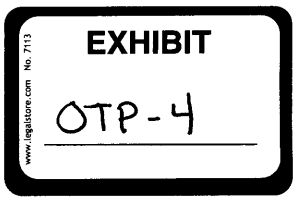

STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-

DIRECT TESTIMONY

OF

BRIAN DRAXTEN

ON BEHALF OF

OTTER TAIL POWER COMPANY

Resource Planning Testimony

April 10, 2017

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND TITLE.

A. My name is Brian Draxten. I am Manager of Resource Planning for Otter Tail Power Company (Otter Tail or the Company).

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I have a Bachelor of Arts degree in accounting with a minor in business finance from Moorhead State University. I have worked for Otter Tail for 35 years in various positions, including as a Rates Analyst, Manager of Market Research, and Manager of Budget. I have served in my current position as Manager of Resource Planning since January 2008.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide support for Otter Tail's application for an Advance Determination of Prudence (ADP) for the Company's proposed development of Astoria Station, an approximately 250 MW simple cycle gas fired generation resource addition. My testimony principally addresses the need for and selection of the Project.

II. NEED FOR AND JUSTIFICATION OF THE RESOURCE ADDITION

Q. PLEASE SUMMARIZE THE COMPANY'S PROPOSED RESOURCE ADDITION.

A. Otter Tail is proposing to develop and construct an approximately 250 MW natural gas-fired simple cycle combustion turbine near the town of Astoria, South Dakota. The Company has obtained land rights to a site for Astoria Station at the intersection of the Northern Border Pipeline and the Big Stone South-Brookings County 345 kilovolt transmission line.

Q. WHY IS THIS RESOURCE ADDITION NEEDED?

A. Otter Tail is forecasting capacity needs of approximately 273 MW by 2021 and energy needs to mitigate reliance on the MISO energy markets. Together, the twin capacity and energy needs argue for the installation of energy and capacity resources by 2021.

Q. HOW IS OTTER TAIL PROPOSING TO MEET ITS NEED FOR ENERGY AND CAPACITY RESOURCES?

A. Otter Tail is proposing a two-part plan to meet its load serving obligations by 2021. Astoria Station is the second part of the plan and will provide low-cost capacity and dispatchable energy to serve customers and support the first part of the Company's two-part plan. Part one of the plan is the construction of the approximately 150 MW Merricourt Wind Farm (Merricourt Project) which will provide low-cost energy.

Together, the Merricourt Project and Astoria Station will, on a least-cost basis, reliably address Otter Tail's capacity deficit and provide energy for Otter Tail's customers, thereby reducing Otter Tail's projected 2021 reliance on the MISO energy markets from approximately 26% to 31% to approximately 16% to 20%.

Q. WHAT IS DRIVING THIS NEED?

A. Several circumstances are driving Otter Tail's need for capacity and energy: (1) overall load growth, including the potential of pipeline load developing in the Company's service territory; (2) expiring capacity purchases; and (3) the anticipated 2021 retirement of the 1950s-era 140 MW Powder River Basin (PRB) coal-fired Hoot Lake Plant in Fergus Falls, Minnesota.

Q. HAS THE COMPANY BEEN ANALYZING THE FUTURE OF HOOT LAKE PLANT?

A. Yes. By way of background, Hoot Lake Plant consists of Unit 2, built in 1959 with a nameplate rating of 53.3 MW, and Unit 3, built in 1964 with a nameplate rating of 75 MW. Unit 1 (which was retired in 2005) and some of the plant site's original infrastructure was constructed in 1948 with a nameplate rating of 7.5 MW.

Given the age and condition of Hoot Lake Plant, the magnitude of investment necessary to keep its units and associated infrastructure operational, and the possible cost of potential future environmental compliance upgrades, the Company has been analyzing the plant's ongoing role in the Company's generation portfolio. The Company's analysis began in 2010 when material investments in Hoot Lake Plant were likely to be needed to comply with the Mercury and Air Toxic Standards (MATS) regulations in 2015. To that end, the Company conducted its Baseload Diversification Study in 2012 to determine the most prudent course of action.

Q. WHAT DID THE COMPANY CONCLUDE IN THE 2012 BASELOAD DIVERSIFICATION STUDY?

A. The 2012 Baseload Diversification Study evaluated three scenarios: (1) retiring Hoot Lake Plant in 2015, (2) adding equipment to comply with the MATS regulations and then retiring the plant in 2020, and (3) refurbishing the plant for long-term operation. The Study concluded that making minimal investments for MATS compliance and then retiring Hoot Lake Plant Units 2 and 3 in 2021 was the least-cost and most prudent course of action.

