Exhibit No. ___ (ECO-9)
Docket UE-152253
Witness: Elizabeth O'Connell

BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PACIFIC POWER & LIGHT COMPANY,** **Respondent.**	**DOCKET UE-152253**

EXHIBIT TO
TESTIMONY OF

ELIZABETH C. O'CONNELL

STAFF OF
WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION

Pacific Power Response to Staff Data Request 37, Attachment WUTC 37 – Investment Appraisal Document

March 17, 2016

INVESTMENT APPRAISAL *[2010-2017]*

Union Gap Substation – Rebuild 230/115 kV, 115/12.5 kV Substation and Install New 230/115 kV Transformer

Revision # 94006194

Revision by: Scott Beyer/Justin Kruger/Lori Adams

Date: 12/18/2015

Project Sponsor: Richard Vail

PacifiCorp Transmission

1 Executive Summary

This project change notice is to authorize a shift of the overall project in-service date from 6/1/2016 to 5/15/2017 and increase overall project costs to $49.7 which is a $2.15m increase over the previous approved APR (94002629). The previous APR was based on a preliminary scope estimate with an expected +/- accuracy of 30%. The current APR is based on the Project Manager's current forecast since bids have been awarded (+/- 5%).

The Union Gap Substation Upgrade is being done in three sequences of work in order to avoid extended outages in the area system.

Initially, the first sequence included the replacement of two 115/12.47 kV distribution substation transformers with a new 25 Mega Volt Ampere (MVA) transformer and relocating an existing third transformer, rated 20 MVA, onsite at the substation. This sequence also involved the relocation of the existing 115/12.47 kV distribution portion of the substation to accommodate the upgraded layout of the substation, which will be completed in the second and third sequences of work. Also, in order to place the distribution portion of the substation into service, there was a $1.1m transmission component as part of the first sequence of work that was placed into service in August of 2015. The 115 kV Nob Hill line had to be relocated to the west side of the substation as the distribution portion of the substation had to be moved to the west. Work associated with the 115 kV Nob Hill line included installing new steel pole and wood pole structures. The first sequence of work was completed and placed into service in August of 2014.

The second sequence of work includes relocating the 230 kV bus and constructing it into a ring bus with six new 230 kV breakers to accommodate the addition of a 230/115 kV, 250 MVA transformer and that will go in service in June, 2016.

The third and final sequence of work is estimated to be placed in service in May 2017 and includes a rebuild of the existing 115 kV main transfer bus to a breaker and a half scheme, and fifteen new 115 kV breakers on the 115 kV bus that connect to ten bay positions and will go into service in May, 2017.

