



Before the North Dakota Public Service Commission  
State of North Dakota

In the Matter of the Application of Otter Tail Power Company  
For Advance Prudence on the Astoria Station Onsite  
Fuel Inventory System in North Dakota

Case No. PU-23-

Exhibit\_\_\_\_

**ASTORIA STATION PROJECT**

Direct Testimony

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February 8, 2023

## TABLE OF CONTENTS

I.	INTRODUCTION AND QUALIFICATIONS.....	1
II.	PURPOSE AND OVERVIEW OF DIRECT TESTIMONY .....	1
III.	NEED & JUSTIFICATION FOR THE PROJECT .....	2
IV.	CONCLUSION.....	9

1 **I. INTRODUCTION AND QUALIFICATIONS**

2 Q. PLEASE STATE YOUR NAME AND EMPLOYER.

3 A. My name is Ryan D. Retzlaff. I am employed by Otter Tail Power Company (Otter  
4 Tail or Company) as its Manager of Power Services.  
5

6 Q. PLEASE SUMMARIZE YOUR CURRENT RESPONSIBILITIES.

7 A. The primary responsibility of Power Services is to implement wholesale energy  
8 market strategies that optimize Otter Tail's generation resources with other  
9 resource alternatives to meet customer needs in a low-cost, reliable manner, all  
10 while maintaining an appropriate level of risk tolerance. I oversee the Company's  
11 wholesale energy market functions, including daily submission of generation  
12 offers and load bids, procurement of natural gas fuel for our generation  
13 resources, oversight of the Company's Auction Revenue Rights and Financial  
14 Transmission Rights portfolios, procurement of forward energy, capacity, and  
15 natural gas contracts, and accounting of wholesale energy market  
16 financial settlements.  
17

18 Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND EXPERIENCE.

19 A. I have a Bachelor of Science degree in physics from Carleton College and Master's  
20 degrees in electrical engineering and business administration from North Dakota  
21 State University. I have worked for Otter Tail for over 23 years in various  
22 positions, including as an Electrical Engineer, Senior Energy Engineer, Senior  
23 Energy Marketer, Principal Energy Marketer, and Manager of Power Services. I  
24 have served in my current position as Manager of Power Services since  
25 June 2014.

26 **II. PURPOSE AND OVERVIEW OF DIRECT TESTIMONY**

27 Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

28 A. The purpose of my testimony is to provide support for Otter Tail's request for an  
29 Advanced Determination of Prudence (ADP) for the Company's proposed  
30 development of onsite liquefied natural gas (LNG) fuel storage at Astoria Station  
31 (Project). In my testimony, I discuss the need and justification for the Project,  
32 focusing on the following:

- 33
- Natural gas market volatility;

- Net benefits of onsite LNG fuel storage at Astoria Station; and
- The impact of Winter Storm Elliot on Astoria Operations demonstrating the value of onsite fuel storage.

### III. NEED & JUSTIFICATION FOR THE PROJECT

Q. DO YOU MONITOR FORWARD ENERGY AND GAS MARKETS?

A. Yes, we continuously monitor natural gas and energy markets to mitigate price risks for our customers.

Q. WHAT IS THE RELATIONSHIP BETWEEN NATURAL GAS AND ENERGY MARKETS?

A. As noted by Mr. Nathan R. Jensen in his Direct Testimony natural gas units tend to be the marginal units in the MISO energy market. This means that they set the price based on their variable energy cost. High market price situations are usually accompanied (or caused) by high natural gas prices. That is why relying on natural gas units to serve load during volatile markets conditions is difficult unless those generation units can switch to an alternate fuel source or stored fuel when natural gas prices are elevated.

Q. IS ENERGY AND GAS MARKET PRICE VOLATILITY A CONCERN?

A. Yes, the current forward energy purchase market is more volatile and has seen considerably higher prices than recent years. Current winter pricing (December, January, and February) at the Otter Tail load zone is projected to be \$59 on peak and \$51.50 off peak for the 2023/2024 Winter. For the 2024/25 winter, prices are projected to be \$60.50 on peak and \$52.50 off peak. This compares to on-peak average pricing of \$30/MWh and off-peak average pricing of \$23.50/MWh for the 2022/23 winter period from our initial IRP filing.

