

**EXHIBIT NO. ___(TAD-3C)
DOCKET NO. UE-16___
PCA 14 COMPLIANCE
WITNESS: TOM A. DEBOER**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**In the Matter of the Petition of
PUGET SOUND ENERGY
For Approval of its April 2016 Power Cost
Adjustment Mechanism Report**

Docket No. UE-16___

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF
TOM A. DEBOER
ON BEHALF OF PUGET SOUND ENERGY**

**REDACTED
VERSION**

APRIL 29, 2016

PUGET SOUND ENERGY

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF TOM A. DEBOER**

I. PUGET SOUND ENERGY’S HEDGING PLAN1

II. PROGRAMMATICALLY MANAGED HEDGE PERIOD.....3

 A. [REDACTED] THROUGH [REDACTED]3

III. ACTIVELY MANAGED HEDGING PERIOD7

IV. FEBRUARY 2015 – WITHIN MONTH OVERVIEW.....10

V. SUPPORTING EXHIBITS.....11

PUGET SOUND ENERGY

**ILLUSTRATION OF PSE'S PORTFOLIO AND
RISK MANAGEMENT ACTIVITIES FOR PCA PERIOD 14 POWER
SUPPLY FOR THE SINGLE MONTH FEBRUARY 2015**

I. PUGET SOUND ENERGY'S HEDGING PLAN

The purpose of this exhibit is to illustrate the manner in which Puget Sound Energy ("PSE") manages its electric portfolio, including risk management activities, by describing how PSE managed power supply and costs for a single month during Power Cost Adjustment Mechanism ("PCA") Period 14: February 2015.

In accordance with PSE's Energy Risk Policy, the Energy Management Committee ("EMC") is responsible for providing policy-level and strategic direction on energy supply portfolio risk issues and significant new long-term resources and contracts. Energy Supply Merchant department staff ("Employees") follow the EMC approved Programmatic Hedge strategy to guide them in the specific time periods and quantities of energy to hedge. PSE manages its short-term energy supply hedging and portfolio risk activities in accordance with the EMC-approved Energy Supply Transaction and Hedging Procedures Manual ("Procedures Manual").

Most of the transactions for the "sample PCA month" (February 2015) were transacted more than [REDACTED] prior to delivery. Transactions within [REDACTED] of delivery fall within the Actively Managed Hedge period and for February 2015 were shorter-term balancing transactions to respond to changes in market heat rates, current hydro conditions and unit assumptions.

1 During the Actively Managed Hedge period, employees manage the monthly net
2 exposure in accordance with the Procedures Manual. The exposure is calculated
3 individually for on-peak, off-peak, and gas for power positions. The authority limit is
4 calculated on the net spot exposure of all three positions. Spot market exposure is
5 measured by utilizing the net open position and the forward market price curve. It
6 represents the net dollar amount that PSE has not hedged during a given timeframe, given
7 forecasted volumes and market prices. As defined in Schedule F of the Procedures
8 Manual, "Spot Market Exposure for Gas and Power Portfolios", the Authorized Traders
9 have exposure authority up to \$ [REDACTED] monthly or \$ [REDACTED] for the entire rolling [REDACTED]
10 [REDACTED] period. Spot market exposure above the Authorized Traders level requires
11 notification to the EMC. See Exhibit No. ___(TAD-7C) for the Schedule F excerpt from
12 the Procedures Manual.

13 Employees use various reports, analytics and data tools to manage positions,
14 measure specific portfolio risks, and compare hedge choices. Examples include stochastic
15 price simulations, portfolio cost simulation and scenario analysis. The stochastic model
16 allows varying key inputs, such as volatility, to create prices distributions, which can aid in
17 making hedge decisions.

18 The remainder of this exhibit will illustrate the executed hedging strategy decisions
19 used by Employees for PCA Period 14. Please reference section II through IV, which
20 provide a summary of [REDACTED] and review the analysis and
21 fundamental views Employees relied upon to make hedging decisions for February 2015.
22 Section V provides a description of Exhibit No. ___(TAD-4C) through Exhibit
23 No. ___(TAD-9C), which collectively provide additional detail supporting this narrative.