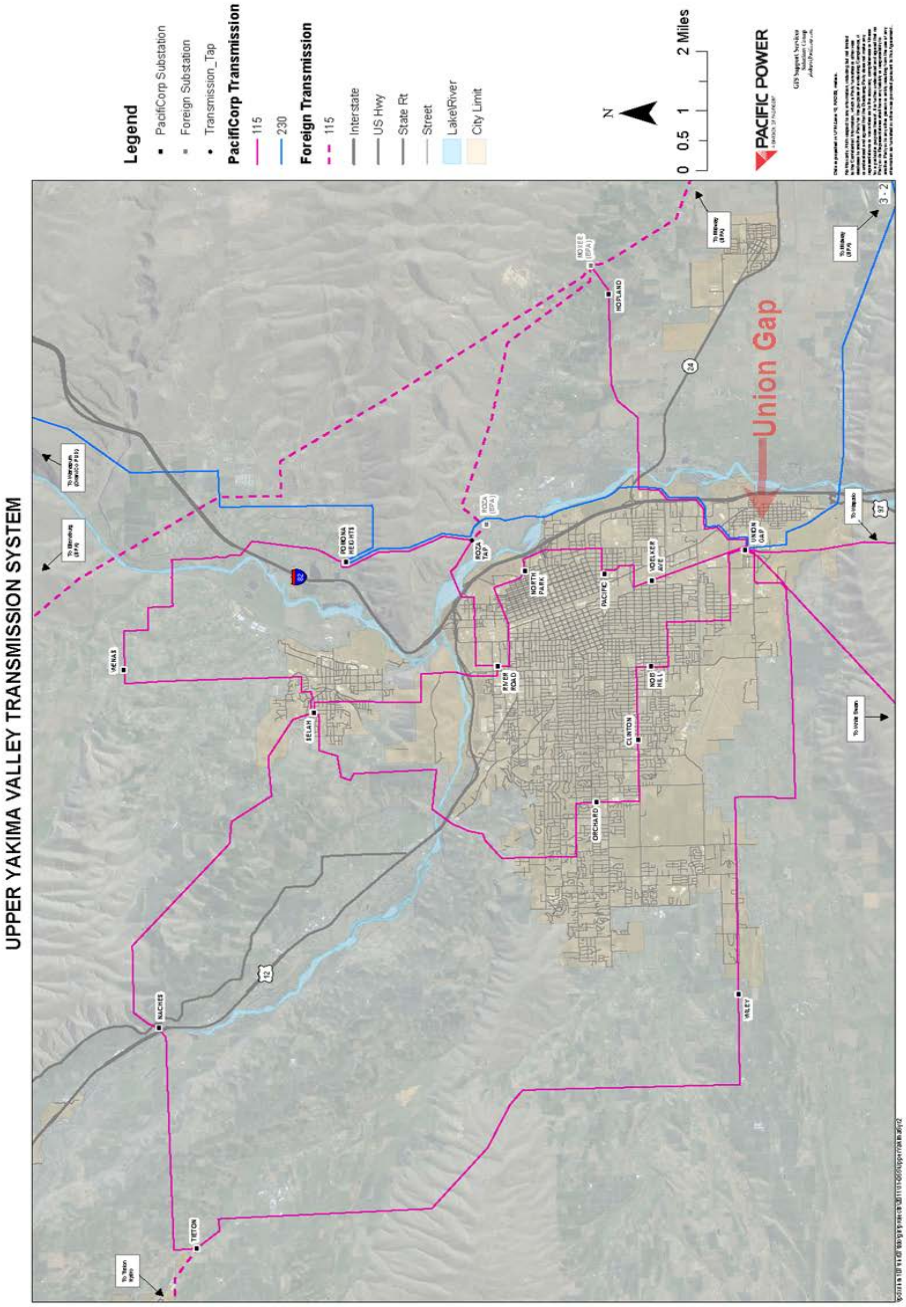
2 Purpose and Necessity

The plant investment for the Union Gap Substation Upgrade is needed to comply with reliability standards mandated by the North American Electric Reliability Corporation (NERC). Specifically, the project is necessary to continue to comply with NERC Standard TPL-002 "System Performance Following Loss of a Single Bulk Electric System Element (Category B)," which requires bulk electric system elements, including transmission transformers, to be within thermal limits following the single contingency loss of a transmission system element. An outage of one of the two 230/115 kV transformers results in an overload of the remaining transformer of approximately 50 megawatts (MWs), which can be maintained for a maximum of four hours. PacifiCorp's West System

Assessment for TPL-002 Compliance Requirements notes that for the loss of a Union Gap 230/115 kV transformer in heavy summer loading conditions, overload of the posted four-hour emergency limit of the transformer will be experienced by 2016. To correct this system deficiency, the recommended plan of service is to install a third 230/115 kV transformer at the Union Gap substation. The new 230/115 kV transformer is planned to be placed into service in May 2016.

Additionally, PacifiCorp's West System Assessment for TPL-003 Compliance Requirements notes nine outages involving 115 kV, 230 kV breaker and bus faults, with stuck breakers and protection systems failures at Union Gap that result in thermal and voltage performance deficiencies. Loss of both 230/115 kV transformers results in 30 MWs of load being shed (approximately 6,000 customers) for the initial outage. This will also result in the remaining transformers at the nearby Pomona Heights substation being overloaded by approximately 150 MWs, which would require corrective measures to remove the overloads from the transformers. To correct all aforementioned system limitations in a cost-effective manner, this plan of service was selected to rebuild the 230 kV and 115 kV buses into a ring bus for the 230 kV bus and breaker and a half configuration for the 115 kV bus, which will eliminate the TPL-003 system deficiencies at the Union Gap substation. Deficiencies related to the 230 kV bus are resolved by the second sequence. Deficiencies related to the 115 kV bus will be resolved by completion of the third sequence. Additionally, the two existing distribution transformers replaced by this project were loaded to 99.5 percent of their combined thermal capability. Completion of the first sequence increased 115/12.47 kV summer capacity by 4 MVA, providing the ability to serve future local distribution load increases from the Union Gap substation.

The map below indicates how limited 230 kV transmission supports the Yakima area. There are only two 230 kV lines that loop in and out of Union Gap substation which provide 115 kV capacity coming out of Union Gap.