Since our initial IRP filing, natural gas and market energy pricing have experienced a period of heightened volatility. The natural gas forecast in our initial IRP filing included a \$3.00 per MMBtu average price for 2022. The actual 2022 historical Ventura Hub average timely natural gas price per MMBtu was \$6.10/MMBtu. Similarly, our 2022 market energy forecasts in our initial IRP filing included peak energy of approximately \$28.50 and off-peak energy of

1 \$21.00. The actual 2022 peak and off-peak pricing for Otter Tail's load zone were  
2 approximately \$54.50 and \$37.00, respectively.

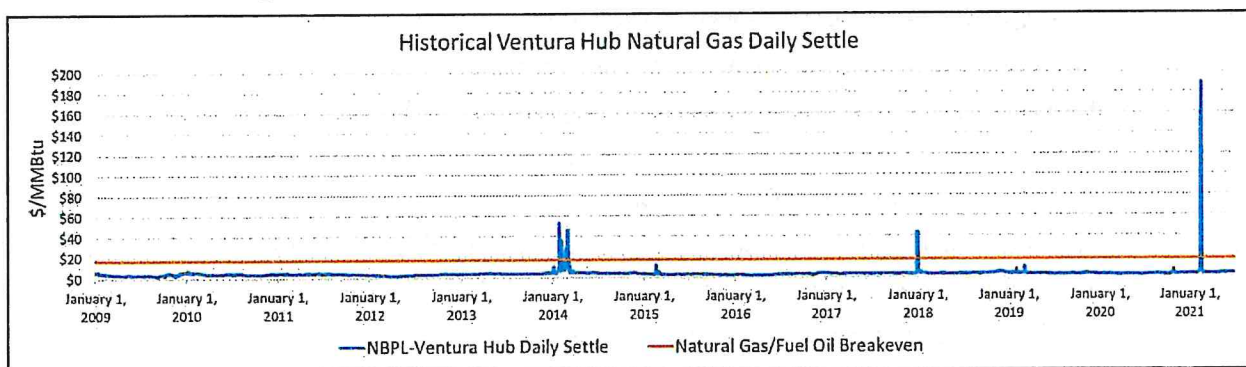
3  
4 Q. HAS OTTER TAIL ASSESSED WHETHER ONSITE FUEL STORAGE AT  
5 ASTORIA STATION WILL MITIGATE NATURAL GAS PRICE VOLATILITY?

6 A. Yes, in our Application, which incorporates key parts of our initial IRP filing, we  
7 noted the connection between extreme weather events and natural gas price  
8 volatility and intra-day price risk. Central to our review was Winter Storm Uri in  
9 2021, which highlighted more than ever natural gas volatility and intra-day price  
10 risk; risk that onsite fuel storage capabilities at a peaker would protect against.

11  
12 Q. HAS OTTER TAIL UNDERTAKEN A REVIEW OF NATURAL GAS  
13 PRICE VOLATILITY?

14 A. Yes, [IRP] Figure 3-11 and ADP Figure 3-11 collectively depict natural gas  
15 market prices at the Ventura Hub since January 2009 up to those most currently  
16 available when the figures were made as identified on the horizontal date axis.<sup>1</sup>  
17 The extraordinary pricing variability during the 2021 Winter Storm Uri event  
18 caused Otter Tail to assess the intra-day pricing variability exposure of a natural  
19 gas generator without a secondary fuel source backup. Over the past decade,  
20 there have been three events that caused high gas prices, the most recent of  
21 which was Winter Storm Uri. [IRP] Figure 3-11 below depicts the gas market  
22 prices since January 2009.

