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May 23, 2018

VIA ELECTRONIC AND U.S. MAIL

Attention: Filing Center Public Utility Commission of Oregon P.O. Box 1088 Salem, Oregon 97308-1088

Re: Docket UG 344: NW Natural's Reply Testimony

Attention Filing Center:

Enclosed for filing in the above-referenced docket is an electronic copy of NW Natural's Reply Testimony and Exhibits of the following:

David H. Anderson (NW Natural/1400-1401) Kevin McVay (NW Natural/1500-1503) Bente Villadsen (NW Natural/1600-1606) Jorge Moncayo (NW Natural/1600-1606) Jorge Moncayo (NW Natural/1700-1730) Lea Anne Doolittle (NW Natural/1800-1804) Joe Karney (NW Natural/1900-1916) Kyle Walker (NW Natural/2000-2002) Kimberly Heiting (NW Natural/2000-2002) Andrew Speer (NW Natural/2200-2202) John Frankel (NW Natural/2300-2301)

Also enclosed is a Certificate of Service, a CD containing copies of the CONFIDENTIAL testimony, exhibits, and workpapers, and a CD containing the nonconfidential workpapers and voluminous exhibits. The confidential CD will be sent to the parties who have signed the Protective Order (Order No. 18-002).

Please contact this office with any questions.

Sincerely,

Alisha Till Legal Assistant

Enclosures

CERTIFICATE OF SERVICE

I hereby certify that on May 23, 2018 I have served by U.S. mail the foregoing NWN

Confidential Reply Testimony and by electronic mail the redacted NWN Reply Testimony upon all parties of record in docket UG 344.

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UG 344

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DATED: May 23, 2018

when till

Alisha Till Legal Assistant

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of David H. Anderson

POLICY EXHIBIT 1400

May 23, 2018

EXHIBIT 1400 - REPLY TESTIMONY - POLICY

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	Provision of Utility Service3
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1		I. INTRODUCTION AND SUMMARY
2	Q.	Are you the same David H. Anderson that provided Direct Testimony in this
3		proceeding?
4	A.	Yes, I presented NW Natural/100, Anderson.
5	Q.	Please summarize your Reply testimony.
6	A.	In my testimony I:
7		 Provide an overview of the parties' proposals in this rate case;
8		Describe some of the impacts that the proposals would have on NW
9		Natural's financial status and ability to provide service to its customers;
10		and
11		Describe some of the other issues that the parties' proposals require
12		the Commission to address, and provide NW Natural's views on those
13		issues.
14		II. OVERVIEW OF THE PARTIES' PROPOSALS IN THIS RATE CASE
15	Q.	Can you please summarize some of the main issues raised by the parties to
16		this case?
17	A.	Yes. In addition to other items raised by each party, the parties filed testimony
18		regarding utility return on equity (ROE), NW Natural's rate mechanisms, and
19		various other areas of cost. Staff offered its view of how capital should be
20		incorporated into rates that would prevent NW Natural from being able to recover
21		its investment in over \$200 million of capital projects that are required to serve

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1		utility customers and operate the utility in the Test Year, the period for which
2		rates will be set. This capital is a combination of investments made prior to the
3		Test Year, as well as the ongoing capital spending that is required to maintain
4		and operate NW Natural's system during the Test Year.
5		The Association of Western Energy Consumers (AWEC) put forth a similar
6		view about the recovery of capital investments, and also raised concerns about
7		rate spread. Oregon Citizens' Utility Board (CUB) raised concerns about NW
8		Natural's pension balancing account, and also sought various adjustments to
9		O&M expense and NW Natural's recovery of pay-at-risk for its employees.
10	Q.	What was the overall requested rate change supported by each Party?
11	A.	Staff proposed that NW Natural's rates be <i>decreased</i> by over \$26 million. AWEC
12		also proposed that NW Natural's rates be decreased. Although CUB put forward
13		various adjustments, it did not propose a specific rate change.
14	Q.	Did Staff or AWEC address the impact that their proposals would have on
15		NW Natural's ability to operate the utility for the benefit of customers?
16	A.	No. Neither party addressed what the impacts of their proposals would be on
17		NW Natural and its customers.
18	Q.	Does NW Natural believe that there are impacts of the Parties' proposals
19		that the Commission should be aware of, which were not raised by the
20		Parties?
21	Α.	Yes. The proposals to reduce NW Natural's rates, despite the fact that the
22		Company has not increased its rates for six years, and despite the fact that its

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1		net utility plant and operations and maintenance expense have grown in order to
2		provide safe and reliable utility service, are not warranted. As explained further
3		below, these proposals would have serious detrimental effects on the utility's
4		ability to operate the business for the benefit of its customers.
5 6 7		III. IMPACT OF PARTIES' PROPOSALS ON NW NATURAL AND PROVISION OF UTILITY SERVICE
7 8	Q.	What aspects of utility service would be negatively affected by Staff's and
9		AWEC's proposals?
10	A.	One significant aspect would be NW Natural's ability to access the low-cost funds
11		that it relies on in order to finance its utility operations. While NW Natural utility
12		customers pay for all utility operations over time, the Company utilizes both debt
13		(50 percent of our capitalization) and investments in the business by
14		shareholders (50 percent of our capitalization) to finance operations during the
15		lag between the time investments are made and the recovery from customers.
16		On average, we recover our investments in critical infrastructure from customers
17		over 37 years. This requires that the Company finance the cost of such
18		infrastructure during that time. However, these financing costs are also
19		ultimately passed on to customers; so, ensuring we obtain the least cost
20		financing alternative is critical to maintaining a low cost of service to customers.
21		The Company carries more than \$700 million of long-term debt, and a
22		similar amount of shareholder investment. NW Natural relies on these funds to
23		pay for pipelines and other critical infrastructure to serve customers, which, as

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1 described above, are only recovered through rates over time. As shown in our 2 initial filing, the total amount of financing that NW Natural secures in order to run its Oregon utility business (rate base) will be around \$1.2 billion during the Test 3 4 Year. This reflects an increase of over \$300 million since our last rate case. Q. Does NW Natural have guaranteed access to low cost capital to run its 5 business? 6 7 Α. No. Importantly, NW Natural does not have guaranteed access to these sources 8 of capital. The prices and terms under which NW Natural can access low cost 9 capital are affected directly by the confidence that people and entities that buy and hold our debt have in NW Natural's ability to repay the money that it borrows. 10 as well as confidence in the Company's ability to demonstrate that it can earn a 11 12 reasonable rate of return for the people and entities that invest in our business, 13 its shareholders. Both of these sources of capital are seriously jeopardized by 14 the proposals made by Staff and AWEC. Q. In what way is NW Natural's access to debt affected by Staff's and AWEC's 15 proposals? 16 17 Α. NW Natural is monitored by two credit rating agencies—Moody's and Standard 18 and Poor's. These two agencies provide a rating indicating their view of NW Natural's creditworthiness. The ratings process considers both quantitative and 19 20 qualitative considerations. They closely analyze NW Natural's cash flows, ability to repay debt, and various other factors, including regulatory treatment. All of 21 22 these factors are directly affected by the decisions made in the regulatory

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environment, and specifically rate cases. Staff's and AWEC's proposals, if
 adopted, would almost certainly cause these agencies to downgrade NW
 Natural's debt. The simple fact that these proposals were made could have a
 negative effect on the Company's credit rating.

5 Q. What evidence is there that the proposals from Staff and AWEC, in and of 6 themselves, could negatively affect NW Natural's credit rating?

7 A. In both of the rating agencies' latest reports, they highlight their perception of a

8 supportive regulatory jurisdiction as positive qualitative contributors to the

- 9 Company's credit rating. Both agencies highlight the Company's cost recovery
- 10 mechanisms and the forward test year for capital as key contributors to their
- 11 determination of a supportive regulatory jurisdiction. They note that the
- 12 Company's cash flow metrics are weak for its rating, and that any incremental
- 13 decline in the Company's ability to recover its costs will likely result in a
- 14 downgrade. Moody's states, for example, that "[s]ince NW Natural's rating
- 15 balances strong regulatory support that counterbalances a weak financial profile,
- 16 any decline in the degree of ongoing OPUC support would likely trigger negative
- 17 ratings pressure."

18Through recent conversations with both agencies, they have also19communicated their concern regarding Staff's and AWEC's testimony, noting the20significant negative impact it would have on our cash flow metrics. Moody's,21which has already put NW Natural on "negative watch" for a credit downgrade in22light of cash flow concerns from tax reform, has explained that if the ratio of NW

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Natural's Funds from Operations (FFO) to debt were to fall below 16% (which is
 at risk in this proceeding given the significant adjustments proposed), negative
 ratings actions could result.

4 Q. How would a lower debt rating affect NW Natural's customers?

5 Α. Credit ratings are used to provide guidance about the risks of loaning money to 6 NW Natural. As credit ratings decline, debt investors look for higher returns on their loans, which means that borrowers (*e.g.* the Company) pay higher interest 7 8 on loans. The Company has historically maintained strong investment grade 9 ratings that allow for quick and low-cost access to public and private debt 10 markets. As the Company's credit rating declines, this represents an increase in the risk associated with the Company and results in an increased cost to acquire 11 12 the debt. It also makes it much more challenging to access the public and 13 private markets during a financial crisis, like the one experienced within the last decade. Because customers ultimately bear the financing costs to run the utility, 14 and benefit from the Company's ability to access capital to operate our system. 15 they would be directly affected by these changes through the rates they pay. 16 17 Q. You have discussed debt up above, but how is it that NW Natural's ability 18 to access shareholder capital (equity) could be negatively affected by

19

Staff's and AWEC's proposals?

A. Equity investors interested in investing in regulated utilities are looking for a
 stable and reliable investment return profile. This includes a dividend and a
 reasonable amount of growth. Investors in regulated entities focus on

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1		companies' regulatory environments to determine whether a utility is likely to be
2		authorized, and able to earn a reasonable return on equity that is attractive
3		relative to other investment opportunities. The proposals that NW Natural
4		decrease its rates, despite the fact that its O&M has increased, its rate base (or
5		net utility plant) has increased, and the fact that it has avoided a rate case for six
6		years, is likely to cause some level of alarm among investors, and obviously if
7		adopted, would cause investors to significantly devalue NW Natural's stock as an
8		investment opportunity.
9	Q.	What evidence is there that Staff's and AWEC's proposals could negatively
10		affect NW Natural's ability to attract shareholder investment in its
11		business?
12	Α.	NW Natural communicates with its investors, and hears concerns regarding the
13		rate case and parties' testimony that has been filed in this case. Equity analysts
14		analyze our regulatory proceedings closely, and produce reports about their
15		concerns. For example, Wells Fargo Securities recently noted that Staff's
16		recommendation is negative (but recognizing that it is early in the rate case, and
17		that settlements are common). Wells Fargo's perception is that Staff is "pushing
18		for a historic test year," which accounts for much of its adjustments. ¹
19	Q.	What would be the impact on customers if NW Natural's ability to attract
20		shareholder capital deteriorates?

¹ See NW Natural/1401, Anderson.

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A. One unfavorable impact that could result is that NW Natural becomes viewed as
a more risky investment, and thus shareholders would demand a higher rate of
return in order to invest. This would mean that NW Natural would require a
higher allowed ROE in order to attract needed investment in its business, which
would directly affect customer rates through the cost of capital that is applied to
rate base when setting rates.

7 Another possible impact would be that NW Natural could have a reduced 8 ability to raise capital needed to fund its operations on a timely and low-cost 9 basis. If it were, in fact, unable to issue equity, or unable to do so on favorable 10 terms, that could have a material effect on the utility's financial stability by causing the utility to operate more heavily on debt, or to potentially be unable to 11 12 find the capital to conduct its business. The link between regulatory predictability 13 and reliability—an expected reasonable return on our investment in the safe and reliable operation of the business—is an important consideration as the 14 Commission seeks to balance the interests of all of the stakeholders in the 15 regulatory process, and ensure that NW Natural remains financially stable over 16 17 the long-term.

18

IV. OTHER ISSUES RAISED BY PARTIES' PROPOSALS

19 Q. Aside from the issues described above, are there other issues of

- 20 importance raised by the parties' proposals?
- A. Yes. The parties' positions highlight uncertainty about important aspects of
 regulatory policy in Oregon.

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1 Q. In what ways is uncertainty about regulatory policy in Oregon highlighted 2 by this case?

Oregon has been understood to be a state where rate-setting utilizes a "forward 3 Α. 4 test year." This means that rates are set to recover the utility's cost of service in 5 the year that follows the effective date of the rates. The Staff and AWEC 6 positions proffered in this case, however, indicate the Staff's view that capital 7 required to operate the utility in the Test Year cannot be included in rate base 8 that is used to determine the rates. This is despite the fact that the capital 9 included in rates would be used to provide the service in the time period for 10 which the rates are being set.

11 Q.

Why is this an important issue?

12 Α. First, it is important to NW Natural because a forward test year represents a 13 particular opportunity to recover our expenses and capital investments, and a particular opportunity to earn our authorized rate of return. Moreover, NW 14 15 Natural believes that a forward test year is good regulatory policy, because it matches customers' rates in the test year, with the cost that the utility 16 17 experiences in that year.

18 Whether Oregon continues to be a forward test year is also important to 19 know because it can affect the Company's cost of capital, for the reasons 20 described above. Both investors and those that loan money to NW Natural through debt are interested in understanding the utility's ability to recover its 21 22 costs and earn a reasonable rate of return. With uncertainty about how capital is

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- treated going forward, this only complicates the picture for investors and debtholders of NW Natural and makes the company a higher risk to these investors
 and debt holders.
- 4 Q. What is your recommendation on this topic?
- 5 A. We recommend that the Commission confirm that it will adhere to a forward-
- 6 looking Test Year that seeks to establish rates that reflect the prudent operations
- 7 and maintenance expense, and capital investments required to operate the utility
- 8 during the Test Year. I expect that this topic will be further explored through legal
- 9 briefing in this case and oral presentations to the Commission in this case, but I
- 10 highlight it here as a policy issue that affects NW Natural.
- 11 Q. Does this conclude your testimony?
- 12 A. Yes it does.

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibit of David Anderson

POLICY EXHIBIT 1401

May 23, 2018

EXHIBIT 1401 – POLICY

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Exhibit 1401 – Wells Fargo Securities Report 1-5

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Northwest Natural Gas Co.

NWN: Rate Case & North Mist Construction Heat Up This Summer

- Summary. NWN reported solid Q1 results and affirmed 2018 EPS guidance of \$2.10-2.30. It's shaping up to be an important year with the pending rate case and North Mist Expansion project front and center we expect key updates on both throughout the summer. No change to our '18-20E EPS of \$2.22, \$2.60 & \$2.66, respectively. The material step-up in '19E is driven by an assumed base rate increase in November '18 and a December '18 in-service date for North Mist. We reiterate our Market Perform rating and raise our forward price target to \$58/share from \$52/share on higher peer group multiples since our last update.
- Rate Case. On 4/20, the OPUC Staff recommended a \$26mm base rate decrease, which compares with NWN's \$38mm requested rate increase (both net of tax reform). The large spread between the Staff and company positions relate to the following: (1) a \$228mm reduction to NWN's proposed rate base (\$20mm hit to revenue) as the Staff is pushing for a historic test year (vs. NWN's forecast through October '19) and scrutinizing certain investments, (2) lower operating expenses (\$26mm) including salary/incentive comp. adjustments, and (3) a 9.0% recommended ROE versus NWN's request of 10.0%. Our initial view of the Staff recommendation is modestly negative, but we note it is early in the process and settlements are common in Oregon. NWN reply testimony is due May 23rd with another round of settlement conferences scheduled for the end of May and a final decision is expected in October 2018.
- North Mist Expansion. Any flexibility built into the North Mist construction schedule appears to be diminishing as the company now expects free flow injections into the reservoir later this month, which compares to the prior target of March. Further, the company specified that the expected in-service date is December versus Q4 previously. Beyond the free flow injections, the next major milestone appears to be the completion of compressor stations followed by high pressure injections targeted for this summer.
- Other Tid-Bits. (1) <u>Healthy Economy</u> NWN's service territory continues to hum along with OR building permits +9% from Q4'17 and single family housing permits expected to pick-up. NWN saw overall customer growth of 1.6% in Q1 driven by both gas conversions and new builds. (2) <u>Water Utility Strategy</u> NWN expects the two water utility acquisitions to close in the 2H'18. Although an immaterial segment at this point, mgmt. expressed excitement about the LT strategy. (3) <u>Gill Ranch</u> Mgmt. did not provide additional details on the LT outlook, but reiterated that the asset is no longer strategic. While the earnings impact appears to be immaterial, we would view a complete exit of the CA gas storage facility favorably as it would help streamline an otherwise high quality business mix.