UPPER YAKIMA VALLEY TRANSMISSION SYSTEM
Legend
PacifiCorp Substation
Foreign Substation
Transmission_Tap
PacifiCorp Transmission
115
230
Foreign Transmission
115
Interstate
US Hwy
State Rt
Street
LakeRiver
City Limit
N
0 0.5 1 2 Miles
PACIFIC POWER
Union Gap

3 Benefits

After installation of the proposed transformer, the TPL-002 transformer overload violation will be corrected. Upgrading the substation's bus topologies will correct TPL-003 violations.

In addition to the correction of TPL violations, this construction will also correct the following operational and reliability concerns associated with the existing bus configuration, equipment capabilities and insulators:

- The existing 115 kV bus is a main and transfer configuration. In addition to the TPL-003 concerns associated with this configuration, there are several operational issues. The bus-tie breaker is currently being used to provide high-side protection for the 115-12.5 kV transformers T-600 and T-666. If either the main or transfer bus needs to be de-energized for maintenance, an insulator replacement, a switch replacement, etc., then a mobile transformer must be brought in to serve the 12.5 kV load. Additionally, a planned or unplanned main bus outage requires opening the 115 kV lines that loop through Union Gap and serving the remaining White Swan line and 115-12.5 kV transformers on the transfer bus, protected by the bus tie breaker. This can only be done during light load conditions due to thermal and voltage issues serving the normally looped 115 kV lines radial from their other source(s).
- The 230 kV circuit switchers 1Y4 and 1Y5, protecting the two 230/115 kV transformers, have insufficient fault interrupting capability to interrupt high duty faults on the transformers. A fault selector scheme blocks tripping of these devices for faults above the interrupting capability and trips both 230 kV line breakers 1Y2 and 1Y6. The resulting outage has the same impact as the TPL-003 230 kV bus fault or breaker failure event.
- The 115 kV capacitor bank circuit switchers 2Y88 and 2Y89 have insufficient fault interrupting capability to interrupt high duty faults on the capacitor banks. A fault selector scheme blocks tripping of these devices for faults above the interrupting capability and trips both 230/115 kV low-side breakers 2Y30 and 2Y95. The resulting outage has the same impact as the TPL-003 230 kV bus fault or breaker failure event.
- The 115 kV fuses on 115/12.5 kV transformer T-3569 are overdutied to 136% of their interrupting capability. If they are unable to operate for a fault, a 115 kV bus outage would result, with the same deficiencies noted for the TPL-003 115 kV bus fault or breaker failure event.
- Most of the existing 115 kV bus support insulators and switches and some of the 230 kV switches are brown glass cap-and-pin type. These insulators have been prone to failure in other PacifiCorp substations.
- Existing oil containment and many of the existing structures and foundations do not likely meet current design standards. Future projects to replace, rebuild or add to portions of the

existing substation would risk increased costs and additional scope to remedy existing issues.

4 Alternatives Considered

- Alternative A: Replace both existing 230/115 kV, 150 MVA transformers at Union Gap with new 230/115 kV, 250 MVA transformers and rebuild the 230 kV and 115 kV buses. Estimated cost: $55,795,000
- Alternative B: Construct a new 230/115 kV substation along the Pomona to Union Gap 230 kV line. Estimated cost: $135,800,000.

After reviewing the alternative construction options, it has been determined that the proposed plan of service is the least costly. Alternative A would still require rebuilding the Union Gap substation to correct the TPL-003 violations, but is a more expensive alternative to the proposed solution due to the need to replace two 230/115 kV transformers instead of adding a third transformer. Alternative B would require constructing a new 230/115 kV substation along the Pomona to Union Gap 230 kV line with increased line routing costs and would also still require rebuilding the Union Gap Substation 230 kV and 115 kV buses to correct the TPL-003 violations.

5 Purpose and Necessity Risk Analysis

TPL studies for the following events determine the corresponding customer impacts.

TPL-002 Outage Event: Outage of one of the two 230/115 kV transformers at Union Gap with all protection operating as planned (TPL-002). This outage results in no customers being lost for the event. The loss of the transformer results in an overload of the remaining transformer of approximately 50 MWs. Given the assumption that “a customer” is 5 kW of load, then approximately 10,000 customers will need to be shed to lower the load back to the continuous rating of the remaining transformer. The amount of load necessary to get the remaining transformer below the emergency rating by 20 MWs will need to be shed by 2016 or 4,000 customers.