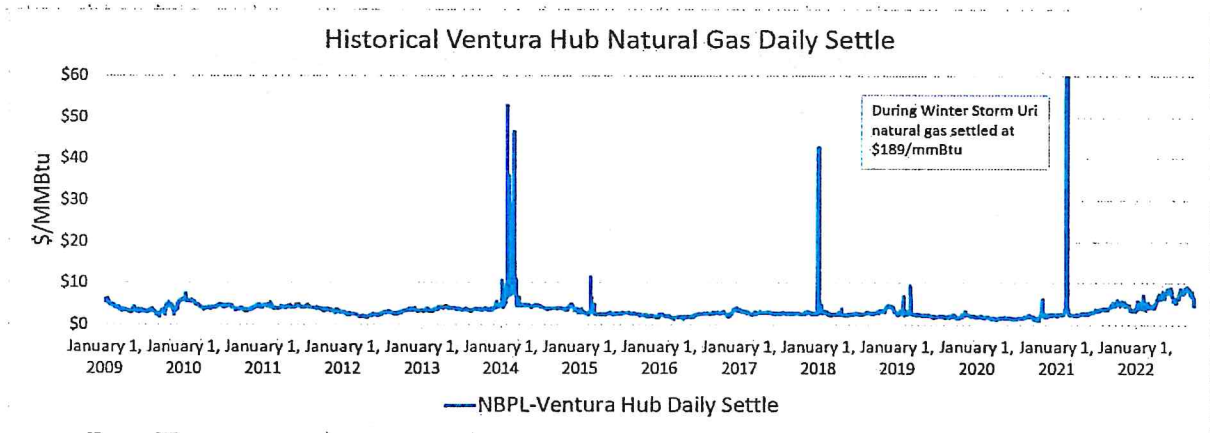
23  
24 **[IRP] Figure 3-11: Historic Ventura Hub Natural Gas Prices**



25  
26  
<sup>1</sup> These figures do not include or reflect Winter Storm Elliot which occurred in late December 2022.

1 ADP Figure 3-11 below depicts gas market prices since January 2009 up to those  
 2 most currently available. Note also that the “Y” axis values have been reduced to  
 3 better illustrate the market variability over the period. Note also that during the  
 4 January 2022 event, gas settlements were above the highest point of the “Y” axis  
 5 of ADP Figure 3-11.

6 **ADP Figure 3-11: Historic Ventura Hub Natural Gas Prices**



8  
 9  
 10 Q. HAVE YOU ANALYZED THE NET ECONOMIC BENEFITS OF ONSITE  
 11 FUEL STORAGE AT ASTORIA STATION IN LIGHT OF NATURAL GAS  
 12 MARKET VOLATILITY?

13 A. Yes. Our analysis focused on: (1) protection against intraday natural gas pricing  
 14 deltas, (2) energy hedge value, and (3) the changing MISO capacity construct.

15  
 16 Q. PLEASES EXPLAIN INTRADAY PRICING DELTAS.

17 A. During volatile pricing conditions the natural gas market can vary dramatically  
 18 between the time a generation offer is given to MISO and when MISO clears the  
 19 offer. If the quantity of MWs cleared varies from expectations, and the price to  
 20 procure or liquidate additional natural gas fuel supply varies from expectations,  
 21 the generator can be exposed to significant pricing risk. Onsite fuel inventory  
 22 mitigates if not eliminates this risk by providing a known and stable fuel supply  
 23 during extreme natural gas pricing events.

24  
 25 Q. PLEASE EXPLAIN ENERGY HEDGE VALUE.

26 A. The ability to call on Astoria Station using stored fuel (and therefore run the  
 27 facility at a pre-determined energy price), provides a hedge against volatile  
 28 market spot pricing and against potential unavailability of pipeline fuel.

1 Q. PLEASE EXPLAIN THE MISO CAPACITY CONSTRUCT.

2 A. On August 31, 2022, FERC approved MISO Tariff revisions that include the  
 3 adoption of a seasonal resource adequacy construct and capacity requirements.  
 4 MISO has since adopted seasonal capacity auctions with each season having its  
 5 own capacity requirement based on seasonal coincident peak loads and a  
 6 seasonal reserve margin. The changes also allow MISO to accredit resources  
 7 based on their historic availability during Resource Adequacy (RA) hours rather  
 8 than on the forced outage rate methodology where all hours are treated equally.  
 9 These changes will be implemented in the 2023/2024 planning year.

10  
 11 Q. PLEASE DESCRIBE YOUR ANALYSIS.

12 A. Please refer to [IRP] Table 3-12 and ADP Table 3-12 in our Application. ADP  
 13 Table 3-12 (provided below) updates the analysis included in our initial IRP  
 14 filing. The analysis assumes Astoria operations during Winter Storm Uri as an  
 15 example, and it provides an estimated value of having onsite fuel available at  
 16 Astoria Station during such an event. It should be noted Astoria was not  
 17 commercially operational during Winter Storm Uri, and therefore did not  
 18 operate. This analysis examines the financial implications if Astoria would have  
 19 been operational and under a must offer commitment requirement, varying  
 20 timely gas nominations and Locational Marginal Pricing (LMP.)

