts from the requests in the Pending Queue there can be substantial error in the PUF assessment totals, as they do not provide an accurate reflection of the expected usage or needs of the transmission system for a large number of requests.

  For the 2009 NOS, the Network Composite PUF analysis assumes that there would be a combined increase of load within the region and exports totaling 1,553 MW to balance the demand associated with the requests in the PTSAs.

- By contrast, the power flow analysis actually includes regionally forecast load growth prior to modeling any of the 2009 NOS PTSAs. For example, the January 2014 base case included approximately 550 MW of increased load over the January 2014 base case considered during the 2008 NOS. The 550 MW increase of regional load is significantly less than the 1,553 MW demand associated with the 2009 NOS requests – a key difference between the January 2014 ATC base case and the impacts indicated by the Pending Queue.

  In order to accommodate the 1,553 MW of demand associated with the PTSAs that exceeded the 550 MW of regional load growth, BPA-TS has to assume an equal amount of generation was displaced, or dispatched off. The reduction in generation further highlights the difference between the Network Composite PUF analysis and the power flow analysis.

By balancing generation with forecast regional load growth and exports, the power flow analysis considers a more realistic expected use of the transmission system.

As a result of the 2009 NOS Cluster Study, BPA-TS finds that reinforcement of the CCN and CCS flowgates is not required at this time in order address the needs of the TSRs in the 2009 NOS. BPA-TS will continue to monitor both of these flowgates to ensure reliable service for regional load growth. A description of the anticipated project to increase the TTCs of these flowgates was included in 2008 NOS Cluster Study Report. BPA-TS will decide to initiate these projects based on the demand for load service.

5.3 ATC Flows

Tables 5.1 and 5.2, below, show the out-year basecase flows on BPA-TS' current flowgates for August 2014 and January 2014, respectively. In table 5.1 below, the column labeled "August 2014 Case Start" depicts the 2014 ATC flows with the addition of the proposed infrastructure projects identified as part of the 2008 NOS and includes modeling of the TSRs from the 2008 NOS; the case does not include modeling of any of the TSRs for the 2009 NOS. The column labeled "August 2014 Case Final" shows the flows after the addition of the infrastructure projects and modeling of all 2009 NOS TSRs as described in section 5.1, above. Similarly in Table 5.2 below, the column labeled "January 2014 Case Start" depicts the 2014 ATC flows with the addition of the proposed infrastructure projects identified as part of the 2008 NOS and includes modeling of the TSRs from the 2008 NOS; the case does not include modeling of any of the TSRs for the 2009 NOS. The column labeled "January 2014 Case Final" shows the flows after the addition of the infrastructure projects and modeling of all 2009 NOS TSRs. The column labeled TTC shows the expected TTCs for each flow gate after completion of the proposed projects. The resulting flows on all flowgates are within the expected TTC for the flowgates. The out-year ATC base cases indicate that BPA-TS will be able to support the requested transmission service with the proposed system reinforcements outlined in Section 2, above.

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		August 2014 Case Start.	**August 2014 Case Final**
Flow gate	**TTC**	**Flow MW**	**Flow MW**
SOUTH OF ALLSTON	3,980	3,175	3,044
CROSS CASCADES NORTH	9,900	4,399	4,239
CROSS CASCADES SOUTH	7,700	4,794	4,909
MONROE-ECHO LAKE	1,500	1,258	1,148
NORTH OF HANFORD	4,100	2,225	1,592
NORTH OF JOHN DAY	8,400	6,631	5,787
PAUL TO ALLSTON	2,990	2,206	2,014
RAVER TO PAUL	1,625	1,093	935
WEST OF MCNARY	4,500	3,025	3,151
WEST OF SLATT	5,500	4,986	4,916

August 2014 Case Start: August 2014 -- Starting ATC case for NOS 2009 w/NOS 2008 Infrastructure
August 2014 Case Final: August 2014 -- ATC case w/ all NOS 2009 TSRs

Table 5.1. Out-year ATC base case flows – August 2014. The TTCs listed are based upon completion of the proposed system reinforcements. Final TTCs and flow will be updated to reflect actual facilities that are developed after completion of NEPA work and BPA decides whether to build these facilities.