TPL-003 Outage Event: Outage of one of the two 230/115 kV transformers at Union Gap with protection system failure (TPL-003). This outage will result in both Union Gap transformers being lost which results in 30 MWs of load being shed (6,000 customers) for the initial outage. This will also result in the remaining transformers at Pomona Heights being overloaded by approximately 150 MWs which would require up to 30,000 customers being shed in order to remove the overloads from the transformers.

TPL-003 Outage Event: 230 kV Union Gap Bus Fault with normal clearing (TPL-003). This outage results in no customers being lost for the event. However, both Union Gap 230/115 kV transformers would have been lost. The result is that Pomona Heights 230/115 kV Transformers and 115 kV lines from Moxee and Outlook are all severely overloaded. The overloads total approximately 200 MWs

which results in approximately 40,000 customers that will need to be shed.

TPL-003 Outage Event: 230 kV Union Gap Bus Fault or 230 kV Circuit breaker failure with protection failure (TPL-003). Depending on what protection system fails, the worst case scenario is that the fault does not get cleared as the protection for remote end clearing of the six 115 kV lines at Union Gap does not operate as the protection for these lines cannot detect the fault thru the Union Gap transformers. This could lead to area voltage collapse with up to 500 MWs of load (100,000 customers) being shed. Even if the fault gets cleared by all of the lines clearing at the remote end, a similar number of customers would still be shed.

TPL-003 Outage Event: 115 kV Union Gap Bus Fault with Normal Clearing (TPL-003). This outage results in approximately 30 MWs (6,000 customers) being shed. As this will result in both Union Gap Transformers being lost the Pomona Heights transformers will be overloaded by approximately 75 MWs (15,000 customers) being shed.

TPL-003 Outage Event: 115 kV Union Gap Bus Fault or 115 kV circuit breaker failure with protection system failure (TPL-003). Depending on what protection system fails, this event can result in a maximum of 500 MWs (100,000 customers) being shed.

NERC has the authority to fine the company the maximum penalty per day per TPL violation under the Energy Policy Act of 2005.

Several of the oil stained foundations and stained soils on the project site were remedied in the first phase of the project. However, there are similar concerns for the final phase of the project as the 115kV foundations exhibit a similar existing condition. The site has been tested by a certified environmental consultant to determine the required level of soil cleanup. In addition the ground water is determined to be approximately four feet deep. If the oil has reached this ground water it may require a substantial cost for cleanup, but at this point, it does not appear as though the ground water has been contaminated in the 115kV yard.

The existing control house to be demolished may have asbestos and lead paint. An environmental consultant will test for these hazardous materials and provide cleanup plan.

Costs for the environmental issues will be determined after testing.

6 Project Delivery Risk Factors

The project shall be managed to mitigate typical project risks (design and construction resources, material deliveries, weather, etc.) as it applies to scope, schedule, and costs. Appropriate documentation will be created, tracked and communicated to properly manage this project. The appropriate risk mitigation measures have been identified and resolved in the project development phase to the furthest extent possible, however, there is the possibility for other risk factors impacting

the project costs, schedule, and scope of the third phase of the project. Coordination with Bonneville Power Administration (BPA) and their capability to deliver the outages necessary for the project is a considerable risk. Another risk that has been identified pertains to removing and reinstalling the existing transformers. Ultimately, the project team will do their best to limit risks and the impacts they may have on the project.

7 Target Milestones for Deliverables

- Project authorization: September 2010
- Phase 1 In Service : August 2014
- Phase 2 Design package complete: March 2015
- Phase 3 Design package complete: March 2016
- Phase 2 & 3 Order Long lead material: October 2015
- Phase 2 & 3Construction contracts executed: July 2015
- Phase 2 Initiate Construction: August 2015
- Phase 2 In service May 2016
- Phase 3 Initiate Construction: March 2016
- Phase 3 In Service May 2017

8 Target Costs

The project will be phased over 8 years.