Market Perform/V/\$58

Natural Gas LDCs Market Weight

Price Target Change

\$	2017A	2018E		2019E	
EPS		Curr.	Prior	Curr.	Prior
Q1 (Mar.)	1.40	1.44 A	1.37	NE	
Q2 (June)	0.10	0.08	0.10	NE	
Q3 (Sep.)	(0.30)	(0.30)	NC	NE	
Q4 (Dec.)	1.04	1.00	1.05	NE	
FY	2.24	2.22	NC	2.60	NC
CY	2.24	2.22		2.60	
FY P/EPS	27.4x	27.7x		23.6x	
Rev.(MM)	762	760		801	

Source: Company Data, Wells Fargo Securities, LLC estimates, and Reuters NA = Not Available, NC = No Change, NE = No Estimate, NM = Not Meaningful V = Volatile, № = Company is on the Priority Stock List Adjusted EPS excludes 2016 regulatory environmental disallowance

Ticker NWN Price Target/Prior: \$58/\$52 Price (05/08/2018) \$61.40 52-Week Range: \$51-70 Shares Outstanding: (MM) 28.8 Market Cap.: (MM) \$1 768 3 S&P 500: 2,665.75 Avg. Daily Vol.: 116,231 Dividend/Yield: \$1.89/3.1% LT Debt: (MM) \$772.2 LT Debt/Total Cap.: 43.2% ROF: 8.0% 3-5 Yr. Est. Growth Rate: 5.0% CY 2018 Est. P/EPS-to-Growth: 5.5x 05/08/2018 Last Reporting Date: Before Open

NC = No Change

Source: Company Data, Wells Fargo Securities, LLC estimates, and Reuters

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Price Target

Price Target: \$58 from \$52

Our price target is based on our P/E multiple (~21.5X on our '20E EPS of \$2.66) analysis in concert with our EV/EBITDA (11.5-12X on our '20E EBITDA of \$243mm less net debt), residual income and dividend discount models. Risks include onerous regulatory outcomes, Mist Expansion execution risks, exposure to unregulated storage operations, and inflationary cost pressures.

Investment Thesis

We are attracted to NWN's conservative gas infrastructure strategy, growing service territory, modern distribution system, and solid financial position. Our Market Perform rating reflects valuation considerations.

Company Description

Northwest Natural Gas Company, headquartered in Portland, Oregon, provides gas distribution services in western Oregon and southwestern Washington and owns and operates underground gas storage facilities in Oregon and California. The utility operations, which represent over 90% of assets and net income, serve more than 718,000 residential, commercial and industrial customers, 89% of which are located in Oregon. Storage operations, which include the Mist and Gill Ranch facilities, include approximately 31 Bcf (billion cubic feet) of capacity serving customers including utilities, gas marketers, power plants and large industrial users. Other non-utility operations, which are immaterial include Trail West Holding, LLC, a minority interest in the Kelso-Beaver Pipeline, small water utility systems and unallocated parent activities.

Required Disclosures



Additional Information Available Upon Request

I certify that:

1) All views expressed in this research report accurately reflect my personal views about any and all of the subject securities or issuers discussed; and

2) No part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed by me in this research report.

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- Wells Fargo Securities, LLC maintains a market in the common stock of Northwest Natural Gas Co...
- Wells Fargo Securities, LLC received compensation for products or services other than investment banking services from Northwest Natural Gas Co. in the past 12 months.
- Northwest Natural Gas Co. currently is, or during the 12-month period preceding the date of distribution of the research report was, a client of Wells Fargo Securities, LLC. Wells Fargo Securities, LLC provided non-investment banking securities-related services to Northwest Natural Gas Co..
- Wells Fargo Securities, LLC or its affiliates has a significant financial interest in Northwest Natural Gas Co..

NWN: Risks include onerous regulatory outcomes, Mist Expansion execution risks, exposure to unregulated storage operations, and inflationary cost pressures.

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STOCK RATING

1 = Outperform: The stock appears attractively valued, and we believe the stock's total return will exceed that of the market over the next 12 months. BUY

2=Market Perform: The stock appears appropriately valued, and we believe the stock's total return will be in line with the market over the next 12 months. HOLD

3= Underperform: The stock appears overvalued, and we believe the stock's total return will be below the market over the next 12 months. SELL

SECTOR RATING

O=Overweight: Industry expected to outperform the relevant broad market benchmark over the next 12 months. M=Market Weight: Industry expected to perform in-line with the relevant broad market benchmark over the next 12 months. U=Underweight: Industry expected to underperform the relevant broad market benchmark over the next 12 months.

VOLATILITY RATING

V = A stock is defined as volatile if the stock price has fluctuated by +/-20% or greater in at least 8 of the past 24 months or if the analyst expects significant volatility. All IPO stocks are automatically rated volatile within the first 24 months of trading.

As of: May 8, 2018

47% of companies covered by Wells Fargo Securities, LLC Equity Research are rated Outperform.	Wells Fargo Securities, LLC has provided investment banking services for 42\% of its Equity Research Outperform-rated companies.
51% of companies covered by Wells Fargo Securities, LLC Equity Research are rated Market Perform.	Wells Fargo Securities, LLC has provided investment banking services for 29% of its Equity Research Market Perform-rated companies.
2% of companies covered by Wells Fargo Securities, LLC Equity Research are rated Underperform.	Wells Fargo Securities, LLC has provided investment banking services for 27% of its Equity Research Underperform-rated companies.

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Kevin McVay

REVENUE REQUIREMENTS Exhibit 1500

May 23, 2018

EXHIBIT 1500 - REPLY TESTIMONY – REVENUE REQUIREMENTS

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i – REPLY TESTIMONY OF KEVIN MCVAY – Table of Contents

1			I. INTRODUCTION AND SUMMARY
2	Q.	Are y	you the same Kevin McVay who filed direct testimony in this
3		proce	eeding on behalf of Northwest Natural Gas Company ("NW Natural" or
4		"the	Company")?
5	Α.	Yes,	I presented NW Natural/200-211, McVay, and NW Natural/1200, McVay.
6	Q.	What	is the purpose of your reply testimony?
7	Α.	l resp	oond to the adjustments proposed by:
8		(1)	Marianne Gardner on behalf of OPUC Staff regarding Franchise Fee Rate,
9			Franchise Fees, ODOE, Property Taxes, and Customer Deposits;
10		(2)	Rose Anderson on behalf of OPUC Staff regarding Miscellaneous
11			Revenues;
12		(3)	Lance Kaufman on behalf of OPUC Staff regarding Revenues;
13		(4)	John Fox on behalf of OPUC Staff regarding Land and Building
14			Allocations:
15		(5)	Matt Muldoon on behalf of OPUC Staff regarding Stock Issuance Costs:
16			and
17		(6)	Bradley Mullins on behalf of the Alliance of Western Energy Consumers
18			(AWEC) regarding ADIT – Accrued Vacation, R&D tax Credits,
19			Restatements of Tax Expense, Excess Deferred Taxes, Interim Period
20			Deferral of effects of the Tax Reform Act (TCJA), TCJA Conversion
21			Factor, Stock Issuance Costs, and Interest Synchronization.
22			

1 2 3		II. <u>FRANCHISE FEE RATE, FRANCHISE FEES, ODOE, AND PROPERTY</u> <u>TAXES</u>
4	Q.	Please describe your testimony regarding Franchise Fees in your revenue
5		requirement calculation.
6	A.	NW Natural requested to recover \$15,219,120 in franchise fees in the Test Year.
7		In my direct testimony, I explain that:
8 9 10 11 12		"Franchise fees were derived by applying the effective rate of 2.37 percent to gross sales and transportation revenue and miscellaneous revenues to provide a forecast for total franchise fees for both the Base Year and Test Year."
13		The basis of the 2.37 percent rate was provided in workpapers and later in
14		response to Staff DR 388. The derived rate for a particular historic year is based
15		on the franchise taxes recognized that year divided by the revenues for the year.
16		The rate then represents an amalgam of all of the individual franchise tax rates
17		that exist for each taxing jurisdiction within the Company's service area during
18		that year. The 2.37 percent rate is based on the actual rate used in the
19		Company's 2017-2018 purchased gas adjustment (PGA) and was based on
20		actual franchise fees from July 1, 2016 through June 30, 2017.
21	Q.	Please explain Staff's position regarding Franchise Fees.
22	A.	Staff proposes to base the franchise fee applied to revenues in the rate case on
23		a 3-year average of the derived rates for 2015 through 2017. This results in a
24		2.364 percent franchise fee rate.
25	Q.	Do you agree that using a 3-year average is an appropriate way to derive
26		the appropriate rate for the Company's Test Year?

1	A.	No. The use of the 3-year average as a technique should be evaluated to			
2		determine that it actually improves the quality of the estimate of an expense or			
3		rate, or, on the other hand, whether it eliminates or dilutes important information,			
4		such as a more current basis of the rate. For franchise taxes, rates established			
5		by taxing jurisdictions change from time to time, but do not usually decrease.			
6		The use of a 3-year average risks understating the rate that will be in effect			
7		during the Test Year, and, consequently, the estimated expense for the test year			
8		will be understated as well.			
9	Q.	Does Staff's proposed use of a 3-year average result in a systematic			
10		underestimate of NW Natural's costs when it comes to estimating costs			
11		that are expected to increase?			
12		Yes. The bar graph below demonstrates the understatement, by showing the			
13		rate for individual historic years, the Company's proposed rate, and the rate			
14		proposed by Staff. The Company's proposed rate already includes a tempering			
15		effect on the most recent rate in the 2017 base year, since it was derived from			
16		information earlier (12 months ended June 2017) than the calendar year 2017			
17		rate shown, but it does show an increase from 2016. By proposing a 3-year			
18		average, Staff's proposed rate is lower than the most recent two years' historic			
19		levels.			
20		///			
21		///			
22		///			



1

2 Q. What is your recommendation regarding Staff's adjustment.

3 A. Staff' adjustment should be rejected. I recommend using the rate from the

4 Company's filed case. The use of Staff's calculated rate reduces the accuracy of

5 the estimate by relying on distant historical data, when the most accurate

6 estimate is expected to be based on current information.

7 Q. Please describe your testimony regarding Oregon Department of Energy

8 (ODOE) Fees in your revenue requirement calculation.

- 9 A. In my direct testimony, I explain that "the Oregon Department of Energy fee is a
- 10 function of gross revenues. For both the Base Year and Test Year, the fee was
- 11 calculated by first calculating an average effective rate for the two-year period of
- 12 2015 and 2016, and then applying the average effective rate to total operating
- 13 revenues." Based on a proposed rate of 0.127 percent, the ODOE fees in the
- 14 Test Year are \$818,134.

15 Q. What is Staff's proposal for calculating ODOE fees?

4 -REPLY TESTIMONY OF KEVIN MCVAY

- A. Staff again proposes to use a 3-year average to establish the rate that is applied
 to revenues to estimate the ODOE fee.
- 3 Q. Do you agree with Staff's position?
- 4 A. No, I do not as explained below.

5 Q. Do ODOE fees have the same characteristics as Franchise fees as to the 6 effective rate?

7 Α. Yes. The basis of the expense each year is calculated by taking the budget for 8 the department and dividing by revenues of the energy utilities in the state. This 9 calculation can result in some variability due to movements in both the budget numerator and the utility revenue denominator. To smooth out that variability, I 10 used a 2-year average of the rate. As with Franchise Taxes above, however, the 11 12 more recent components of the rate (ODOE budget and utility revenues) are 13 indicative of the components that will exist in the Test Year. Introducing elements to the equation based on budgets and revenues from the third year 14 15 distant cannot be expected to add any quality to the estimated rate and will prevent the Company from recovering current expenses. 16 17 Again, Staff has not explained why its methodology is a better predictor of 18 Test Year expense than the Company's rate. The Company's proposed rate 19 emphasizes the most recent experienced rate in 2017, whereas Staff's proposed 20 rate is significantly lower than the 2017 rate. To illustrate this point, the bar

21 graph below shows why a 3-year average is not a reliable data source.

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1 Q. What is your recommendation regarding Staff's adjustment?

- 2 A. Staff's adjustment should be rejected. I recommend using the rate from the
- 3 Company's filed case. The use of Staff's calculated rate reduces the accuracy of
- 4 the estimate by relying on distant historical data, when the most accurate
- 5 estimate is expected to be based on current information.
- 6 Q. Please describe your testimony regarding Property Taxes in your revenue
- 7 requirement calculation.

8 A. In my direct testimony, I explain that:

9 "Test Year Property Taxes were calculated using the rate resulting from a 10 one-third two-third average of the 2016 and 2017 rates, respectively, derived by taking the assessed taxes divided by net utility plant at 11 December 31 of the year prior to each assessment. The rate was then 12 13 applied to net plant at year end 2017 for the 2018 tax assessment and to year end 2018 for the 2019 tax assessment. The forecast assessments 14 15 for the two years were then combined at a ratio of eight months of 2018 and four months of 2019 to arrive at an appropriate tax expense to include 16 for the Test Year. This is because the ratio is based on property tax 17 18 assessments occurring on a July to June cycle."

- 19 20
- 6 -REPLY TESTIMONY OF KEVIN MCVAY

1	Q.	What is Staff's proposal for calculating Property Taxes for the Test Year?			
2	A.	Staff proposes to use a 3-year average to establish the rate that is applied to net			
3		plant to estimate Property Tax expense.			
4	Q.	Do you agree with Staff's position?			
5	A.	No, I do not. Again, Staff has not shown that the Company's Test Year property			
6		tax expense has been calculated incorrectly. Instead, Staff uses a 3-year			
7		average, which will prevent the Company from recovering its Test Year property			
8		expense.			
9	Q.	Do Property Taxes have the same characteristics as Franchise fees as to			
10		the effective rate?			
11	A.	Yes. The same argument very much applies. The most recent year in the			
12		average should be heavily weighted or even used on its own. There are			
13		numerous reasons calling for the use of the most current rate for the estimation			
14		of property tax expense:			
15		The Oregon Department of Revenue adopted a new valuation model in			
16		2017 that substantially increased the value of the utility operations			
17		compared to the previous model. As a result, using years before 2017 for			
18		averaging purposes is no longer an apples to apples exercise.			
19		• The 'average' approach takes the ratio of 'paid' property taxes over net			
20		utility plant. Property taxes paid are increasing faster than net plant			
21		because property tax rates are increasing each year. The impact of			
22		increasing property tax rates gets diluted the more historical years are			

1	included in the average. As an example, in 2017 the 'value' on which
2	property taxes were paid increased 6.17 percent, but the tax liability
3	increased 7.88 percent because the tax rates were higher. ¹
4	• In 2017, a number of new school district construction bonds took effect in
5	Portland, Gresham, and several other cities. Below is a summary of three
6	recently passed bond measures that are causing the greatest impact. All
7	tax rates are stated as amount per \$1,000 of assessed value.
8	Portland Public School – Bond Measure 26-193 – to improve health,
9	safety, and learning by modernizing and repairing schools – was
10	approved by voters in May 2017.
11	\circ Last year's rate for existing bonds = \$1.0623.
12	\circ This year's rate for existing bonds plus this new bond = \$2.4182.
13	 Net Increase = \$1.559
14	 This Bond is estimated to impact taxpayers for 30 years.
15	<u>Gresham Barlow School District – Measure 26-187</u> – to increase safety,
16	technology, expanding education, and vocational opportunities – was
17	approved by voters in November 2016.
18	\circ Last year's rate for existing bonds = \$0.9846.
19	\circ This year's rate for existing plus new bonds = \$2.6132.
20	 Net Increase = \$1.6286.
21	 Estimated to impact taxpayers for 21 years.

