

**EXHIBIT NO. ___(RJR-1CT)
DOCKETS UE-17___/UG-17___
2017 PSE GENERAL RATE CASE
WITNESS: RONALD J. ROBERTS**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

Docket UE-17___

Docket UG-17___

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF

RONALD J. ROBERTS

ON BEHALF OF PUGET SOUND ENERGY

**REDACTED
VERSION**

JANUARY 13, 2017

PUGET SOUND ENERGY

**PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF
RONALD J. ROBERTS**

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1 **PUGET SOUND ENERGY**

2 **PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF**
3 **RONALD J. ROBERTS**

4 **I. INTRODUCTION**

5 **Q. Please state your name, business address, and position with Puget Sound**
6 **Energy.**

7 A. My name is Ronald J. Roberts. My business address is 10885 N.E. Fourth Street
8 Bellevue, WA 98004. I am the Director of Thermal Resources for Puget Sound
9 Energy. (“PSE”).

10 **Q. Have you prepared an exhibit describing your education, relevant**
11 **employment experience, and other professional qualifications?**

12 A. Yes, I have. It is Exhibit No. ___(RJR-2).

13 **Q. What are your duties as Director of Thermal Resources for PSE?**

14 A. I plan, organize, and direct PSE’s thermal energy production including operations
15 and maintenance of PSE’s owned and jointly-owned generating facilities and
16 PSE’s thermal purchased power agreements. Furthermore, I assist PSE’s
17 Resource Acquisition team in performing due diligence evaluations of potential
18 thermal resource acquisitions. I am responsible for overseeing the safe operation
19 of PSE's natural gas and coal generation plants and optimizing their operation in a
20 manner that will benefit our customers and develop our employees to their
21 maximum potential.

1 **Q. Please summarize your testimony.**

2 A. First, I discuss how PSE's decision to transition from the use of Colstrip
3 Units 1 & 2 in a measured and thoughtful way provides a clearer pathway for
4 reduced risk to PSE's customers and reduction of carbon emissions without
5 compromising reliability. Second, I provide an overview of the rate year
6 production operations and maintenance ("O&M") expense and discuss the O&M
7 expense for PSE's thermal, hydroelectric, and wind generation facilities,
8 including major maintenance, as applicable.

9 **II. CLOSURE PLAN FOR COLSTRIP UNITS 1 & 2**

10 **A. Background**

11 **1. Overview of Colstrip Units 1 & 2**

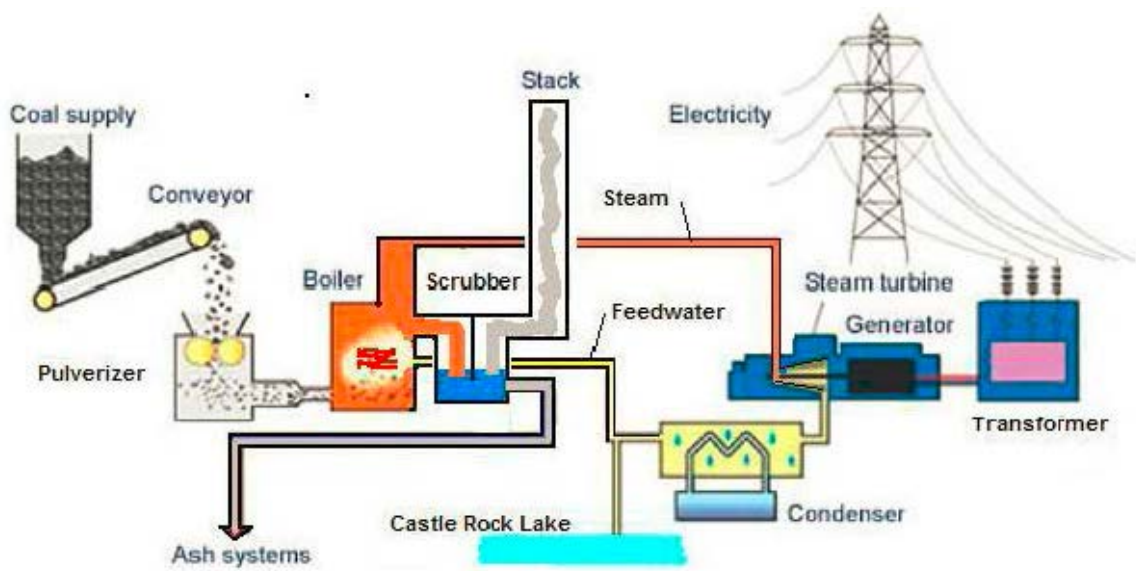
12 **Q. Please describe Colstrip Units 1 & 2.**

13 A. Colstrip Units 1 & 2 consist of two coal-fired steam electric plant units located in
14 eastern Montana about 120 miles southeast of Billings, Montana. Colstrip
15 Units 1 & 2 began operation in 1975 and 1976, respectively, and each unit
16 produces up to 307 megawatts ("MW") net.

17 Each of Colstrip Units 1 & 2 consists of a fuel supply system, a coal-fired boiler,
18 a steam turbine-generator, a cooling tower, step-up transformers, piping, and
19 electric distribution and auxiliary equipment. Colstrip Units 1 & 2 are paired,
20 sharing certain common systems. In addition, Colstrip Units 1 & 2 and Colstrip
21 Units 3 & 4 share certain common facilities (administrative buildings, supply

1 warehouse, water supply system, transmission lines etc.). Figure 1 provides a
2 simplified illustration of how each of Colstrip Units 1 & 2 generates electricity.

3 **Figure 1. How Colstrip Units 1 & 2 Generate Electricity**



4
5 Colstrip Units 1 & 2 were constructed adjacent to the Rosebud Coal Mine, a
6 surface mine originally established to supply coal to locomotives of the Northern
7 Pacific Railroad. Rosebud Mine produces low-sulfur, sub-bituminous coal with an
8 approximate heating value of 8400 BTU per pound, and the coal is delivered to
9 the plant by coal haulers. Coal from the Rosebud Mine is crushed into 3-inch
10 chunks and transported to the generating plant on overland conveyors or in trucks
11 where it is stored in piles at the plant site before being moved to silos in the boiler
12 buildings. The coal travels through a pulverizer that grinds it to the consistency of
13 talcum powder. The pulverized coal is then mixed with air and blown into the
14 boiler. Inside the boiler, the coal and air mixture burns, releasing hot gases that
15 convert water in boiler tubes to steam. The steam powers turbines connected to

1 electric generators, which transform the mechanical energy from the turbine into
2 electric energy.

3 Once combustion is completed, the hot gases are drawn into a set of scrubbers and
4 cleaned to minimize pollutants emitted before being exhausted through the stack.
5 Bottom ash and fly ash are two residuals created from coal combustion. Bottom
6 ash, the heavier of the two residuals, sinks to the bottom of the boiler where it is
7 collected for storage. The lighter fly ash is pulled into the scrubbers with the flue
8 gases, where it is captured for storage. The scrubbers also capture sulfur and
9 mercury released from the coal during combustion.

10 **Q. Please describe the arrangements for water used for operations at Colstrip**
11 **Units 1 & 2.**

12 A. Water for Colstrip Units 1 & 2 operations is pumped 37 miles from the
13 Yellowstone River to a man-made lake constructed as part of the plant facilities.
14 The pumping station at the Yellowstone River and two thirty-seven mile long
15 pipelines are owned and operated as a jointly-owned facility of Colstrip
16 Units 1 & 2 and Colstrip Units 3 & 4. The lake (Castle Rock Lake) is large
17 enough to provide a thirty-day supply of water.

18 As water enters the plant, it is divided into two streams. Most of the water is
19 directed to the cooling towers where it replaces water lost from evaporation, the
20 rest is used for various processes including equipment cooling and scrubber
21 system make-up. Water to be used in the boilers is demineralized before entering
22 a closed-loop system that passes through the boiler and turbine system. It is then

1 condensed and passes into a hot well where the cycle begins again. The water
2 from Castle Rock Lake is also used to provide water to the city of Colstrip,
3 Montana.

4 **Q. Please describe the ownership structure for Colstrip Units 1 & 2.**

5 A. PSE and Talen Montana LLC (“Talen Montana”) each owns a 50 percent,
6 undivided interest in the generating plants and related facilities of Colstrip
7 Units 1 & 2. Talen Montana is an independent power producer and is not subject
8 to regulation by a state public service commission. On December 6, 2016,
9 Riverstone Holdings LLC, a private investment firm focused on the energy and
10 power industry, indirectly acquired all of the interests in Talen Montana.

11 **Q. What agreements govern the ownership and operations of Colstrip**
12 **Units 1 & 2?**

13 A. The following three agreements govern the ownership and operations of Colstrip
14 Units 1 & 2:

15 (i) the Construction and Ownership Agreement, dated as of
16 July 30, 1971, by and between The Montana Power
17 Company and the Puget Sound Power & Light Company
18 (the “Colstrip Units 1 & 2 Construction and Ownership
19 Agreement”);

20 (ii) the Agreement for the Operation and Maintenance of
21 Colstrip Steam Electric Generating Station, dated as of
22 July 30, 1971, by and between The Montana Power
23 Company and the Puget Sound Power & Light Company
24 (the “Colstrip Units 1 & 2 Operation and Maintenance
25 Agreement”); and

26 (iii) the Common Facilities Agreement, dated as of May 6,
27 1981, by and between The Montana Power Company,
28 Puget Sound Power & Light Company, Puget Colstrip

1 Construction Company, The Washington Water Power
2 Company, Portland General Electric Company, Pacific
3 Power & Light Company, and Basin Electric Power
4 Cooperative (the “Colstrip Common Facilities
5 Agreement”).

6 The Colstrip Units 1 & 2 Construction and Ownership Agreement provides for the
7 terms and conditions of the construction and ownership of Colstrip Units 1 & 2.

8 Please see Exhibit No. ___(RJR-3) for a copy of the Colstrip Units 1 & 2
9 Construction and Ownership Agreement, as amended and revised.

10 The Colstrip Units 1 & 2 Operation and Maintenance Agreement provides for the
11 terms and conditions of the operation and maintenance of Colstrip Units 1 & 2.

12 Please see Exhibit No. ___(RJR-4) for a copy of the Colstrip Units 1 & 2
13 Operation and Maintenance Agreement, as amended and revised.

14 The Colstrip Common Facilities Agreement provides the terms and conditions for
15 allocating the use and costs, and operation and maintenance, of certain facilities
16 that are common to Colstrip Units 1 & 2 and Colstrip Units 3 & 4. These common
17 facilities include, for example, 115 kV and 230 kV start-up transmission lines.

18 Please see Exhibit No. ___(RJR-5) for a copy of the Colstrip Common Facilities
19 Agreement, as amended and revised.

20 **Q. Please describe the coal supply agreement for Colstrip Units 1 & 2.**

21 A. Western Energy Company provides the coal supply for Colstrip Units 1 & 2
22 pursuant to the terms and conditions of the Coal Purchase and Sale Agreement,
23 dated as of March 21, 2007, by and among PPL Montana, LLC (now Talen
24 Montana), Puget Sound Energy, and Western Energy Company (the “Coal

1 Purchase and Sale Agreement”). Please see Exhibit No. ___(RJR-6) for a copy of
2 the Coal Purchase and Sale Agreement, as amended and revised.

3 **Q. Please describe the Colstrip Project Transmission System.**

4 A. The Colstrip Project Transmission System was built in the mid-1980s and is
5 jointly owned by Avista Corporation (“Avista”), NorthWestern Corporation
6 (“NorthWestern”), PacifiCorp, Portland General Electric Company (“Portland
7 General”), and PSE pursuant to the terms and conditions of the Colstrip
8 Transmission Agreement. The Colstrip Project Transmission System consists of a
9 500 kilovolt (kV) transmission system in two segments:

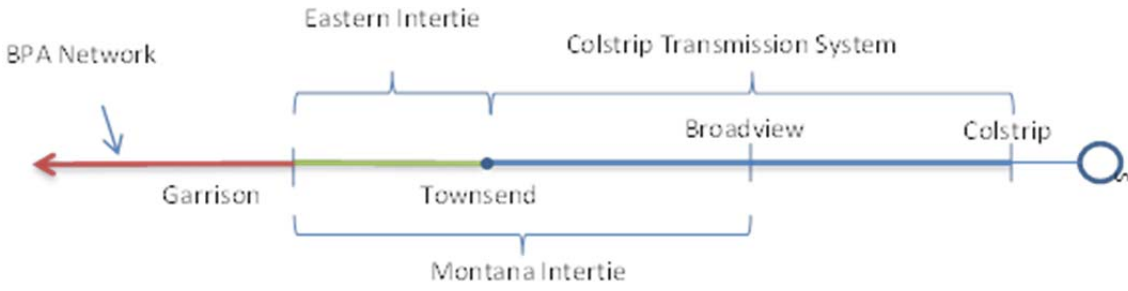
10 (i) a segment between Colstrip, Montana, and Broadview,
11 Montana, and

12 (ii) a segment between Broadview, Montana and Townsend,
13 Montana (there is no substation at Townsend, Montana).

14 The Bonneville Power Administration (“BPA”) owns and operates a 500 kV
15 double circuit transmission system between Townsend, Montana and Garrison,
16 Montana (commonly referred to as the Eastern Intertie), which connects the
17 Colstrip Project Transmission System to the Federal Columbia River
18 Transmission System. Figure 2 provides a simplified illustration of the Colstrip
19 Project Transmission System, the Eastern Intertie, and the Federal Columbia
20 River Transmission System.

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**Figure 2. Colstrip Project Transmission System,
Eastern Intertie, and Federal Columbia River Transmission System**



Q. Please describe the ownership structure for Colstrip Project Transmission System.

A. The Amended and Restated Colstrip Project Transmission Agreement, dated as of September 27, 2013, by and among NorthWestern Corporation, Puget Sound Energy, Avista Corporation, Portland General Electric Company, and PacifiCorp (the “Colstrip Project Transmission Agreement”) provides for the engineering, design, and construction of the Colstrip Project Transmission System. Please see Exhibit No. ___(RJR-7) for a copy of the Colstrip Project Transmission Agreement, as amended and revised.

Each party to the Colstrip Project Transmission Agreement is to contribute to the transmission facilities’ costs, including operations and maintenance costs, and is to receive an undivided ownership interests in the transmission facilities as a tenant in common. Each party to the Colstrip Project Transmission Agreement is entitled to use its share of capacity in the respective segments of the Colstrip Project Transmission System identified in Table 1 below:

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Table 1. Capacity Shares of the Respective Segments of the Colstrip Project Transmission System

Ownership	Colstrip-Broadview	Broadview-Townsend
NorthWestern	36%	24%
Puget Sound Energy	33%	39%
Portland General Electric	14%	16%
Avista Corporation	10%	12%
PacifiCorp	7%	8%

Q. Does PSE rely on transmission agreements other than the Colstrip Project Transmission Agreement for the transmission of Colstrip Units 1 & 2 generation to PSE’s loads?