Net costs	Prior years	2015	2016	2017	Total Cost
10 Year Plan Budget	$14,843,663	$13,798,012	$12,958,180	$4,651,083	$46,250,938
Appropriation request (gross)	$14,843,663	$14,675,789	$14,863,219	$5,707,641	$49,740,056
-reimbursements	$0	$0	$0	$0	$0
-contingency	$0	$0	$0	$0	$0
Appropriation request (net)	$14,843,663	14,675,789	14,863,219	5,707,641	$49,740,056
Plant Placed In Service- Dist	$9,264,220	$35,954	$0	$0	$9,300,174
Plant Placed In Service- Tran	$1,344,107	-$11,515	$20,484,270	$18,620,106	$40,439,882
Total Plant Placed In Service	$10,608,327	$27,353	$20,484,270	$18,620,106	$49,740,056

9 Accounting Issues or Regulatory Recovery Issues

This is a transmission project (230 kV and 115 kV) and will be recovered in general rates across all six states. The in-service date is sequenced with $1.3m going into service in 2014, $20.5m is projected to be in service in May 2016, and $18.6m is projected to be in service in May 2017. Phases of this project will be included in rate cases with test periods of August 2014 or later.

AND

This is a distribution project (12.47 kV) and will be recovered in general rates in the state of Washington. The in-service date was in August 2014 and this project will be included in rate cases with test periods of August 2014 or later.

10 Return on investment

This project change notice (APR 94006194) increases total authorized project cost $2.15m from $47.6m to $49.7m. This reflects moving from a preliminary scope estimate to the current forecast. The 4.1m contingency included in the previous APR is eliminated by this project change notice. Therefore, total project cost including contingency is reduced from $51.6m to $49.7m.

A financial analysis was prepared January 22, 2013 when APR 94002629 was approved. The estimated project cost was $51.6m including contingency of $4.0m. The cost of the next best alternative was $60.5m including contingency of $4.7m. The recommended alternative was the least cost alternative with a present value revenue requirement benefit of $9.0m compared to the next best alternative. The recommended alternative is the least cost alternative. An updated financial analysis is not required.

For reference, the financial analysis for the previous APR 94002629 is copied below.

It is recommended to spend $47.6 million plus $4.0 million for contingency, total of $51.6 million to rebuild the Union Gap substation and install a new 230/115 kV, 250-MVA autotransformer.

Alternative #1 – Option A would replace the existing transformers with larger transformers and rebuild 115 kV yard. The estimated cost is $55.8 million plus $4.7 million for contingency, total of $60.5 million.

Alternative #2 – Option B1 would build a new eastside substation. The estimated cost is $135.8 million plus $11.5 million for contingency, total of $147.3 million.

Alternative #3 – Option B2 would build a new westside substation. The estimated cost is $120.9 million plus $10.3 million for contingency, total of $131.1 million.

The financial analysis was based on the following assumptions:

Recommended Solution	2011	2012	2013	2014	2015	2016	Total
Capital	$28,446	$312,941	$981,744	$15,678,000	$25,957,328	$4,630,656	$47,589,115
Contingency						$4,045,075	$4,045,075
Total	$28,446	$312,941	$981,744	$15,678,000	$25,957,328	$8,675,731	$51,634,190

Alternative #1	2011	2012	2013	2014	2015	2016	Total
Capital	$33,260	$365,901	$1,147,888	$18,343,713	$30,416,870	$5,450,644	$55,758,276
Contingency						$4,739,453	$4,739,453
Total	$33,260	$365,901	$1,147,888	$18,343,713	$30,416,870	$10,190,097	$60,497,729

Alternative #2	2011	2012	2013	2014	2015	2016	Total
Capital	$80,429	$884,804	$2,775,770	$44,462,490	$74,111,659	$13,484,917	$136,800,068
Contingency						$11,543,006	$11,543,006
Total	$80,429	$884,804	$2,775,770	$44,462,490	$74,111,659	$25,027,922	$147,343,074

Alternative #3	2011	2012	2013	2014	2015	2016	Total
Capital	$71,627	$787,977	$2,472,008	$39,588,742	$65,958,239	$11,985,726	$120,864,320
Contingency						$10,273,467	$10,273,467
Total	$71,627	$787,977	$2,472,008	$39,588,742	$65,958,239	$22,259,193	$131,137,787

- The financial analysis was completed over 50 years.
- Transmission assets are depreciated over 15 years for tax and 58 years for book.
- The transmission assets are allocated to all six states.
- Distribution assets are depreciated over 20 years for tax and 48 years for book.
- The distribution assets are allocated to Washington.
- The in-service date for the transmission assets is June 1, 2016.
- The in-service date for the distribution assets is July 15, 2014
- No incremental operating and maintenance or administrative and general expense.
- The financial analysis results presented below are based on the project's after-tax cash flows. This is based on a capital structure of 47% debt and 53% common with a 5.50% debt and a 10.00% common rate.
- A 1.15% Washington property tax rate was used.
- A 6.88% discount rate was used.
- A 37.95% tax rate was used.