¹ Id.

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1		Lake Oswego School District – Measure 3-515 – for improvements,			
2		curriculum support facilities, and safety and technology updates – was			
3		approved by voters in May 2017.			
4		\circ Last year's rate for existing bonds = \$0.9490.			
5		\circ This year's rate for existing plus new bonds = \$2.0888.			
6		 Net Increase = \$1.1398. 			
7		 Estimated to impact taxpayers for 26 years. 			
8		Reynolds School District and Beaverton School District also saw larger			
9		increases in existing bonds.			
10	Q.	Does Staff assert that its methodology is better able to predict Test Year			
11		expenses than the methodology used in your calculation of revenue			
12		requirement?			
13	A.	No. Staff does not argue that its methodology is better able to predict Test Year			
14		expenses.			
15	Q.	Part of Staff's adjustment concerns the applicable rate, but the other			
16		component is based on Staff's application of a rate to net plant as adjusted			
17		in other areas of their direct case. Is Staff correct that the overall property			
18		tax expense for the Test Year should change as a result of any changes in			
19		net plant as compared to the Company's filed case?			
20	A.	Yes, I agree that because taxes are calculated by an applicable rate multiplied by			
21		a net plant amount, that an adjustment to property tax expense would be			
22		appropriate for any changes in net plant that occur as a result of this rate case.			

1 Q. What is your recommendation regarding Staff's adjustment. 2 Α. Staff' adjustment should be rejected. I recommend that the rate provided in the Company's filed case should be used for the estimation of property tax expense. 3 The use of Staff's calculated rate reduces the accuracy of the estimate by relying 4 on distant historical data, when the most accurate estimate is expected to be 5 6 based on current information. 7 III. CUSTOMER DEPOSITS Q. Please describe the Company's position regarding Customer Deposits and 8 9 treatment of Customer Deposits in the revenue requirement calculation. 10 Α. In my Direct Testimony, I explained that for Customer Deposits: "This reduction to rate base represents amounts that customers are required to provide to 11 12 comply with credit requirements under our tariff." The amount included as a 13 reduction to rate base was calculated as an extrapolation of historical data using coefficients resulting from a linear regression. The historic data used was the 14 monthly balances of deposits from January 2014 through September 2017, or 45 15 months. 16 17 Q. Please describe how Staff calculated their customer deposits amount for 18 rate base. Α. Staff requested year-end data from 2010 to the present, and the Company 19 20 responded by providing the monthly data for that time period. Staff used averages of year-end information to generate coefficients that could be used to 21

10 – REPLY TESTIMONY OF KEVIN MCVAY

1 estimate the Test Year period amount.²

Q. Do you agree with Staff's approach to estimating the Test Year rate base amount?

No. for several reasons. The first error in Staff's approach is to use 8 years of 4 Α. 5 historical data, as compared to a more recent period. Using distant past 6 information to establish current expense and balance sheet levels is unnecessary 7 and inaccurate as a foundation for estimating future levels in the near term. 8 Recent information is the most reliable indication of what can be expected in the 9 near term. The use of older data is more likely to bias the estimate improperly. The second problem with Staff's approach is to use only year-end 10 information. As a result of higher numbers of customers in the winter months, 11 12 customer deposits are at their highest levels during that period. Staff's use of the 13 year-end balances for customer deposits systematically overstates deposits each year as compared to using all months, due to a seasonality to the deposit activity 14 (higher balances in heating season period). The use of the higher amounts 15 based on the ending annual balances in turn overstates the estimate resulting 16 17 from Staff's trend analysis.

- 18 **Q.** What is your recommendation regarding Staff's adjustment?
- 19 A. I recommend that Staff's adjustment be rejected, and the Company's filed test
- 20 year amount for customer deposits be affirmed.

² Staff/100, Gardner/22.

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IV. MISCELLANEOUS REVENUES

Q. 2 Please describe the Company's position regarding Miscellaneous Revenues included in the Company's revenue requirement calculation. 3 4 Α. The Miscellaneous Revenues category of revenues included in the Test Year 5 was comprised of 18 individual revenue elements. The estimate of Test Year 6 revenue was calculated by considering data from the last three years (October 7 2014 through September 2017). Actual data on a 12-month-ended-September 8 basis was used for the 36 month period, since the last 3 months of the base 9 period of 2017 were not available when the Company was assembling its rate 10 case numbers. As stated in my direct testimony, the revenues were "calculated by 11 12 adjusting specific categories of Miscellaneous Revenues to reflect levels of 13 operating activity, based on a three-year history of amounts. If the amounts for a particular category were trending upward or downward, the most recent year was 14 taken as representative for the forecast. If there was no apparent trend to the 15 historic amounts, a simple three-year average was used." 16 17 Q. Please describe Staff's adjustment to revenue requirement for 18 miscellaneous revenues. Α. Staff included two types of adjustments for miscellaneous revenues. The first 19 20 was to adjust the revenues based on the difference between calendar-year 2017 data and the 12 month ended September data that was used in the Company's 21 3-year average analysis. The second was to impute a level of rental income on a 22

12 - REPLY TESTIMONY OF KEVIN MCVAY
1		very specific piece of property to replace income lost when the rental customer
2		discontinued their rental agreement with the company.
3	Q.	Do you agree with Staff's adjustment to miscellaneous revenue to include
4		calendar year data?
5	A.	No. Regarding the adjustment to include the difference resulting from the use of
6		calendar-year 2017 data, when I attempted to replicate Staff's adjustment, I
7		found that Staff had erred in calculating the 12 months of data for five separate
8		revenue categories. The items included data for Summary Bill, Meter Rentals,
9		Multiple Callout, Rent from Gas Property, and Late Payment revenues. The data
10		provided by the Company in response to a data request included information
11		from October 2016 through December 2017. In the four of the five categories,
12		Staff aggregated all 15 months of data and used those to represent the calendar
13		year 2017, which overstated the amounts. In the case of Rent from Gas
14		Property, it is unclear how Staff produced their number. The correct data as well
15		as the incorrect data is shown below.
16		///
17		///

18

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13 - REPLY TESTIMONY OF KEVIN MCVAY

	Staff Calculation	Correct Sum of 2017	Variance
MISC SERVICE REVENUES-FIELD COLLECTION C	(\$332,560)	(\$332,560)	\$0
MISC SERVICE REVENUES-GAS DIVERSIONS	(\$8,339)	(\$8,339)	\$0
MISC SERVICE REVENUES-RECONN CHG-CR-AFTE	(\$2,920)	(\$2,920)	\$0
MISC SERVICE REVENUES-RECONN CHG-CR-DURI	(\$238,520)	(\$238,520)	\$0
MISC SERVICE REVENUES-RECONN CHG-SEAS-AF	(\$80)	(\$80)	\$0
MISC SERVICE REVENUES-RECONN CHG-SEAS-DU	(\$10,350)	(\$10,350)	\$0
MISC SERVICE REVENUES-SEAS RECONN FEE	(\$15,600)	(\$15,600)	\$0
MISC SERVICE REVENUES-SUMMARY BILL SVCS	(\$13,286)	(\$12,204)	(\$1,082)
OTHER GAS REVENUES-METER RENTALS	(\$223,280)	(\$179,029)	(\$44,251)
OTHER GAS REVENUES-MULTIPLE CALL OUT FEE	(\$52,736)	(\$43,238)	(\$9,498)
OTHER GAS REV-LNG SALES & OTHER MISC REV	(\$18,372)	(\$18,372)	\$0
RENT FROM GAS PROPERTY-RENT - UTILITY PR	(\$214,747)	(\$241,126)	\$26,379
FORFEITED DISCOUNTS-LATE PAYMENT CHARGE	(\$2,412,479)	(\$2,103,742)	(\$308,736)
MISC SERVICE REVENUES-AUTOMATED PAYMENT	(\$38,450)	(\$38,450)	\$0
MISC SERVICE REVENUES-RETURNED CHECK CHA	(\$104,805)	(\$104,805)	\$0
MISC SERVICE REVENUES-DELINQ RECONN FEE	(\$278,640)	(\$278,640)	\$0
Non-AMR Install/Remove Charge	(\$516)	(\$516)	\$0
Non-AMR Read Charge	(\$2,018)	(\$2,018)	\$0
Total Actual 2017 Misc Rev	(\$3,967,698)	(\$3,630,510)	(\$337,188)

1 Q. What would Staff's adjustment be if the correct data was used in their

2 adjustment?

- 3 A. I calculate the amount of the adjustment to be \$66,183, as compared to Staff's
- 4 recommended adjustment of \$403,370 for this component of their overall
- 5 adjustment to miscellaneous revenues. The immaterial amount of the
- 6 adjustment also serves to show that the Company's use of actual 12 month
- 7 ended data in its filed case was reasonable.
- 8 Q. Do you agree with Staff's adjustment to miscellaneous revenue to impute
- 9 revenues to replace revenues ending due to the discontinuance of a rental
- 10 agreement?

1	Α.	No. As background, the property in question is a dock in the Willamette River
2		located close to the Gasco LNG site. With the discontinuance of the prior rental
3		agreement, the company has not determined that it wishes to make the site
4		available for a future rental since it is in the proximity of environmental
5		remediation efforts related to the Harbor. The test year for this rate case has
6		excluded the revenue as a result of the discontinued rental agreement, which
7		corrects for the improper attribution.
8		Additionally, the Company has determined that the rate base for the dock

9 has actually not been a part of utility operations, and has been classified as non10 utility property. As a result, there is no reason to attribute these revenues to
11 utility operations.

12 Q. What is the Company's recommendation regarding Staff's adjustment?

A. I recommend that the adjustment be rejected, and the Company's filed test year
 amounts for miscellaneous revenues be affirmed.

15

V. LAND AND BUILDING ALLOCATION

16 Q. What is Staff's recommendation regarding Land and Building allocations?

17 A. Staff proposes a downward adjustment to the allocation factor used in the

18 Company's calculation of the building component of gross plant.

19 **Q.** What is the basis for Staff's adjustment?

20 A. Staff points out that the Company calculates Oregon allocation factors on a

- 21 property-by-property basis, and then uses an average of these individual values
- for both gross plant and accumulated depreciation. Staff proposes using the

15 – REPLY TESTIMONY OF KEVIN MCVAY

1	individual averages for gross plant and accumulated depreciation, since the
2	Company is already going to the effort of calculating these averages at the more
3	detailed individual asset level.

4 Q. Do you agree with Staff's position?

- A. Yes, and to be clear, the proposed adjustment appears to be appropriately
 limited to the building account. Because the land account has no ongoing
 accumulated depreciation growth, the Company's filed case was correct in its
 determination of the state allocation of existing land and its addition of future
 planned land acquisitions on a state-specific basis. For buildings, the use of
 gross plant vs. accumulated depreciation allocation factors, as proposed by Staff,
 is a reasonable alternative method to allocate future gross plant and
- 12 accumulated depreciation balances.
- 13 14

VI. <u>EXCESS ACCUMULATED DEFERRED INCOME TAXES (ADIT)</u> <u>RESULTING FROM TAX CUTS AND JOBS ACT (TCJA)</u>

15 16 Q. Please explain how the Company will have excess ADIT as a result of the 17 TCJA.

A. Excess ADIT results from the implementation of the TCJA due to applying the
new federal tax rate to the underlying book-tax differences that produce the
deferred taxes. For example, if there is a book-tax difference that produces a
deferred tax liability representing a future tax obligation, the obligation was
revalued, or re-measured, to reflect the lower tax rate that will apply in the future.
For deferred taxes existing prior to the change in the rate, this meant that the
amount of deferred taxes on the books was too high compared to the future

obligation (in the case of a liability), so there were excess deferred taxes
 identified.

Q. Has the Company completed all analyses required to identify excess ADIT,
 and all other issues around the amounts that should be used to benefit
 customers?

A. No. Some of that work is ongoing. However, as an estimate, NW Natural
believes that over \$200 million of ADIT on a system basis will be available over
time to benefit customers in some manner.

9 Q. What is the Company's position in the rate case regarding excess ADIT?

10 Α. The Company is interested in ensuring that the appropriate and full amount of 11 excess ADIT is used to benefit customers, and believes that building an amount 12 into base rates is not likely the best way to achieve this. The Company filed a deferral application in UM 1919 on December 29, 2017. The purpose of that 13 application is to defer the net benefits to customers resulting from the TCJA for 14 later ratemaking treatment (including treatment as early as this year). In the 15 Company's deferral application, we stated that the impacts of the TCJA include 16 deferred taxes, and that the Company was requesting to "defer all costs and 17 18 benefits resulting from tax reform, so that an appropriate net adjustment can be made to customers' rates in a manner approved by the Commission in the 19 future."³ The deferral docket is ongoing and the Company has engaged with 20

³ UM 1919

1	stakeholders, including Staff, CUB, AWEC, and other utilities to work through the
2	complexity of the impacts of tax reform on the Company.
3	NW Natural believes that seeking to impute an amount of Excess ADIT
4	amortization as a reduction to base rates at this time is complicated by the fact

that the precise numbers are not known, and the Commission has not made any
generic determination for how it should be treated, although it is likely something
that will be concluded in UM 1919 and the other utilities' corollary dockets.

8 Q. Are customers receiving the benefit of Excess ADIT in the meantime?

9 A. Yes. Until such time that our customers receive the benefit of the excess ADIT
10 directly through an amortization, our customers continue to benefit from the lower
11 rate base balance resulting from the excess ADIT balance, which serves as an
12 offset to rate base.

13 Q. AWEC states that NW Natural has implied that it intends to keep the

14 benefits of excess ADIT for the Company. Is this true?

- 15 A. No, it is not. In every public statement and response to data requests from the
- 16 Company, we have stated that benefits associated with excess ADIT are being
- 17 deferred for the future benefit of customers. As previously mentioned, the
- 18 Company's deferral application and update to the application both explained how
- 19 NW Natural intends to defer the benefits of excess ADIT.⁴ Additionally, in
- 20 response to AWEC's data request on this subject, the Company stated:
- 21It is not the intention of NW Natural to exclude the benefit of the excess22deferred income taxes. The calculation of rate base, as included in the

⁴ UN 1919 (12/29/17: 4/16/18)

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1 2 3 4 5 6		revenue requirement model referenced in NW Natural 1200, continues to include a reduction to rate base for the full amount of the revalued deferred income taxes (excess) recorded upon enactment of the TCJA. As a result, customers would continue to benefit from the excess deferred income taxes in the revenue requirement determination at the authorized rate of return.
7 8 9 10 11		Until such time that customers receive the benefit of the excess deferred taxes in another manner (<i>Examples:</i> bill credit, offset to existing regulatory assets, allocation or offset to a capital project, etc. as discussed at the workshop) they would continue to benefit from the lower rate base balance. ⁵
12		The Company then went on to describe the various ways customers could
13		receive the benefit of excess ADIT. Simply put, NW Natural has made it clear
14		that it is not seeking to retain excess ADIT, and we do not know what gave
15		AWEC the impression that we would.
16	Q.	What does AWEC propose with respect to benefitting customers with
17		Excess ADIT?
18	A.	AWEC asserts that "the Commission must establish rates that take into
19		consideration the amortization of EDFIT (excess deferred federal income taxes,
20		another term for excess ADIT) in results, at least for protected plant EDFIT
21		balances." This statement is not correct, and it is unclear why AWEC interprets
22		the TCJA in this manner. As to amortized EDFIT, the Commission is free to
23		consider different methods as to the application of amortized balances. Income
24		tax normalization rules should be included in those ratemaking evaluations and
25		decisions, but they do not govern or specify a particular outcome on their own.

⁵ NW Natural/1501, McVay

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Q. What is your recommendation regarding AWEC's adjustment for Excess
 ADIT?