A. Yes. PSE relies on the following two additional transmission agreements for the transmission of Colstrip Units 1 & 2 generation to PSE’s loads:

- (i) the Transmission Agreement, dated as of July 30, 1971, by and between The Montana Power Company and Puget Sound Power & Light Company (the “Colstrip Units 1 & 2 Transmission Agreement”) and
- (ii) the Amended and Restated Transmission Agreement, dated as of April 17, 1981, by and between the United States of America, Department of Energy, acting by and through the Bonneville Power Administration, The Montana Power Company, Pacific Power & Light Company, Portland General Electric Company, Puget Sound Power & Light Company, The Washington Water Power Company, and Basin Electric Power Cooperative (the “Montana Intertie Agreement”).

The Colstrip Units 1 & 2 Transmission Agreement provides the terms and conditions for the transmission of PSE’s share of the output of Colstrip Units 1 & 2 across NorthWestern’s transmission system to points of interconnection described in the agreement. Please see Exhibit No. ___(RJR-8)

1 for a copy of the Colstrip Units 1 & 2 Transmission Agreement, as amended and
2 revised.

3 The Montana Intertie Agreement provides the terms and conditions for the
4 construction, operation, and use of a regional transmission intertie (the “Montana
5 Intertie”) to interconnect the Colstrip generating facilities to BPA’s Federal
6 Columbia River Transmission System. The Montana Intertie runs between the
7 Broadview Substation and the Garrison Substation in the vicinity of Deer Lodge,
8 Montana. Please see Exhibit No. ___(RJR-9) for a copy of the Montana Intertie
9 Agreement, as amended and revised.

10 **2. Operator of Colstrip Units 1 & 2**

11 **Q. What entity acts as plant operator of Colstrip Units 1 & 2?**

12 A. Talen Montana currently acts as plant operator of Colstrip Units 1 & 2 and as
13 plant operator of Colstrip Units 3 & 4. As plant operator, Talen Montana acts as
14 agent for Colstrip Units 1 & 2 owners and has a responsibility to operate,
15 maintain, hire personnel, and pay all necessary costs. A committee of owner
16 representatives (one from each owner) facilitates cooperation, information
17 exchange, and management oversight for Colstrip Units 1 & 2.

18 **Q. Does Talen Montana intend to continue to act as plant operator of Colstrip?**

19 A. No. In May 2016, Talen Montana provided notice of its intention to resign as
20 plant operator for Units 3 & 4 of the Colstrip Steam Electric Generating Station,
21 effective May 23, 2018. The decision of Talen Montana to cease as plant operator
22 is in the context of frequent corporate restructuring that has created considerable

1 business uncertainty and created a level of risk that PSE took into consideration as
2 it evaluated the future of Colstrip Units 1 & 2.

3 **Q. Please describe the corporate restructuring of the joint owner of Colstrip**
4 **Units 1 & 2.**

5 A. Over the past 24 months, PSE has dealt with three different owners as its
6 50% partner in Colstrip Units 1 & 2.

7 Prior to June 2015, PSE's partner in Colstrip Units 1 & 2 was PPL Montana, a
8 subsidiary of PPL Corporation, headquartered in Allentown, Pennsylvania.

9 On July 1, 2015, the competitive power generation assets of PPL Corporation and
10 the competitive generation assets of Riverstone Holdings LLC were combined to
11 create a new corporation, Talen Energy. Following the creation of Talen Energy,
12 PPL shareholders owned 65% of Talen Energy's common stock and affiliates of
13 Riverstone Holdings LLC owned 35% of Talen Energy's common stock.

14 On June 3, 2016, Talen Energy entered into an agreement with Riverstone
15 Holdings LLC, pursuant to which Riverstone Holdings LLC would acquire the
16 outstanding stock of Talen Energy. This transaction closed on December 6, 2016,
17 and Riverstone Holdings LLC is now the parent company of Talen Montana.

18 **Q. What actions are the owners of Colstrip Steam Electric Generating Station**
19 **taking to replace Talen Montana as plant operator?**

20 A. The owners of Colstrip Units 1 & 2 and the owners of Colstrip Units 3 & 4 are
21 currently engaged in a due diligence process to structure a new legal entity to
22 manage units of the Colstrip Steam Electric Generating Station and hire a third

1 party to act as plant operator in the event that no other owner opts to step in as
2 plant operator.

3 **3. Budgets of Colstrip Units 1 & 2**

4 **Q. What is PSE's share of the operating and capital budgets for Colstrip**
5 **Units 1 & 2 for 2018?**

6 A. PSE's share of the production and operating budget for Colstrip Units 1 & 2 for
7 2018 is projected to be \$23,020,645. PSE's share of the capital budget for Colstrip
8 Units 1 & 2 for 2018 is projected to be \$10,114,600.

9 **Q. How are the budgets for Colstrip Units 1 & 2 developed?**

10 A. The operating budget for Colstrip Units 1 & 2 is determined by the plant operator
11 (i.e., Talen Montana) and approved via a voting process by the plant owners
12 committee. The plant operator develops the proposed operating and capital
13 budgets for the upcoming year and presents the budgets to the Owners
14 Committees by September 1 of each year. (There are separate committees for
15 Colstrip Units 1 & 2 and Colstrip Units 3 & 4.) Voting (based upon ownership
16 share) on the budget proposed by the operator is to be done before November 1 of
17 each calendar year. Each owner's share of the budget is based on its ownership
18 share of the units.

19 **Q. Have the owners proposed changes in the capital budget for Colstrip**
20 **Units 1 & 2?**

21 A. Yes. Given a recent legal settlement, described later, that mandates the retirement
22 of the boilers of Colstrip Units 1 & 2 by July 1, 2022, Talen Montana has

1 proposed a decrease in the capital spending for Colstrip Units 1 & 2. The goal is
2 to operate Colstrip Units 1 & 2 in a safe and efficient manner but not spend
3 money unnecessarily given an impending closure date (i.e., by July 1, 2022).

4 **Q. What is the projected magnitude of savings associated with the decrease in**
5 **the capital spending for Colstrip Units 1 & 2?**

6 A. A retirement date for the boilers of Colstrip Units 1 & 2 by July 1, 2022, will
7 result in approximately \$34,215,000 in reduced capital spending at Colstrip
8 Units 1 & 2 based on the 10 year capital spending plan provided by Talen
9 Montana.

10 **4. Environmental Impact Measures at Colstrip Units 1 & 2**

11 **Q. What additional environmental related rules, laws, or regulations affect**
12 **(or may affect) operations at Colstrip Units 1 & 2?**

13 A. Several current and potential federal and state rules affect operations at Colstrip
14 Units 1 & 2. These include, for example, the Mercury and Air Toxics (MATS)
15 Rule, the Regional Haze Rule, the Coal Combustion Residuals Rule, Clean Water
16 Act rules, the National Ambient Air Quality Standards (NAAQS), and
17 section 111(d) of the Clean Air Act.

18 **Q. Has PSE prepared an exhibit describing the current and potential federal**
19 **and state rules affecting operations at Colstrip Units 1 & 2?**

20 A. Yes. PSE provided a description of the current and potential federal and state
21 rules affecting operations at Colstrip Units 1 & 2 in Appendix K (Colstrip) to
22 PSE's 2015 Integrated Resource Plan. Please see Exhibit No. ___(RJR-10) for an

1 updated description of the current and potential federal and state rules affecting
2 operations at Colstrip Units 1 & 2 since PSE published Appendix K (Colstrip) to
3 PSE's 2015 Integrated Resource Plan.

4 **Q. What steps have been taken at Colstrip Units 1 & 2 to reduce the**
5 **environmental impact of coal combustion?**

6 A. Each of Colstrip Units 1 & 2 is in compliance with all current state and federal
7 environmental laws and regulations. The owners have taken measures to reduce
8 environmental impacts associated with nitrogen oxides, mercury, sulfur dioxides,
9 particulate matter, and coal combustion residuals ("CCRs").

10 **Q. What steps have been taken at Colstrip Units 1 & 2 to reduce the**
11 **environmental impact of nitrogen oxides?**

12 A. Coal and air leaving the pulverizers passes through burner systems and over-fire
13 air systems that cool the flame temperature and reduce the formation of nitrogen
14 oxides. Colstrip Units 1 & 2 use a second-generation low-nitrogen oxides
15 combustion system with a close-coupled over-fire air injection. Digital control
16 systems recently installed on Colstrip Units 1 & 2 enhance nitrogen oxides
17 emissions control. In 2016, SmartBurn—an optimized combustion system
18 installed in the boilers that helps to decrease the amount of nitrogen oxides
19 formed during the combustion process—was added to Colstrip Unit 2 to further
20 reduce nitrogen oxides emissions.

1 **Q. What steps have been taken at Colstrip Units 1 & 2 to reduce the**
2 **environmental impact of mercury?**

3 A. Coal contains mercury. To oxidize the mercury and enhance its capture, the coal
4 is treated with a bromine solution before entering the boiler. Then, flue gases are
5 treated with powdered activated carbon to capture the mercury before the gases
6 enter the scrubbers; there, the activated carbon and mercury are removed along
7 with other particulate matter.

8 **Q. What steps have been taken at Colstrip Units 1 & 2 to reduce the**
9 **environmental impact of sulfur dioxide and particulate matter?**

10 A. Permit specifications limit the amount of sulfur in the coal fuel. Additionally,
11 Colstrip Units 1 & 2 remove sulfur dioxide from flue gases using wet alkali
12 scrubbers. These scrubbers use the alkalinity of fly ash and/or hydrated lime to
13 capture sulfur dioxide. Then, a water spray collects the fly ash and the captured
14 mercury for further processing. This process also captures particulate matter.

15 **Q. What steps have been taken at Colstrip Units 1 & 2 to reduce the**
16 **environmental impact of CCRs?**

17 A. Two types of ash are produced by coal combustion, bottom ash and fly ash.
18 Bottom ash makes up 30 to 35 percent of the total. Fly ash makes up the
19 remainder. The larger and heavier bottom ash falls into a water-filled trough in the
20 bottom of the boiler; from there it is pumped to settling ponds on the plant site
21 and then to permanent storage ponds. Some bottom ash is used as a construction

1 material. The smaller and lighter fly ash and other particulate matter passes into
2 the scrubbers with the flue gases.

3 The scrubbers use the fly ash's alkalinity or hydrated lime to capture sulfur
4 dioxide gases, and a water spray removes the fly ash and other particulate matter.
5 The resulting scrubber slurry is piped to storage ponds. Before final placement in
6 the storage "ponds," paste plants remove most of the water from the slurry to
7 create a paste. The paste, which begins the process at about 65 percent solids, sets
8 up like low-grade concrete after several days.

9 The original ash holding ponds at Colstrip Units 1 & 2 were designed with highly
10 impermeable clay liners to prevent slurry components from seeping into the
11 groundwater. These conformed to the requirements of the Montana Major Facility
12 Siting Act Certificate. Monitoring wells, installed prior to the start of operations,
13 monitor the groundwater for any sign of possible contamination (pond water
14 seepage), and capture wells pump impacted ground water back to the ponds.

15 Since 2000, projects have been completed and there are other projects ongoing to
16 manage ash ponds, reduce potential for migration of affected groundwater and to
17 upgrade plant wastewater systems to allow increased recycling of water.

18 **B. Litigation Affecting the Colstrip Steam Electric Generating Station**

19 **Q. Please provide a description of the recently concluded litigation pertaining to**
20 **the Colstrip Steam Electric Generating Station.**

21 A. Two sets of litigation pertaining to the Colstrip Steam Electric Generating Station
22 have recently concluded. The first was an action brought by Sierra Club and

1 Montana Environmental Information Center that allege violations of the Clean Air
2 Act at the Colstrip Steam Electric Generating Station. The second was an action
3 brought by Montana Environmental Information Center and Earthjustice
4 (formerly Sierra Club Legal Defense Fund, a nonprofit that represents Sierra Club
5 and other environmental nonprofit organizations on legal issues) against the
6 Montana Department of Environmental Quality pertaining to the Agreed Order on
7 Consent Regarding Impacts Related to Wastewater Facilities entered into with
8 PPL Montana, LLC (now Talen Montana), the plant operator.

9 **1. Litigation Alleging Violations of the Clean Air Act at the**
10 **Colstrip Steam Electric Generating Station**

11 **Q. Please describe the action brought by Sierra Club and Montana**
12 **Environmental Information Center that alleged violations of the Clean Air**
13 **Act at the Colstrip Steam Electric Generating Station.**

14 A. The Sierra Club and Montana Environmental Information Center provided notice
15 on July 25, 2012 that they would sue for alleged violations of the Clean Air Act at
16 the Colstrip Steam Electric Generating Station. The complaint in the case was
17 filed on March 6, 2013 and alleged that the Colstrip Steam Electric Generating
18 Station had violated the Clean Air Act by undertaking major repairs without a
19 permit that would have required the installation of best available pollution control
20 technology.

21 Several amended complaints were filed, and at one point, plaintiffs alleged that
22 73 projects undertaken at the Colstrip Steam Electric Generating Station facility
23 violated the Clean Air Act. Through amendment of the complaint and favorable

1 court decisions, the number of claims was greatly reduced. Ultimately, claims
2 related to two projects (one project at Colstrip Unit 1 and one project at Colstrip
3 Unit 3) were set for trial in May 2016.

4 **2. Litigation Alleging Violations of the Agreed Order on Consent**
5 **Regarding Impacts Related to Wastewater Facilities**

6 **Q. Please describe the action brought by Montana Environmental Information**
7 **Center and Earthjustice that alleged violations of the Agreed Order on**
8 **Consent Regarding Impacts Related to Wastewater Facilities.**

9 A. Two lawsuits were originally filed in fall 2012 by the Montana Environmental
10 Information Center and Earthjustice (formerly Sierra Club Legal Defense Fund, a
11 nonprofit that represents Sierra Club and other environmental nonprofit
12 organizations on legal issues) against the Montana Department of Environmental
13 Quality pertaining to the Agreed Order on Consent Regarding Impacts Related to
14 Wastewater Facilities entered into with PPL Montana, LLC (now Talen
15 Montana), the plant operator. This litigation included a mandamus action and a
16 petition for review. The petition for review was originally filed with Montana
17 Board of Environmental Review alleging that the Agreed Order on Consent
18 Regarding Impacts Related to Wastewater Facilities is an improper enforcement
19 action and violates Montanans' constitutional right to a clean and healthful
20 environment. The Montana Department of Environmental Quality was the
21 original defendant, but the operator of the Colstrip Steam Electric Generating
22 Station intervened and removed the petition for review to Montana state court.
23 Meanwhile, the mandamus action was dismissed in 2013.