1 **II. PROGRAMMATICALLY MANAGED HEDGE PERIOD**

2 **A. [REDACTED] THROUGH [REDACTED]**

3 In [REDACTED], the entire [REDACTED]
4 rolled into Employees' Programmatically Managed Hedge purview. Therefore, February
5 2015 was within the Programmatically Managed Hedge strategy. At the beginning of
6 [REDACTED], the February 2015 net exposure was [REDACTED] with a [REDACTED] MW on-
7 peak power [REDACTED] position, a [REDACTED] MW [REDACTED] power [REDACTED] position and a [REDACTED]
8 MMBtu/day natural gas [REDACTED] position. At the time, the portfolio position indicated that the
9 on- and off-peak power positions, valued at the current market price, resulted in an on- and
10 off-peak power exposure of [REDACTED] and [REDACTED], respectively. This power
11 exposure, combined with the [REDACTED] natural gas exposure totaled a net exposure of
12 [REDACTED]. See Exhibit No. ___(TAD-4C) for the February 2015 exposures over the
13 entire hedging period.

14 The "maximum" monthly reduction in exposure is the net exposure noted above
15 divided by the remaining months prior to the time when the position falls into the Actively
16 Managed Hedge. In [REDACTED], with [REDACTED] remaining before February 2015 fell
17 into Employees' Actively Managed Hedge, the maximum monthly reduction was
18 \$ [REDACTED]). Since February 2015 is month [REDACTED] and Employees
19 are not obligated to remove exposure for months [REDACTED], the "minimum" reduction is
20 zero (as explained in Exhibit No. ___(TAD-1CT).

21 In early [REDACTED], Employees reviewed market prices, drivers, and risks,
22 electing to hedge to maximum for the Programmatically Managed Hedge period of [REDACTED]
23 [REDACTED]. The [REDACTED] hedge reduction limit for February 2015

1 delivery was [REDACTED]. Employees purchased [REDACTED] MW of power [REDACTED]
2 [REDACTED]) and [REDACTED] power for
3 the [REDACTED]. This hedge, in addition to changes in commodity prices and
4 heat rates, resulted in a reduction of net exposure of [REDACTED] over the month. Often a
5 power hedge transaction spans a full quarter or full calendar year due to the fact that
6 quarterly and calendar strips are much more liquid than single month markets and the
7 pricing and volume reflect the availability at that time. Most of the power hedge
8 transactions for February 2015 were either quarterly or calendar year strips. See Exhibit
9 No. ___(TAD-9C) for the forward and daily settled market prices for February 2015.

10 During the months of [REDACTED], Employees managed the
11 [REDACTED] spot market exposure similar to [REDACTED]. During the period from
12 [REDACTED] through [REDACTED], Employees [REDACTED] MMBtu/day of gas for
13 [REDACTED] and a total of [REDACTED] power and [REDACTED] power for the
14 entire [REDACTED]. These hedges, in addition to commodity price and heat rate
15 changes over the [REDACTED], reduced total net exposure by [REDACTED].

16 In [REDACTED], PSE updated its customer load forecast and as a result, the February
17 2015 demand forecast decreased by [REDACTED] MW in the [REDACTED] and [REDACTED] MW in the [REDACTED]
18 hours. During [REDACTED], Employees [REDACTED] MW [REDACTED] power and [REDACTED]
19 MMBtu/day of gas. The combination of the change in load and heat rates, combined with
20 the hedges, reduced the total net exposure to [REDACTED].

21 During [REDACTED], PSE entered into a Coal Transition Power Purchase and Sale
22 Agreement with deliveries starting December 2014. This purchase, in addition to the
23 change in commodity prices and heat rates and the programmatic hedges of [REDACTED] MW [REDACTED]

1 [REDACTED] power and [REDACTED] MMBtu/day of gas for power, reduced the total net exposure for
2 February 2015 by [REDACTED].

3 During [REDACTED] through [REDACTED], Employees [REDACTED] a total of [REDACTED] MW
4 of [REDACTED] and [REDACTED] MW of [REDACTED] power for the [REDACTED] and [REDACTED]
5 MMBtu/day of gas for power for February 2015. During this three month period PSE's
6 total net exposure [REDACTED] million as a result of higher Sumas natural gas prices
7 and lower market heat rates. Given the lower implied market heat rates, the probabilistic
8 portfolio position reflected less gas-fired generation that was economical to dispatch which
9 meant the power position got shorter.