A. I recommend that the adjustment be rejected, and that the issue should be
resolved in the deferral application proceeding as intended. There is no reason
that the determination of Excess ADIT and its amortization must be determined in
this proceeding, and doing so through base rates can raise difficulties with
ensuring that the correct amounts are applied as benefits to customers. NW
Natural believes that the determination of when and how Excess ADIT is used to
benefit customers may best be resolved in the deferral dockets.

Q. Is NW Natural open to using excess ADIT amounts to benefit customers
 through this rate case?

A. Yes, if clarity is provided that doing so is the method the Commission expects
 NW Natural to take, then NW Natural is open to begin amortizing the deferred
 amounts. applying the amortizations through base rates. NW Natural would
 request, however, that provisions be put in place to ensure that the appropriate
 and full amount benefits customers.

17 Q. What methodology could the Commission use to ensure that the

18 appropriate and full amount is passed back to customers if it were to

- 19 determine that a reduction to base rates should be applied in this case?
- A. The Commission could establish that each year, a true-up could occur at the time
- 21 of the Purchased Gas Adjustment, so that the amount amortized is accurate and
- 22 complete. This could be accomplished through deferred accounting.

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Q. If this case were to involve the provision to customers of a benefit from
 excess ADIT, are there any rate base implications that need to be
 accommodated?

Yes. If a determination of the disposition of any excess ADIT amounts is 4 Α. 5 concluded during the processing of this rate case, it would be necessary to adjust 6 the amount of deferred taxes included in rate base. This is because excess 7 ADIT is currently built into rate base as an offset to the utility's financing cost 8 (because it represents dollars collected for taxes, but no longer expected to be 9 needed to pay taxes due to the reduced rate from the TCJA). In other words, it 10 offsets rate base. Once the ADIT deferral is amortized, however, it is no longer appropriate to have those amounts reflected as a reduction to the utility's 11 12 financing requirements, and rate base should be adjusted upward accordingly. 13 Q. Do you have any suggestions for how the Commission could ensure the appropriate benefit is provided to customers of Excess ADIT that came 14 about from the TCJA? 15

- 16 A. Yes. NW Natural proposes a method to reflect the impact on revenue
- 17 requirement from a bill credit or other application of deferred tax, by applying the
- 18 amount of deferred tax net of the revenue requirement associated with its rate
- 19 base value. This method has been described in our data request response to
- 20 Staff ⁶, and the Company intends to propose this as the method to amortize
- 21 applicable amounts in the context of the deferral dockets.

⁶ NW Natural/1502, McVay

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1		VII. ADIT RELATED TO ACCRUED VACATION
2	Q.	Please describe the adjustment AWEC proposes related to accumulated
3		deferred income taxes for accrued vacation.
4	Α.	AWEC argues that accumulated deferred income taxes related to accrued
5		vacation should be excluded from rate base for the test year.
6	Q.	What is your response to AWEC's assertion?
7	Α.	Deferred income tax asset and liability items are always created by a timing
8		difference between when an expense or revenue is reportable for income
9		statement purposes per Generally Accepted Accounting Principles ("GAAP") and
10		when the same expense or revenue is recognized for income tax purposes.
11		AWEC is correct that vacation expense is deducted for GAAP reporting
12		when earned by the employee, and is deducted for income tax purposes when
13		actually taken by the employee. Vacation is generally taken by an employee in
14		the year earned or the following year. However, consistent with state law
15		requirements, non-union employees in Oregon and Washington can take 40
16		hours and 50 hours of vacation time, respectively, before it is earned. Union
17		employees are allowed to take additional hours, above the amount provided to
18		non-union employees, in advance of earning it. If employees take vacation in a
19		year before it is earned, this creates a deferred tax liability. Employees of NW
20		Natural are also allowed to "bank" vacation, and take vacation in years after it is
21		earned, which creates a deferred tax asset.

22 Q. Do you then agree that AWEC is correct in their adjustment?

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A. No, AWEC's adjustment is not warranted. While I understand the principle that
AWEC is putting forth, AWEC's proposal is incomplete in its application. If
applied correctly and across all of the cost items to which the theory applies, the
result would actually be an increase to rate base, and customers' rates.

AWEC proposes to eliminate a deferred tax asset from rate base, but 5 6 because it is more common that an expense must be prepaid by the utility, there 7 are deferred tax liabilities that are similarly subject to AWEC's logic, and should 8 be removed. For example, insurance policy premiums and property taxes are 9 significant expenses that are paid by the utility before they are recovered in 10 revenues, and result in the creation of deferred income tax liabilities. These items are included by NW Natural in its filing as lowering rate base. Under 11 12 AWEC's approach, however, these would also need to be removed, thus 13 increasing rate base.

If NW Natural were to remove property tax alone, the impact would be an
 increase to revenue requirement of \$358 thousand. This more than offsets
 AWEC's proposed adjustment of a \$250 thousand reduction to revenue
 requirement. It should be noted that the correct impact from removing the
 vacation is \$199 thousand, not \$250 thousand, based on using the Company's
 revenue requirement model that has incorporated the TCJA.

- 20 Q. What is the Company's recommendation regarding AWEC's adjustment?
- A. I recommend that the adjustment be rejected, unless the deferred taxes related
- to insurance policies and property taxes are also removed from rate base. This

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1		would raise customers' rates compared to the Company's application, and the
2		Company is therefore not insisting on this treatment in this case.
3 4 5		VIII. <u>FEDERAL INCOME TAX RATE (AWEC RESTATEMENT OF TAX</u> EXPENSE AND TCJA CONVERSION FACTOR)
6	Q.	Please describe your testimony regarding the federal income tax rate
7		included in your revenue requirement calculation.
8	A.	The federal income tax rate included in the Company's supplemental filing dated
9		March 20, 2018 included the new rate of twenty-one percent that was established
10		as a result of the TCJA.
11	Q.	The testimony of AWEC identifies an adjustment to restate tax expense for
12		purposes of reflecting the new federal rate, for both "results" and the
13		revenue surplus or deficiency associated with test period results. Is this
14		adjustment appropriate?
15	A.	No. The adjustments result from their use of the original filed revenue
16		requirement model as the basis of their calculations. In comparison, the revenue
17		requirement model used by Staff in its direct testimony is based on the March 20
18		supplemental filing, which already includes the use of the new tax rate. As a
19		result, Staff did not include comparable adjustments in their testimony, and also
20		identified that the new Income tax rate was included in the supplemental filing. It
21		is fair to assume that the Company's or Staff's model will ultimately be the model
22		used for the final determination of revenue requirement in this rate case, so to
23		include the adjustments by AWEC for this issue would be redundant.

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1	Q.	What is the Company's recommendation regarding AWEC's adjustments to
2		Restate Tax Expense and adjust for the Conversion Factor for the TCJA?
3	A.	I recommend that the adjustments be rejected given that they are redundant to
4		the Company and Staff models.
5		IX. INTERIM PERIOD FEDERAL INCOME TAX EXPENSE DEFERRAL
6	Q.	Please describe the Company's position regarding the treatment of the
7		deferral of the effect of the new federal income tax rate resulting from the
8		TCJA during the period January 1, 2018 through October 31, 2018.
9	A.	The treatment of the deferral was not a component of this rate case, because the
10		Company understands that the deferral conditions are pursuant to the deferral
11		applications that have been filed with the Commission, and are being processed
12		in docket nos. UM 1919 (NWN filed) and UM 1924 (Staff filed).
13	Q.	Please provide background on the deferral.
14	A.	The deferral is intended to capture the net benefits of the lower federal tax rate
15		on results for the period January 1, 2018, the effective date of the new rate, to
16		October 31, 2018, the day prior to the expected effective date of rates in this rate
17		case. The beneficial effect on revenue requirement starting November 1, 2018
18		will then be captured as a result of this rate case. Amounts accrued pursuant to
19		the deferral will be amortized to customers in a manner to be determined by the
20		outcome of the deferral application proceeding.
21	Q.	What is your understanding of AWEC's adjustment for the Interim Period
22		Deferral?

1	Α.	My understanding is that they seek to replicate in this rate case an event that is
2		already taking place in a separate proceeding. The inclusion of the adjustment is
3		wholly unnecessary and completely inappropriate to include in this rate case.
4		Amortizations of deferrals are not accomplished through reductions in base rates.
5	Q.	What is the Company's recommendation regarding AWEC's adjustment?
6	A.	I recommend that the adjustment be rejected.
7		X. RESEARCH AND DEVELOPMENT TAX CREDITS
8	Q.	Please describe AWEC's proposed adjustments for Research and
9		Development Tax Credits?
10	A.	First, AWEC proposed an adjustment for Research and Development Tax
11		Credits based on the inclusion of a one-time research expenditure the Company
12		incurred in calendar year 2016. Qualified research expenditures of \$625,000
13		were included in the test year credit calculation as proposed by NW Natural in
14		the current rate case. The \$625,000 figure is the same amount of qualified
15		research expenditures claimed for income tax reporting purposes in 2013, 2014,
16		2015, and that amount will be claimed in 2017. It is also the same figure
17		projected to occur in the Test Year. Only the 2016 income tax return included a
18		higher amount (\$800,000), which as previously explained in UG 344 NWIGU DR
19		11, was a result of a one-time additional expenditure on a renewable natural gas
20		research project of \$175,000.
21		The \$625,000 figure is not a random estimate, but as noted in the
22		descriptions provided in UG 344 NWIGU DR 44 Attachment 5 and UG 344

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- NWIGU DR 11 Attachment 1, is the result of fixed commitments made to three
 research projects / energy research consortiums:
- 3

4

5

Operations Technology Development \$240,000 Annually

- Utilization Technology Development \$335,000 Annually
- Oregon Seismic Preparedness Research \$50,000 Annually
- 6 NW Natural only included total research and development expenditures of
- 7 \$661,000 in the current rate case for the Test Year [see OPUC Staff Testimony,
- 8 Page Staff/900, Moore/2]. Of those expenditures, NW Natural asserts that
- 9 \$625,000 will continue to qualify for the federal research income tax credit.
- 10 NWIGU's proposal to include \$750,000 of qualified research expenditures
- 11 (almost \$100,000 more than actually requested in this rate case) is not supported
- 12 or consistent with actual historical results, forecasted results, or the rate case as
- 13 filed.
- 14 If nothing else, if AWEC imputes a tax credit related to a higher O&M
- 15 amount, the higher O&M amount should be included in revenue requirement. Of
- 16 course AWEC would also likely not agree to include an adjustment to increase
- 17 O&M just to also include a higher related tax credit.
- 18 Q. What is the other proposed adjustment from AWEC?
- A. AWEC also identified an error that had been made in the Company's tax effect of
 the credit related to the new federal income tax rate. Their proposal is consistent
 with recent federal tax reform changes and was only recently clarified by the IRS.

As corrected, the research income tax credit included in the rate case Test Year
 increases from \$76,000 to \$91,680.

3 Q. In summary, what is your recommendation regarding the Research and

- 4 Development Tax Credit included in the revenue requirement calculations
- 5 for the rate case?
- A. I recommend that AWEC's proposal to change the basis of the credit from
 \$625,000 be rejected, but that that the credit be based on the new tax rates
 resulting from the TCJA.
- 9

XI. STOCK ISSUANCE COSTS

Q. Please describe your testimony regarding stock issuance costs included in your revenue requirement calculation.

- 12 A. My testimony explained that "the only change to O&M as presented in Mr.
- 13 Moncayo's testimony was for the addition of an equity issuance flotation cost.
- 14 When a company issues common equity, there are costs of issuance including
- 15 expenses such as underwriting fees, legal fees, and registration fees. The
- 16 Company has included costs in the Test Year O&M based on a three-year
- average of costs realized during the years 2016, 2017, and the forecast year
- 18 2018. The Oregon-allocated amount of the three-year average was \$1.2 million."

19 **Q.** Which parties submitted testimony on stock issuance costs in this

- 20 proceeding?
- 21 A. AWEC and Staff provided testimony on this topic.

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Q. Please explain your understanding of the recommendations of AWEC, as
 well as your evaluation of its positions.

3 Α. AWEC takes the position that stock issuance costs are not appropriately 4 considered in results due to concerns with retroactive ratemaking. However, AWEC's argument does not apply to future costs. The company's inclusion of 5 6 the costs in the revenue requirement was not to affect a deferral and amortization 7 of historical costs, but to use the actual experienced costs as a proxy for an 8 ongoing cost of service that is not incurred every year, but will be during the test 9 year. The company was following past precedent for the issue as reflected in UG 10 132, and as filed in UG 152, where the parties ultimately stipulated that the agreed-to return on equity included the Company's stock issuance expense 11 12 (Order 03-507 Appendix D, page 2 of 7). The issue was not included in the 13 Company's last rate case as there had been no issuances for many years, and 14 no upcoming issuances were anticipated at the time of the case. 15 AWEC also contends that stock issuance costs are not appropriately

- 16 considered an expense. However, as described above, they have been17 considered an expense in Oregon ratemaking.
- Finally, AWEC points to Barbour Coal Co. v. Commissioner of Internal Revenue as relevant to their argument, but that case from 1934 was related to the deductibility of issuance costs for federal tax purposes, and not at all related to the issue as to state ratemaking.

Q. Please explain your understanding of the recommendation of Staff, as well
 as your evaluation of its position.

A. Staff recommends that the flotation costs as included by the company should be
removed and that Staff's calculation of return on equity includes an adder to
represent the cost in revenue requirement. I defer to NWN witness Dr. Bente
Villadsen's reply testimony (NW Natural/1600, Villadsen) for discussion and
consideration of Staff's arguments on the inclusion of flotation costs in return on
equity.

9

XII. <u>REVENUE</u>

10 Q. Please summarize Staff's revenue forecast adjustments?

A. Staff forecasted residential and commercial revenue differently from industrial
revenue, which is consistent with the Company's approach. Staff's residential
and commercial methodology is similar to the Company's except that Staff has
introduced a separate forecast for each of eight load centers, whereas the
Company weights load center-observed weather by customer count and
analyzes the loads of all eight in aggregate.

17 Staff's industrial revenue forecast methodology differs greatly from the 18 Company's. Staff employed a simple three-year average forecast of industrial 19 load for the years 2014 through 2016 and carried it forward into the Test Year. 20 The Company's industrial forecast, by contrast, uses subject matter expertise, 21 research, and direct communication with our industrial customers to forecast at a 22 high level of granularity, namely on a customer-by-customer basis across every

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1	industrial rate schedule. It takes into consideration, for instance, knowledge of a
2	customer's plans to ramp up production, or an extended offline period for
3	scheduled major equipment maintenance.

Q. Does the Company agree with Staff's residential and small commercial
 forecast methodology?

6 Α. The Company notes that Staff's forecasted residential and small commercial 7 loads are somewhat similar to the Company's filed loads in this case. However, the company strongly supports its own development of use-per-customer 8 amounts that are the basis of the load forecast, along with forecasted numbers of 9 10 customers during the Test Year. The Company performed both fit evaluations and predictive evaluations across various periods of years and heating seasons. 11 12 and is very comfortable with results of those evaluations compared to other 13 forecasting techniques. Additionally, the Company's method is consistent with the load forecast produced in its last rate case. In a data request response from 14 Staff, Staff indicated that they performed a fit evaluation of their model, but not a 15 predictive forecasting evaluation.⁷ 16 The Company is open to collaborating with Staff to get the best load 17 18 forecast result for these schedules, but also to work towards understanding the implications of Staff's approach of forecasting each of eight load centers 19

- 20 separately. The Company would like to understand if it is Staff's intention that
- 21

⁷ NW Natural/1503, MvVay

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the Company should modify its WARM and Decoupling mechanisms such that

1		one of eight different coefficients are applied to customers' bills based on their
2		geographic location. Currently, the Company administers these mechanisms
3		using a single Oregon-wide coefficient for each applicable rate schedule. A
4		change from the Oregon class-wide approach to a load center specific approach
5		to WARM and Decoupling is significant in its level of administration, and may
6		produce unintended results unless carefully considered. For example, if
7		decoupling is calculated at the load center level, this raises the question of
8		whether the amortization of deferred balances in the Decoupling mechanism
9		would also be load-center specific.
10	Q.	Do you agree with Staff's large commercial forecast methodology?
11	A.	No. While we have not been able to fully understand the approach taken by Staff
12		in their residential and commercial use-per-customer analysis, it is clear that
13		Staff's forecast methodology in the case of rate schedule 32CSF is not an
14		improvement over the Company's methodology.
15	Q.	Please explain the Company's critique of Staff's 32CSF forecast?
16	A.	The Company filed a weather normalized use-per-customer (UPC) of 90,637
17		therms for 32CSF customers; Staff has proposed a weather normalized UPC of
18		122,634 therms, a load forecast that is roughly 35 percent higher under normal
19		weather. The Company's forecast produces a therm load that falls in the middle
20		of recent historic annual loads, which is reasonable given that the weather in
21		recent years has been both warmer and colder than normal. By comparison,
22		Staff's forecast for the class is 29 percent higher than any recent year. See table

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- 1 below for recent annual volumes for rate schedule 32CSF, as well as the
- 2 Company and Staff proposed forecast therm volumes for the Test Year.