1 **C. Factors Considered By PSE Regarding the Future of Colstrip**
2 **Units 1 & 2**

3 **Q. What factors did PSE consider regarding the future of Colstrip Units 1 & 2?**

4 A. Although Colstrip Units 1 & 2 operate safely and are well maintained, both units
5 have now passed forty years of service. Additionally, economic pressures,
6 environmental regulations, and ongoing legal matters make it important for Talen
7 Montana and PSE to assess the future of the units. In evaluating the future of
8 Colstrip Units 1 & 2, PSE looked at a myriad of factors, including the following:

- 9
- 10 • present and future state of the electricity market in the United States;
 - 11 • existing and potential federal and state policy changes with respect
12 to coal-fired generation units;
 - 13 • economics specific to Colstrip Units 1 & 2;
 - 14 • operational considerations related to water management with
15 respect to Colstrip Units 1 & 2;
 - 16 • current and potential future environmental regulations applicable
17 to Colstrip Units 1 & 2; and
 - 18 • the Coal Purchase and Sale Agreement for coal supply to Colstrip
19 Units 1 & 2.

20 Additionally, given PSE's undivided joint interest in Colstrip Units 1 & 2, PSE
21 considered Talen Montana's interests in the units, including the viability,
22 economics, and risk of PSE running the units with and without Talen Montana's
23 participation.

1 **1. Present and Future State of Electricity Markets in the United**
2 **States**

3 **Q. Has the present and future state of electricity markets in the United States**
4 **affected Colstrip Units 1 & 2?**

5 A. Yes. The volatility of electricity markets in the United States has been especially
6 problematic for Colstrip Units 1 & 2. As previously mentioned, Talen Montana
7 has an undivided fifty percent ownership interest in Colstrip Units 1 & 2. As an
8 independent power producer, Talen is more sensitive to energy market volatility
9 than an investor-owned utility, such as PSE and the majority of other owners of
10 Colstrip Units 3 & 4.

11 Nationally, this electricity market volatility has led some energy companies to sell
12 independent power producer assets. Duke Energy, for example, sold its
13 unregulated energy assets to Dynegy, while PPL and Riverstone spun off their
14 unregulated assets to create Talen Energy.

15 Additionally, there have been a relatively high number of coal generating
16 facilities retired over the past few years. In March 2016, the U.S. Energy
17 Information Administration reported that nearly 18 gigawatts (GW) of electric
18 generating capacity was retired in 2015, a relatively high amount compared with
19 recent years. More than 80% of the retired capacity was conventional steam coal,
20 with more than 200 coal plants having closed in the past five years. Please see
21 Exhibit No. ____ (RJR-11) for a copy of the report issued by the U.S. Energy
22 Information Administration in March 2016.

1 **2. Existing and Potential Federal and State Policy Changes With**
2 **Respect to Coal-Fired Generation Units**

3 **Q. Have existing and potential federal and state policy changes with respect to**
4 **coal-fired generation units affected Colstrip Units 1 & 2?**

5 A. Yes. The use of coal to generate electricity has come under increasing public
6 scrutiny over the past decade, and lawmakers in some states are increasingly
7 exploring legislation that affects fossil fuel use.

8 In Washington State, the Greenhouse Gas Emissions Performance Standards
9 (RCW 80.80.040) and the Energy Independence Act (Chapter 19.285 RCW) have
10 affected the use of fossil fuel generation. The state legislature has also considered
11 cap and trade programs and variations of carbon pricing models. Through
12 executive rulemaking, the state has implemented the Washington Clean Air Rule.
13 Additionally, citizens have taken direct action by proposing initiative measures to
14 price the externalities associated with the use of fossil fuels, such as the recently
15 failed attempt to pass Initiative 732, which would have implemented a carbon tax.
16 Coal emits approximately 30% more greenhouse gases than natural gas and
17 creates additional exposure for companies and their customers when a carbon
18 price is added to the cost of electricity.

19 **3. Economics Specific to Colstrip Units 1 & 2**

20 **Q. Have commodity prices affected Colstrip Units 1 & 2?**

21 A. Yes. Commodity prices are central to energy production and dispatch. Recent
22 increases in natural gas production have driven electricity prices lower, thereby

1 making natural gas an attractive fuel to replace older coal units. According to the
2 U.S. Energy Information Administration, the amount of power produced from
3 natural gas increased by over 200,000 gigawatt hours (GWh) between 2014 and
4 2015 alone.¹

5 Furthermore, natural gas is now generally cheaper to extract and transport than
6 coal. The development of a cheaper and more readily available energy source has
7 sharply driven down the price of energy. In fact, the price has fallen below the
8 profit margin of producing coal at many older plants. The effect of cheap natural
9 gas driving energy prices down to an unprofitable level for coal has been the topic
10 of news stories.

11 **Q. Have commodity prices affected Talen Montana's operations at Colstrip**
12 **Units 1 & 2?**

13 A. Yes. An article in The Billings Gazette from May 2016 summarizes the
14 difficulties encountered by Talen Montana in profitably generating power at
15 Colstrip Units 1 & 2 as follows:

16 Talen CEO Paul Farr said earlier this month that his company "will
17 lose millions in terms of operating Colstrip through the balance of
18 the year." The market price of electricity, largely because of cheap
19 natural gas, has fallen below the profit margin of coal-fired power.

¹ U.S. Energy Information Administration, Electric Power Monthly, Data for October 2016 Table 1.1 (Net Generation by Energy Source: Total (All Sectors), 2006-October 2016 (Dec. 23, 2016), available at http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_1_1 (showing an increase in power generation from natural gas facilities from 1,126,609 GWh in 2014 to 1,333,482 GWh in 2015).

1 Talen is more vulnerable to market prices than Colstrip's other
2 owners because it is unregulated. The other Colstrip owners are
3 regulated utilities guaranteed fixed profit percentages by the states
4 in which they do business.

5 Talen reported a \$341 million net loss in 2015. The company's
6 value has fallen 70 percent since it was spun off of Pennsylvania
7 Power and Light.²

8 The Institute for Energy Economics and Financial Analysis published a report
9 about Colstrip Units 1 & 2, which reported that the profitability of Colstrip
10 Units 1 & 2 for PPL Montana (now Talen Montana) has been hurt by a decline in
11 the prices at which power produced by the units can be sold and by rising plant-
12 generating costs. Please see Exhibit No. ___(RJR-12) for a copy of the report
13 published by the Institute for Energy Economics and Financial Analysis. The
14 Institute for Energy Economics and Financial Analysis report stated that "[t]hese
15 factors combined to reduce PPL Montana's pre-tax earnings (also called EBITDA
16 – Earnings Before Interest Taxes Depreciation and Amortization) from Colstrip 1
17 and 2 by 50% just between 2010 and 2014." Exhibit No. ___(RJR-12) at 7.

18 The Institute for Energy Economics and Financial Analysis report suggested that
19 neither Talen Montana nor any subsequent merchant owner could "expect to
20 obtain earnings either in the short-term or over the long term sufficient to cover
21 operating expenses, debt, taxes, amortization of investments while providing a
22 significant after-tax profit from Colstrip 1 and 2." *Id.* at 17.

² T. Lutey, "Colstrip Operator Wants Out in 2 Years or Less," *The Billings Gazette* (May 24, 2016), available at http://billingsgazette.com/news/government-and-politics/colstrip-operator-wants-out-in-years-or-less/article_68a897f9-ff08-536f-b360-32d585162cce.html.

1 In July 2016, Talen Energy's Senior Vice President and Chief Financial Officer
2 Jeremy McGuire testified before the Montana State Energy and
3 Telecommunication Interim Committee that it is not economically viable for an
4 independent power producer to survive under the current circumstances due to the
5 historically low natural gas prices and increasing environmental regulations.
6 Please see Exhibit No. ___(RJR-13) for a copy of the testimony of Mr. McGuire
7 before the Montana State Energy and Telecommunication Interim Committee.

8 **Q. Has Talen Montana attempted to sell its interests in Colstrip Units 1 & 2?**

9 A. Yes. Talen Montana has previously attempted to sell its Colstrip assets (which
10 include a share of Colstrip Unit 3 as well as 50% of Colstrip Units 1 & 2) for
11 several years. These efforts, however, have been unsuccessful. Indeed,
12 NorthWestern, a prospective buyer, announced that the value of the entire
13 package of PPL Montana's Colstrip and hydro assets was worth less than the
14 value of the hydro assets alone. *See* Exhibit No. ___(RJR-12) at 3.

15 **4. Operational Considerations Related to Water Management**
16 **With Respect to Colstrip Units 1 & 2**

17 **Q. Did PSE consider operational issues in deciding the future of Colstrip**
18 **Units 1 & 2?**

19 A. Yes. PSE considered operational issues in deciding the future of Colstrip
20 Units 1 & 2. Specifically, water and wastewater management in response to the
21 CCR rule and other regulations were important cost and operational
22 considerations in determining the retirement of Colstrip Units 1 & 2.

1 A recent report by WorleyParsons commissioned by Talen Montana suggested
2 that there are substantial benefits (both in cost and logistics) in retiring Colstrip
3 Units 1 & 2 after 2020 as compared to before 2020. Please see Exhibit
4 No. ___(RJR-14) for a copy of the WorleyParsons report. The WorleyParsons
5 report describe the benefits as follows:

6 Capital cost lowers from FY2018 through FY2021 since
7 procurement of required treatment equipment can begin further in
8 advance of the shutdown date. Shutdown dates that occur further in
9 the future require less storage of capture well water and allow for a
10 smaller storage pond and smaller treatment equipment. Capital cost
11 is at its minimum in FY2021, when procurement at least three
12 years in advance of a shutdown date allows for the smallest storage
13 pond and smallest treatment system. Storage pond size and
14 treatment equipment capacity remains the same in the years
15 following FY2021, so capital cost remains the same.

16 Operating cost lowers from FY2018 to FY2019 as remaining pond
17 inventory is removed via forced evaporation and as CWBRS feed
18 flow lowers (made possible by construction of the CWBRS more
19 than one year in advance of the shutdown date). Operating cost
20 increases if the shutdown occurs in FY2020 since forced
21 evaporation of excess pond water may not be possible.

22 Exhibit No. ___(RJR-14) at 8-9.

23 Given the public statements by Talen Montana regarding its difficulty in earning a
24 profit with Colstrip Units 1 & 2, PSE's observation of Talen Energy's declining
25 stock position, and analysis of the overall energy market, PSE believed there was
26 significant risk that Talen Montana would choose to shut down its operations at
27 Colstrip Units 1 & 2. Should that have occurred, PSE would be left with a 50%
28 share in Colstrip Units 1 & 2 and an absent partner. There would have been
29 significant questions around PSE's options in that scenario:

- 1 • Could PSE run Colstrip Units 1 & 2 at full capacity if Talen
2 Montana had left?
- 3 • Would PSE need the additional power from Talen
4 Montana's 50% share of Colstrip Units 1 & 2 to serve
5 load?
- 6 • If PSE were to continue to run Colstrip Units 1 & 2 at 50%
7 capacity, would the cost of power generated from those
8 units be uneconomic?
- 9 • What legal recourse, if any, would PSE seek against Talen
10 Montana?

11 Finally, Chapter 80.80 RCW prohibits PSE from entering into a new long-term
12 financial commitment for electric generation that does not meet certain
13 greenhouse gas emission standards. Generation from Talen Montana's 50% share
14 of Colstrip Units 1 & 2 could not meet the greenhouse gas emission standards, so
15 it would not be possible for PSE to use Talen Montana's 50% share of Colstrip
16 Units 1 & 2 to meet loads within Washington.

17 **5. Current and Potential Environmental Regulations Applicable**
18 **to Colstrip Units 1 & 2**

19 **Q. Did PSE consider current and potential environmental regulations in**
20 **deciding the future of Colstrip Units 1 & 2?**

21 A. Yes. In addition to the economic challenges facing Colstrip Units 1 & 2, there are
22 also issues regarding the current and potential environmental regulations and
23 laws.

24 The first regulation considered and modeled is the U.S. Environmental Protection
25 Agency's Regional Haze Program. This long-term program requires reduction of
26 emissions to achieve a natural level of visibility by 2064. Emission controls

1 required under the Regional Haze Program implemented through determination of
2 Best Available Retrofit Technology (“BART”). Either the state makes a BART
3 determination through a State Implementation Plan or Environmental Protection
4 Agency makes a determination in a Federal Implementation Plan. Phase 1 of the
5 Regional Haze Program was implemented in the past five years and focused on
6 older plants, including Colstrip Units 1 & 2.

7 **Q. What would the Regional Haze Rule likely require for Colstrip Units 1 & 2?**

8 A. To comply with the Regional Haze Rule, Colstrip Units 1 & 2 would have had to
9 make major upgrades to existing scrubbers for sulfur dioxide control and install
10 controls for nitrogen oxides emissions. Although Talen Montana’s challenge of
11 the Environmental Protection Agency’s Phase 1 BART determination was
12 successful in the courts and remanded to the Environmental Protection Agency,
13 the court remanded the determination based on a lack of justification. The
14 Environmental Protection Agency must reissue a Federal Implementation Plan,
15 which could contain more justification and more controls for BART.

16 Moreover, in the second phase of the Regional Haze Program, “reasonable
17 progress” towards achieving natural visibility is required by 2028. To meet that
18 schedule, which had plans initially due in 2018 (now an EPA-proposed delay for
19 plans to 2021 is pending approval), additional sulfur dioxide and nitrogen oxides
20 emission reductions from Colstrip Units 1 & 2 would likely be required.

1 **Q. Was a BART analysis conducted to evaluate the cost-effectiveness of adding**
2 **emissions controls at Colstrip Units 1 & 2 in response to the Regional Haze**
3 **Rule?**

4 A, Yes. PPL Montana (now Talen Montana) conducted a BART analysis to evaluate
5 the cost-effectiveness of adding emissions controls at the Colstrip Steam Electric
6 Generating Station in response to the Regional Haze Rule. The BART analysis
7 considered retrofitting selective catalytic reduction systems to all four Colstrip
8 units in order to reduce nitrogen oxides emissions. As part of the BART analysis,
9 PPL Montana developed cost estimates for the retrofit technology using the
10 EPA's Integrated Planning Model. PPL Montana retained the services of Burns &
11 McDonnell to prepare independent feasibility capital cost estimates for the retrofit
12 of selective catalytic reduction technology on all four units at the Colstrip Steam
13 Electric Generating Station. On February 7, 2012, Burns & McDonnell issued its
14 feasibility capital cost estimate to comply with the Regional Haze Rule. Please
15 see Exhibit No. ___(RJR-15) for a copy of the Burns & McDonnell feasibility
16 capital cost estimate.