Financial Analysis Results:

Project	Capital Cost	Present Value of Revenue Requirements	Present Value of Unlevered Cash Flows
Recommended Solution	$51,634 k	$53,066 k	($31,998 k)
Alternative #1	$60,498 k	$62,056 k	($37,427 k)
Alternative #2	$147,343 k	$150,140 k	($90,614 k)
Alternative #3	$131,138 k	$133,704 k	($80,689 k)

The recommended solution to rebuild the Union Gap substation and install a new 230/115 kV, 250-MVA autotransformer has a lower cost of $51.6 million vs. $60.5 million for the next best alternative and a present value of revenue requirements benefit of $9.0 million compared to the next best alternative.

The present value of revenue requirements, cash flows and financial impacts of the proposed solution are as follows:

Union Gap Substation; Recommended Solution

(Dollars)

Project Economics

	Customer Revenue Requirement	Cash Flows Without Regulatory Recovery	Cash Flows With Regulatory Recovery
PV Revenue Requirement	$53,066,136		
Project NPV		($31,998,386)	$928,621
Project IRR		No Solution	7.15%
Discount Rate Used		6.88%	6.88%
Capital Productivity Ratio		0.13	1.03
Payback Period (years)*		Does Not Occur	14.2 Years

*Payback from start of spending

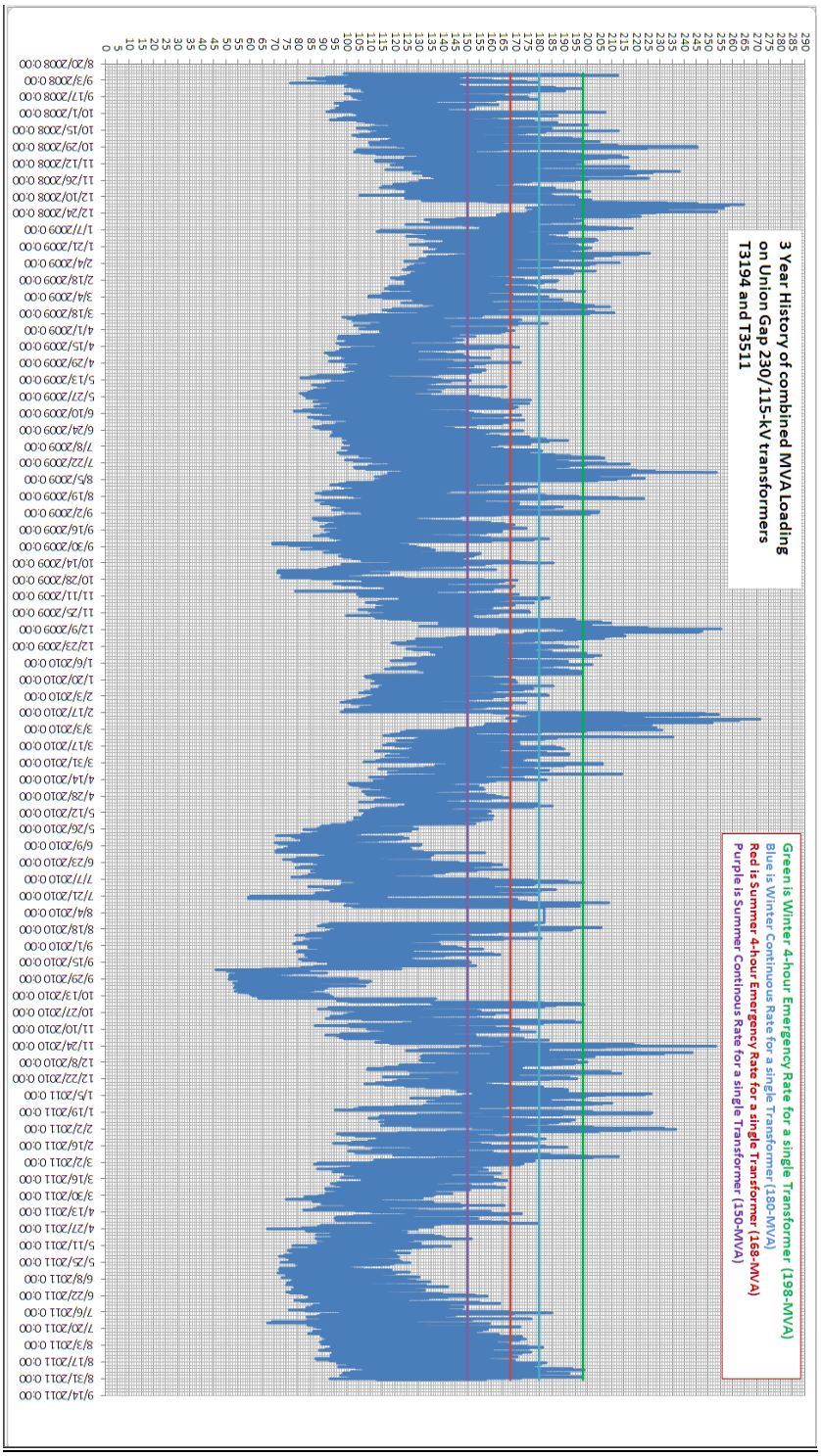
	2011	2012	2013	2014	2015	2016	2017
Capital Spending w/o AFUDC	$27,392	$299,230	$920,036	$15,061,148	$23,975,233	$6,951,714	$0
Capital Spending w AFUDC	$28,446	$312,941	$981,744	$15,678,000	$25,957,328	$8,675,731	$0
Net Cash Flow Without Regulatory Recovery							
Annual	($27,392)	($299,433)	($922,472)	($15,012,410)	($23,892,903)	($6,058,124)	$1,289,514
Cumulative	($27,392)	($326,825)	($1,249,297)	($16,261,707)	($40,154,610)	($46,212,734)	($44,923,220)
Net Cash Flow With Regulatory Recovery							
Annual	($27,392)	($299,230)	($920,036)	($14,827,240)	($23,504,910)	($3,723,409)	$5,721,685
Cumulative	($27,392)	($326,622)	($1,246,658)	($16,073,898)	($39,578,809)	($43,302,218)	($37,580,532)
Incremental Earnings Before Interest & Taxes							
Without Regulatory Recovery	$0	($327)	($3,926)	($69,965)	($179,212)	($776,024)	($1,740,355)
With Regulatory Recovery	$0	$0	$0	$228,461	$446,088	$2,986,671	$5,402,664
Incremental Earnings @ 47.1% Debt Financing							
Without Regulatory Recovery	$691	$8,714	$37,999	$345,746	$1,137,986	$264,132	($1,881,211)
With Regulatory Recovery	$691	$8,917	$40,435	$530,916	$1,525,978	$2,598,847	$2,550,961
Annual Revenue Requirement							
Calculated	$0	$327	$3,926	$298,426	$625,300	$3,762,695	$7,143,019
Recovered	$0	$327	$3,926	$298,426	$625,300	$3,762,695	$7,143,019