Commercial (Rate Schedule 32)		
2016	33,435,303	
2017	41,172,692	
Company	39,092,810	
Staff	53,100,442	

Staff has argued that the Decoupling mechanism should not apply to this rate 3 schedule, and has produced a forecast that clearly over-estimates load, which, in 4 5 the absence of decoupling, would mean that the Company would be expected to 6 under-recover its revenue requirement for the class on an annual basis, and would be more likely to under-earn its authorized return as a result. 7 Q. Staff used a three year average for purposes of their industrial load 8 9 forecast. Does the Company believe that Staff's industrial forecast was made in error? 10 11 Yes. In Exhibit Staff/200 – wp2 Rate Case Margin Model STAFF, Staff uses Α. 12 actual load data supplied by the Company to forecast a three-year average. In aggregating the industrial volumes by rate schedule, Staff incorrectly used a 13 14 schedule that the Company classifies as commercial (31CSF), and omitted an industrial schedule (03I) that should have been included. 15

16 **Q.** What is the impact of this error?

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1	Α.	Staff's three-year average of industrial load results in a miscalculated scalar of
2		1.0688 (the ratio of Staff's Test Year therms to the Company's originally filed
3		Test Year therms), indicating a large Test Year increase in industrial load
4		resulting from the Staff adjustment over the Company's forecasted load. Using
5		Staff's methodology and the aggregated load of the correct rate schedule
6		volumes, the Company calculates a scalar of 0.9959 (the ratio of Test Year
7		therms using a corrected Staff methodology to the Company's originally filed Test
8		Year therms). This corrected scalar indicates that the Company's originally filed
9		industrial load forecast is actually higher than the load forecasted using a three-
10		year average methodology.
11	Q.	What is the Company's recommendation regarding the industrial load
12		forecast?
40		
13	A.	The Company recommends that the Staff Industrial load forecast and resulting
13 14	A.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed
13 14 15	A.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed load forecast represents an increase over the corrected three-year average of
13 14 15 16	A.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed load forecast represents an increase over the corrected three-year average of industrial loads, rather than a decrease as indicated by Staff's miscalculated
13 14 15 16 17	A.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed load forecast represents an increase over the corrected three-year average of industrial loads, rather than a decrease as indicated by Staff's miscalculated three-year average. While the Company's forecast produces a result of lower
13 14 15 16 17 18	Α.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed load forecast represents an increase over the corrected three-year average of industrial loads, rather than a decrease as indicated by Staff's miscalculated three-year average. While the Company's forecast produces a result of lower revenue requirement in the rate case as compared to the Staff method, the
13 14 15 16 17 18 19	Α.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed load forecast represents an increase over the corrected three-year average of industrial loads, rather than a decrease as indicated by Staff's miscalculated three-year average. While the Company's forecast produces a result of lower revenue requirement in the rate case as compared to the Staff method, the company strongly supports the industrial forecast included in its own originally
13 14 15 16 17 18 19 20	A.	The Company recommends that the Staff Industrial load forecast and resulting impact on projected revenues in the rate case be rejected. The Company's filed load forecast represents an increase over the corrected three-year average of industrial loads, rather than a decrease as indicated by Staff's miscalculated three-year average. While the Company's forecast produces a result of lower revenue requirement in the rate case as compared to the Staff method, the company strongly supports the industrial forecast included in its own originally filed case.

22 forecast?

1	Α.	The Company believes that the proposed forecasts for industrial customers and
2		Commercial 32CSF customers should be rejected. The former was grounded in
3		error and the latter has no reasonable connection to recent historical actuals for
4		the customer group. The Company is willing to collaborate with Staff to fine-tune
5		the decoupled residential and small commercial rate schedule load forecasts,
6		with the understanding that the Company would like to understand more the
7		implications of using eight load center forecasts for each schedule. If such a
8		collaboration could not be completed in a timely manner for purposes of this rate
9		case, then the company strongly supports its own forecast for residential and
10		commercial decoupled customers, and is open to pursuing the collaborative
11		result for implementation in a later proceeding.
12		XIII. PENSION BALANCING ACCOUNT
12 13	Q.	XIII. <u>PENSION BALANCING ACCOUNT</u> Please explain the Company's position relating to the Pension Balancing
12 13 14	Q.	XIII. <u>PENSION BALANCING ACCOUNT</u> Please explain the Company's position relating to the Pension Balancing Account.
12 13 14 15	Q. A.	XIII. PENSION BALANCING ACCOUNT Please explain the Company's position relating to the Pension Balancing Account. In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docket
12 13 14 15 16	Q. A.	XIII. PENSION BALANCING ACCOUNTPlease explain the Company's position relating to the Pension BalancingAccount.In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docketUM 1475 that created a balancing account for the Company's pension expense.
12 13 14 15 16 17	Q. A.	XII. PENSION BALANCING ACCOUNT Please explain the Company's position relating to the Pension Balancing Account. In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docket UM 1475 that created a balancing account for the Company's pension expense. Pension expense rises and falls (sometimes it become negative) from year to
12 13 14 15 16 17 18	Q. A.	XII. PENSION BALANCING ACCOUNT Please explain the Company's position relating to the Pension Balancing Account. In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docket UM 1475 that created a balancing account for the Company's pension expense. Pension expense rises and falls (sometimes it become negative) from year to year and to address this variability, the parties agreed to collect \$3.8 million
12 13 14 15 16 17 18 19	Q. A.	XII. PENSION BALANCING ACCOUNT Please explain the Company's position relating to the Pension Balancing Account. In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docket UM 1475 that created a balancing account for the Company's pension expense. Pension expense rises and falls (sometimes it become negative) from year to year and to address this variability, the parties agreed to collect \$3.8 million pension expense in rates each year. The recovery of pension expense is
12 13 14 15 16 17 18 19 20	Q. A.	XII. PENSION BALANCING ACCOUNT Please explain the Company's position relating to the Pension Balancing Account. In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docket UM 1475 that created a balancing account for the Company's pension expense. Pension expense rises and falls (sometimes it become negative) from year to year and to address this variability, the parties agreed to collect \$3.8 million pension expense in rates each year. The recovery of pension expense is recorded in a balancing account that tracks the difference between the \$3.8
12 13 14 15 16 17 18 19 20 21	Q. A.	XII. <u>PENSION BALANCING ACCOUNT</u> Please explain the Company's position relating to the Pension Balancing Account. In 2010, NW Natural, Staff, CUB, and NWIGU agreed to a stipulation in docket UM 1475 that created a balancing account for the Company's pension expense. Pension expense rises and falls (sometimes it become negative) from year to year and to address this variability, the parties agreed to collect \$3.8 million pension expense in rates each year. The recovery of pension expense is recorded in a balancing account that tracks the difference between the \$3.8 million in rates and the Company's actual pension expense. At the time of the

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account would grow (actual expense exceeds \$3.8 million) and then eventually
 reduce (\$3.8 million exceeds actual expense) in size until the account is
 "balanced," and would be terminated at the time of the Company's next rate
 case.

As previously mentioned in my opening testimony, in the Company's 5 6 review of the pension balancing account, we found that the account would not 7 reach a balanced level (or negative balance) at the pace all parties expected when we developed the pension balancing account. We approached the parties 8 9 to describe our findings and informed the parties that we would be open to 10 working with them to jointly determine modifications so that the pension balancing account would terminate sooner than our current projections. We took 11 12 this approach rather than requesting an increase in recovery of pension expense 13 because the Stipulation in UM 1475 expressly prohibits any party from requesting 14 an increase to pension expense in rates.

Q. Please describe the most recent activities regarding resolving issues with
 the Pension Balancing Account since the Company filed opening testimony

17 in this rate case?

A. On April 4, 2018, the Parties had a workshop to further examine the Pension
Balancing Account and whether the account should be modified in order to
reverse the current increasing trend and to get the balancing account to zero
more expeditiously. On April 20, 2018, the parties filed direct testimony in this
rate case.

36 – REPLY TESTIMONY OF KEVIN MCVAY

1	Q.	Do the Parties appear to agree that the balancing account has not
2		performed as originally intended in 2011?
3	A.	Yes, all Parties were in agreement that the original forecast of the balancing
4		account had not been actualized, and, as a result, the account had grown
5		significantly.
6	Q.	If the balancing account didn't perform as intended, is the mechanism
7		broken?
8	A.	No. The balancing account did not perform as intended due to unforeseen
9		increases in FAS 87 expense. The balancing account mechanism itself certainly
10		works, however, and it applied the difference between the \$3.8 million collected
11		in rates and the actual amount of O&M related FAS 87 expense each year, and
12		calculated interest on the amount of FAS 87 not recovered from ratepayers.
13	Q.	Does the Company agree with Staff and CUB's stated characterizations and
14		concerns regarding the balancing account?
15	A.	In part, yes. The Company agrees with CUB's characterization of the history of
16		the account and the reasons it has not operated to move toward zero more
17		quickly. We also agree that the future implications of how the account will
18		operate in the future could present intergenerational inequities that were not
19		intended when the account was implemented, and that it would make sense to
20		modify the mechanism in certain ways to improve the timing of when it can be
21		terminated. Finally, because of the provisions of the original approved settlement
22		precluding unilateral proposals to modify the mechanism, we agree that the

37 - REPLY TESTIMONY OF KEVIN MCVAY

1

2

appropriate process to remedy the issue is to pursue a settlement between the parties that we can present to the Commission for its approval.

3 However, the Company does not agree with Staff's and CUB's emphasis on the interest costs on the account or that the interest was somehow unintended 4 5 or improper. Typical of any mechanism that addresses the under-recovery (or 6 over-recovery) of amounts from ratepayers, an interest element is included that 7 recognizes the financing implication of amounts not recovered. That element 8 was built into the balancing account to recognize that there were amounts not 9 recovered and that then required financing. Accounts requiring future recovery 10 are not broken up into what the company is owed for the principal as compared to the interest. The total amount of both principal and interest is what are subject 11 12 to recovery since both were the result of the under-recovery. The financing or 13 interest cost built into the balancing account mechanism was at the Company's overall rate of return, which reflects that long-term capital is required to finance 14 15 the long-term account balance.

To be clear, the use of the company's authorized overall rate of return does not achieve that rate on a realized basis, since there is no gross-up for taxes on the equity portion of the rate as applied to deferrals. In a rate case, that gross-up occurs such that the after tax return achieved is the authorized level, but that is typically not the case for deferred accounts and is not the case for the balancing account mechanism.

38 – REPLY TESTIMONY OF KEVIN MCVAY

1	Q.	CUB recommends terminating the balancing account now. Does the
2		Company agree with CUB that no changes can be made to pension
3		expense in rates prior to termination of the balancing account?
4	A.	The Company believes that changes can be made to the provisions under the
5		balancing account if they are mutually agreeable to the parties to the original
6		stipulation. CUB's recommendation to terminate the balancing account on the
7		basis that no changes can be made is premature, and NW Natural believes it
8		should first be explored how the mechanism can be modified by agreement and
9		with review of the Commission.
10	Q.	What could reverse the current trend in the balancing account and get the
11		balance to zero more quickly?
12	Α.	Additional collections from customers are needed in order to reverse the current
13		trend and get the account balance to zero in a more reasonable timeframe.
14	Q.	Are there additional tools that could help pay down the account faster and
15		not put such a burden on customer rates?
16	A.	Yes. There is a current unique circumstance due to the tax reform legislation
17		that was passed in December 2017 that could help pay down the balancing
18		account and minimize the unfavorable impact to customer rates. It would involve
19		applying deferred amounts to the balancing account that would otherwise
20		amortize to the benefit of customers for changes in the tax rate and historic
21		deferred tax balances.

39 - REPLY TESTIMONY OF KEVIN MCVAY

1	Q.	Is NW Natural committed to solving the pension balancing account issue
2		with the Parties?
3	Α.	Yes. NW Natural believes an increase in the collection of pension expense is
4		required in order for the balancing account to reverse and pay down quicker than
5		its current forecast. The Company is committed to working with the Parties to
6		utilize some of the unique tools now available to minimize customer impact while
7		recovering the under-recovered FAS 87 expense represented in the account.
8 9 10		XIV. IMPLICATIONS OF ADJUSTMENTS TO THE COMPANY'S FILED REVENUE REQUIREMENT
11	Q.	Are there implications of making adjustments to the Company's filed
12		revenue requirement that should be considered before a final order is
13		issued in this general rate case?
14	Α.	Yes, there are a number of possible unintended consequences of adjustments
15		that should be evaluated. One is that when adjustments are made to many O&M
16		items, because some of the expense may be apportioned to capital through the
17		application of an administrative transfer to construction overhead, part of an
18		adjustment may be required to be applied to rate base rather than O&M.
19		Another concerns the possibility of overlapping adjustments, where an
20		adjustment to an O&M account that includes labor may be redundant to an
21		
21		adjustment to an overall payroll adjustment.
21		adjustment to an overall payroll adjustment. A third required synchronization is for the Decoupling and WARM
22 23		adjustment to an overall payroll adjustment. A third required synchronization is for the Decoupling and WARM mechanisms. Any adjustment to baseline use per customer amounts and

7	Q.	Does this conclude your testimony?
6		income taxes. This was also noted by other parties to the case.
5		elements such as depreciation expense, accumulated depreciation, and deferred
4		adjustment to plant should also include other related revenue requirement
3		A final area to address is for adjustments to plant in rate base. Any
2		added to the tariff sheets for the Company's Decoupling and WARM programs.
1		class volumes used in the revenue requirement calculation will also need to be

8 A. Yes.

41 – REPLY TESTIMONY OF KEVIN MCVAY

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Kevin McVay

REVENUE REQUIREMENTS EXHIBITS 1501- 1503

May 23, 2018

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NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 NWIGU DR 42

42. Reference NW Natural 1200, Page 2: NW Natural states "There are two elements of the revenue requirements model that are affected by tax reform. The first impact is the direct change in income tax expenses based on the reduction of the federal income tax rate from 35% to 21%. The second occurs in the accumulated deferred tax component of rate base, which reflects the loss of the higher "bonus" depreciation that had previously been available on a phase-out basis through the test year."

a. Is it NW Natural's proposal to exclude the impacts of Excess Tax Reserves (i.e. Excess Deferred Federal Income Taxes) as defined in § 13001(d) of the TCJA.

b. Does NW Natural agree that it will violate the IRS normalization requirements if, in computing its cost of service in this matter, NW Natural does not account for Excess Tax Reserves in the manner described § 13001(d) of the TCJA. Please explain.

c. Is it NW Natural's proposal to exclude the impact of deferring the revenue requirement benefits associated with the TCJA realized between January 1, 2018 and the rate effective date in this proceeding. Please explain.

d. Please provide all presentations and documents that the Company has received from its auditors or tax advisors discussing the implementation of the Tax Cuts and Jobs Act, since the Tax Cuts and Jobs Act was enacted into law.

e. Please provide NW Natural's best estimate of the impact of Excess Deferred Federal Income Taxes on test period revenue requirement. Please provide all workpapers, with all links and formulas intact, supporting the calculation. To the extent that the document includes hard-coded numbers, please identify and provide the source of the hardcoded number.

f. Does NW Natural track book accumulated depreciation by FERC account and by asset vintage? If yes, please prove accumulated depreciation by FERC account and by asset vintage as of 12/31/2017 (actual), 12/31/2018 (forecast) and 12/31/2019.

g. Does NW Natural track tax accumulated depreciation by FERC account and by asset vintage? If yes, please provide tax accumulated depreciation by FERC account and by asset vintage as of 12/31/2017 (actual), 12/31/2018 (forecast) and 12/31/2019.