17 **Q. What did this BART analysis conclude with respect to the Regional Haze**
18 **Rule?**

19 A. Preliminary calculations for compliance with further nitrogen oxides reductions
20 was estimated to cost between \$27 million for selective non-catalytic reductions
21 to \$165 million for selective catalytic reduction for Colstrip Units 1 & 2.
22 Estimated capital investments to make further sulfur dioxide emissions reductions

1 could range from \$6 million for lime additions to the existing scrubbers to \$56
2 million for an additional scrubber.

3 Given Talen Montana already had deemed Colstrip Units 1 & 2 to be in a
4 precarious financial situation, PSE considered it unlikely that Talen Montana
5 would be willing to bear the investment costs of the equipment upgrades.

6 Additionally, Talen Montana determined that retirement of Colstrip Units 1 & 2
7 would further aid compliance with the second phase of the Regional Haze
8 program for all four units of the Colstrip Steam Electric Generating Station. In
9 other words, planned retirement of Colstrip Units 1 & 2 would likely avoid any
10 future decision on BART compliance that would require additional investment at
11 Colstrip Units 3 & 4.

12 **Q. Did PSE consider current and potential environmental regulations other**
13 **than the Regional Haze Rule in deciding the future of Colstrip Units 1 & 2?**

14 A. Yes. In addition to the Regional Haze Rule, PSE considered the Environmental
15 Protection Agency's proposed Clean Power Plan in deciding the future of Colstrip
16 Units 1 & 2. In a declaration submitted to the U.S. District Court for the District
17 of Montana, Mr. Gordon Criswell, Talen Montana's Director of Environmental
18 and Engineering Compliance, described the challenges to Colstrip Units 1 & 2 in
19 the face of the Clean Power Plan as follows:

20 Based on my calculations, EPA's Clean Power Plan requires a
21 30 percent reduction in carbon dioxide emissions from Montana
22 coal plants by 2022. Colstrip Units 1 and 2 make up 27 percent of
23 carbon dioxide emissions from coal plants in Montana. Based on
24 Talen [Montana]'s projections of likely compliance scenarios with
25 the Clean Power Plan, a retirement of [Colstrip] Units 1 and 2

1 affords an easier path for [Colstrip] Units 3 and 4 to comply and
2 continue operating. In analyzing the regulatory requirements,
3 Talen [Montana] thus determined that retirement of [Colstrip]
4 Units 1 and 2 would be a key mechanism for compliance with the
5 Clean Power Plan.

6 See Exhibit No. ___(RJR-16) at 7. In short, the retirement of Colstrip Units 1 & 2
7 would satisfy the bulk of the emissions compliance reductions for Montana under
8 the proposed Clean Power Plan, while providing a more certain future for Colstrip
9 Units 3 & 4. Regardless of any pending litigation, PSE took these factors into
10 account in evaluating the future of all four Colstrip units and the subsequent
11 decision to retire Colstrip Units 1 & 2.

12 **6. Terms and Conditions of the Coal Purchase and Sale**
13 **Agreement**

14 **Q. Did PSE consider the terms and conditions of the Coal Purchase and Sale**
15 **Agreement in deciding the future of Colstrip Units 1 & 2?**

16 A. Yes. PSE factored the terms and conditions of the Coal Purchase and Sale
17 Agreement in deciding the future of Colstrip Units 1 & 2. Section 3.1 of the Coal
18 Purchase and Sale Agreement provides, in part, that coal delivery under such
19 agreement shall continue until the first December 31 that falls on or after the
20 expiration of thirty-six (36) months after the day that Talen Montana and PSE
21 issue the Termination Notice, as defined and limited by subsection 3.2 of the Coal
22 Purchase and Sale Agreement. Exhibit No. ___(RJR-6) at 18. Subsection 3.2 of
23 the Coal Purchase and Sale Agreement allows Talen Montana and PSE to issue a
24 Termination Notice to Western Energy Company at any time after the occurrence
25 of both (a) and (b) below:

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- (a) All the coal is mined in Area D as shown in the initial General Mining Plan, and
- (b) The prime stripping ratio on average in Areas A and B for coal to be delivered for the following year is projected to exceed 6.5:1 as evidenced by an Approved Annual Operating Plan (AOP).

Exhibit No. ___(RJR-6) at 18-19. The conditions in both subsections 3.2(a) and (b) have occurred. Therefore, PSE sees a path forward for terminating the Coal Purchase and Sale Agreement without penalty.

7. Legislative and Policy Considerations in Both Washington State and Montana

Q. Did PSE consider legislative and policy considerations in deciding the future of Colstrip Units 1 & 2?

A. Yes. PSE factored several legislative and policy considerations in both Washington State and Montana in deciding the future of Colstrip Units 1 & 2.

Q. What legislative and policy considerations for Washington State did PSE consider in deciding the future of Colstrip Units 1 & 2?

A. The State of Washington has a history of progressive policy in the environmental arena, including passage of such statutes as the Growth Management Act, the Energy Independence Act, the Emission Performance Standard, and the Model Toxics Control Act. Recently, Governor Inslee directed the Washington Department of Ecology to promulgate a Washington Clean Air rule to reduce greenhouse gas emissions in Washington State, and compliance begins in January 2017. At the polls in November 2016, Washington State voters were asked to consider an initiative proposing a carbon tax. Although the carbon tax

1 initiative was not approved, similar proposals will likely be considered in the
2 recently commenced 2017 legislative session, including an initial budget request
3 by Governor Inslee that proposes to tax carbon.

4 Changes in policy create the potential for uncertainty. Some policies create long-
5 lasting cost increases for customers even after the market adapts. For example,
6 PSE estimates that a \$25 per ton carbon tax would add more than \$43 million
7 dollars to electric generation costs in calendar year 2018, based on PSE's
8 2016 generation profile. Please see Exhibit No. ___(RJR-17) for PSE's projected
9 impact of a carbon tax of \$25 per ton on PSE's cost of electric generation.

10 These potential additional costs change the economic profile of PSE's resource
11 choices and create risk and uncertainty. Taking into account an unpredictable
12 policy landscape, especially around carbon pricing in Washington State, the
13 decision to transition from the use of Colstrip Units 1 & 2 in a measured and
14 thoughtful way provides a clearer pathway for reduced risk to PSE's customers
15 and reduction of carbon emissions without compromising reliability.

16 **Q. What legislative and policy considerations for Montana did PSE consider in**
17 **deciding the future of Colstrip Units 1 & 2?**

18 A. The State of Montana has considerably different policy goals than the State of
19 Washington. As a resource-dependent state, the focus of Montana's recent policy
20 actions around environmental and energy issues has been on employment and
21 economic impact of measures to reduce greenhouse gas emissions. For instance,
22 the Attorney General of Montana joined several other states in challenging the

1 Clean Power Plan, arguing that the Clean Power Plan was crafted without state
2 input and could cause economic harm.

3 Montana state legislators are similarly focused. Throughout the 2016 interim,
4 state legislators crafted several bills that the Montana Legislature is likely to
5 consider in the current legislative session, including proposals addressing the
6 following items:

- 7 1. Appropriate funds to allow the State of Montana to
8 intervene in this rate proceeding.
- 9 2. Establish requirements and a fee for submission, review,
10 modification, and approval of a decommissioning and
11 remediation plan for a coal-fired generating unit.
- 12 3. Appropriate money from an increased wholesale energy
13 transaction tax fund to the Montana Department of
14 Commerce to provide grants to entities (local governments,
15 schools, etc.) impacted by the closure of a Montana located
16 coal plant.
- 17 4. Require an electrical company, wholesale exempt
18 generator, or a public utility that retires a coal-fired
19 generating unit to pay a coal-county impact fee for ten
20 years following closure of the unit or units. The money is
21 provided to entities (local governments, schools, etc.)
22 impacted by the closure of a unit.
- 23 5. Establish a benefits and retirement security task force in the
24 Montana Governor's Office.
- 25 6. Establish liability requirements for owners of coal-fired
26 generation.

27 PSE expects more bills to be introduced during the Montana legislative session
28 creating greater uncertainty around the estimated costs and viability of Colstrip
29 Units 1 & 2.

1 **D. The Decision to Settle Litigation and Retire Colstrip Units 1 & 2**

2 **Q. What legislative and policy considerations for Montana did PSE consider in**
3 **deciding the future of Colstrip Units 1 & 2?**

4 A. Given the factors considered by PSE regarding the future of Colstrip Units 1 & 2
5 previously discussed (including the environmental regulatory benefits potentially
6 derived by Colstrip Units 3 & 4 through retirement of Colstrip Units 1 & 2), PSE
7 concluded (in consultation with Talen Montana) that the best course was to
8 determine a planned retirement date for Colstrip Units 1 & 2. The existing
9 litigation was not a primary factor in the decision to retire Colstrip Units 1 & 2.
10 Through a planned retirement, PSE and Talen Montana could avoid future
11 investment in environmental equipment upgrades on Colstrip Units 1 & 2 while
12 ensuring that Colstrip Units 3 & 4 would continue to run into the future. PSE and
13 Talen Montana agreed that a retirement date in 2022 could achieve these
14 objectives.

15 Once PSE and Talen Montana had reached this conclusion, it was possible to
16 agree to a retirement date of July 1, 2022, with Sierra Club and Montana
17 Environmental Information Center to settle the Clean Air Act litigation.
18 Beginning in April 2016, the parties filed a joint motion to stay the case to engage
19 in settlement discussions. The parties reached agreement in July 2016 and filed a
20 consent decree with the court. The court approved the consent decree on
21 September 6, 2016. Please see Exhibit No. ___(RJR-18) for a copy of the consent
22 decree approved by the court to dismiss the Sierra Club and Montana
23 Environmental Information Center lawsuit.

1 **Q. Does the consent decree require the retirement of the boilers of the Colstrip**
2 **Steam Electric Generating Station?**

3 A. Yes. The consent decree to dismiss the Sierra Club and Montana Environmental
4 Information Center lawsuit requires the retirement of the boilers at Colstrip
5 Units 1 & 2 by July 1, 2022. *See* Exhibit No. ___(RJR-18) at 6-7. The consent
6 decree also sets interim emissions limits for Colstrip Units 1 & 2 nitrogen oxide
7 and sulfur dioxide that are no more stringent than the current emissions rates from
8 those units. *See id.* at 7. This consent decree is binding on any future owner of
9 Colstrip Units 1 & 2.

10 **Q. Does the consent decree provide benefits to PSE and the other owners of the**
11 **Colstrip Steam Electric Generating Station?**

12 A. Yes. The consent decree provides a broad array of benefits to PSE and the other
13 owners of the Colstrip Steam Electric Generating Station. For instance, the
14 consent decree places no requirements or restrictions on Colstrip Units 3 & 4, and
15 Sierra Club and Montana Environmental Information Center have agreed to
16 release their claims against Colstrip Units 3 & 4 relating to any projects
17 undertaken prior to the date of the consent decree.

18 For Colstrip Units 1 & 2, Sierra Club and Montana Environmental Information
19 Center agreed to a broad release of claims, including a release of all
20 environmental claims, under any statute or common law, related to both past and
21 future operation. *See* Exhibit No. ___(RJR-18) at 10-12. However, claims related
22 to future operations are not released if such operations cause an unexpected and

1 unintended sudden release of contaminants to the environment which poses a
2 significant threat to human health or the environment.

3 The consent decree also restricts the plaintiffs in the matter from filing additional
4 litigation to force retirement of Colstrip Units 1 & 2 prior to July 1, 2022, the
5 settlement date in 2022. *See* Exhibit No. ___(RJR-18) at 9. With some limitations,
6 the consent decree retained the right of PSE and Talen Montana to use equipment
7 at Colstrip Units 1 & 2 other than the boilers to support the operation of Colstrip
8 Units 3 & 4. *See id.* at 12.

9 Subject to certain limitations, the consent decree permits the installation of a new
10 auxiliary/heating boiler at the Colstrip Steam Electric Generating Station. *See*
11 Exhibit No. ___(RJR-18) at 12. Plaintiffs also agreed in the consent decree to
12 limit advocacy efforts against the Colstrip Steam Electric Generating Station in
13 several ways, including, for example, efforts related to Colstrip Units 1 & 2
14 regarding Regional Haze and the Clean Power Plan. *See id.* at 13. Finally, the
15 consent decree does not require the payment of any penalties. *See id.* at 18.

16 **Q. Did the parties reach a settlement with respect to the action brought by**
17 **Montana Environmental Information Center and Earthjustice that alleged**
18 **violations of the Agreed Order on Consent Regarding Impacts Related to**
19 **Wastewater Facilities?**

20 A. Yes. In 2016, the parties reach a settlement with respect to the action brought by
21 Montana Environmental Information Center and Earthjustice that alleged
22 violations of the Agreed Order on Consent Regarding Impacts Related to

1 Wastewater Facilities. Specifically, the parties reached a settlement regarding the
2 petition for review based on (i) the proposed retirement of the boilers of Colstrip
3 Units 1 & 2 by July 1, 2022, and (ii) a commitment to transition to the use of a
4 non-liquid disposal system for CCR material from the Colstrip Unit 3 & 4
5 scrubbers by July 1, 2022. Please see Exhibit No. ____ (RJR-19) for a copy of the
6 settlement agreement associated with the Montana Environmental Information
7 Center and Earthjustice lawsuit.

8 **Q. Why did PSE choose to settle the litigation rather than proceed to trial?**

9 A. The decision to retire Colstrip Units 1 & 2 was a decision made by PSE and
10 Talen Montana, and that decision was based on the factors described above. Once
11 PSE and Talen Montana had decided to retire Colstrip Units 1 & 2, all owners of
12 all four units of the Colstrip Steam Electric Generating Station were able to avoid
13 further litigation costs, obtain releases related to all four units, and obtain
14 significant other concessions from Sierra Club and Montana Environmental
15 Information Center that will assist with the continued operation of Colstrip
16 Units 3 & 4. These objectives were achieved without agreeing to any additional
17 requirements that would impact operations. Additionally, PSE would be able to
18 avoid operational costs associated with all four Colstrip units.

19 **Q. Did the settlement provide additional costs savings to PSE?**

20 A. Yes. The settlement also provided PSE the opportunity to forego investments that
21 may have been required in the future for equipment to meet environmental
22 compliance. PSE estimated the costs of SCR equipment to be well over

1 \$100 million for Colstrip Units 1 & 2 and even more for Colstrip Units 3 & 4. *See*
2 Exhibit No. ____ (RJR-15).