Q. HOW DOES HOOT LAKE PLANT CURRENTLY OPERATE IN THE MISO MARKET?

A. Unit 2 is available to the MISO market, but market prices have been so low that it has been operated primarily in the winter as a source of building heat. Due to recent low market prices, Unit 3 has seen only limited operation year-round, and is primarily operated only for required environmental testing and as MISO infrequently dispatches the unit.

Q. WHY IS THE COMPANY RETIRING HOOT LAKE PLANT?

A. There are several reasons. First, because of the age of Hoot Lake Plant's infrastructure and its generation technology, it is comparatively expensive to keep operational. The Company can no longer justify additional investment in the existing facilities. Second,

future upgrades and investments could be necessary to comply with existing environmental regulations and the cost of such upgrades could be significant. Third, the plant's age and condition expose Otter Tail's customers to the risk of a major operational disruption at a time when replacement capacity and energy cannot be procured economically. This, in turn, could unnecessarily expose our customers to a volatile and potentially non-economic market for capacity and energy.

For these reasons, Otter Tail has developed a plan to retire Hoot Lake Plant in 2021 and replace it with an optimal complement of generation resources.

Q. WHAT CAPACITY PURCHASES DID THE COMPANY MAKE IN CONJUNCTION WITH ITS PLAN TO RETIRE HOOT LAKE PLANT IN 2021?

A. In conjunction with the Company's plans to retire Hoot Lake Plant in 2021, Otter Tail entered into several capacity purchase agreements to meet its obligations to serve customers:

- A 50 MW capacity-only contract with Great River Energy in 2014, increasing to 100 MW from January 2015 through May 31, 2017;
- A 25 MW capacity-only contract with Great River Energy that begins on June 1, 2017 and runs through May 31, 2019, and increases to 50 MW capacity-only from June 1, 2019 through May 31, 2021; and
- A 55 MW capacity-only contract with Great River Energy that begins on June 1, 2017 and runs through May 31, 2019.

The capacity purchased through these agreements was intended to "bridge" the Company's capacity needs until Hoot Lake Plant is retired in 2021. Otter Tail arranged for this package of capacity purchases to expire coincident with the retirement of Hoot Lake Plant so that it could aggregate its capacity needs to support the addition of new generation, rather than rely on the market.

Q. HOW DO THE COMPANY'S LOAD FORECASTS INFORM DECISIONS RELATED TO ITS RESOURCE NEEDS?

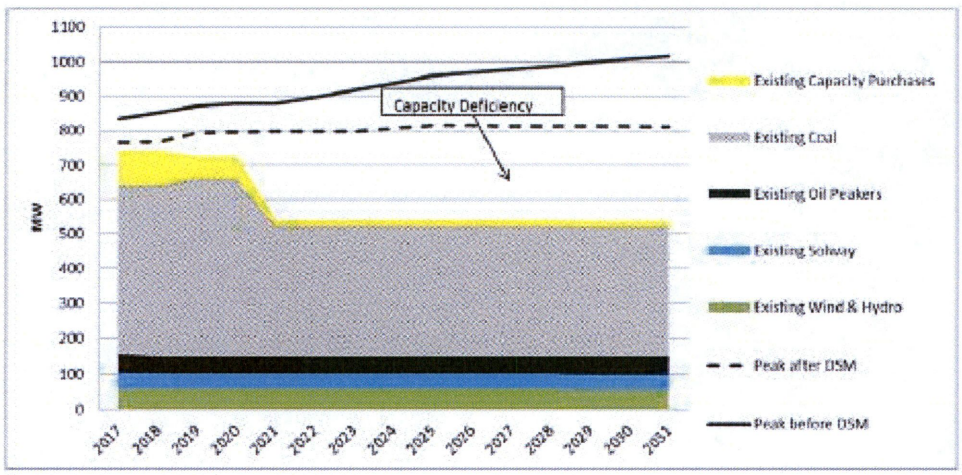
A. Otter Tail forecasts continued load growth. The Company's MISO obligation (non-coincident summer peak demand + transmission losses + reserve margins) for 2017 is 795 MW; this is expected to increase to 938 MW by 2031. A significant portion of this load growth is anticipated to result from expansion of pipelines that transport oil from the Bakken Shale in North Dakota and from Canada. While load growth forecasts are inherently uncertain, the need to reliably serve customers with capacity and energy is an additional driver of the need for the Astoria Station.