Response:

NW Natural filed a TCJA related deferral application with the utility commission of Oregon on December 29, 2017. In addition, Staff at the Oregon Public Utility Commission filed a deferral application on December 29, 2017 with respect to the TCJA implications for NW Natural. As a result, regulatory accounting is being utilized to defer

A TCJA tax workshop was held on February 28, 2017 that included representatives from all of the investor owned electric and gas utilities in Oregon, Staff from the Oregon Public Utility Commission, and representatives from Northwest Industrial Gas Users, Citizens Utility Board of Oregon, Sierra Club, Fred Meyer, Wal-Mart, and other interested parties. In follow up correspondence from Ms. Sommer Moser, from the Oregon Department of Justice (see email to all parties dated March 23, 2018), it was noted that supplemental filings regarding TCJA deferral applications are due later in April. It is NW Natural's intention to submit these supplemental filings.

a) It is not the intention of NW Natural to exclude the benefit of the excess deferred income taxes. The calculation of rate base, as included in the revenue requirement model referenced in NW Natural 1200, continues to include a reduction to rate base for the full amount of the revalued deferred income taxes (excess) recorded upon enactment of the TCJA. As a result, customers would continue to benefit from the excess deferred income taxes in the revenue requirement determination at the authorized rate of return.

Until such time that customers receive the benefit of the excess deferred taxes in another manner (*Examples:* bill credit, offset to existing regulatory assets, allocation or offset to a capital project, etc. as discussed at the workshop) they would continue to benefit from the lower rate base balance.

Each of the examples noted above provides a meaningful economic return to customers:

Bill Credit – Bill credits would be a dollar for dollar refund of excess deferred income taxes. The reduction in the excess deferred income tax balance would also result in an increase to rate base and related revenue requirement.

Existing Regulatory Asset Offset – Applying excess deferred income taxes as an offset to an outstanding regulatory asset, such as the pension balancing account, would result in a reduction to the customer recovery requirement of the regulatory asset balance and reduce the future interest charge on that balance. The reduction in the excess deferred income tax balance would also result in an increase to rate base and related revenue requirement.

Capital Project Allocation - Applying excess deferred income taxes as an offset to new or existing capital projects would reduce the cost basis of the asset, its cost of recovery inclusion in depreciation, and its corresponding influence on rate base. The reduction in the excess deferred income tax balance would also result in an increase to rate base and related revenue requirement.

It is anticipated that the amortization of excess deferred income taxes subject to normalization will result in annual amounts that vary, perhaps significantly, from

UG 344 NWIGU DR 42 NWN Response Page 3 of 5

year to year. As a result, inclusion in base rates per the revenue requirement of a particular annual amount, such as that may occur in a single test year, may result in a disconnect in later years when the amount that has been built into base rates per the revenue requirement differs significantly from the actual amortization amount in those later years. It may be more appropriate to address the annual amortization of these normalized amounts in a separate mechanism that can reflect the annual change in amortization in real time. This would help to ensure that in years that amounts are increasing that customer benefits are not delayed, and in years that amounts are decreasing that normalization violations do not occur.

- b) Customers continue to benefit from the estimated excess deferred income tax balance as it is currently included as a reduction to rate base. As provided in §13001(d)(1), of the TCJA, a normalization violation occurs if excess tax reserves are reduced more rapidly, or to a greater extent than such reserve would be reduced under the average rate assumption method (ARAM). An accelerated reduction of the excess deferred income tax balance, beyond that which would be provided for under ARAM, was not included in the filing. Please see the discussion in a) above.
- c) It is not the intention of NW Natural to exclude the benefit of the excess revenue deferral occurring in 2018. NW Natural is currently recording a deferral of estimated excess revenue in 2018, based on the forecasted benefit of the lower federal corporate income tax rate provided in the TCJA, for the period from January 1 through October 31, 2018. To determine the net reduction to income tax expense from the TCJA, NW Natural is utilizing a forecasted annual results of operations report to perform a with and without TCJA calculation. Beginning in January of 2018, the reduced tax amount, grossed up for income taxes, is recorded as a reduction to current revenue, with an equal offset to a new regulatory liability account. The actual deferral amount, for the full ten month period, will not be known until after October of 2018. In addition, the application of earnings test consideration usually applies to deferrals. Earnings test implications may not be known until the calendar year is complete.

The determination of the deferral amount, using actual 2018 results, is consistent with the direction provided by Ms. Sommer Moser, from the Oregon Department of Justice (see email to all parties dated March 23, 2018), in follow up correspondence from the tax workshop held in late February. Deferrals of revenue, such as that one at issue here, are usually subject to amortization over the gas year (November to October) or in a single lump sum if significant. In the meantime, NW Natural is accruing interest, to the benefit of customers, until a determination can be made regarding the disposition of this deferral balance.

d) See files enclosed:

UG 344 NWIGU DR 42 Attachment 1- Deloitte Accounting for Income Taxes Qtrly Hot Topics.pdf UG 344 NWIGU DR 42 Attachment 2- Deloitte Frequently Asked Questions About Tax Reform.pdf

UG 344 NWIGU DR 42 Attachment 3- Deloitte Power and Utilities Quarterly Accounting Update.pdf

UG 344 NWIGU DR 42 Attachment 4- PwC Accounting considerations of US tax reform.pdf

UG 344 NWIGU DR 42 Attachment 5- PwC Sample Disclosure Tax Reform.pdf

UG 344 NWIGU DR 42 Attachment 6 – PwC SEC staff provides accounting and reporting.pdf

UG 344 NWIGU DR 42 Attachment 7- PwC Tax reform readiness.pdf

e) As noted in the discussion in a), above, it is anticipated that the amortization of excess deferred income taxes subject to normalization will result in annual amounts that vary, perhaps significantly, from year to year. As a result, inclusion in base rates per the revenue requirement of a particular annual amount, such as that may occur in a single test year, may result in a disconnect in later years when the amount that has been built into base rates per the revenue requirement differs significantly from the actual amortization amount in those later years. It may be more appropriate to address the annual amortization of these normalized amounts in a separate mechanism that can reflect the annual change in amortization in real time. This would help to ensure that in years that amounts are increasing that customer benefits are not delayed, and in years that amounts are decreasing that normalization violations do not occur.

As noted in part c) of "UG 344 NWIGU DR 38 NWN Response.docx," the future annual amortization amounts of EDIT balances subject to normalization is not yet known. It will take additional time to prepare the amortization schedules under the normalization rules.

f) and g) The request for accumulated book and tax depreciation, in the context of this overall data request NWIGU DR 42, appears to be an effort to gather information to allow a third party to prepare their own ARAM amortization analysis. The information requested, on its own, would be insufficient to prepare an analysis of this nature. However, we are providing book and income tax projected accumulated depreciation for the years ending 2017, 2018 and 2019 attached as UG 344 NWIGU 42 Attachment 8. This information includes depreciation on assets placed in service through 2017 (does not include projected additions for 2018 or 2019). The accumulated depreciation figures are segregated by asset vintage (the year the assets were placed in service). The book accumulated depreciation figures include method / life depreciation but do not include other plant accruals, such as cost of removal, salvage value, gain /
NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 304

304. Referring to The Tax Cuts and Jobs Act of 2017 (Tax Act), please provide a detailed narrative explaining how implementation of the Act impacts the Company's Test Year on a Total Company (Utility and Non-Utility consolidated) basis, Total Regulated Company basis, and Oregon-Allocated basis. Additionally,:

a. Please update the Company's UG 344 workpaper, 200 wp1 – Revenue Requirements Model.xlsx for the Oregon-Allocated impact and provide a reference page or highlight the cells that have been modified.

b. Please supplement SDR No. 114 for the 2017 tax return. This request is ongoing.

c. Please update SDR Nos. 115, 116, 117 and 118 for the Test year based on the Act. Please include the Total Company (Utility and Non-Utility), Total Regulated Company, and the Oregon-Allocated basis.

In the response, please list all assumptions made in forecasting the impact of the Tax Act.

Response:

- a. At the February 28th tax workshop with Staff and other interested parties, it was agreed that the utilities would provide detailed information about how the utilities would propose to treat the impacts of tax reform in a further update in that forum, and that the parties would reconvene to determine next steps for implementing the ratemaking associated with the impacts of tax reform. As those issues are resolved, NW Natural will be better able to update this data request, and it is our hope that we can resolve any outstanding issues and respond to this data request by the end of March 2018.
- b. Consistent with our annual filing schedule, the 2017 tax return will not be completed and filed until October 2018.
- c. The updated SDRs referenced will be available at the same time that an update can be completed per 304a above.

April 6 Supplemental Response:

The Company supplemented its rate case with testimony on the impact of tax reform on March 20, 2018, including changes to revenue requirement due to lower tax expense,

The company originally anticipated that the deferral application process would include discussions that would clarify the treatment of excess deferred taxes included in rate base. The company has viewed the deferral application process, including any uniformity with the treatment for all regulated companies, as the venue that would resolve the excess deferred taxes treatment. At the time of the supplemental testimony, the more detailed issues had still not been discussed or clarified, but the company also considered the excess deferred tax amortization and refund to be a deferral issue that could be processed outside of the rate case. As a result, if an ongoing deferral process were used to determine how the excess deferred taxes should be left intact at its full value. This approach assumes that the agreed treatment would be to keep the remeasurement amount in rate base. The revenue requirement was therefore not adjusted for any change to the deferred taxes as a result of remeasurement.

The company files this supplemental response to explain that it does have a proposed method to deal with the amortization of the deferred liability account that it plans to put forward in the deferral application process. The method would be to credit to a deferred liability account with the amount that is amortized each year, net of the cost of service on the amount. The reduction of the refund amount for the cost of service reflects that the amount is removed from rate base, and that rate base has increased as a result of its removal.

There are subsets of the remeasurement amount that are not required by the tax reform law to be amortized over time, and that could potentially be credited to customers more quickly, but those amounts are still uncertain. The Company has not presumed the treatment of those amounts, and has always intended that the treatment reflect the agreement of the parties on the timing of credits. If an agreement were reached that resulted in an expedited return of those amounts, and thus an expedited reduction in the deferred tax/excess deferred component of rate base, then the Company would propose that an appropriate adjustment to rate base be made in the rate case. UG 344 – PUC Response to NWN Data Request Page 1

Date: May 17, 2018

TO:

ZACHARY KRAVITZ NORTHWEST NATURAL GAS 220 NW SECOND AVENUE PORTLAND, OR 97209 zdk@nwnatural.com efiling@nwnatual.com LISA RACKNER McDOWELL RACKNER & GIBSON PC 419 SW 11th AVENUE, SUITE 400 PORTLAND, OR 97205 <u>lisa@mcd-law.com</u>

FROM: Lance Kaufman Senior Utility Economist Energy Rates, Finance and Audit Division

OREGON PUBLIC UTILITY COMMISSION Docket No. UG 344 - NWN Data Request filed May 3, 2018

Data Request No 030:

After estimating use-per-customer (UPC) for residential, small commercial, 31CSF, and 32CSF customers, did Staff test their UPC model output coefficients to determine how well they can replicate historic load data at the Oregon system level (a test fit)? Did Staff attempt to test the model by regressing on a subset of data, and then forecasting load through the end of the data date range to determine how well the model predicts actual load (a forecast to actuals)?

Staff Response No 030:

Yes, Staff performed a fit test on each model. Staff did not attempt an out of sample test as described in the second question of this data request.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Dr. Bente Villadsen

RETURN ON EQUITY Exhibit 1600

May 23, 2018

EXHIBIT 1600 - REPLY TESTIMONY – RETURN ON EQUITY

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i - REPLY TESTIMONY OF DR. BENTE VILLADSEN

1		

I. INTRODUCTION AND SUMMARY

- Q. Please state your name and relationship with NW Natural Company ("NW
 Natural").
- 4 A. My name is Bente Villadsen and I am a principal at The Brattle Group (Brattle). I
- 5 am the same Bente Villadsen who filed Direct Testimony in this matter in
- 6 December 2017. I have been asked by Northwest Natural ("NW Natural" or "the
- 7 Company") to review and comment on the opening testimonies of Mr. Matt
- 8 Muldoon on behalf of Staff ("Muldoon Testimony" or "Staff 200"), Mr. Michael P.
- 9 Gorman on behalf of AWEC ("Gorman Testimony" or "AWEC 100") and Mr. Bob
- Jenks and Mr. William Gehrke on behalf of CUB ("Jenks & Gehrke Testimony" or
- "CUB 100") on behalf of CUB. I have also reviewed and comment on the
- 12 testimony by Mr. Bradley G. Mullins on behalf of AWEC.
- 13 My qualifications were included with my direct testimony ("Villadsen
- 14 Testimony" or "NW Natural/400, Villadsen").
- 15 Q. Please summarize your rebuttal testimony.
- A. Preliminarily, the ROE proposed by Staff and AWEC is well below that awarded
- other gas LDCs recently, where the average ROE for 2017-18 was approximately
- 18 9.7% while the median was 9.6% in 2017 but reached 9.8% in Q1, 2018. CUB
- 19 calculates an average 9.55 percent from my multi-stage DCF. This figure is
- 20 higher than that of Staff and AWEC, but below the average and mean for the
- industry. At the same time the intervening parties have provided no compelling

1 - REPLY TESTIMONY OF DR. BENTE VILLADSEN

1	evidence that NW Natural has lower business or systematic risk than that of
2	these companies. Therefore the recommended ROE is simply too low.
3	The remainder of my rebuttal testimony reaches the following conclusions:
4	 My recommended ROE of 10% on 50% equity remains valid
5	The ROE recommendations of interveners are too low and below
6	industry standards
7	Interveners have not provided evidence that NW Natural has lower risk
8	than their peers and ignore company specific risks
9	Interveners agree that interest rates are increasing; hence is the cost
10	of capital
11	 Once adjusted for key flaws in inputs or method,
12	 Staff's modified results support an ROE of no less than before
13	any consideration of NW Natural specific risks; for the
14	modification, I consider the following:
15	1. Staff relies on only one method
16	2. Staff excludes Chesapeake
17	3. Staff's estimate of the market risk premium is too low
18	 AWEC's modified results support an ROE of 9.5% - 9.9% before
19	any consideration of NW Natural specific risks or recovery of
20	equity issuance costs; for the modification I consider the following:
21	1. Mr. Gorman fails to consider financial risk

1	2. Mr. Gorman relies on a growth rates that is not well
2	described or documented and ignore Value Line
3	growth rates
4	3. Mr. Gorman inappropriately uses the current yield on
5	Baa bond in his risk premium model, but forecasts
6	that government bond yield will increase
7	\circ CUB does not estimate an ROE but looks to the midpoint of the
8	multi-stage DCF. The midpoint of my estimate did not include
9	equity issuance costs, which should therefore be added.
10	 Regarding NW Natural's circumstances, I note that
11	$_{\odot}$ $$ The size premium is well documented contrary to Staff's and
12	AWEC's belief although I note that I did not add a size premium to
13	my results, but merely used it as an indicator of, where in the
14	range NW Natural would fall.
15	\circ CUB's belief that the WARM and other mechanisms reduce NW
16	Natural's risk fails to recognize that most of the sample
17	companies have similar mechanisms and ignores the empirical
18	evidence that decoupling and other mechanisms do not affect the
19	ROE.
20	\circ Equity issuance cost is a cost of raising capital and it is common
21	to recover such costs.
22	 Interveners critique of my approach has no merit; specifically