11 Procurement and Project Delivery Strategy

- In order to satisfy business requirements, ensure best value, and minimize risk, the purchases and construction contracts shall be procured through a competitive bid process.
- Project specifications shall be developed in accordance with company engineering specifications and standard designs.
- Bidders shall be screened to meet company credit and procurement requirements. This process is being managed by the PacifiCorp procurement department.
- Project delivery strategy to be determined by project team
- Cover any long lead material that is already placed on order, listing the material, cost and schedule.

Appendix A: 3 year History of combined MVA flow through the two 230/115 kV Union Gap Transformers

Three year history of transformer overloads at Union Gap substation.



Appendix B: TPL-003

TPL-003 credible outages which result in violations for both Heavy Winter and Heavy Summer 2012 and 2016:

- TPL-003-C1, "Category C Loss of a Bus Section or Breaker with Normal Clearing (Type C1, C2)" violations include:

    1. A bus fault on the Union Gap 230 kV bus that takes out the two 230/115 kV transformers and also the 230 kV lines from Union Gap to Midway and Union Gap to Pomona.

    2. A bus fault on the Union Gap 115 kV bus that takes out the entire Union Gap 115 kV bus.

TPL-003-C1 Outages

Fault Number	Faulted Element	Bus	Breakers Tripped	Normal Clearing Time Single Phase Fault
Z477-F9	Bus	Union Gap 115	Union Gap 2Y30, 2Y90, 2Y91, 2Y92, 2Y93, 2Y94, 2Y95, 2Y96, 2Y99	4.5 cycles
Z477-F10	Bus	Union Gap 230	Union Gap 1Y2, 1Y6, 2Y30, 2Y95	5.7 cycles

- TPL-003-C2, "Category C Loss of a Bus Section or Breaker with Normal Clearing (Type C1, C2)" violations include:

    - All faulted breakers: 1Y2, 1Y6, 2Y91, 2Y92, 2Y93, 2Y94, 2Y95, 2Y96, 2Y99, 2Y30 and bus tie breaker 2Y90 result in disconnecting the entire 230 kV bus at Union Gap. Each of these outages completely disconnects the 230 kV Union Gap Sources from the Yakima Area Transmission System. For 2011 summer peak loading levels, this would result in low voltages and also thermal overloads beyond the TPL-003 criteria.