Q. ARE THERE AGREEMENTS AFFECTING THE COMPANY'S ANTICIPATED ENERGY NEEDS?

A. Yes. In addition to Otter Tail's capacity needs, energy needs will also increase due to the 2021 expiration of a 50 MW on-peak energy-only contract.

Q. WHAT DOES THIS CONFLUENCE OF NEED DRIVERS MEAN FOR OTTER TAIL?

A. Together, these events require Otter Tail to take action. The Company's current analysis indicates that without replacement capacity and energy, Otter Tail will have a capacity deficit of approximately 273 MW in 2021, and will need to source between approximately 26% to 31% of its energy from the MISO market. This capacity deficit is illustrated below:



In response to these need drivers, Otter Tail must install new generation resources.

III. ANALYSIS OF OPTIONS TO MEET NEEDS

Q. WHAT OPTIONS DID THE COMPANY CONSIDER TO ADDRESS THESE NEEDS?

A. In its 2013 Resource Plan, Otter Tail analyzed a number of potential resources options, including (1) a 311 MW combined cycle generator; (2) three different sized simple cycle generators; (3) conversion of Hoot Lake Plant to natural gas-fired generation; and (4) wind and solar resources. As described more fully in the testimony of Company witness Randy Synstelien, the Company used the Strategist resource planning tool to aid in the examination of the various options.

Q. WHAT DID THE 2013 RESOURCE PLAN MODELLING CONCLUDE WOULD BE THE MOST ECONOMIC CAPACITY RESOURCE?

A. The Strategist model concluded that meeting Otter Tail's 2021 capacity need with a simple cycle generator was the most economic capacity resource.

Q. DID THE COMPANY CONSIDER COMBINED CYCLE GENERATION?

A. Yes. Typically, when a utility has a simultaneous capacity and energy need for a portion of its load-serving obligation, it seeks resource additions that provide both capacity and energy at reasonable pricing, generally combined cycle generation. Combined cycle generation has the ability to follow load by ramping up and down throughout the day while providing energy at lower marginal cost than a simple cycle generator and with lower capital cost than a baseload generator. Therefore, the Company considered combined cycle generation.

The 311 MW combined cycle plant utilized in the Strategist model would have been the smallest unit for Otter Tail to develop on its own consistent with its identified capacity need. As I mentioned, Strategist indicated that this generation addition would not be economic but, rather, that it would be more cost effective to install a capacity resource through a simple cycle generator and source energy elsewhere, either in the MISO markets or through the installation of wind facilities, if pricing was sufficiently attractive.

I note that a hybrid approach of wind-plus-gas can more optimally provide many of the same characteristics as combined cycle generation, which I discuss further later in my testimony.

Q. DID THE COMPANY CONSIDER PARTNERING WITH ANOTHER COMPANY TO JOINTLY DEVELOP A LARGER COMBINED CYCLE FACILITY TO CAPTURE ECONOMIES OF SCALE?

A. Yes. Company representatives reached out to a number of potential co-owners, but these discussions were not fruitful.

Q. DID OTTER TAIL CONSIDER REFURBISHING OR OTHERWISE CONTINUING TO OPERATE HOOT LAKE PLANT TO MEET ITS NEEDS?

A. Yes. Continued operation of Hoot Lake Plant was considered. However, based on the results of the Baseload Diversification Study, Otter Tail did not pursue continued operation.

Q. DID OTTER TAIL CONSIDER REPOWERING HOOT LAKE PLANT TO NATURAL GAS AS AN OPTION TO MEET ITS NEEDS?

A. Yes. Because of its location and infrastructure, the Company seriously considered repowering of Hoot Lake Plant to natural gas-fired generation. The Company analyzed repowering in all of the Strategist modelling scenarios, but Strategist did not pick repowering as a least-cost resource in the majority of scenarios analyzed.

Q. WHAT DID THE COMPANY DO IN RESPONSE TO THE 2013 RESOURCE PLAN'S CONCLUSION TO REPLACE HOOT LAKE PLANT'S CAPACITY WITH A SIMPLE CYCLE GENERATOR?