1		\circ Contrary to Mr. Gorman's position, the consideration of financial
2		leverage through the Hamada (or other) method is fully consistent
3		with the Commission's precedence and modern finance theory.
4		\circ Reliance on the ECAPM is warranted in addition to the CAPM and
5		can substitute for other multi-factor models. Value Line adjusted
6		betas and ECAPM consider two different impacts and are both
7		merited.
8		 The inverse relationship between risk-free rates and allowed ROE
9		is persistent and a useful tool to determine the risk premium
10		model.
11		\circ My elimination of very low or very high results was (i) symmetric
12		and (ii) a simple elimination of outliers – not a biased approach.
13 14		II. <u>RECOMMENDED ROE: INDUSTRY STANDARDS AND RISK</u> <u>CONSIDERATIONS</u>
15 16	Q.	What is your reaction to the ROE recommendations from Staff, AWEC, and
17		CUB in this proceeding?
18	A.	As noted above, I find that my recommendation of an ROE of 10% on 50% equity
19		remains valid. In contrast, the recommendations of the intervening parties are
20		too low for several reasons. Staff's and AWEC's recommendation of 9.0% and
21		9.15%, respectively is near the bottom of what has recently been awarded in
22		other jurisdictions – yet, no convincing evidence has been presented that NW
23		Natural is lower risk than the industry – let alone any evidence on the magnitude

1		of such risk. At the same time, the lower than standard ROE recommendations
2		are based primarily on results from the multi-stage DCF model with, in the case
3		of Staff, no consideration of other standard cost of equity estimation methods and
4		in the case of AWEC, no consideration of financial risk or recovery of equity
5		issuance costs. The recommendation of CUB is also below the national average
6		for the gas LDC industry but closer than those of Staff and AWEC. However,
7		CUB also ignored methods other than the multi-stage DCF and company-specific
8		risks.
9	Q.	Why do you say the recommended ROE is below industry standard?
10	A.	Looking to 2018 and the first quarter of 2018, the allowed ROE among US gas
11		LDC's is summarized in Figure R-1 below.
12		Figure R-1: Allowed ROE Among US Gas LDCs ¹
		Q1, 2018 2017
		Average Allowed ROE 9.68% 9.72%
		Median Allowed ROF 980% 960%
13		Source: RRA Regulatory Focus: Major Rate Case Decisions – January – March 2018
14		
15		Clearly, Staff's recommendation of 9.0% and AWEC's recommendation of 9.15%
16		is much below the norm while CUB's proposed 9.55% is somewhat below. ²
17		Importantly, Staff's proposed ROE of 9.0% includes 12.5 basis points for equity

¹ RRA provide the publicly available ROE (ROR and Capital Structure) for all major rate cases, but does not provide details about the methodology relied upon, and limited information about specifics such as whether equity issuance costs are included in the allowed ROE. Dr. Villadsen is aware that among the 2018 allowed ROEs, the allowed ROE for Northern Illinois Gas Company (9.8%) did not include equity issuance costs, while, for example, the Missouri Public Service Commission (Spire 9.8%) and Maine Public Utilities Commission (Northern Utilities at 9.5%) did not specify whether equity issuance cost were included in the ROE.

² Staff/200/Muldoon/1, AWEC/100/Gorman/2, CUB/100/Jenks-Gehrke/21.

1	issuance costs. ³ I note that the difference between the recommended ROE and
2	that typically allowed in the industry cannot be explained by NW Natural's
3	financial or business risk. The allowed ROEs for other gas LDCs were awarded
4	on an average of 51.1% equity in Q1, 2018 and 49.9% equity in 2017. ⁴ This is
5	very much in line with the capital structure NW Natural is requesting in this
6	proceeding. I also see no compelling argument that NW Natural has lower
7	business risk than the peers and will address that issue next.

8 Q. Does NW Natural face lower risk than its peers?

9 A. No. In my direct testimony I noted that NW Natural faced risks from its smaller

size and from Oregon / City of Portland climate initiatives. It appears that Staff,

AWEC, and CUB all took issue with NW Natural's size resulting in higher risk.⁵

12 However, no party took issue with my discussion of Oregon and the City of

13 Portland's climate initiatives and their potential impact on NW Natural's risk

14 profile. In addition, CUB believes that the "purchased gas adjustment

15 mechanism, the WARM program, decoupling, environmental cost deferral, and

- 16 pension cost deferral" are risk reducing.⁶
- As no party took issue with the discussion of climate initiatives, I only
- address the impact of the recovery mechanisms on ROE and the size effect.

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³ Staff/200/Muldoon/52-53.

⁴ Source: RRA Regulatory Focus: Major Rate Case Decisions – January – March 2018, April 17, 2018.

⁵ Staff/200/Muldoon/33; AWEC/100/Gorman/53-54, and CUB/100/Jenks-Gehrke/21.

⁶ CUB/100/Jenks-Gehrke/22.

Q. Please discuss the relationship between mechanisms such as those listed
 by CUB and a utility's cost of equity.

Α. First and foremost, many of the mechanisms listed by CUB are common among 3 gas LDCs, so to the degree that there is any impact on the ROE, it would already 4 be included in the ROE estimates I obtain from the sample. For example, while 5 many of the sample companies operate in multiple jurisdictions, all companies in 6 the subsample have some form of purchased gas adjustment mechanism and all 7 8 but Chesapeake have some form of decoupling. Additionally, many of the companies have other types of trackers. Figure R- 2 below illustrates the 9 prevalence of such mechanisms and also lists the jurisdictions in which the 10 subsample companies have substantial operations. 11 /// 12

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Figure R- 2: Prevalence of Adjustment Clauses among Sample Companies⁷

Company	Significant States	Fuel Adjustment	Decoupling	Other mechanisms
Atmos	Mississippi	Yes	Partial	1
	Louisiana	Yes	Partial	2
	Texas	Yes	Partial	3
Cheasapeake	Delaware	Yes	No	4
	Florida	Yes	No	5
One Gas	Kansas	Yes	Partial	6
	Oklahoma	Yes	Partial	7
Southwest	Nevada	Yes	Full	8
	Arizona	Yes	Partial	9
Spire	Alabama	Yes	Partial	10
	Missouri	Yes	No	11
NW Natural	Oregon	Yes	Partial	12

Source: Regulatory Research Associates, "Adjustment Clauses," Aug 2016

1. Conservation, other	7. Conservation, other
2. Other	8. Capital tracker, other
3. Capital tracker, other	9. Conservation, other
4. Environmental, other	10. Other
5. Conservation, environmental, capital tracker,	
other	11. Capital tracker, other
6. Conservation, capital tracker, other	12. Environmental

- 2 Based on the information in Figure R- 2 it is clear that the use of decoupling, fuel
- 3 adjustment, and other mechanisms for NW Natural is in line with their use for the
- 4 sample companies. Thus, NW Natural is no less at risk for recovery than the
- 5 sample of regulated sample companies.

6 Q. Are there other reasons why the recovery mechanisms that NW Natural has

7 in place may not impact the cost of equity?

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⁷ NW Natural/1604/Villadsen provides details about the states in which the sample companies have substantial activity.

A. Yes. Empirical tests have shown that decoupling mechanisms have no impact
 on the cost of equity. For example, Wharton and Vilbert found no evidence that
 decoupling impacted the cost of capital for a sample of regulated electric
 companies.⁸ A similar result was found for gas LDC in a prior study.⁹ Looking to
 this empirical result, it is important to recognize that only items that impact
 systematic risk affect the cost of capital. According to the empirical evidence,
 decoupling does not affect systematic risk and hence not the cost of capital.

8 Q. Please explain the issue with NW Natural's size.

9 A. As explained in my direct testimony, NW Natural is smaller than the average gas

10 LDC and the average company in my sample at about half the size of the

¹¹ average subsample company.¹⁰ According to academic studies, smaller

12 companies require a higher return than do larger companies.¹¹ For example,

13 Duff & Phelps look to all companies in the CRSP data base, which includes

14 stocks traded on the New York Stock Exchange ("NYSE") and NASDAQ and

15 estimate the amount by which a company in a specific size decile require a return

on equity that is higher or lower than what is determined by the CAPM. As all my

sample companies (as well as NW Natural) trade on the NYSE and are therefore
 subject to the analysis.

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⁸ Joe Wharton and Michael J. Vilbert, "Decoupling and the Cost of Capital," The Electricity Journal 28, 2015, pp. 19-28.

⁹ Joe Wharton, "An Empirical Study of Impact of Decoupling on Cost of Capital," National Conference of Regulatory Attorneys, June 2011.

¹⁰ NW Natural/400/Villadsen/Page 2 and Page 32 (Table 2)

¹¹ Duff & Phelps, 2017 Valuation Handbook, Chapter 7.

1	Duff & Phelps estimate the premium that is needed for a smaller size
2	company over the CAPM estimate by decile and consistently find that smaller
3	companies have a return in excess of that estimated by the CAPM, while larger
4	firms have a return below that of the CAPM. ¹² Studies in the last ten years or so
5	have provided theoretical underpinnings for this result and find that theoretical
6	models have emerged in which the "size effect arises endogenously as a result
7	of systematic risk." ¹³ The results from empirical studies focus on explaining the
8	phenomena but do not directly test the theory. ¹⁴ The study further notes that "the
9	size premium in the US has been positive and large in recent years" and
10	acknowledge that more research is needed. ¹⁵ I know of no recent studies that
11	focus on the utility industry and of none that test the more recent theoretical
12	developments. ¹⁶ I also note that while earlier studies focused on the size
13	premium using the excess return of small stocks relative to larger stocks, newer
14	research focus on the beta-adjusted size effect, which tend to be smaller. ¹⁷ The
15	figures I cited in my direct testimony are beta-adjusted. Regardless, the general
16	observation on the size premium is clear – smaller stocks command a higher
17	return. However, I do not add a size premium to my estimates, but rather use the

¹² Duff & Phelps, 2017 Valuation Handbook, p. 7-9 and 7-11.

¹⁷ Michael W. Barad, "Technical Analysis of the Size Premium," Ibbotson Associates.

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¹³ See Marthijs A. van Dijk, "Is Size Dead? A Review of the Size Effect in Equity Returns," *Journal of Banking and Finance* 35 (2011), pp. 3263-3274 for a review.

¹⁴ *Ibid.*, p. 3272.

¹⁵ *Ibid.*, p. 3272.

¹⁶ Studies from the 1990es found limited evidence of the size effect for utilities.

- literature on this topic to guide my selection of the recommended ROE. The
 ROE of 10% is fully supported by my analysis as summarized in Tables 3-5 in my
 direct testimony.¹⁸
- 4 Q. What do you conclude from the discussion above?

A. Indications are that gas LDCs are allowed an average / median return on equity
of 9.6 to 9.8 percent with the six 2018 decisions ranging from 9.0 to 10.19
percent. Consequences of awarding a ROE below that available in other
jurisdictions is a matter of (i) fairness as the Supreme Court has been adamant
that the allowed return must be comparable to that of alternative investments of
equal risk (Hope and Bluefield) and (ii) investors will draw inferences about the
allowed return and how to allocate funds.

12 Regarding NW Natural's company risks, I note that the presence of 13 various regulatory mechanisms such as the purchased gas adjustment 14 mechanism, the WARM program (decoupling of weather usage),¹⁹ decoupling, 15 environmental cost deferral, and pension cost deferral is common among the 16 sample companies and therefore included in the cost of equity estimation. There 17 is additionally empirical evidence that decoupling does not affect the cost of 18 capital. Therefore, tracker mechanisms are neutral for the placement of NW

11 - REPLY TESTIMONY OF DR. BENTE VILLADSEN

¹⁸ NW Natural/400/Villadsen/Pages 40, 43, and 45.

¹⁹ I note that at least Atmos, Chesapeake, Southwest Gas, and Spire have some type of weather adjustment mechanism in place. Source: Regulatory Research Associates, Adjustment Clauses," August 2016.

- 1 Natural in the sample and the State of Oregon and the City of Portland's climate
- 2 initiatives add a degree of uncertainty.
- 3 Lastly, NW Natural's smaller than average size provides indications that a
- 4 higher ROE is warranted.
- 5 6

7

III. IMPACT OF ECONOMIC AND FINANCIAL DEVELOPMENTS ON ROE

- Q. What do intervening parties discuss regarding the economic and financial
 developments?
- 10 A. Mr. Muldoon discusses the economic development since NW Natural's last rate
- case and notes that that yields on both long-term and short-term government
- bonds has risen in 2018 (more for the shorter term securities), that dividends are
- 13 up, and the credit negative impact of the December 2017 Tax Cut and Jobs Act
- 14 ("TCJA"). Mr. Muldoon concludes that optimistic growth has yet to materialize
- and that the:

16 general economic trends underscores an economy that is still slow 17 and sluggish in growth. The slow growth of the economy in general

18 requires less of a return on equity to attract investors, indicating an

- 19 ROE toward the lower end of the range of reasonable ROEs.²⁰
- 20 Mr. Gorman concurs that interest rates have risen and are expected to
- 21 increase further; again more for the shorter term rates.²¹ Mr. Gorman further

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²⁰ Staff/200/Muldoon/16, lines 13-16.

²¹ AWEC/100/Gorman/16-18.

range and stable.²² but he does not appear to discuss the impact of the TCJA. 2 Do you have any comments on the economic and financial condition Q. 3 discussions by Mr. Muldoon or Mr. Gorman? 4 5 Α. Yes. I agree that interest rates have been and are increasing and that to date we have seen the increase in interest rates primarily materialize in the shorter rates. 6 I also concur with Mr. Muldoon that the TCJA will have a negative impact on 7 credit metrics and note that Moody's listed NW National as one of the companies 8 it put on watch primarily due to the tax reform.²³ I will address Mr. Muldoon's 9 conclusion that the ROE should be toward the lower end of the range of 10 reasonable ROEs below. I will also address Mr. Gorman's focus on credit rating 11 agencies' statements regarding NW Natural²⁴ as they pertain to the 12 determination of the cost of equity – credit rating agencies focus on credit risk, 13 equity investors want a return that is comparable to that of comparable equity 14 investments. 15 Q. What are some key developments in the economy since your direct 16 evidence that might impact the cost of equity? 17

notes that credit ratings for the gas LDC industry are mostly in the A to high BBB

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²² AWEC/100/Gorman/12-13.

²³ Moody's, "Moody's Changes Outlook on 25 US Regulated Utilities Primarily Impacted by Tax Reform," January 19, 2018.

²⁴ AWEC/100/Gorman/21-22.

A. As noted above, increasing interest rates will impact the cost of equity as will the
 TCJA. In addition, GDP growth was higher than expected in 2017²⁵ and market
 volatility returned for a short period in February 2018. I discuss each of these in
 turn along with their impact on the cost of equity.

5

Q. How has the TCJA impacted NW Natural's cost of capital?

- Α. While it is too early to know exactly how the TCJA will impact cost of capital, 6 there are preliminary indications. The TCJA is intended to stimulate the 7 economy and to the extent that it is successful, it will put upward pressure on 8 inflation and interest rates for an increase in the cost of capital. Additionally, a 9 reduction in the tax rate will increase the variability in NW Natural's earnings, so 10 that earnings and cash flow become more volatile as shown below in Figure R-11 3.²⁶ It is clear from the example that a lower tax rate leads to larger volatility in 12 earnings – in the example, Net Income is reduced by \$52 if cost increases by 13 10%, but at 21% income tax the reduction in net income increases to \$63.2. In 14 essence, taxes act as a buffer on volatility in revenues or cost. 15 /// 16 /// 17
- 18

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²⁵ NW Natural/1601/Villadsen.