10 In [REDACTED], Employees added the Ferndale gas-fired generation resource
11 acquisition to its portfolio and modeled position with a capacity of [REDACTED] MW and a dispatch
12 heat rate of [REDACTED] Btu/kWh. The implied flat market heat rate for February 2015 at that
13 time was below the dispatch heat rate of the Ferndale plant. As a result, the modeled
14 probabilistic on-peak and off-peak power positions increased only [REDACTED] aMW and [REDACTED] aMW,
15 respectively. During the month of [REDACTED], Employees [REDACTED] MW of [REDACTED]
16 [REDACTED] power, by [REDACTED]g the entire [REDACTED], and [REDACTED]
17 MMBtu/day of gas for power for February 2015 delivery, in an effort to remove exposure.

18 During the months of [REDACTED], Employees continued to
19 programmatically reduce exposure by hedging to [REDACTED]. Employees [REDACTED] a total
20 of [REDACTED] MMBtu/day of gas for power for February 2015. In addition, Employees
21 purchased [REDACTED] MW of [REDACTED] and [REDACTED] MW of [REDACTED] power for February 2015 delivery
22 by [REDACTED], a [REDACTED]

1 [REDACTED] and several [REDACTED]. These hedges, along with changes in
2 commodity prices and heat rates, [REDACTED] PSE's net exposure to [REDACTED].

3 In [REDACTED] PSE again updated its customer load forecast and consequently, the
4 February 2015 demand forecast [REDACTED] MW in the [REDACTED] and [REDACTED] MW in the [REDACTED]
5 [REDACTED] hours. During [REDACTED], Employees purchased [REDACTED] MMBtu/day of gas for
6 power for February 2015 delivery. This hedge, combined with the demand forecast update,
7 [REDACTED] net exposure. However, the change in commodity prices and heat rates,
8 [REDACTED] the net exposure for February 2015 and the net effect resulted in an [REDACTED] of
9 [REDACTED] million to the total net exposure.

10 Employees [REDACTED] MMBtu/day of gas for power each month during
11 [REDACTED] for February 2015 delivery. Given lower liquidity in the
12 power markets and increased power prices, Employees determined to purchase gas for
13 power rather than power in an effort to reduce costs. By hedging the power load with gas,
14 the hedge cost is capped at the cost to generate PSE gas-fired generation units while
15 retaining the option to rebalance commodities later if and when power prices decline.

16 In early [REDACTED] Employees determined to switch from hedging at
17 [REDACTED] exposure reduction levels to [REDACTED] exposure reduction levels for all delivery
18 terms of the Programmatically Managed Hedge period, which included February 2015.
19 Market liquidity in the term power markets, especially beyond one year out, had declined.
20 It was unclear at the time whether this was a transitory event or a longer term structural
21 change. There were three main factors contributing to the power market illiquidity. First,
22 there were fewer market participants. Several entities had scaled back or exited West
23 power over time (e.g., [REDACTED])

1 [REDACTED]). Second, power markets had changed as a result of Dodd-Frank regulation. Many
2 entities moved away from transacting fixed-for-float power swaps and were instead
3 transacting futures and/or physical power. Credit under physical enabling agreements was
4 more restrictive and therefore PSE had fewer counterparties willing to transact beyond
5 twelve months out. Dodd-Frank regulation had created market uncertainty and added
6 costs. Lastly, new rules and regulations related to California Air Resource Board (CARB)
7 were adding to the illiquidity and price uncertainty. Employees continued to hedge at
8 [REDACTED] exposure reduction levels in [REDACTED] for February
9 2015 delivery. During the three months ([REDACTED]) at the [REDACTED]
10 hedging level Employees [REDACTED] a total of [REDACTED] MMBtu/day of gas for power. This
11 purchase, along with the increase in commodity prices and reduction of market heat rates,
12 slightly increased the total net exposure by [REDACTED].