		January 2014 Case Start	January 2014 Case Final
Flow gate	TTC	Flow MW	Flow MW
SOUTH OF ALLSTON	3,980	1,659	1,815
CROSS CASCADES NORTH	9,900	9,041	9,193
CROSS CASCADES SOUTH	7,700	6,758	6,734
MONROE-ECHO LAKE	1,500	-260	-307
NORTH OF HANFORD	4,100	-227	-38
NORTH OF JOHN DAY	8,400	4,579	4,858
PAUL TO ALLSTON	2,990	933	987
RAVER TO PAUL	1,625	655	696
WEST OF MCNARY	4,500	3,478	3,716
WEST OF SLATT	5,500	4,570	4,906

January 2014 Case Start: January 2014 -- Starting ATC case for NOS 2009 w/NOS 2008 Infrastructure
January 2014 Case Final: January 2014 -- ATC case w/ all NOS 2009 TSRs

Table 5.2. Out-year ATC base case flows – January 2014. The TTC's listed are based upon completion of the proposed system reinforcements. Final TTC's and flow will be updated to reflect actual facilities that are developed after completion of NEPA work and BPA decides whether to build these facilities.

6 Conclusion

Table 6.1, below, lists the reinforcements identified in the 2009 NOS Cluster Study, the associated estimated direct cost (no overhead loadings), and an estimated energization date for each project.

Project-Description	Estimated Total Direct Cost ($M)	Projected Energization Date
Harney Area Reinforcement Total	$242	Sep-2015
Northern Intertie Reinforcement Total	$225	Sep-2016
West of Garrison	$91	Sept-2014
Total '09 NOS Projected Project Costs	$558	

Table 6.1. Summary of 2009 NOS system reinforcements with expected energization dates.

BPA-TS is confident that with the facilities identified in this Cluster Study, it can reliably support long-term transmission service to meet the needs for service embodied in the 34 PTSAs from the 2009 Network Open Season with an associated demand of 1,553 MW.

Appendix A: PTSA Grouping Summary

2009 NOS PTSA Grouping Summary

Grouping	PTSAs	Demand
Authorize	10 TSRs	293 MW
Harney	1 TSR	25 MW
I-5	2 TSRs	100 MW
I-5, MCNY-JDAY, BIGE-KNGT	1 TSR	125 MW
MCNY-JDAY, BIGE-KNGT	17 TSRs	896 MW
Northern Intertie, CFRY-LOMO, & West of Garrison	2 TSRs	100 MW
West of Garrison	1 TSR	14 MW
Total	34 TSRs	1,553 MW

Appendix B: 2009 NOS PTSA Groupings

2009 NOS PTSA Grouping

Authorize			10 TSRs	293 MW
Customer	Columbia Energy Partners	AREF	73076382	10 MW
Requested POR	NEWPOINT	Requested POD	MIDWAY230MIDCR	
Analyzed POR	Harney 115	Analyzed POD	Network Composite PUF	
Start	12/1/2009	Stop	12/1/2039	
Customer	Columbia Energy Partners LLC	AREF	72093971	25 MW
Requested POR	NEWPOINT	Requested POD	MIDWAY230MIDCR	
Analyzed POR	Harney 115	Analyzed POD	Network Composite PUF	
Start	12/1/2009	Stop	12/1/2039	
Customer	Seattle City Light	AREF	72478874	10 MW
Requested POR	NEWPOINT	Requested POD	SEATTLECNTGSB	
Analyzed POR	Boardman 115	Analyzed POD	LaGrande 230	
Start	2/1/2009	Stop	8/1/2025	
Customer	Grant County PUD No.2	AREF	72582664	150 MW
Requested POR	MIDWAYP230GCPD	Requested POD	COLMBIA115	
Analyzed POR	Midway 230	Analyzed POD	Network Composite PUF	
Start	1/1/2011	Stop	1/1/2016	
Customer	Pacific Northwest Generating Co-op	AREF	73003463	13 MW
Requested POR	FCRPS	Requested POD	HTSPNGS230MPC	
Analyzed POR	FCRPS	Analyzed POD	Hot Springs 230	
Start	10/1/2011	Stop	10/1/2021	
Customer	Benton REA	AREF	73184475	4 MW
Requested POR	NWMRKTHUB(NWH)	Requested POD	BENTREANTDP	
Analyzed POR	Vantage 230	Analyzed POD	FCRPS	
Start	10/1/2012	Stop	10/1/2019	
Customer	Northern Wasco	AREF	73188365	6 MW
Requested POR	SPEARFISH12	Requested POD	PSEI_CENTCNTGS	
Analyzed POR	Spearfish 115	Analyzed POD	Network Composite PUF	
Start	1/1/2013	Stop	1/1/2018	
Customer	Clark Public Utilities	AREF	73198880	25 MW
Requested POR	ALCOA115CLAR	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	Alcoa 115	Analyzed POD	Network Composite PUF	
Start	10/1/2011	Stop	10/1/2016	
Customer	Clark Public Utilities	AREF	73198888	25 MW
Requested POR	CHIEFJOECNTGS	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	Chief Joseph 500	Analyzed POD	Network Composite PUF	
Start	10/1/2011	Stop	10/1/2016	
Customer	Clark Public Utilities	AREF	73198896	25 MW
Requested POR	GRNDCULEECNTGS	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	Grand Coulee Contiguous	Analyzed POD	Network Composite PUF	
Start	10/1/2011	Stop	10/1/2016	