A. In 2015, the Company completed an extensive evaluation of the preferred sites for gas generation in light of the results of our 2013 resource planning process selecting simple cycle generation as the most economical way for the Company to meet its capacity needs. There were six sites originally under consideration across our three-state service area. We also evaluated the possibility of partnering with another utility to build a larger

simple cycle generating station. The results of the evaluation indicated that developing simple cycle generation at Astoria, South Dakota provided the most benefits at the least cost to our customers. Mr. Swanson discusses this further.

Q. WHY DID THE ASTORIA SITE PROVIDE THE MOST BENEFITS AT THE LEAST COST?

A. A site at the intersection of a natural gas pipeline and electric transmission line is optimal. Fortuitously, the Company was able to obtain land rights to a suitable site near Astoria. Interconnection of the natural gas-fired generation to the new Big Stone South-Brookings County 345 kV transmission line would provide the most robust transmission service of all the sites. Because both electric and natural gas transmission are located on the property, interconnection costs for each are projected to be significantly lower than at other sites, driving down overall Project costs. There is also superior electric and natural gas transmission capacity for potential future expansion at the Astoria site.

Q. DID THE COMPANY CONTINUE TO ANALYZE REPLACEMENT SCENARIOS FOR HOOT LAKE PLANT IN SUBSEQUENT RESOURCE PLANNING CYCLES?

A. Yes. The Company's 2016 Resource Plan again analyzed a number of scenarios, including combined cycle generation, two sizes of natural gas simple cycle generation, wind, and solar. The 2016 resource planning analysis also included generic simple cycle generation with the characteristics of the Company's proposed Astoria Station and a generic low-priced wind project. The 2016 resource planning analysis confirmed the outcome of the 2013 resource planning cycle, especially in light of forecast load growth from the 2013 to the 2016 planning cycles.

Q. WHAT DID THE 2016 RESOURCE PLAN CONCLUDE?

A. The 2016 Resource Plan concluded that the least-cost option was a wind-plus-gas configuration: the 2018 addition of 100 MW of wind and another 100 MW of wind in 2020, plus the 2021 addition of an approximately 248 MW simple cycle natural gas turbine.

Q. HOW DID THIS CONCLUSION RELATE TO THE PROJECT CONTEMPLATED FOR THE ASTORIA LOCATION?

A. For purposes of the 2016 Resource Plan, the gas plant that was analyzed in the modelling was assumed to be located at Astoria and sized consistent with our current plans for Astoria Station. In other words, in 2016 the Strategist modeling system, given quite detailed information about Astoria's characteristics and costs, selected Astoria as part of the least-cost plan.

Q. HOW DOES THE WIND-PLUS-GAS APPROACH COMPARE TO OTHER APPROACHES FOR MEETING A SIMULTANEOUS ENERGY AND CAPACITY NEED?

A. The combination of wind and a natural gas-fired simple cycle generator provides many beneficial operating characteristics. The simple cycle component provides relatively low-cost capacity and dispatchable energy. The wind component provides low-cost energy. Wind and natural gas simple-cycle generation have natural synergies. Wind is an intermittent, variable energy resource. Natural gas simple-cycle generation demonstrates great flexibility in addressing wind generation's intermittency and variability, inasmuch as it is able to start and achieve full-output in a matter of minutes and is capable of cycling multiple times per day. Consequently, a simple cycle generator can provide load-following capability to support a reliable grid. Backing wind with gas captures the low-cost energy made possible by the current market for wind generation while helping to ensure sufficient reliability through grid support from dispatchable simple cycle generation, which includes low-cost capacity. Simple cycle generation paired with wind is particularly attractive to Otter Tail because the Company's service territory has some of the best wind resources in the country, with low potential for transmission congestion due to proximity of the wind resource to Otter Tail load. A wind-plus-gas configuration can provide many of the same economic and operational benefits and operating characteristics of a combined cycle plant.

Q. WHAT ARE SOME OTHER ADVANTAGES OF A WIND-PLUS-GAS CONFIGURATION?

A. A wind-plus-gas configuration also has hedge and expansion value. If Otter Tail installed a combined cycle plant, the Company and its customers would have significant exposure to fluctuations in natural gas pricing. Because it will use less gas, a simple cycle plant mitigates that potential exposure. Moreover, a natural gas simple cycle plant site can include sufficient space and design parameters to accommodate the potential future addition of combined cycle generation, if market conditions later warrant it. The wind component can provide low-cost energy from a zero-cost fuel source providing both a market and fuel hedge. And the Company's service area has excellent wind resources, providing an economic generation resource with low potential for transmission congestion due to the wind resource's proximity to the Company's load.