21  
 22 **ADP Table 3-12: February 2021 LMP Pricing Scenario**

LMP Pricing Scenario	Timely Gas Purchase: % of Daily Capacity	Timely MMBtu Purchase (MMBTu)	Intraday Purchase (MMBTu)	Gas Only		LNG Dual Fuel Integration (5 Day Invty)			Net Benefit Delta	
				Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	LNG Dispatch (MWh)	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case
Historical Astoria LMPs	0%	0	70,950	(\$840,795)	(\$5,346,120)	31,350	\$3,862,028	\$3,826,553	\$4,702,823	\$9,172,673
	10%	74,923	(3,973)	(\$2,313,096)	(\$6,226,902)	31,350	\$3,962,974	\$3,892,932	\$6,276,069	\$10,119,834
	15%	112,385	(41,435)	(\$3,102,458)	(\$7,240,915)	31,350	\$4,013,447	\$3,926,121	\$7,115,905	\$11,167,036
	25%	187,308	(116,358)	(\$4,943,698)	(\$12,246,128)	31,350	\$4,100,203	\$3,953,336	\$9,043,901	\$16,199,464
	50%	374,616	(303,666)	(\$9,678,766)	(\$25,815,180)	31,350	\$4,256,076	\$3,860,743	\$13,934,842	\$29,675,922
Historical Astoria LMPs X2	0%	0	337,722	(\$3,727,217)	(\$28,119,827)	34,200	\$10,403,895	\$10,276,185	\$14,131,112	\$38,396,012
	25%	187,308	150,414	(\$6,957,434)	(\$25,620,066)	34,200	\$11,075,987	\$10,990,847	\$18,033,421	\$36,610,913
MISO LMP Price Cap \$3,500/MWh	0%	0	749,232	\$208,816,344	\$127,252,224	34,200	\$245,272,001	\$245,101,721	\$36,455,656	\$117,849,497
	25%	187,308	561,924	\$207,466,301	\$146,293,211	34,200	\$247,740,255	\$247,612,545	\$40,273,954	\$101,319,334
Historical SPP Big-Stone LMPs	0%	0	533,544	\$45,673,869	(\$9,688,416)	34,200	\$71,788,382	\$71,639,387	\$26,114,513	\$81,327,803
	25%	187,308	346,236	\$43,969,076	\$4,875,626	34,200	\$72,460,473	\$72,354,048	\$28,491,398	\$67,478,423

23  
 24  
 25 Q. WHAT ASSUMPTIONS DID YOU MAKE IN THIS ANALYSIS?

26 A. The analysis assumes the value of avoiding intraday natural gas forecasting  
 27 uncertainty. This includes intraday pricing deltas and timing challenges  
 28 associated with procurement of natural gas, offering generation, and  
 29 commitment/dispatch by the MISO market. Despite using historical data,

1 numerous assumptions were required, including timely gas nominations,  
2 intraday purchase pricing and liquidation pricing, and changing market  
3 conditions. Sensitivity analysis was completed based on varied natural gas timely  
4 nominations and energy market pricing. We also assumed LNG dispatch of the  
5 unit being capped at five days and the output of Astoria Station at 285 MW.  
6 Assuming 285 MW of output, a five-day supply of onsite fuel would allow for  
7 generation output of 34,200 MWh from the stored fuel resource. This theoretical  
8 event contains simplified assumptions for the purpose of providing a guideline  
9 for possible futures. It also allows for utilization and optimization of a relatively  
10 low-cost, stored fuel resource within a high priced, volatile market.  
11

12 Q. WHAT DOES ADP TABLE 3-12 INDICATE?

13 A. As provided in the yellow highlighted column “Net Benefit: Average Gas Case”, in  
14 the cases where February 2021 historical Astoria LMP data was utilized, the net  
15 benefit of dual fuel capability ranged from \$4.7 million to \$23.7 million,  
16 depending on the amount of timely gas nominations. Similar to the analysis  
17 included in our initial IRP filing, the net benefit nearly doubles under a “worst”  
18 natural gas scenario where natural gas is either purchased at the high trading  
19 mark of the day or liquidated at the low trading mark of the day. Under the  
20 additional scenarios considering the possibility of increased LMP prices above  
21 what was historically experienced during Winter Storm Uri, the net benefit  
22 ranged from \$14.1 million - \$40.3 million.  
23