13 III. ACTIVELY MANAGED HEDGING PERIOD

14 In [REDACTED], February 2015 rolled into Employees' Actively Managed Hedge.
15 This hedge program allows Employees to more actively manage the February 2015
16 position for a full [REDACTED] prior to delivery. At the beginning of [REDACTED], the
17 position report indicated the February 2015 net exposure was [REDACTED] with a
18 [REDACTED] or [REDACTED] MW [REDACTED] power [REDACTED] position, a [REDACTED] or [REDACTED] MW [REDACTED]
19 [REDACTED] power [REDACTED] position and a [REDACTED] or [REDACTED] MMBtu/day natural gas [REDACTED]
20 position. See Exhibit No. ___(TAD-4C) for the February 2015 exposures over the hedging
21 period. At that time, market implied flat heat rates for February 2015 were averaging
22 around [REDACTED], a level where two of PSE's gas-fired generators were right on the

1 margin of being economically dispatched. See Exhibit No. ___(TAD-8C) for the daily
2 forward heat rate trends for February 2015. The total net exposure was [REDACTED]
3 [REDACTED]. Given the recent rise in
4 commodity prices, Employees chose, at that time, to [REDACTED] – well
5 within the monthly exposure limits under Schedule F of the Procedures Manual.

6 During the months of [REDACTED] implied market heat rates
7 fluctuated from [REDACTED] Btu/kWh, a level that would have two gas-fired generation
8 units economically dispatched. As a result, the probabilistic on- and off-peak power
9 positions [REDACTED] while the gas for power position got [REDACTED]. Commodity prices
10 remained at higher levels so Employees during this time decided to [REDACTED].

11 In [REDACTED] after months of forward power prices moving in tandem with
12 the natural gas price volatility, power prices for February 2015 were down near all-time
13 lows. Given that PSE had switched to minimum hedging targets a year earlier and then had
14 remained out of the market, Employees determined to remove some exposure by
15 [REDACTED] MW of [REDACTED] power.

16 In [REDACTED], power prices for February 2015 continued to decline. As a
17 result, Employees [REDACTED] another [REDACTED] MW of [REDACTED] power to remove exposure and
18 reduce the short-to-load fixed price position.

19 In [REDACTED] with February 2015 as the prompt month, given the fairly wet and
20 warm winter we had been experiencing, runoff at Grand Coulee had been averaging above
21 normal at 131% of normal water year to date (October 2014 through December 2014). Due
22 to the warm weather, the Snow Water Equivalent (SWE) was below normal for that time of
23 year. However, in early January 2015, the Northwest River Forecast Center (NWRFC)

1 forecasted January through July outflows at Grand Coulee to be normal at 101% of normal.
2 Weather forecasts for the Pacific Northwest (“PNW”) were calling for above normal
3 temperatures for February 2015 with below normal precipitation, which could result in
4 lower power demand and possibly lower power and gas prices. At the time, on-peak
5 market implied heat rates for February 2015 were up slightly around the 8,800 level.
6 Employees decided to rebalance the commodity mix of hedges, by selling power and
7 buying gas for power, so that the volume of power and gas for power hedges would be
8 fairly balanced. As a result, Employees [REDACTED] on-peak heat rate by
9 [REDACTED] MMBtu/day of natural gas. A few
10 days later, heat rates for February 2015 decreased slightly. Employees [REDACTED] an additional
11 [REDACTED] MW of [REDACTED] power and [REDACTED] an additional [REDACTED] MMBtu/day of natural gas, for
12 February 2015, which was equivalent to an 8,250 heat rate. Given the expected increase in
13 hydro in February, due to the fact that the Bonneville Power Administration was drafting
14 Grand Coulee to 1,255 feet for drum gate maintenance, Employees decided to rebalance
15 commodities again and to be more hedged with gas for power hedges than power hedges.
16 Doing so would allow for more participation in lower power prices within the month of
17 February 2015. If heat rates were to decrease within the month, Employees could sell the
18 gas hedges and purchase power. At the end of January 2015, due to a decrease in flat
19 market heat rates, combined with the above mentioned hedges , the net exposure for
20 February 2015 was [REDACTED], within the Actively Managed hedging limits defined by
21 the Procedures Manual.

1 **IV. FEBRUARY 2015 – WITHIN MONTH OVERVIEW**

2 At the end of January 2015, the net exposure for February 2015 was [REDACTED], which
3 represented a [REDACTED] position for gas for power of [REDACTED] MMBtu/day [REDACTED]
4 [REDACTED]) and a [REDACTED] position for both on- and off-peak power of [REDACTED]
5 [REDACTED], respectively. As PSE entered February 2015, market
6 observers were taking into consideration the weather forecasts for the remainder of the
7 winter and coming spring months and the impact on hydro generation given the Grand
8 Coulee drum gate maintenance work. In early February 2015, the Northwest River
9 Forecast Center (“NWRFC”) January through July runoff forecast for Grand Coulee had
10 decreased slightly to 98% of normal. Market flat heat rates at the beginning of February
11 2015 were 8,975 Btu/kWh falling to as low as 2,237 mid-month and ending at 7,979
12 Btu/kWh. The average daily flat heat rate for the month was 6,670 Btu/kWh, with on-peak
13 power prices averaging \$18.83/MWh, off-peak power prices averaging \$10.63/MWh and
14 the gas price averaging \$2.31/MMBtu.