Q. IN LIGHT OF ITS NEED DRIVERS, WHAT HAS THE COMPANY CONCLUDED?

A. The Company has concluded that its two-part plan – the Merricourt wind project and Astoria Station – provides least-cost capacity and energy for the Otter Tail system in the most prudent fashion.

IV. ASTORIA STATION IS PRUDENT

Q. HAS THE COMPANY CONTINUED ANALYZING THE PRUDENCE OF THE ASTORIA STATION?

A. Yes. After Otter Tail selected Astoria Station as the least-cost resource available, the Company continued its analysis to confirm the prudence of moving forward with the Project. This modelling process and its results are described in more detail in the testimony of Company witness Randy Synstelien.

Q. WHAT CONSIDERATIONS MAKE A SIMPLE CYCLE COMBUSTION TURBINE OPTION, SUCH AS IS CONTEMPLATED FOR ASTORIA STATION, ATTRACTIVE AT THIS TIME?

A. During our continued review, the Company assessed options and analyzed the market dynamics, including sustained low natural gas prices and increasingly inexpensive wind generation. Regardless of political developments and environmental compliance matters, we believe the market dynamics remain largely static. Low-cost wind additions are likely to contribute to increasingly volatile market prices caused by fluctuations in the availability of wind. Astoria Station will serve to hedge customers' energy needs, so that they are not paying high market prices during periods when wind is not available. In addition, it will afford us dispatch flexibility to serve as a price hedge for our customers at times of high energy prices. A simple cycle combustion turbine is also less complicated for permitting and construction purposes. Finally, ownership of the resource will allow flexibility for the Company to convert to combined-cycle in the future if it is deemed prudent to do so.

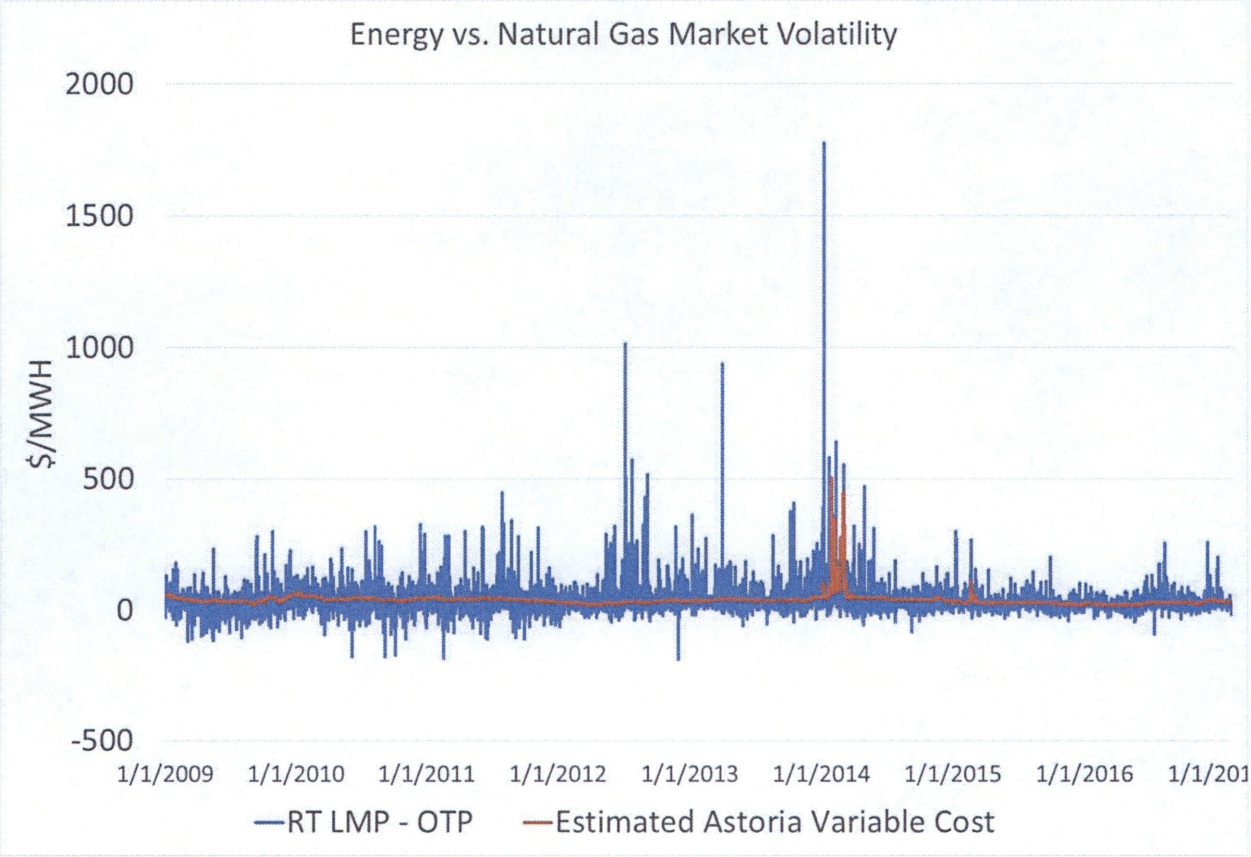
Q. DID THE COMPANY ANALYZE FORECASTS OF THE FUTURE PRICE OF NATURAL GAS?