3 **Q. Did PSE have other factors in its decision to enter into the settlement?**

4 A. Yes. PSE considered other factors in its decision to enter into the settlement,
5 including the age and depreciation of Colstrip Units 1 & 2. As previously noted,
6 Colstrip Units 1 & 2 are now over 40 years old. Please see the Prefiled Direct
7 Testimony of John Spanos, Exhibit No. ____ (JJS-1T), and the supporting exhibits
8 thereto, for updated depreciation schedules for Colstrip Units 1 & 2 and other PSE
9 assets.

10 PSE also considered the intergenerational equity issues associated with past,
11 present, and future investments at Colstrip Units 1 & 2, and the ratemaking and
12 financing mechanisms available to address those issues. Please see the Prefiled
13 Direct Testimony of Daniel A. Doyle, Exhibit No. ____ (DAD-1T), and the Prefiled
14 Direct Testimony of Katherine J. Barnard, Exhibit No. ____ (KJB-1T), for a
15 discussion of the ratemaking and financing mechanisms considered by PSE to
16 address the intergenerational equity issues.

17 In short, PSE's goal was to balance the past investments in the Colstrip Steam
18 Electric Generating Station made by customers without incurring additional future
19 investment that would not be equal to a potential benefit. Thus, PSE was willing
20 to agree with Talen Montana on a retirement date for Colstrip Units 1 & 2 that
21 reflected factors such as economics and environmental regulation, and to ensure

1 Colstrip Units 3 & 4, which are newer, cleaner, and more economic, could operate
2 longer.

3 **Q. Please outline any factors that may prompt a retirement of Colstrip**
4 **Units 1 & 2 prior to July 1, 2022.**

5 A. PSE plans for the operation of Colstrip Units 1 & 2 until July 1, 2022. However,
6 forces not under PSE's control may cause the retirement of Colstrip Units 1 & 2
7 prior to July 1, 2022. Such forces could include actions taken by Talen Montana,
8 significant operational failures, environmental issues or new requirements, and
9 changes in the economics of the units.

10 If Talen Montana were to decide to cease operations of Colstrip Units 1 & 2 prior
11 to July 1, 2022, PSE believes that it would neither be in the best economic interest
12 of its customers nor legally possible for PSE to either assume the role of plant
13 operator of Colstrip Units 1 & 2 or assume the Talen Montana's share of the
14 output of Colstrip Units 1 & 2. As previously noted, Riverstone Holdings LLC
15 acquired Talen Montana on December 6, 2016. Prior to the merger and
16 acquisition, Talen Montana was unable to communicate fully with PSE due to the
17 pending merger discussions, which affected the ability of either parties to make
18 any significant decisions as to the future of Colstrip Units 1 & 2. Prior to the time
19 that Talen Montana was unable to communicate with PSE, Talen Montana had
20 publically indicated an economic need and desire to close Colstrip Units 1 & 2 as
21 quickly as possible. Currently, PSE is establishing a new relationship with new
22 management to ensure PSE's goals for responsible retirement of the facility
23 remain front and center.

1 Colstrip Units 1 & 2 will be run as safely and efficiently as possible until the
2 retirement date. As with any piece of machinery, however, there can be
3 unexpected breakdowns. Should a breakdown of a unit occur, PSE and Talen
4 Montana would evaluate the costs and benefits of repairing and returning the unit
5 to operation, but a planned retirement date of no later than July 1, 2022, would
6 undoubtedly alter the cost-benefit analysis associated with such a decision.

7 Like PSE's other units, Colstrip Units 1 & 2 dispatch electricity when it is cost
8 effective for customers. As always, PSE will procure electricity to meet load at
9 the lowest reasonable cost, which can impact Colstrip Units 1 & 2. For instance,
10 the Colstrip Units 1 & 2 could be taken offline during a heavy spring hydro run
11 off. As the retirement date approaches, PSE will continue to evaluate Colstrip
12 Units 1 & 2 holistically versus market prices.

13 PSE will continue to evaluate any new laws and environmental regulations
14 against the economic benefit of continually running Colstrip Units 1 & 2. With
15 new leadership at the federal level, there is considerable uncertainty about the
16 direction of environmental regulation. Nonetheless, PSE will stay compliant with
17 all laws and regulations. One area of risk PSE is closely monitoring is potential
18 action by the Montana State Legislature. Certain proposals currently before the
19 body (described above) could have considerable negative costs impacts to
20 Colstrip Units 1 & 2. The impact of some of those provisions becoming law may
21 ultimately influence how cost-effective it is to continue to run the units. For
22 instance, a proposed measure that seeks to double the wholesale energy tax and
23 use the funding for coal community mitigation could potentially make Colstrip

1 Units 1 & 2 uneconomic versus other sources. PSE will work with the State of
2 Montana as they deliberate on legislation and update the Commission through this
3 general rate case proceeding.

4 **E. Colstrip Units 1 & 2 Decommissioning Requirements and**
5 **Considerations**

6 **Q. What are the current legal obligations for decommissioning Colstrip Units**
7 **1 & 2?**

8 A. PSE interprets the term “decommissioning” generally as the estimate of costs to
9 suspend operations, and remove some or all the above grade structures associated
10 with Colstrip Units 1 & 2, followed by reasonable restoration in these areas. As
11 with remediation described further below, this will require estimates that may be
12 expressed in ranges of costs according to different projections of potential
13 decommissioning scenarios.

14 There are currently no specific legislative, regulatory, permit or contractual
15 requirements to decommission any above ground plant structures for Colstrip
16 Units 1 & 2. However, going forward there is the potential for legislation in the
17 State of Montana that could change this legal requirement. In late 2016, the
18 Montana Joint Energy Committee drafted legislation to require a
19 decommissioning and remediation plan be filed with the Montana State
20 Department of Environmental Quality. The proposed legislation would require the
21 Montana State Department of Environmental Quality to consider and approve or
22 deny any final plan for decommissioning in addition to assessing penalties for

1 non-compliance. At this time, the specifics of the requirements that may be
2 included in legislation are undetermined.

3 Given current requirements or lack thereof, a minimum decommissioning
4 scenario would be to simply isolate Colstrip Units 1 & 2 from Colstrip
5 Units 3 & 4 by installing security measures and procedures to prevent access or
6 interference. The highest cost scenario would be full demolition of above and
7 below ground structures and returning the site to greenfield conditions. All
8 estimates assume scrap value will be accrued to the demolition company and the
9 estimated cost reflects that value. Additionally, the contractor would hire the
10 necessary labor to perform the on-site work.

11 **Q. What does PSE project will be PSE's share of decommissioning and**
12 **demolition costs for Colstrip Units 1 & 2?**

13 A. PSE projects that its share of decommissioning and demolition costs for Colstrip
14 Units 1 & 2 will be \$4.2 million in 2016 dollars. PSE relied upon
15 decommissioning and demolition cost estimates from the following three entities
16 to arrive at this cost estimate: (i) Black & Veatch Corporation ("Black &
17 Veatch"); (ii) HDR Engineering, Inc. ("HDR Engineering"); and
18 (iii) Brandenburg Industrial Service Company ("Brandenburg").

19 **Q. Please describe the decommissioning and demolition costs projected by**
20 **Black & Veatch for Colstrip Units 1 & 2.**

21 A. To address the potential decommissioning and demolition cost scenarios for
22 Colstrip Units 1 & 2, PSE commissioned Black & Veatch in 2013 to perform an

1 “order of magnitude” cost estimate for decommissioning and demolition of
2 Colstrip Units 1 & 2. The Black & Veatch study utilized the engineering firm’s
3 proprietary estimating tool developed for other coal fired steam generating station
4 decommissioning and demolition studies. Black & Veatch solely used paper
5 documents to determine plant specifications and conducted no site visit. On
6 January 15, 2014, Black & Veatch issued its study to PSE. Please see Exhibit
7 No. ___(RJR-20) for a copy of the Black & Veatch study.³

8 The Black & Veatch study projected costs of approximately \$81,000/MW for the
9 decommissioning and demolition of Colstrip Units 1 & 2. See Exhibit
10 No. ___(RJR-20) at 5. (All costs for the Black & Veatch study are in 2014
11 dollars.) Each unit has a gross capacity of 307 MW. Thus, the Black & Veatch
12 study projected decommissioning and demolition cost of (i) approximately
13 \$24,867,000 per unit and (ii) approximately \$49,734,000 for both Colstrip
14 Units 1 & 2. PSE’s share is 50% of these projected costs, for a total projected cost
15 to PSE of \$24,867,000.

16 **Q. Please describe the decommissioning and demolition costs projected by**
17 **HDR Engineering for Colstrip Units 1 & 2.**

18 A. In 2016, PSE sought additional analysis around the potential decommissioning
19 and demolition costs of Colstrip Units 1 & 2 and commissioned

³ Although the Black & Veatch study was protected by the work product privilege during litigation, PSE no longer asserts privilege for this document due to the settlement. However, production of this document in this proceeding does not waive privilege as to any other document.

1 HDR Engineering, an engineering firm with expertise in demolition, to perform
2 an updated decommissioning and demolition cost study. Whereas PSE permitted
3 Black & Veatch to prepare its estimate solely on paper documentation, PSE
4 permitted HDR Engineering to base its estimate on plant drawings and a site visit.
5 The HDR Engineering study is a Class IV level feasibility study, with cost
6 estimates at +/- 30-50%. All costs for the HDR Engineering costs (i) are in
7 2016 dollars, (ii) assume demolition to 3 feet below grade for slabs and
8 foundations, and (iii) do not include costs to handle or remediate impacts from
9 CCRs.

10 PSE requested that HDR Engineering provide cost estimates for the following
11 three scenarios, generally described as follows:

12 **Option A:** Colstrip Units 1 through 4 are shut down and there are
13 no operating facilities that need to remain or be protected that
14 would restrict demolition means and methods. All environmental
15 concerns such as asbestos, universal waste, plant chemicals, PCB
16 oil and lube oils will be removed from Colstrip Units 1 & 2 and
17 properly disposed offsite.

18 **Option B:** Colstrip Units 3 & 4 remain operational while the
19 complete demolition of Colstrip Units 1 & 2 occurs. Demolition
20 means and methods will be modified to protect the Auxiliary
21 building and all operations that are to remain. In this option, all
22 asbestos, universal waste and PCB oil associated with Colstrip
23 Units 1 & 2 will be removed and disposed offsite and all plant
24 chemicals and lube oil will be transferred to Colstrip Units 3 & 4
25 for re-use.

26 **Option C:** In this option all asbestos, universal waste and PCB oil
27 associated with Colstrip Units 1 & 2 will be removed and disposed
28 offsite. All plant chemicals and lube oils will be transferred to
29 Colstrip Units 3 & 4 for reuse, and the plant will be idled in place.
30 Once this is completed, Colstrip Units 1 & 2 will remain in a cold,
31 dark and dry condition until Colstrip Units 3 & 4 are shut down. At
32 that time all four units will be demolished simultaneously.

1 On November 4, 2016, HDR Engineering issued its study to PSE. Please see
2 Exhibit No. ____ (RJR-21) for a copy of the HDR Engineering study.

3 The HDR Engineering study projected the following decommissioning and
4 demolition costs for the three scenarios requested:

5 **Option A:** The HDR Engineering study projected
6 decommissioning and demolition costs of \$8,158,790 for Colstrip
7 Units 1 & 2 when all four units are shut down and there are no
8 operating facilities that need to remain or be protected that would
9 restrict demolition means and methods.

10 **Option B:** The HDR Engineering study projected
11 decommissioning and demolition costs of \$14,147,728 for Colstrip
12 Units 1 & 2 when Colstrip Units 3 & 4 remain operational while
13 the complete demolition of Colstrip Units 1 & 2 occurs.

14 **Option C:** The HDR Engineering study projected
15 decommissioning and demolition costs of \$293,353 for Colstrip
16 Units 1 & 2 when Colstrip Units 1 & 2 will remain in a cold, dark
17 and dry condition until Colstrip Units 3 & 4 are shut down.

18 See Exhibit No. ____ (RJR-21) at 3.

19 **Q. Please describe the decommissioning and demolition costs projected by**
20 **Brandenburg for Colstrip Units 1 & 2.**

21 A. Also in 2016, PSE engaged Brandenburg—the demolition firm that performed the
22 demolition work for Talen Montana at its recently-retired Corrette Coal-Fired
23 Generating Station located in Billings, Montana—to provide a high-level
24 decommissioning and demolition cost estimate based solely on paper records,
25 plant drawings, and without a site visit. On November 3, 2016, Brandenburg
26 issued its study to PSE. Please see Exhibit No. ____ (RJR-22) for a copy of the
27 Brandenburg study. (All costs in the Brandenburg study are presented in

1 2016 dollars.) The Brandenburg study projected the decommissioning and
2 demolition costs of \$7,548,840 for Colstrip Units 1 & 2. *See* Exhibit
3 No. ___(RJR-22) at 4.

4 **Q. How did PSE arrive at its projected share of decommissioning and**
5 **demolition costs for Colstrip Units 1 & 2 of \$4.2 million in 2016 dollars?**

6 A. PSE relied on the HDR Engineering report in determining its projected share of
7 decommissioning and demolition costs for Colstrip Units 1 & 2 of \$4.2 million in
8 2016 dollars. Specifically, PSE relied upon a combination of Option A and
9 Option C presented in the HDR Engineering report. The sum of these two options
10 is \$8,452,143 in 2016 dollars (i.e., the sum of the projected cost of Option A
11 (\$8,158,790) and the projected cost of Option C (\$293,353)). (Please note that all
12 costs in the HDR Engineering report are presented in 2016 dollars.) As an owner
13 of an undivided 50% interest in Colstrip Units 1 & 2, PSE's projected share of
14 decommissioning and demolition costs for Colstrip Units 1 & 2 is \$4.2 million in
15 2016 dollars. Please see Exhibit No. ___(RJR-23) at page 1, column B, for a
16 schedule of the total projected decommissioning and demolition costs (in 2016
17 dollars) for Colstrip Units 1 & 2 and at page 2, column B, for PSE's share thereof.