15 Temperatures in the PNW averaged over six degrees above normal with record
16 amounts of precipitation for the month of February 2015, resulting in high hydro flows in
17 the region. This increase in hydro generation caused power prices to retreat, which
18 ultimately resulted in lower heat rates. Employees rebalanced commodities within the
19 month by [REDACTED] and [REDACTED] (a
20 heat rate [REDACTED]) and [REDACTED] and [REDACTED]
21 [REDACTED] participating in lower power
22 prices. Employees also [REDACTED]

1 [REDACTED] within the month to [REDACTED] generation and purchase market power
2 below the [REDACTED] generation cost.

3 From [REDACTED] through [REDACTED], Employees [REDACTED] MW of on-
4 peak power at an average price of \$ [REDACTED]/MWh, [REDACTED] MW of off-peak power at an average
5 price of \$ [REDACTED]/MWh, [REDACTED] MW of flat power at an average price of \$ [REDACTED]/MWh and
6 [REDACTED] MMBtu/day of natural gas at an average price of \$ [REDACTED]/MMBtu. Employees also
7 [REDACTED] MW of on-peak power at an average price of \$ [REDACTED]/MWh, [REDACTED] of off-peak
8 power at an average price of \$ [REDACTED]/MWh and [REDACTED] MW of flat power at an average price of
9 \$ [REDACTED]/MWh. Most of the power purchase hedges were executed for quarter or calendar
10 strips, rather than for February 2015 alone, where market liquidity is far greater than an
11 individual month. *See* Exhibit No. ___(TAD-5C) for further detail of PSE's hedges for
12 February 2015.

13 V. SUPPORTING EXHIBITS

14 The monthly exposure for February 2015 is included in Exhibit No. ___(TAD-4C).
15 February 2015 hedges were executed in accordance with both the Programmatically
16 Managed Hedge and Actively Managed Hedge strategies, and the hedge details are shown
17 for both power and gas for power in Exhibit No. ___(TAD-5C).

18 As of the 2012 water supply season, the NWRFC water supply forecasting
19 procedures changed whereby Ensemble Streamflow Prediction ("ESP") generated forecasts
20 replaced regression-based forecasts. Water supply forecasts were no longer released on a
21 scheduled three times per month basis. The new ESP forecasts are published on the
22 NWRFC website at a minimum of once a week but may be updated daily. There is no

1 longer a NWRFC Final forecast for each month. The current published forecast is
2 designated as the NWRFC Official Forecast and is valid until it is replaced with an updated
3 forecast. The 30-year average (1981-2010), referred to as "normal," for the January-July
4 period at Grand Coulee is 59,599 KAF. The actual January-July 2015 runoff was 91
5 percent of normal at Grand Coulee, or 53,964 KAF. A graph of the NWRFC forecasts for
6 the January through July 2015 period is provided in Exhibit No. ____ (TAD-6). The
7 monthly runoff volumes at Grand Coulee for water years 2013 through 2015 are also
8 shown in Exhibit No. ____ (TAD-6).

9 A copy of Schedule F from the Procedures Manual, "Spot Market Exposure for Gas
10 and Power Portfolios", which provides the monthly exposure limits, is provided in Exhibit
11 No. ____ (TAD-7C).

12 Daily heat rate trends for February 2015 can be found in Exhibit No. ____ (TAD-8C),
13 as well as the dispatch heat rate of PSE's gas fired turbines. Implied market heat rates
14 fluctuate daily depending on the power and gas prices, and are part of the dispatch logic
15 used in the risk model to determine which gas fired turbines are "in the money" and may
16 dispatch economically.

17 Daily commodity prices for February 2015 are provided in Exhibit No. ____ (TAD-
18 9C). This chart illustrates on-peak power, off-peak power, and gas for power prices as they
19 evolved over the [REDACTED] hedging period.