24 Q. HAVE YOU UNDERTAKEN AN EFFORT TO DETERMINE THE PROPENSITY  
25 FOR FUTURE WINTER STORM URI EVENTS?

26 A. Yes. [IRP] Figure 3-11 above can be used as a guideline to determine the  
27 propensity for future Winter Storm Uri-type events, but it cannot be concluded  
28 that the propensity for such events will not grow in the future. In fact, there are  
29 reasons to conclude the propensity will in fact grow.  
30

31 Q. WHAT ARE THE REASONS INDICATING THE PROPENSITY OF THESE  
32 EVENTS MAY INCREASE IN THE FUTURE?

33 A. First, as shown in [IRP] Figure 3-11, natural gas prices rose significantly three  
34 separate times, for different durations, over approximately a 12-year span, or  
35 roughly once every four years. Second, the North American Electric Reliability  
36 Corporation’s (NERC) 2022-2023 Winter Reliability Assessment (Winter  
37 Assessment), issued November 2022, highlighted the increased risk of extreme

1 weather events.<sup>2</sup> Third, our experience with Winter Storm Elliot, which I discuss  
2 below, came only 22 months after Winter Storm Uri, suggesting these events may  
3 occur with increased frequency.  
4

5 Q. HAVE YOU ASSESSED POTENTIAL NET BENEFITS OF ONSITE FUEL  
6 STORAGE AT ASTORIA STATION CONSIDERING THE PROPENSITY OF  
7 FUTURE WINTER-STORM URI EVENTS?

8 A. Yes. We analyzed the net benefits in ADP Table 3-12 with likelihood of events of  
9 similar magnitude occurring with a frequency of once every four years into the  
10 future. We calculated the net present value financial benefit of onsite fuel  
11 inventory by including the net benefits delta from ADP Table 3-12 into a table  
12 with an event occurring once every four years and discounting future events back  
13 to present day dollars. Using ADP Table 3-12 and a four-year propensity, the net  
14 present value of the financial benefits for many of the scenarios offsets a  
15 significant portion of the cost of the project while also increasing reliability and  
16 reducing rate volatility.  
17

18 Q. HAVE RECENT EVENTS INFORMED YOUR VIEW ABOUT THE NEED FOR  
19 ONSITE FUEL STORAGE AT ASTORIA STATION?

20 A. Yes. Winter Storm Elliot recently had a significant impact on Astoria Station,  
21 including a forced outage, which lends support for onsite fuel storage.  
22

23 Q. PLEASE DESCRIBE WINTER STORM ELLIOT.

24 A. Winter Storm Elliot was a significant extreme weather event that commenced  
25 December 21, 2022 and ended December 26, 2022. Winter Storm Elliot was  
26 deemed a bomb cyclone, bringing extreme cold temperatures to the eastern two-  
27 thirds of the Lower 48, with blizzard conditions occurring in several states.  
28

29 Q. HOW DID WINTER STORM ELLIOT IMPACT ASTORIA STATION?

30 A. During Winter Storm Elliot Otter Tail experienced: (1) a forced outage at Astoria  
31 due to lack of fuel on Northern Border Pipeline, (2) natural gas pricing of  
32 \$150/MMBtu, and (3) MISO committing Astoria for reliability purposes under a  
33 unit offer utilizing approximately \$120/MMBtu natural gas costs even though  
34 locational marginal pricing (LMP) at Astoria was relatively low at the time. MISO

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<sup>2</sup> Available at: [https://www.nerc.com/pa/RAPA/ra/Reliability Assessments DL/NERC\\_WRA\\_2022.pdf](https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_WRA_2022.pdf).

1 provided Otter Tail make whole payments for this requested commitment which  
2 covered the unit's offer cost.

3  
4 Q. PLEASE FURTHER DESCRIBE THESE EVENTS.