TPL-003-C2 Outages

Fault Number	Faulted Element	Breaker Location	Breaker Number	Protection Scheme (Primary)	Breakers Tripped	Normal Clearing Time Single Phase Fault
Z477-F27	Breaker	Union Gap 115	2Y99	115kV bus diff	2Y30, 2Y90, 2Y91, 2Y92, 2Y93, 2Y94, 2Y95, 2Y96	5-cycles for all Union Gap breakers.
Z477-F31	Breaker	Union Gap 115	2Y30	115kV bus diff, line protection	2Y90, 2Y91, 2Y92, 2Y93, 2Y94, 2Y95, 2Y96, 2Y99, 1Y5	5-cycles for all Union Gap breakers.
Z477-F32	Breaker	Union Gap 115	2Y95	115kV bus diff, line protection	2Y30, 2Y90, 2Y91, 2Y92, 2Y93, 2Y94, 2Y96, 2Y99, 1Y4	5-cycles for all Union Gap breakers.
Z477-F28	Breaker	Union Gap 115	2Y92	115kV bus diff, line protection	2Y30, 2Y90, 2Y91, 2Y93, 2Y94, 2Y95, 2Y96, 2Y99, Pomona 2Y102, 2Y103	5-cycles for all Union Gap breakers, 6-cycles @ Pomona 2Y102, 2Y103.
Z477-F29	Breaker	Union Gap 115	2Y96	115kV bus diff, line protection	2Y30, 2Y90, 2Y91, 2Y92, 2Y93, 2Y94, 2Y95, 2Y99, River Road 2Y5	5-cycles for all Union Gap breakers, 39-cycles at River Road.
Z477-F30	Breaker	Union Gap 115	2Y94	115kV bus diff, line protection	2Y30, 2Y90, 2Y91, 2Y92, 2Y93, 2Y95, 2Y96, 2Y99, Outlook 2Y80, 2Y125	5-cycles for all Union Gap breakers, 43.8-cycles @ Outlook 2Y80, 2Y125.
Z477-F33	Breaker	Union Gap 115	2Y91	115kV bus diff, line protection	2Y30, 2Y90, 2Y92, 2Y93, 2Y94, 2Y95, 2Y96, 2Y99, River Road 2Y4	5-cycles for all Union Gap breakers, 47.4-cycles at River Road.

Z477-F34	Breaker	Union Gap 115	2Y93	115kV bus diff, line protection	2Y30, 2Y90, 2Y91, 2Y92, 2Y94, 2Y95, 2Y96, 2Y99, Moxee B904	5-cycles for all Union Gap breakers, 22.2-cycles @ Moxee B904.
Z477-F35	Breaker	Union Gap 230	1Y2	Line protection, 230kV bus differential	1Y6, 2Y30, 2Y95, Midway A998	Union Gap breakers in 5.7-cycles, Midway A998 in 6-cycles.
Z477-F36	Breaker	Union Gap 230	1Y6	Line protection, 230kV bus differential	1Y2, 2Y30, 2Y95, Pomona 1Y19, 1Y21	Union Gap breakers in 5.7-cycles, Pomona 1Y19, 1Y21 in 5-cycles.

- TPL-003-C8 violations include:

  - *A stuck breaker, 1Y2, for a fault on Union Gap to Midway 230 kV line.*

TPL=003-C8 Violations

Fault Number	Faulted Element	From Bus	To Bus	Stuck Breaker	Local and Remote Breakers Tripped	Single Phase Fault Delayed Clearing Time
Z477-F58	Line	Midway 230	Union Gap 230	1Y2	1Y6, 2Y30, 2Y95	Union Gap: 1Y6, 2Y30, 2Y95 in 18

- TPL-003-C9 violations include:
  - Category C9: Transmission bus section breaker stuck with single line to ground fault. (These are duplicates of the 10 noted TPL-003-C2 violations but with delayed clearing.)