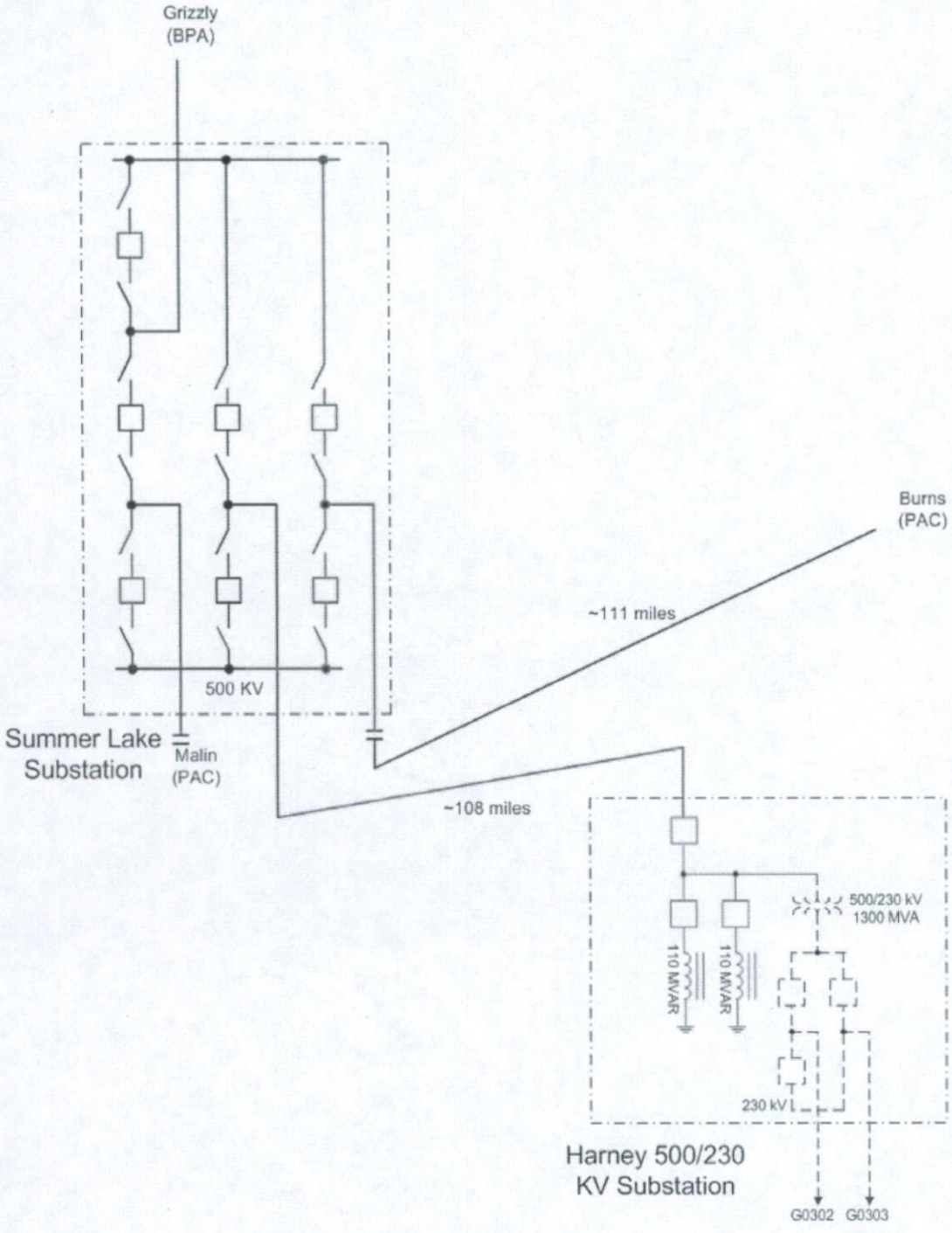
Harney			1 TSR	25 MW
Customer	Columbia Energy Partners LLC	AREF	72093973	25 MW
Requested POR	NEWPOINT	Requested POD	MIDWAY230MIDCR	
Analyzed POR	Harney 115	Analyzed POD	Network Composite PUF	
Start	12/1/2009	Stop	12/1/2039	
I-5			2 TSRs	100 MW
Customer	PacifiCorp	AREF	72883771	88 MW
Requested POR	WOODLANDTP230	Requested POD	ALVEY230PACW	
Analyzed POR	Woodland Tap 230	Analyzed POD	CW Paul 500	
Start	5/1/2009	Stop	7/1/2012	
Customer	PSEM	AREF	72940872	12 MW
Requested POR	LONGVW230MFGL	Requested POD	PSEI_CENTCNTGS	
Analyzed POR	Longview 230	Analyzed POD	Network Composite PUF	
Start	5/1/2009	Stop	5/1/2014	
I-5, MCNY-JDAY, BIGE-KNGT			1 TSR	125 MW
Customer	Coral Power L.L.C.	AREF	72745392	125 MW
Requested POR	RKYRCHSS230	Requested POD	JOHNDAYINTI500	
Analyzed POR	Rocky Reach 230	Analyzed POD	John Day 500	
Start	1/1/2010	Stop	1/1/2015	
MCNY-JDAY, BIGE-KNGT			17 TSRs	896 MW
Customer	PPM Energy, Inc.	AREF	72174062	50 MW
Requested POR	SLATT500	Requested POD	JOHNDAYINTI500	
Analyzed POR	Slatt 500	Analyzed POD	John Day 500	
Start	12/1/2011	Stop	12/1/2016	
Customer	PPM Energy, Inc.	AREF	72174071	50 MW
Requested POR	SLATT500	Requested POD	BIGEDDY500CELO	
Analyzed POR	Slatt 500	Analyzed POD	Big Eddy 500	
Start	12/1/2011	Stop	12/1/2016	
Customer	BP Wind Energy North America	AREF	72490816	50 MW
Requested POR	NEWPOINT	Requested POD	PSEI_CENTCNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72490823	50 MW
Requested POR	NEWPOINT	Requested POD	PSEI_CENTCNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72490826	50 MW
Requested POR	NEWPOINT	Requested POD	PSEI_CENTCNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72490832	50 MW
Requested POR	NEWPOINT	Requested POD	PSEI_CENTCNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72674839	50 MW
Requested POR	NEWPOINT	Requested POD	PGE_CNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	

Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72674841	50 MW
Requested POR	NEWPOINT	Requested POD	PGE_CNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72674842	50 MW
Requested POR	NEWPOINT	Requested POD	PGE_CNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	BP Wind Energy North America	AREF	72674846	50 MW
Requested POR	NEWPOINT	Requested POD	PGE_CNTGS	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	
Customer	PacifiCorp	AREF	72792445	8 MW
Requested POR	DALREED230	Requested POD	TROUTDL230PAC	
Analyzed POR	Dalreed 230	Analyzed POD	Network Composite PUF	
Start	3/1/2009	Stop	3/1/2014	
Customer	Bonneville Power Administration	AREF	73092187	91 MW
Requested POR	KLONDIKESH230	Requested POD	PWRSRVNTMOA	
Analyzed POR	John Day 500	Analyzed POD	PWRSRVNTMOA	
Start	6/1/2009	Stop	2/1/2019	
Customer	Diversified Energy Transmission LLC	AREF	73131621	100 MW
Requested POR	NEWPOINT	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	McNary 500	Analyzed POD	Network Composite PUF	
Start	12/1/2012	Stop	12/1/2017	
Customer	Diversified Energy Transmission LLC	AREF	73131624	50 MW
Requested POR	NEWPOINT	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	McNary 500	Analyzed POD	Network Composite PUF	
Start	12/1/2012	Stop	12/1/2017	
Customer	Diversified Energy Transmission LLC	AREF	73131625	50 MW
Requested POR	NEWPOINT	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	McNary 500	Analyzed POD	Network Composite PUF	
Start	12/1/2012	Stop	12/1/2017	
Customer	Clark Public Utilities	AREF	73198892	25 MW
Requested POR	JOHNDAY500	Requested POD	NWMRKTHUB(NWH)	
Analyzed POR	John Day 500	Analyzed POD	Network Composite PUF	
Start	10/1/2011	Stop	10/1/2016	
Customer	Los Angeles Wholesale Mar	AREF	73198926	72 MW
Requested POR	BOARDMAN115GEN	Requested POD	BIGEDDYCNTGS	
Analyzed POR	Boardman 115	Analyzed POD	Big Eddy 500	
Start	1/1/2010	Stop	1/1/2024	