5 A. On December 23, 2022, the Northern Border Pipeline declared an operational  
6 flow order (OFO) limiting withdrawals from the pipeline to scheduled  
7 nominations.<sup>3</sup> Despite the MISO LMP being relatively low, and the Astoria unit  
8 being priced utilizing extremely high natural gas, MISO continued to call for the  
9 unit during December 23 and December 24. During this time, Astoria was able to  
10 utilize natural gas from Otter Tail's Park and Loan balance (PAL),<sup>4</sup> which Otter  
11 Tail ultimately exhausted. After exceeding Astoria's PAL balance, and still facing  
12 a declared OFO at a time when additional gas nominations were not possible,  
13 Otter Tail was forced to place Astoria on outage due to lack of fuel. When the gas  
14 markets opened on the morning of December 24, Otter Tail was unable to  
15 procure gas at Astoria *for any price* because of increased demand and production  
16 facility freeze offs. These conditions persisted for over two days. And not until  
17 December 26 did fuel become available. At that time, we purchased 3,500  
18 MMBtu at \$50/MMBtu to return us to within our PAL balance. As a result of  
19 these pipeline and gas market disruptions, Astoria was on forced outage and fully  
20 curtailed from operations from early morning December 24 into mid-morning  
21 December 26. Because of this occurrence, we expect to see a decrease in the unit's  
22 accreditation under the new Resource Adequacy accreditation methodology per  
23 Schedule 53 of MISO's Seasonal Accreditation Construct.

24  
25 Q. DID OTTER TAIL SUFFER MARKET PRICE CONSEQUENCES DUE TO  
26 WINTER STORM ELLIOT?

27 A. Fortunately, strong regional wind generation greatly contributed to keeping Otter  
28 Tail LMP pricing relatively low. During these events, we avoided very serious  
29 market price consequences at Astoria Station in large part because strong  
30 regional wind generation helped keep Otter Tail's LMPs relatively low over these  
31 dates. Of course, we cannot count on low LMPs occurring during future  
32 pipeline/gas market disruptions. In this instance, the gas markets and LMP

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<sup>3</sup> Northern Border Pipeline issued the OFO in order to protect system integrity. Extreme cold and blizzard conditions resulted in natural gas production and processing underperforming throughout the Bakken region (specifically the Roosevelt, Rawson, Southeast Little Missouri, and Stateline receipt points).

<sup>4</sup> Park and Loan (PAL) is the Northern Border Pipeline balancing service. Park and Loan is procured on an annual basis and entitles a customer to either park excess gas in the pipeline to be consumed later or to borrow gas from the pipeline to be replaced later, within a set, predetermined bandwidth.

1 markets diverged, which is not a common occurrence. For some of Astoria's  
2 operating hours, we were able to utilize our very limited PAL balance—and this is  
3 only something we have for the purpose of balancing withdrawals. It is not a  
4 balance we can count on for prolonged risk mitigation (of more than a few  
5 hours), and, as noted, that balance was ultimately fully depleted. Otter Tail  
6 customers could have seen very different results if regional LMP pricing would  
7 have followed natural gas pricing. Five days of onsite fuel inventory, however,  
8 would have allowed Astoria to operate continuously throughout this most recent  
9 event. Astoria would have been able to remain online as a capacity resource for  
10 MISO instead of being forced into an outage for over two days for lack of fuel.

11  
12 Q. WHAT CONCLUSIONS DO YOU DRAW FROM THIS EXPERIENCE?

13 A. Winter Storm Elliot illustrates the reliability risks that are posed by an  
14 operational strategy that relies solely on pipeline-delivered fuel at this important  
15 generating station. These circumstances and the likelihood of similar  
16 circumstances in the future demonstrate the necessity and prudence of adding  
17 onsite fuel storage.

18 **IV. CONCLUSION**

19 Q. PLEASE SUMMARIZE THE KEY POINT OF YOUR TESTIMONY.

20 A. The addition of onsite fuel inventory at Astoria Station maintains and enhances  
21 system resiliency, the importance of which has been demonstrated by events such  
22 as the recent Winter Storm Uri and Winter Storm Elliot. Specifically, the Project  
23 substantially increases the level of resilient generation provided by Otter Tail's  
24 generation portfolio during all seasons and mitigates natural gas market volatility  
25 impacts to customers. It allows Otter Tail to preserve an important onsite fuel  
26 inventory and dispatchable-market-hedge attribute once provided by our retired  
27 Hoot Lake generation unit that we are currently without.

28  
29 Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

30 A. Yes, it does.

31