18 **Q. What is PSE's projected share of decommissioning and demolition costs for**
19 **Colstrip Units 1 & 2 in real dollars?**

20 A. As previously mentioned, PSE projects that its share of decommissioning and
21 demolition costs for Colstrip Units 1 & 2 is \$4.2 million in 2016 dollars
22 (i.e., nominal dollars). PSE would not actually incur these expenses until 2023

1 and 2035 for the work to be performed for Option C and Option A, respectively.
2 Therefore, to calculate the projected costs that PSE would actually incur in each
3 of these years, PSE has adjusted the dollars by an average annual inflation rate of
4 2.50%. This adjustment results in a projected PSE share of decommissioning and
5 demolition costs for Colstrip Units 1 & 2 of \$6.7 million in real dollars. Please see
6 Exhibit No. ___(RJR-23) at page 1, column C, for a schedule of the total
7 projected decommissioning and demolition costs (in real dollars) for Colstrip
8 Units 1 & 2 and at page 2, column C, for PSE's share thereof.

9 **Q. Why did PSE rely upon both Option A and Option C from the**
10 **HDR Engineering report in determining the projected decommissioning and**
11 **demolition costs of Colstrip Units 1 & 2?**

12 A. PSE relied upon both Option A and Option C from the HDR Engineering report in
13 determining the projected decommissioning and demolition costs of Colstrip
14 Units 1 & 2 because the combination of these options minimized costs while
15 providing for the eventual demolition of Colstrip Units 1 & 2. As demonstrated by
16 the cost differential between Option A and Option B from the HDR Engineering
17 report, there are significant cost advantages of decommissioning and demolition
18 of Colstrip Units 1 & 2 at the same time as the decommissioning and demolition
19 of Colstrip Units 3 & 4. Therefore, PSE assumed the following:

- 20 (i) PSE and Talen Montana would incur the costs projected in
21 Option C in 2023 to place Colstrip Units 1 & 2 in a cold,
22 dark and dry condition until Colstrip Units 3 & 4 are shut
23 down; and
- 24 (ii) PSE and Talen Montana would incur the costs projected in
25 Option A in 2035 for the decommissioning and demolition

1 of Colstrip Units 1 & 2 at the same time as the
2 decommissioning and demolition of Colstrip Units 3 & 4.

3 **Q. Why did PSE assume the demolition of all four units of the Colstrip Steam**
4 **Electric Generating Station in 2035?**

5 A. Whereas Colstrip Units 1 & 2 now have a planned retirement date of July 1, 2022,
6 Colstrip Units 3 & 4 do not have any planned date for retirement. The
7 depreciation schedules presented in the Prefiled Direct Testimony of John Spanos,
8 Exhibit No. ___(JJS-1T), and supporting exhibits thereto, suggest a depreciable
9 life for Colstrip Units 3 & 4 through 2035. Therefore, PSE assumed, for purposes
10 of analysis only, that (i) Colstrip Units 3 & 4 would be retired in 2035 and (ii) all
11 four units of the Colstrip Steam Electric Generating Station would be
12 simultaneously decommissioned and demolished at that time.

13 **F. Plan for the Development, Operation, and Closure of the Water and**
14 **Waste Management Features at Colstrip Units 1 & 2**

15 **Q. Please describe the CCRs produced by electric generation operations at**
16 **Colstrip Units 1 & 2.**

17 A. Electricity generation operations at the Colstrip Units 1 & 2 produce two CCRs:
18 (i) scrubber slurry, which includes the fly ash and flue gas desulfurization solids
19 from the air pollution control system; and (ii) bottom ash, which is collected at the
20 bottom of the boilers. For CCRs generated at Colstrip Units 1 & 2, the scrubber
21 slurry is transferred as a slurry through pipes to either the Stage-Two Evaporation
22 Pond area, where it is treated and dewatered (the resulting material is commonly
23 referred to as paste) and then disposed. Bottom ash that is generated at Colstrip

1 Units 1 & 2 is dewatered in bottom ash ponds at the plant area, and then
2 transported via truck to the the Effluent Holding Pond area for disposal. The
3 ponds at the Colstrip Steam Electric Generating Station also store and treat water
4 that is used in plant operations. Because the Colstrip Steam Electric Generating
5 Station is a “zero discharge” operation, the storage and evaporation functions of
6 the ponds are critical to operations at the facility.

7 **Q. Has Talen Montana developed a plan for the development, operation, and**
8 **closure of the water and waste management features at the Colstrip Steam**
9 **Electric Generating Station?**

10 A. Yes. Talen Montana commissioned Geosyntec Consultants (“Geosyntec”) to
11 develop a plan for the development, operation, and closure of the water and waste
12 management features at the Colstrip Steam Electric Generating Station. The need
13 for the plan arose from new requirements for management of the CCRs that are
14 generated at the site. On September 23, 2016, Geosyntec issued the most current
15 version of the plan. Please see Exhibit No. ___(RJR-24) for a copy of the most
16 current version of the plan issued by Geosyntec.

1 **Q. What is the status and current use of the CCR impoundments for Colstrip**
2 **Units 1 & 2?**

3 A. The status and current use of CCR impoundments for Colstrip Units 1 & 2 are as
4 follows:

Plant Area Units

Units 1 & 2 Fly A Pond	Full with CCRs prior to the effective date of the CCR Rule and no longer receives CCRs nor impounds water.
Units 1 & 2 B Pond	Contains a significant amount of CCRs and is currently in use for CCR disposal, as needed.
Units 1 & 2 Bottom Ash Pond	Contains a significant amount of bottom ash and water and is currently in use for bottom ash dewatering.

Colstrip Units 1 & 2 Stage II Evaporation Pond

A Cell	Full with CCRs prior to effective date of the CCR Rule and no longer receives CCRs nor impounds water.
B Cell (Clearwater Cell)	Used for water storage and is the current location of return water to the plant.
C Cell	Not yet constructed.
Old Clearwell	Contains CCRs and water and is currently in use.
D Cell	Currently used for water storage.
E Cell	Contains significant amounts of both paste/water and is currently in use.

5 See Exhibit No. ___(RJR-24) at 4-5.

1 **Q. What approach was used to develop the plan for the development, operation,**
2 **and closure of the water and waste management features at the Colstrip**
3 **Steam Electric Generating Station?**

4 A. The plan was generally developed by: (i) identifying relevant compliance
5 parameters; (ii) identifying relevant site operating parameters; (iii) collecting data
6 needed to perform the planning analyses and performing water balance analyses;
7 (iv) analyzing current and future disposal capacities for water and waste under
8 several potential future site development scenarios; and (v) estimating the cost for
9 various candidate master plan approaches. Then, after incorporating input from
10 Talen Montana, an overall approach for future development of the CCR units at
11 the Colstrip Steam Electric Generating Station was developed. Please see Exhibit
12 No. ___(RJR-24) at 5-8 for further detail regarding the approach used in the
13 development of the plan.

14 **Q. Please describe the construction and design activities contained in the plan**
15 **for the development, operation, and closure of the water and waste**
16 **management features at Colstrip Units 1 & 2.**

17 A. The plan contains the construction and design activities described in Table 2
18 below for the development, operation, and closure of the water and waste
19 management features at Colstrip Units 1 & 2.

1

Table 2. Colstrip Units 1 & 2 Plan Construction and Design Activities

Year	Construction and Design Activity	Costs (in 2016 dollars)
2016	Design/Begin Construction Bottom Ash Dewatering System & new Scrubber Makeup Water Pond, Design/Construct Water Management System.	\$4,400,000
2018	Design A Pond Closure	\$150,000
2019	Design Capture Well Treatment System	\$200,000
	Close A Pond	\$2,500,000
	Design STEP A Cell closure	\$300,000
2020	Close Step A Cell	\$8,600,000
	Design Capture Well Storage Pond	\$150,000
	Design/Construct Capture Well Treatment System	\$6,460,000
2021	Construct Capture Well Storage Pond	\$1,710,000
	Construct Capture Well Treatment System	\$10,336,000
	Design STEP Old Clearwell closure	\$300,000
	Design STEP E Cell closure	\$300,000
	Design Bottom Ash Pond closure	\$300,000
2022	Close STEP Old Clearwell	\$2,300,000
	Close STEP E Cell	\$9,500,000
	Complete construction of Capture Well Treatment System	\$9,044,000
	Close bottom ash ponds and clearwell	\$1,700,000
	Design STEP D Cell closure	\$300,000
	Design B Pond Closure at plant area	\$150,000
2023	Close STEP D Cell	\$5,300,000
	Close B Pond	\$2,800,000
	Prepare STEP B Cell for use as post-closure stormwater management pond	\$500,000

2

See Exhibit No. ___(RJR-24) at 12-14.

3

Q. Please describe the operations and maintenance activities contained in the plan for the development, operation, and closure of the water and waste management features at Colstrip Units 1 & 2.

4

5

6

A. The plan contains the following operations and maintenance activities for the

7

development, operation, and closure of the water and waste management features

1 at Colstrip Units 1 & 2: (i) groundwater monitoring, (ii) forced evaporation;
2 (iii) wastewater treatment; (iv) post-closure care; and (v) landfill dry disposal. The
3 operations and maintenance activities identified in the plan commence in 2016
4 and continue through 2051. Projected operations and maintenance activity costs
5 (in 2016 dollars) range from a low of \$460,000 (in 2016) to a high of \$4,218,292
6 (in each of 2024, 2025, and 2026). *See* Exhibit No. ___(RJR-24) at 12-14.

7 **Q. What does PSE project will be PSE's share of the costs of the plan for the**
8 **development, operation, and closure of the water and waste management**
9 **features at Colstrip Units 1 & 2?**

10 A. The sum of the projected costs of (i) the construction and design activities and
11 (ii) operations and maintenance activities associated with the plan for the
12 development, operation, and closure of the water and waste management features
13 at Colstrip Units 1 & 2 is \$149,987,908 in 2016 dollars. (Please note that all
14 amounts in the plan are presented in 2016 dollars.) As a an owner of an undivided
15 50% interest in Colstrip Units 1 & 2, PSE's projected share of the costs of the
16 plan is approximately \$75 million in 2016 dollars. Please see Exhibit
17 No. ___(RJR-23) at page 1, column D, for a schedule of the total costs of the plan
18 for the development, operation, and closure of the water and waste management
19 features at Colstrip Units 1 & 2 (in 2016 dollars) for Colstrip Units 1 & 2 and at
20 page 2, column D, for PSE's share thereof.

1 **Q. What is the PSE's projected share of the costs of the plan for the**
2 **development, operation, and closure of the water and waste management**
3 **features at Colstrip Units 1 & 2 in real dollars?**

4 A. As previously mentioned, PSE projects that its share of the costs of the plan for
5 the development, operation, and closure of the water and waste management
6 features at Colstrip Units 1 & 2 is approximately \$75 million in 2016 dollars
7 (i.e., nominal dollars). PSE would incur these expenses for the period beginning
8 2016 and ending in 2051. Therefore, to calculate the projected costs that PSE
9 would actually incur in each of these years, PSE has adjusted the dollars by an
10 average annual inflation rate of 2.50%. This adjustment results in a projected PSE
11 share of the costs of the plan for the development, operation, and closure of the
12 water and waste management features at Colstrip Units 1 & 2 of approximately
13 \$103 million in real dollars. Please see Exhibit No. ___ (RJR-23) at page 1,
14 column E, for a schedule of the total costs of the plan for the development,
15 operation, and closure of the water and waste management features at Colstrip
16 Units 1 & 2 (in real dollars) and at page 2, column E, PSE's share thereof.

17 **G. Replacement Power**

18 **Q. How will PSE determine which resources will be used to replace the**
19 **generation currently produced by Colstrip Units 1 & 2 post-retirement?**

20 A. PSE will use its existing processes and tools to determine future resources
21 including the Integrated Resource Planning, load forecasting, and Request for
22 Proposal processes. The retirement of the boilers of Colstrip Units 1 & 2 does not

1 require PSE to take immediate action to replace the resulting lost energy or
2 capacity. Now that a retirement date is known, PSE can plan for the resulting loss
3 of energy and capacity in its ongoing Integrated Resource Planning processes.
4 PSE's 2017 Integrated Resource Plan will take into account the most recent load
5 forecast along with retirement of Colstrip Units 1 & 2 boilers to determine the
6 need for resources.

7 **Q. When does PSE plan to release its 2017 Integrated Resource Plan?**

8 A. PSE plans to release a draft version of the 2017 Integrated Resource Plan in
9 April 2017 and file a final version of the 2017 Integrated Resource Plan with the
10 Commission in July 2017. Assuming both (i) the filing of a final version of the
11 2017 Integrated Resource Plan with the Commission in July 2017 and (ii) the
12 2017 Integrated Resource Plan projects a need for resources, PSE would issue an
13 all-source request for proposals (in accordance with WAC 480-407-015) to
14 determine the appropriate resource (or mix of resources) that most cost-effectively
15 meets PSE's projected need.

16 **III. RATE YEAR PRODUCTION OPERATIONS AND**
17 **MAINTENANCE EXPENSE**

18 **A. Overview of Rate Year Production Operations and Maintenance**
19 **Expense**

20 **Q How has PSE prepared its rate year production operations and maintenance**
21 **expense for the rate year?**

22 A. PSE developed the rate year production O&M expense in accordance with the
23 Final Order in Docket UE-141141. ("2014 PCORC"). For most plants, PSE

1 utilizes test year O&M expense and makes certain pro forma adjustments as
2 allowed by the Commission.

3 **Q. What is the basis for rate year production O&M if not test year expense?**

4 A. Rate year O&M expenses for PSE's jointly-owned facilities, (Colstrip
5 Units 1 & 2, Colstrip Units 3 & 4 and the Frederickson 1 Generating Station
6 ("Freddy 1"), are developed from budgets and business plans provided by the
7 plant operator and approved by the owners. For PSE's hydroelectric plants, rate
8 year O&M expense undertaken to comply with FERC license requirements is
9 based on scheduled rate year activity required under the terms of the FERC
10 licenses. PSE's wind generating stations' rate year royalties, rents and contract
11 maintenance expense are pro formed to reflect rate year projected wind
12 generation. This is consistent with the methodology used to determine rate year
13 O&M expenses that was approved by the Commission in the last several rate
14 cases.

15 **Q. What is PSE's production O&M expense for the rate year?**

16 A. The rate year production O&M costs included in this filing are \$147.0 million, an
17 increase of \$13.9 million as compared to the 2014 PCORC production O&M
18 costs of \$133.1 million. Please see Exhibit No. ___(RJR-25) for a summary of the
19 rate year production O&M costs.