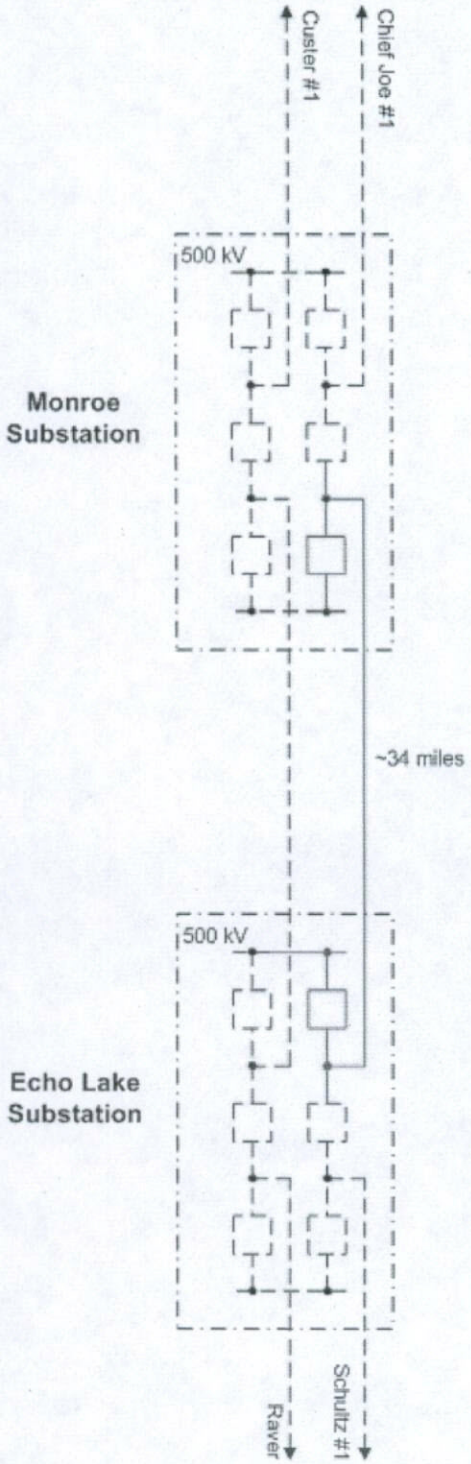
Northern Intertie, CFRY-LOMO, & West of Garrison			2 TSRs	100 MW
Customer	PWX	AREF	72173426	50 MW
Requested POR	GARRISON500	Requested POD	USCNDNBDRW230	
Analyzed POR	Garrison 500	Analyzed POD	Custer w/ Blaine 500	
Start	1/1/2009	Stop	1/1/2014	
Customer	PWX	AREF	72173427	50 MW
Requested POR	GARRISON500	Requested POD	USCNDNBDRW230	
Analyzed POR	Garrison 500	Analyzed POD	Custer w/ Blaine 500	
Start	1/1/2009	Stop	1/1/2014	
West of Garrison			1 TSR	14 MW
Customer	Avista Corporation	AREF	73135919	14 MW
Requested POR	GARRISON500CLS	Requested POD	HATWAI230	
Analyzed POR	Garrison 500	Analyzed POD	Network Composite PUF	
Start	1/1/2010	Stop	1/1/2015	

Appendix C: Plans of Service and One-Line Diagrams

C.1 Harney Area Reinforcement



C.2 Northern Intertie



C.3 West of Garrison