A. Yes. The Company utilized a natural gas price forecast purchased from Wood Mackenzie. Otter Tail tested the base forecast using ±25%, ±50%, and +100% natural gas pricing scenarios as part of its resource planning process. In all cases, the addition of the 248 MW simple-cycle combustion turbine was a part of the least cost resource mix. This robust testing gives us confidence that simple-cycle generation is the correct addition, even with widely varying natural gas prices.

Q. DOES THE VOLATILITY OF NATURAL GAS PRICES EXPOSE OTTER TAIL'S CUSTOMERS TO UNNECESSARY RISK?

A. While natural gas has been volatile in the past, it is significantly less volatile than the real-time MISO energy market. The following chart represents data from January 1, 2009 to January 1, 2017. The blue line represents the real-time Locational Marginal Price (LMP) at the Otter Tail load zone. The red line estimates what the cost of energy

from the Astoria unit would have been for that historical period of time. It is calculated by multiplying the daily clearing price at the Ventura natural gas trading point—just southeast of Astoria Station on the Northern Border Pipeline—by the heat rate of the unit (9.5 times the natural gas price) and then adding $3.50/MWh as variable O&M. As the chart demonstrates, there have been two times in this period when natural gas exhibited volatility similar to the real-time energy market—namely during the winter of 2013-14 and for a brief period in early-2015. However, these periods are exceptions. The vast majority of the time, Astoria Station would have provided a backstop to the real-time energy markets—limiting the energy market exposure that customers would have experienced.



Q. PLEASE DESCRIBE ANY OTHER ADVANTAGES OF ASTORIA STATION.

A. We believe the Project affords us flexibility in times of political, regulatory, and market uncertainty. A combustion turbine is likely to have less exposure under any future environmental regulatory regime, given that a simple cycle combustion turbine results in

significantly lower carbon dioxide emissions than other options. A simple cycle combustion turbine can also be converted to combined cycle generation in the future if circumstances warrant it. A simple cycle combustion turbine also affords greater dispatch flexibility than does a combined cycle unit. This will allow us to better address the variability of wind generation and energy prices. Finally, a simple cycle combustion turbine is less complicated for permitting and construction purposes.

Q. DOES THE ASTORIA STATION USE GAS FROM NORTH DAKOTA?

A. Yes. The natural gas that will fuel the Project comes from a pipeline partially filled with natural gas recovered in the Williston Basin in North Dakota or produced synthetically at Dakota Gasification Company's plant near Beulah. Inasmuch as our Company incorporated in 1907 and served its first customer in Wahpeton in 1909, it would be a source of pride to use natural gas extracted or produced in energy rich North Dakota.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED TESTIMONY?

A. Yes, it does.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-___

VERIFICATION

STATE OF MINNESOTA)
) ss.
COUNTY OF OTTER TAIL)

Brian Draxten, being first duly sworn on oath, deposes and says that he is the Manager of Resource Planning for Applicant Otter Tail Power Company; that the testimony and schedules submitted in the above-captioned matter under his name were prepared under his direction; and that he knows and verifies the contents thereof, and that the same is true and correct to the best of his knowledge and belief.

Dated this 10th day of April, 2017

Brian Draxten

Subscribed and sworn to before
me on this 10 day of April, 2017.

Notary Public
My Commission expires 1-31-22

KIMBERLY ANN WARD
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2022