1 **Q. Please describe the nature of the pro forma adjustments made to production**
2 **O&M costs in this filing.**

3 A. The test year for this proceeding is October 1, 2015, through September 30, 2016,
4 and the rate year is January 1, 2018, through December 31, 2018. PSE has made
5 certain adjustments to test year expenses for rate year production O&M expense,
6 as follows:

7 (i) increased test year production O&M to reflect \$3.0 million
8 projected increase in Colstrip non overhaul-related O&M
9 and \$3.1 million for amortization of Colstrip overhaul costs
10 as discussed in more detail below;

11 (ii) added \$3.3 million to test year O&M to reflect rate year
12 amortization of major maintenance of combustion turbine
13 and combined cycle facilities as detailed in the "Major
14 Maintenance" tab of the workpapers entitled RJR-UP (C)
15 Production O&M 2017 GRC and as discussed below;

16 (iii) added \$2.7 million to test year wind production O&M
17 expense to reflect projected rate year contract maintenance
18 costs under the Vestas and Siemens maintenance contracts
19 as well as rent and royalty payments for the Hopkins Ridge,
20 Wild Horse/Wild Horse Expansion and Lower Snake River
21 Phase 1 Wind Generating Stations based upon forecasted
22 rate year wind generation;

23 (iv) added \$0.6 million to test year O&M to reflect higher
24 scheduled rate year FERC licensing costs associated with
25 the Baker River and the Snoqualmie Falls Hydroelectric
26 Projects.

27 (v) added \$[REDACTED] million to test year production O&M to reflect
28 Freddy 1 budgeted test year O&M, per the plant operator;

29 (vi) added \$[REDACTED] million to test year O&M to reflect a
30 performance bonus under the contractual service agreement
31 with General Electric International ("GE International").

1 **B. Operations and Maintenance Expense of PSE's Coal Generation**
2 **Facilities**

3 **Q. What are the sources of O&M costs for the Colstrip Generating Station?**

4 A. The O&M costs for both of PSE's jointly-owned Colstrip units, are developed
5 from budgets and business plans provided by the plant operator and approved by
6 owners. Colstrip fuel costs are developed from annual operating plans prepared by
7 the coal supplier, Western Energy Company. The Commission has approved this
8 practice for determining rate year power costs in the past several general rate case
9 and power cost only rate case proceedings.

10 With respect to Colstrip overhaul costs, the 2017 GRC Production O&M reflects
11 the methodology as outlined in the Settlement Stipulation approved in PSE's
12 2014 PCORC.⁴ Accordingly, the January-December 2018 rate year includes
13 amortization associated with Colstrip Unit 2 actual overhaul costs incurred in
14 2015 and actual overhaul costs for Colstrip Units 1 & 4 incurred in 2016 as well
15 as the overhaul costs for Colstrip Units 2 & 3 (excluding management reserves) as
16 projected in the plant operator's 2017 or 2018 budget, all amortized over a 36-
17 month period. Amounts included in this filing for amortization associated with the
18 2017 Colstrip Unit 1 overhaul will be adjusted once actual costs are known and
19 measurable.

⁴ Appendix A of the Final Order No. 04 approving and adopting the Settlement Stipulation between PSE, Staff of the Washington Utilities and Transportation Commission ("Commission Staff"), Public Counsel and Industrial Customers of Northwest Utilities ("ICNU") in PSE's 2014 PCORC.

1 **Q. What Colstrip overhaul events did PSE include in the rate year?**

2 A. The calculation of rate year amortization related to Colstrip overhaul events is
3 summarized in Table 3 below:

4 **Table 3. Colstrip Overhaul Events Amortization**

Event	Event Date	Amt. to Amort.	Amort. Period	Monthly Amort.	Amort. Begin	Amort. End	Rate Year
Colstrip Unit #1 Outage	5/6/16	XXXXXX	36	XXXXXX	6/1/16	5/31/19	XXXXXX
Colstrip Unit #1 Outage (a)	4/30/17	XXXXXX	36	XXXXXX	5/1/17	4/30/20	XXXXXX
Colstrip Unit #2 Outage	6/30/15	XXXXXX	36	XXXXXX	7/1/15	6/30/18	XXXXXX
Colstrip Unit #2 Outage	6/30/18	XXXXXX	36	XXXXXX	7/1/18	6/30/21	XXXXXX
Colstrip Unit #3 Outage	6/30/14	XXXXXX	36	XXXXXX	7/1/14	6/30/17	XXXXXX
Colstrip Unit #3 Outage	6/30/17	XXXXXX	36	XXXXXX	7/1/17	6/30/20	XXXXXX
Colstrip Unit #4 Outage	6/30/16	XXXXXX	36	XXXXXX	7/1/16	6/30/19	XXXXXX

(a) Due to uncertainties in 2016 associated with pending New Source Review (NSR) litigation, the scope of the 2016 major maintenance event was reduced, and a portion of the work was deferred into 2017.

5 **Q. What was the amount of non-overhaul related Colstrip O&M included in the**
6 **rate year?**

7 A. Non-overhaul related Colstrip O&M included in the operator budget for the rate
8 year amounts to \$39.1 million. This compares with \$35.8 million for the
9 2014 PCORC rate year and \$36.1 million in the test year. These amounts do not
10 include any provision for management reserve.

11 **Q. Did PSE include Colstrip major overhauls and other outages that will occur**
12 **in the rate year in the preparation of the power costs?**

13 A. Yes. Colstrip overhauls and other outages are inputs to the AURORA model and
14 are used in determining rate year power costs, which are discussed in the Prefiled
15 Direct Testimony of Paul K. Wetherbee Exhibit No. ___(PKW-1CT).

1 Additionally, the average of the most recent four years of other maintenance
2 outages and deratings, forced outages and forced deratings of the units, called the
3 planning forced outage rate are calculated and the available energy production is
4 reduced by this average. In this case, the four-year average covers the time period
5 2010 through 2013. The forced outage rate of [REDACTED] percent for Colstrip
6 Units 1 & 2 is calculated separately from the forced outage rate of [REDACTED] percent
7 for Colstrip Units 3 & 4 because of the differences in the unit design and
8 equipment.

9 **Q. What major overhauls did PSE include for the rate year?**

10 A. PSE included one outage and one unit derating planned during the rate year.

11 Colstrip Unit 2 will be offline for [REDACTED] for its planned overhaul from [REDACTED]
12 [REDACTED] Colstrip Unit 1 will be reduced to [REDACTED] of
13 normal output [REDACTED] for [REDACTED] ([REDACTED]
14 [REDACTED]) for scrubber cleaning and repair.

15 **Q. What other assumptions are input to the AURORA model for the Colstrip**
16 **units?**

17 A. The AURORA model uses several Colstrip-specific data inputs. In addition to the
18 forced outage rate input, PSE's AURORA model also includes (i) the four-year
19 average heat rate for Colstrip Units 1 & 2 and Colstrip Units 3 & 4; (ii) the
20 average transmission line losses of [REDACTED] percent on the Colstrip Project
21 Transmission System; and (iii) the forecasted costs of coal and the average rate
22 year coal heat content from the coal supplier's annual operating plans.

1 **Q. Does PSE anticipate making any updates to the rate year O&M expense for**
2 **its jointly-owned facilities?**

3 A. PSE proposes to update production O&M expense for its jointly-owned facilities
4 if information changes during the course of this proceeding.

5 **C. Operations and Maintenance Expense of PSE's Simple- and**
6 **Combined-Cycle Combustion Turbine Generation Facilities**

7 **1. Non-Major Maintenance and Operating Expense of PSE's**
8 **Simple- and Combined-Cycle Combustion Turbine Facilities**

9 **Q. What is the basis for the calculation of O&M expense, other than major**
10 **maintenance, for PSE's owned and jointly-owned generation stations?**

11 A. As previously discussed, PSE generally uses a test year level of production O&M
12 expense to represent a normal level of operating expenses for PSE's owned and
13 operated gas fired turbines. For PSE's jointly-owned gas fired turbine, Freddy 1,
14 the plant operator's budget, except for major maintenance costs, is used to
15 represent the rate year level of production O&M expense. To summarize:

- 16 (i) The Goldendale, Mint Farm, Encogen, Sumas, Ferndale,
17 Frederickson, Fredonia, Whitehorn and Crystal Mountain
18 facilities rate year production O&M expense is based upon
19 actual test year production O&M expense; and
- 20 (ii) The jointly-owned Freddy 1 rate year production O&M
21 expense is based upon projected rate year operating costs
22 provided by the plant operator, Atlantic Power Corporation
23 (formerly Capital Power Corporation).

24 This methodology is consistent with the manner in which production O&M
25 expense was determined in PSE's past several general rate case and power cost
26 only rate case proceedings.

1 **2. Major Maintenance of PSE'S Simple- and Combined-Cycle**
2 **Combustion Turbine Facilities**

3 **Q. What is the basis for major maintenance events and expenditures included in**
4 **this filing?**

5 A. Major maintenance included in this proceeding reflects the rate making treatment
6 as established in the 2013 PCORC.⁵ In general, if the cost of a major maintenance
7 event performed at any of PSE's gas fired generating facilities is \$500,000 or
8 greater, the costs incurred shall be deferred and amortized over the period until
9 the next scheduled equivalent major maintenance event for that facility. The
10 deferred amount will not be treated as a regulatory asset. If a major maintenance
11 event occurs during the test year but does not meet the \$500,000 threshold, the
12 cost of the major maintenance will be included in test year production O&M
13 expense as incurred. Amortization associated with events that have occurred prior
14 to and during the test year have been included in the rate year to the extent that
15 the associated amortization occurs within the rate year. Amortization that ends
16 prior to the rate year is excluded from the rate year. Finally, amortization
17 associated with major maintenance events that occur after the test year but that are
18 known and measurable at the time of the evidentiary hearing are to be included in
19 rate year production O&M expense.

⁵ Docket UE-130616, Order 06 7:20; Settlement Stipulation 6:17-8:19.

1 **Q. What is the cost for major maintenance associated with PSE's owned and**
2 **jointly-owned simple- and combined-cycle combustion turbine facilities**
3 **included in this proceeding?**

4 A. PSE's rate year major maintenance expense is \$8.0 million as compared to
5 \$2.4 million in the 2014 PCORC and \$4.7 million in the test year. Please see
6 Exhibit No. ___(RJR-26C) for amortization included in this proceeding's rate
7 year. Once the 2017 events have been completed and the costs become known,
8 the associated amortization will be recalculated based upon known and
9 measurable costs and incorporated into this filing.

10 The timing of the 2017 major maintenance events at Freddy 1, Mint Farm, and
11 Sumas Generating Stations are based upon original equipment manufacturer's
12 recommendations (and as specified in the long term maintenance agreements with
13 respect to the Freddy 1 and Mint Farm combustion turbines). The timing of the
14 major maintenance events at Encogen and Whitehorn generating facilities were
15 predicated upon observed condition and identified operational issues with these
16 units.

17 **3. Status of Major Maintenance Contracts / Equipment Upgrades**
18 **at Goldendale and Mint Farm**

19 **Q. What is the status of major maintenance contracts for PSE's thermal**
20 **generating facilities?**

21 A. PSE currently has long term major maintenance contracts with GE International
22 to provide combustion turbine major maintenance services at the Goldendale
23 Generating Station and Mint Farm Generating Station. The contracts are effective

1 December 14, 2015, and expire in 2037. These contracts replace long term
2 maintenance contracts with GE International that were to expire at Goldendale
3 Generating Station and Mint Farm Generating Station in 2016 and 2026,
4 respectively. There is also a long term maintenance contract with GE International
5 at Freddy 1 that will expire in 2018.

6 **Q. What factors affected the timing of the new contracts at Goldendale**
7 **Generating Station and Mint Farm Generating Station?**

8 A. The previous long term maintenance contract at Goldendale Generating Station
9 was to expire in 2016 upon the completion of the combustion turbine major
10 inspection performed in June of 2016. In September 2015, GE International
11 approached PSE and proposed an extension of both the Goldendale and Mint
12 Farm contracts in conjunction with favorable pricing of certain upgrades to
13 combustion turbine components for both units. The timing of the contract
14 renewals permitted the upgraded components to be installed at Goldendale
15 Generating Station during the 2016 major inspection and the upgrade of
16 components at Mint Farm Generating Station when the major inspection is
17 performed at that facility in 2017.

18 **Q. Please describe the nature of the component upgrades.**

19 A. The new contracts with GE International include upgrades to the combustion
20 turbines collectively referred to in the contracts as the "Optimization Package":
21 These include the following:

- 1 • upgraded components in the combustion section (the
2 DLN 2.6+ package) at both Goldendale Generating Station
3 and Mint Farm Generating Station;
- 4 • upgraded components in the turbine sections (the
5 AGP package) at both Goldendale Generating Station and
6 Mint Farm Generating Station;
- 7 • modification to the compressor section at Mint Farm
8 Generating Station; and
- 9 • upgrades to the software that controls the fuel flow to the
10 units (the Opflex package).

11 The advantages to be realized from the installation of the Optimization Package
12 include an increase in the generating capacity of the units, an increase in the
13 efficiency of the units (the amount of energy generated per BTU of fuel
14 consumed, or “heat rate”), and greater flexibility in the ability to run the units at
15 less than full load (“turn-down capacity”).

16 **Q. Are there any other advantages to be realized from the installation of the**
17 **optimization packages?**

18 A. Yes. The new combustion section components have a useful life of 24,000 hours
19 as compared to the 12,000 hour life of the original combustion components.

20 Accordingly, PSE will not need to perform combustion inspections between the
21 major and hot gas path major maintenance events as was the case prior to the
22 upgrade.

23 Additionally, the compressor modifications at Mint Farm Generating Station will
24 reduce risk of a compressor failure significantly due to new component geometry.

1 **Q. Do the contracts guarantee these performance improvements?**

2 A. Yes. The contracts specify minimum improvements in performance associated
3 with installation of the optimization packages. In the case of Goldendale
4 Generating Station, the generating capacity was guaranteed to increase by
5 [REDACTED] percent, and the heat rate was guaranteed to be reduced by [REDACTED] percent. In
6 the case of Mint Farm Generating Station, the generating capacity was guaranteed
7 to increase by [REDACTED] percent, and the heat rate was guaranteed to be reduced by
8 [REDACTED] percent.

9 The differences in the guaranty values between the Goldendale and Mint Farm
10 contracts are due to the fact that, as originally configured, Mint Farm Generating
11 Station was operating at a higher firing temperature and was thus
12 thermodynamically more efficient prior to the upgrade. Additionally, Goldendale
13 Generating Station is located in eastern Washington at an elevation of 1,637 feet,
14 and Mint Farm Generating Station is located in western Washington at an
15 elevation of 20 feet, resulting in different operating environments of air pressure,
16 temperature and humidity.

17 **Q. Have the performance improvements been achieved at Goldendale**
18 **Generating Station subsequent to the installation of the Optimization**
19 **Package in 2016?**

20 A. Yes. Performance testing was performed post-installation, and the output of the
21 Goldendale Generating Station combustion turbine increased [REDACTED] MW or
22 [REDACTED] percent. Performance tests demonstrated a post-installation heat rate of

1 [REDACTED] BTU/kW, a [REDACTED] percent improvement from the pre-installation
2 performance. Guaranteed performance is referenced to ISO standard temperatures
3 and ambient conditions. The performance guarantees have been validated by site
4 personnel and fall within the test tolerances.

5 **Q. Have the performance improvements that have been achieved at Goldendale**
6 **Generating Station and are anticipated at Mint Farm Generating Station**
7 **been incorporated into the calculation of power cost in this proceeding?**

8 A. Yes. Please see the Prefiled Direct Testimony of Paul K. Wetherbee, Exhibit
9 No. ___(PKW-1CT), for a discussion of how PSE incorporated the performance
10 improvements that have been achieved at Goldendale Generating Station and are
11 anticipated at Mint Farm Generating Station into the calculation of power cost in
12 this proceeding. Additionally, please see the Prefiled Direct Testimony of
13 Katherine J. Barnard, Exhibit No. ___(KJB-1T), for a discussion of how PSE
14 incorporated the capital costs associated with these upgrades in this proceeding.

15 **D. Operations and Maintenance Expense of PSE's Hydroelectric**
16 **Generation Facilities**

17 **Q. How has PSE prepared its forecast of hydroelectric production O&M**
18 **expense for the rate year?**

19 A. PSE developed the rate year production O&M expense for hydroelectric projects
20 in a manner consistent with the development of O&M expenses in PSE's
21 2014 PCORC. PSE utilizes test year O&M expense and then makes certain pro
22 forma adjustments as previously allowed by the Commission.

1 **Q. What is PSE's forecast of hydro O&M for the rate year?**

2 A. The forecast for rate year hydro production O&M costs is \$17.8 million, an
3 increase of approximately \$1.9 million relative to the hydro production O&M
4 costs of \$15.9 million from the 2014 PCORC.

5 **Q. Please summarize the hydro production O&M costs.**

6 A. Hydro production O&M costs are summarized in Table 4 below.

7 **Table 4. Hydro Production O&M Costs**

Resources	Test Year 10/01/2015 - 09/30/2016	Adjustments	2017 GRC Jan - Dec 2018	2014 PCORC Dec 14 - Nov 15	2017 GRC vs. 2014 PCORC as Filed
Lower Baker	\$4,763,084	–	\$4,763,084	\$4,137,204	\$625,880
Upper Baker	\$4,413,567	–	\$4,413,567	\$4,299,468	\$114,099
Baker License	\$2,499,722	\$456,830	\$2,956,552	\$2,398,675	\$557,878
Electron	\$10,335	(\$10,335)	–	\$2,009,672	(\$2,009,672)
Snoqualmie 1/2	\$5,169,224	–	\$5,169,224	\$2,446,632	\$2,722,592
Snoqualmie License	\$403,706	\$134,377	\$538,084	\$605,327	(\$67,244)
Total Hydro O&M	\$17,259,638	\$580,872	\$17,840,511	\$15,896,978	\$1,943,533

8 **Q. What is the nature of the adjustments PSE has made to test year hydro**
9 **production O&M expense?**

10 A. PSE has increased test year hydro production O&M by \$580,872 to reflect
11 budgeted rate year FERC license costs associated with the Baker River
12 Hydroelectric Project and the Snoqualmie Falls Hydroelectric Project. This is
13 consistent with treatment of license costs in the 2013 and 2014 PCORC filings.

1 **E. Operations and Maintenance Expense of PSE's Wind Generation**
2 **Facilities**

3 **1. Wind Production O&M Costs**

4 **Q. What is PSE's forecast of wind generation O&M for the rate year?**

5 A. The forecast for rate year wind production O&M costs is \$33.7 million, an
6 increase of approximately \$3.5 million relative to the 2014 PCORC wind
7 production O&M costs of \$30.2 million.

8 **Q. Please summarize the wind production O&M costs.**

9 A. Please see Table 5 below for a summary of wind production O&M costs.

10 **Table 5. Wind O&M Costs**

Resources	Test Year 10/01/2015 - 09/30/2016	Adjustments	2017 GRC Jan - Dec 2018	2014 PCORC Dec 14 - Nov 15	2017 GRC vs. 2014 PCORC as Filed
Hopkins Ridge	\$6,507,378	\$64,733	\$6,572,112	\$5,127,642	\$1,444,469
Wild Horse	\$10,879,887	\$256,116	\$11,136,003	\$10,958,274	\$177,728
Wild Horse Expansion	\$1,278,119	(\$145,679)	\$1,132,441	\$1,654,444	(\$522,003)
Lower Snake River	\$12,395,839	\$2,497,203	\$14,893,042	\$12,441,421	\$2,451,621
Total Wind O&M	\$31,061,224	\$2,672,373	\$33,733,597	\$30,181,781	\$3,551,816

11 **Q. What is the nature of the adjustments PSE has made to test year wind**
12 **production O&M expense?**

13 A. PSE has made adjustments to test year wind production O&M that total
14 \$2.7 million as described below:

- 15 (i) added \$2.5 million to test year wind production O&M to
16 reflect projected rate year contract maintenance costs under
17 the Siemens maintenance contract for the Lower Snake
18 River Wind Generating Station (please see the discussion
19 regarding the Siemens contract below);

- 1 (ii) added \$0.2 million to test year wind production O&M to
2 reflect projected rate year contract maintenance costs under
3 the Vestas maintenance contracts for the Hopkins Ridge
4 and Wild Horse/Wild Horse Expansion Wind Generating
5 Stations (please see the discussion regarding the Vestas
6 contract extension below); and
- 7 (iii) added \$0.1 million to test year wind production O&M
8 expense to reflect projected rate year royalty costs under
9 the royalty contracts for the Hopkins Ridge, Wild
10 Horse/Wild Horse Expansion, and Lower Snake River
11 Phase 1 Wind Generating Stations based upon projected
12 rate year wind generation.

13 **Q. Please explain PSE's proposed adjustment to wind royalty expense.**

14 A. Wind turbine production royalties represent variable dollar per MWh fees paid
15 under contract to project stakeholders. These fees are based on the actual
16 generation of PSE's wind turbines. Consistent with the treatment in the
17 2014 PCORC, PSE has pro formed the royalty costs based upon the wind
18 generation included in the rate year projected power costs. The rate year royalty
19 expenses for PSE's wind facilities have increased to \$6.9 million for the rate year
20 as compared to \$6.8 million for the 2014 PCORC (i.e., a rate year-to-rate year
21 increase of \$0.1 million).

22 **Q. Do the wind turbine production royalty payments reflect contract increases?**

23 A. Yes. In accordance with the terms of PSE's development and land lease
24 agreements with project stakeholders, the annual royalty rate paid per MWh of
25 energy production is subject to an annual adjustment for inflation.

1 **Q. How is routine and corrective maintenance provided for the wind turbines?**

2 A. PSE's wind turbines at Hopkins Ridge, Wild Horse, and the Wild Horse
3 Expansion Wind Generating Stations are maintained by the manufacturer (Vestas)
4 in accordance with the terms of five-year service agreements. PSE has contracted
5 with Siemens to provide all maintenance services at the Lower Snake River
6 Phase 1 Wind Generating Station. The term of the initial contract with Siemens
7 expires after five years following turbine commissioning on February 29, 2012.

8 **2. New Siemens Wind Turbine Services Agreement Effective**
9 **March 1, 2017**

10 **Q. Please discuss the extension of the Siemens maintenance contracts at the**
11 **Lower Snake River Wind Generating Station.**

12 A. With the scheduled expiration of the original Siemens Service and Maintenance
13 Agreement and expiration of the five-year equipment warranty period on
14 February 29, 2017, PSE evaluated alternative service options for the Lower Snake
15 River Wind Generating Station. PSE's evaluation of service options included a
16 new agreement with Siemens, a new agreement with an independent service
17 provider, and an option for PSE self-performance of the services.

18 PSE retained the international consulting firm of DNV/GL to assist in the
19 evaluation of these options. On January 7, 2016, DNV/GL issued its Operations
20 Benchmark and Forecast Study, which reviewed the common turbine services
21 alternatives and provided a range of expected costs, major component reliability
22 risks, and a forecast of potential future costs. Please see Exhibit No. ___(RJR-27)
23 for a copy of the DNV/GL Operations Benchmark and Forecast Study.

1 **Q. What were the results of the DNV/GL Operations Benchmark & Forecast**
2 **Study?**

3 A. DNV/GL reported that wind turbine service costs tend to increase with additional
4 years in operation as more major components require replacement. The reliability
5 of generators, gearboxes, blades, main bearings, and pitch bearings were all
6 identified as major lifecycle cost uncertainties, with increasing risk in future
7 years. These major components are expensive and represent the greatest cost
8 variability in the operating lifecycle of the turbine. Based on data from its clients,
9 DNV/GL benchmarked actual turbine median O&M cost from 2010 to 2014 to be
10 in the range of [REDACTED] to [REDACTED] per MW, or in the range of [REDACTED] to
11 [REDACTED] for a Siemens 2.3 MW turbine. O&M cost in future years was expected
12 to be at least 15%-20% higher, plus annual escalation.

13 **Q. How did PSE use the DNV/GL Operations Benchmark and Forecast Study to**
14 **inform its service evaluation process?**

15 A. PSE had been monitoring the development and maturity of independent turbine
16 services providers for several years, and believed that market competition was
17 creating high-quality providers with favorable risk and cost structures. To test that
18 market, PSE developed a comprehensive Request for Proposals for Wind Turbine
19 Maintenance that included all scheduled and unscheduled services, all spare parts,
20 a performance warranty, monitoring and surveillance of turbine operations, and
21 control software maintenance and updates. Please see Exhibit No. ___(RJR-28)
22 for a copy of the Request for Proposals for Wind Turbine Maintenance issued by

1 PSE. PSE selected four candidate service providers based on their experience,
2 customer feedback, and PSE's own evaluation of the service product being
3 offered. PSE released the Request for Proposals for Wind Turbine Maintenance,
4 dated February 22, 2016.

5 **Q. What services did PSE request through the Request for Proposals for Wind**
6 **Turbine Maintenance?**

7 A. In the Request for Proposals for Wind Turbine Maintenance, PSE asked potential
8 service providers to perform all scheduled and unscheduled services, diagnostics,
9 repair, and replacements on the wind turbines from the top of the foundation to the tip
10 of each blade including all towers, turbines, electrical cables/equipment,
11 fiber/communication equipment, blades, climb assist, wind turbine generator aviation
12 lights, wind turbine generator anemometers, supervisory control and data acquisition
13 (SCADA) system, and miscellaneous appurtenances.

14 The Request for Proposals for Wind Turbine Maintenance asked for proposals to
15 be structured as warranty-like with all included services to be provided for a fixed
16 annual fee. The fixed fee concept reduced PSE's overall cost exposure due to major
17 component failure risk, and provided incentives to the service providers to improve
18 maintenance efficiency and equipment performance.

19 **Q. What were the results of the Request for Proposals for Wind Turbine**
20 **Maintenance process?**

21 A. PSE received three compliant proposals for wind turbine services at Lower Snake
22 River Wind Generating Station and evaluated them on the basis of cost
23 (30% weight), risk (25% weight), contractor capability (25% weight), and

1 expected service quality (10% weight). After discussion with the contractors and
2 internal team, Siemens was the service provider with the highest overall score.
3 Negotiations commenced on the terms of a definitive service agreement shortly
4 thereafter, and the new agreement was signed September 23, 2016. Please see
5 Exhibit No. ___(RJR-29C) for a copy of the new Siemens wind turbine services
6 agreement.

7 **Q. What is the term and expected cost of the new Siemens wind turbine services**
8 **agreement?**

9 A. The new Siemens wind turbine services agreement becomes effective on March 1,
10 2017, and remains in effect until March 1, 2027. The per-turbine annual service
11 fee starts at \$ [REDACTED] and increases based only on published escalation
12 benchmarks.

13 **Q. Were maintenance costs expected to increase substantially as the original**
14 **Siemens wind turbine services agreement is replaced with the new Siemens**
15 **wind turbine services agreement?**

16 A. Yes. Based on the per turbine cost of the original Siemens wind turbine services
17 agreement, wind turbine maintenance costs were fixed and increased only at a rate
18 tied to normal inflationary benchmarks. Only scheduled maintenance services
19 were provided under the terms of the original Siemens wind turbine services
20 agreement. Unscheduled services were *not* covered by the original Siemens wind
21 turbine services agreement but were included under the terms of the original five-
22 year warranty agreement included with the turbine purchase. Following expiration

1 of the turbine warranty, unscheduled services are no longer covered by the
2 warranty agreement, and PSE expected increased costs in future years, just as
3 with other types of power generation facilities.

4 **Q. Does Siemens provide a performance warranty on the wind turbines in the**
5 **new Siemens wind turbine services agreement?**

6 A. Yes. During the ten-year term of the new Siemens wind turbine services
7 agreement, Siemens will provide a warranty on turbine availability performance,
8 and on spare parts availability. The base availability performance warranty is set
9 at an average of █%. Should the actual availability fall below this level, Siemens
10 pays liquidated damages to PSE, calculated based on a defined formula within the
11 service agreement. Likewise, PSE pays Siemens an incentive bonus if availability
12 exceeds █% during any twelve-month production period. The availability bonus
13 is capped at \$█████ for any availability period.

14 The spare parts availability warranty provides an incentive in the form of
15 \$█████ per day liquidated damages to insure that all spare parts critical to the
16 operation of individual wind turbines remain available over the term of the new
17 Siemens wind turbine services agreement.

18 **Q. How does PSE monitor and manage its contractors for compliance with the**
19 **terms of the new Siemens wind turbine services agreement?**

20 A. PSE's internal staff, the turbine manufacturer's workforce, and other third-party
21 service providers work together to conduct maintenance services at PSE's wind

1 facilities. PSE's wind facility staff manages this collaboration to ensure
2 compliance with safety and environmental procedures, contract requirements,
3 avoid miscommunication, and establish appropriate staging and responsibility
4 boundaries.

5 **Q. Does the new Siemens wind turbine services agreement represent a good**
6 **value to PSE's ratepayers?**

7 A. Yes. The new Siemens wind turbine services agreement is designed to reduce
8 performance and maintenance cost risk over the next ten years, provide a steady
9 supply of spare parts long after these turbines have gone out of production, assure
10 high turbine availability to optimize wind power production, maintain a safe
11 environment for workers and the community, and does so at a competitive
12 market-tested cost.

13 **IV. CONCLUSION**

14 **Q. Does this conclude your prefiled direct testimony?**

15 A. Yes.