²⁶ See also Bob S. Mudge, Mike Tolleth, and Bente Villadsen, "Six Implications of the New Tax Law for Regulated Utilities," January 2018. Available at: http://files.brattle.com/files/13011 six implications of the new tax law for regulated utilities.pdf

	Allowed Rev	enue	Cost Increases	s by 10%
Tax Rate	35%	21%	35%	21%
Revenue	\$953.8	\$926.6	\$953.8	\$926.6
Cost	\$800.0	\$800.0	\$880.0	\$880.0
Income before Tax	\$153.8	\$126.6	\$73.8	\$46.6
Тах	\$53.8	\$26.6	\$25.85	\$9.78
Net Income	\$100.0	\$100.0	\$48.0	\$36.8

Figure R- 3: Illustration of the Impact of Lower Taxes on Net Income

1

2

3		Further, Moody's Investor Services on January 19, 2018 put 25 utilities on
4		credit watch negative as their credit metrics may be adversely impacted by the
5		TCJA. Among those utilities was NW Natural. ²⁷ A negative ratings action clearly
6		impacts the utility's cost of debt and could impact its access to capital.
7		While we have yet to see the impact of the TCJA on economic activity and
8		inflation as well as on credit ratings, the expected directional impact on NW
9		Natural's cost of capital is an increase.
10	Q.	How about the development in interest rates?
10 11	Q. A.	How about the development in interest rates? At the time I filed my direct testimony, the 20-year government bond was
10 11 12	Q. A.	How about the development in interest rates? At the time I filed my direct testimony, the 20-year government bond was approximately 2.7%, whereas in April it has reached 2.96% for an increase of
10 11 12 13	Q. A.	How about the development in interest rates? At the time I filed my direct testimony, the 20-year government bond was approximately 2.7%, whereas in April it has reached 2.96% for an increase of about 25 basis points. ²⁸ Additionally, Blue Chip in October 2017 forecast a 10-
10 11 12 13 14	Q. A.	How about the development in interest rates? At the time I filed my direct testimony, the 20-year government bond was approximately 2.7%, whereas in April it has reached 2.96% for an increase of about 25 basis points. ²⁸ Additionally, Blue Chip in October 2017 forecast a 10- year government bond yield of 3.5% for 2020 and 2021, but that forecast had
10 11 12 13 14 15	Q. A.	How about the development in interest rates? At the time I filed my direct testimony, the 20-year government bond was approximately 2.7%, whereas in April it has reached 2.96% for an increase of about 25 basis points. ²⁸ Additionally, Blue Chip in October 2017 forecast a 10- year government bond yield of 3.5% for 2020 and 2021, but that forecast had increased slightly in March 2018 to 3.5% and 3.6%. ²⁹ All indications are that

²⁷ Moody's, "Moody's Changes Outlook on 25 US Regulated Utilities Primarily Impacted by Tax Reform," January 19, 2018.

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²⁸ Federal Reserve Bank of St. Louis: <u>https://fred.stlouisfed.org/categories/115</u>

²⁹ Blue Chip Economic Indicators, October 2017; Blue Chip Economic Indicators, March 2018.

1		the Federal Funds Rate and reduces its balance sheet. Most recently, the
2		Federal Reserve raised the Federal Funds Rate in December 2017 and March
3		2018, while the most recent meeting in early May 2018 held the rate constant.
4		Thus, the Federal Reserve has initiated an increase in its target rate and
5		expectations are that other interest rates will follow.
6	Q.	What are your observations regarding Mr. Muldoon's and Mr. Gorman's
7		risk-free rates?
8	Α.	Mr. Muldoon relies on an observed risk-free rate of 3.14%, ³⁰ Mr. Gorman uses a
9		forecasted risk-free rate of $3.70\%^{31}$ and my direct testimony used a forecasted
10		risk-free rate of 3.94%. ³²
11		I disagree with Mr. Muldoon's use of a current risk-free rate for the
12		purpose of estimating the cost of capital for November 2018 onwards. As the
13		rates that are determined in this proceeding will become effective after November
14		1, 2018, it is necessary to reflect the risk-free rate that is expected after
15		November 2018.
16	Q.	What are inflation expectations?
17	Α.	Blue Chip forecast 2019-2020 inflation at 2.3%. ³³ This is the same level as that
18		relied upon in my direct testimony, but above the 2% the Federal Reserve views

³⁰ Staff/212/Muldoon/1. The rate is listed as that on 30-year government bonds as of Feb. 28, 2018.

³¹ AWEC/100/Gorman/43.

³² NW Natura/402/Villadsen/9.

³³ Blue Chip Economic Indicators, March 2018.

as "most consistent over the longer run with the Federal Reserve's statutory
 mandate."³⁴

3 Q. Has market volatility changed in recent months?

A. Yes. After a longer period of relatively low market volatility, the US saw
substantial market changes in early 2018 and the VIX (a 30-day ahead measure
of market volatility) spiked in February 2018. The VIX is depicted in below, which
is simply an updated version of Figure 4 from my direct testimony.³⁵ It is clear
from the figure that a period of calm on February 7, 2018 was replaced by a
spike that more than doubled the VIX index. While the spike in the VIX was
short-lived, it showed that volatility is not a thing of the past.

Volatility and especially longer term volatility such as the SKEW is an important consideration in cost of capital estimation because, as I discussed in my direct testimony, lead to higher equity risk premium and hence higher return expectations.³⁶ Figure R-4 and Figure R- 5 below provide the recent history of the VIX and SKEW indices.³⁷

15 the VIX and SKEV

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³⁴ https://www.federalreserve.gov/faqs/money_12848.htm

³⁵ NW Natural/400/Villadsen/23.

³⁶ NW Natural/400/Villadsen/23-25

³⁷ NW Natural/1602/Villadsen. The associated workpaper provides the underlying data.



Figure R-4: Recent VIX History





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1	While the VIX recently has indicated higher volatility than in the recent past, the
2	SKEW has fluctuated around its 2016-18 average, which is higher than that of
3	the past.

Q. What are the implications of the developments in the general economy and
 the TCJA?

- A. Increasing interest rates and inflation are indications that the cost of capital is
 increasing. As interest rates have increased since my direct evidence and are
 expected to increase further, the estimated ROE of 10% remains valid. The
 spikes in the VIX as well as the level of the SKEW are indications that, if
 anything, the cost of equity is increasing.
- 11

IV. <u>RECOVERY OF EQUITY ISSUANCE COSTS</u>

12 Q. What do interveners say about equity issuance costs?

- 13 A. Staff recommends including 12.5 basis points in the allowed ROE for utilities to
- recoup issuance / flotation costs.³⁸ AWEC's witness, Mr. Mullins, in turn
- 15 suggests that stock issuance costs are not an expense and therefore should not
- ¹⁶ be recovered in the revenue requirement.³⁹ I did not find a discussion of this
- issue in the Jenks and Gehrke Testimony.

18 **Q.** What is your reaction to these statements?

³⁸ Staff/200/Muldoon/53-54.

³⁹ AWEC/200/Mullins/25.

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1	Α.	I disagree with Mr. Mullins that equity issuance cost should be disallowed as
2		raising funds (debt or equity) cost money and, just like a discount on a bond
3		issuance, is part of what a utility needs to recover in rates. As for Staff's
4		proposal to add 12.5 basis points to the ROE to recoup such costs, I see no
5		problem including an appropriate amount in the allowed ROE.
6	Q.	What are common practices in this regard?
7	A.	The practices vary widely by jurisdiction, but I note there are examples of
8		jurisdictions that recover such costs as a line item in the revenue requirement
9		and examples of jurisdictions that add a number of basis points to the allowed
10		ROE. As for the latter approach, I am aware that Professor Morin provides a
11		summary of methodologies relied upon to adjust the ROE for the issuance of
12		equity. Professor Morin also finds that the issuance costs vary by the size of the
13		issuance. ⁴⁰ As Dr. Morin explains:
14 15 16 17 18 19 20		The simple fact of the matter is that common equity capital is not free. Flotation costs associated with common stock issue are very similar to the flotation costs associated with bonds and preferred stocks. Flotation costs are incurred, and if they are not expensed at the time of issue, they must be recovered through a rate of return adjustment. This is routinely done for bond and preferred stock issues by most regulatory commission. ⁴¹
21		One approach to adjusting the allowed ROE to provide recovery of all past

22 equity issuance costs can be implemented via a straightforward adjustment to

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⁴⁰ Roger A. Morin, "*New Regulatory Finance*," 2006, Chapter 10.

⁴¹ *Ibid.* p. 321.

the single-stage DCF model. In place of the standard single-stage DCF formula,
 the following formula is used.

$$r = \frac{D_1}{P_0(1-f)} + g$$

4		where f is the percentage of proceeds lost to underwriting fees or other flotation
5		costs. This formula recognizes that if shares trade at (for example) \$100, but 7.2
6		percent of the proceeds of the initial issuance of those shares was spent on
7		underwriting fees, only $100 \times (1 - 0.072) = 92.8$ represents value invested in
8		cash-flow generating assets. Therefore it is relative to this "adjusted" price-not
9		the nominal market price—that investors' required return should be measured.
10		Simply put, equity investors provided \$92.8 towards the financing of the
11		company's assets, while \$7.2 was used to raise that capital.
12	Q.	Can you provide some concrete examples of jurisdictions that allow the
13		recovery of equity issuance costs or flotation costs?
14	Α.	Yes. Other jurisdictions have awarded an ROE adder of 8 to 50 basis points for
15		the recovery of equity issuance costs and flotation costs. These examples are

- 16 summarized in Figure R-6 below.
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		Jurisdiction	Basis Points Allowed	Reference
		Minnesota Public Service Commission	18	GR-10-276 p. 9
		The Public Utilities Commission of South Dakota	Allowed, Bps not specified	Order in EL11-019 p. 6
		Maryland Public Service Commission	8	Order 85724, p. 108
		Federal Energy Regulatory Commission	Method for calculation	Federal Register 54, 1989: 31707-31708
		Alberta Utilities Commission	50	Decision 20622- D01-2016, p. 35
2		Sources: Please see Exhibit NW Natural/1	603, Villadsen for a list of det	ailed references and links.
3	Q.	In your opinion is it appropriate f	or NW Natural to ob	tain cost recovery
4		equity issuance costs?		
5	Α.	Yes. It is simply a cost of raising equ	uity capital.	
6		V. INPUT AND METHODOLOGY		
7	Q.	What issues do you discuss in thi	is section?	
8	A.	I discuss several technical issues pertaining to the submitted testimonies. I		
9		address Staff's sample selection, growth rate inputs, and failure to use any		
10		method other than the multi-stage DCF. I also discuss Mr. Gorman's failure to		
11		incorporate a forward-looking interest rate in his risk premium model, his reliance		
12		on backward-looking growth rates, and lack of considering financial risk and		
13		ECAPM.		
14		A. Sample Selection and Estin	nation Approach	
15	Q.	Do you have any comments on th	e interveners sample	e selection?

Figure R-6: Examples of Equity Issuance Recovery

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1	A.	Yes. Mr. Muldoon ignores Chesapeake Utilities although 82 percent of its
2		balance sheet assets and 82 percent of its property, plant and equipment are
3		regulated, ⁴² which is hardly a "heavily unregulated company." ⁴³ The elimination
4		of Chesapeake is therefore not justified and reduces an already small sample.
5		Mr. Muldoon further eliminates New Jersey Resources, South Jersey
6		Industries and WGL due to their ongoing merger / acquisition activity. Mr.
7		Gorman similarly raises concern about those companies as did I in direct
8		testimony, where I created a subsample eliminating these companies. There is
9		no large difference with the inclusion / exclusion of these entities and I would
10		normally not include companies involved in merger or acquisition activity in a cost
11		of capital analysis. I therefore do not object to their exclusion.
12	Q.	What models do the witnesses present?
13	A.	While Mr. Muldoon calculates a CAPM estimated ROE as well as a single stage
14		DCF result, he relies on his multi-stage DCF results. ⁴⁴ Mr. Gorman calculates
15		three DCF estimates (Constant Growth, Sustained Growth, and Multi-Stage), two
16		versions of the CAPM and two risk premium estimates. ⁴⁵ CUB witnesses Jenks
17		and Gehrke do not implement cost of equity models.

⁴² Calculated as the sum of regulated assets plus regulatory assets divided by total assets and regulated assets divided by total property, plant and equipment, respectively. See NW Natural/1604.

⁴³ Staff/200/Muldoon/42

⁴⁴ Staff/200/Muldoon/43.

⁴⁵ AWEC/100/Gorman.

1	Q.	What are your key concerns with Mr. Muldoon's and Mr. Gorman's
2		approach to calculate the cost of equity?
3	A.	I am concerned with Staff's reliance on a single method, because different times
4		may make any one method more or less reliable.
5	Q.	Why do you think the use of multiple methods is preferable?
6	A.	I concur with the advice of Professor Stewart C. Myers who advised to "[u]se
7		more than one model when you can." ⁴⁶ Professor Morin similarly wrote:
8 9 10 11 12 13 14		No one individual method provides the necessary level of precision for determining a fair return, but each method provides useful evidence to facilitate the exercise of an informed judgment. Reliance on any single method or preset formula is inappropriate when dealing with investor expectations because of possible measurement difficulties and vagaries in individual companies' market data. ⁴⁷
15		I agree as different models and the required inputs have different pros and cons,
16		it is important to consider what they can contribute to our determination of the
17		cost of capital.
18		As for the implementation of the methods, I am concerned about certain
19		inputs used in the analysis as well as with Mr. Gorman's lack of consideration of
20		financial risk. I will discuss the models in turn below.

⁴⁶ Stewart C. Myers, "On the Use of Modern Portfolio Theory in Public Utility Rate Cases: Comment," *Financial Management*, Autumn 1978, p. 67.

⁴⁷ Roger A. Morin, *New Regulatory Finance*, Public Utilities Reports, Inc., 2006, (Morin 2006) p. 428.

1		B. Comments on Staff's Estimation Methods and Inputs
2	Q.	What concerns do you have regarding Mr. Muldoon's DCF implementation?
3	Α.	I have two concerns. Mr. Muldoon relies solely on a multi-stage DCF model and
4		uses a very low equity risk premium in his Hamada calculation. He does not
5		consider the impact of share buybacks and does not consider other versions of
6		the DCF model.
7	Q.	What are the implications of Mr. Muldoon's implementation
8	Α.	Looking to Mr. Muldoon's Exhibit 207, it is clear that had Mr. Muldoon included
9		Chesapeake and considered the constant growth DCF model, one observation
10		for consideration would be an ROE of 9.44% ⁴⁸ which is the average estimated by
11		Mr. Muldoon before any consideration of equity issuance costs. Adding the 12.5
12		basis points from Mr. Muldoon's multi-stage model results in a constant growth
13		DCF result of 9.56%, which is more than 50 basis points above Mr. Muldoon's
14		recommendation.49
15		As to Mr. Muldoon's Hamada adjustment, which is based on an
16		implementation of the CAPM and the difference obtained with and without the
17		adjustment, I note that Mr. Muldoon relies on a market risk premium of only 4.2%
18		based on Ibbotson historical MRP since 1980. ⁵⁰ It appears that Mr. Muldoon

⁴⁸ Staff/207/Muldoon, Tab "Rebuilt by Staff."

⁴⁹ Including Chesapeake in Staff's multi-stage DCF model will have limited impact on Staff's multi-stage DCF results. See NW Natural/1605 workpaper at Tab "ROE" column P.

⁵⁰ Staff/212/Muldoon/1.

1	relies on a 2011 study by Professor Arnott for this purpose. ^{51,52} There are (at
2	least) two problems with using this study for this purpose. First, the study ends in
3	2010 and therefore captures the downturn in the market associated with the
4	financial crisis, but not the upturn that has occurred recently. Second, academic
5	research suggest that if you rely on a historical measure of the market risk
6	premium, then it is best to rely on as long a period as is available. For example,
7	Professors Ross, Westerfield and Jaffe recommend that using as long a period
8	as possible is reasonable. ⁵³

Lastly, Professor Arnott's article considers it a myth that the equity risk

premium changes little over time.⁵⁴ This is relevant because the more recent 10 study of Duarte and Rosa (2015)⁵⁵ shows that recent MRP estimates have been 11 much higher than the historical past and that a current forecast for the MRP is 12 slightly higher than the long-term historical average.⁵⁶ I recognize that by looking 13 to Bloomberg's forecasted MRP as a second measure of the MRP and Mr. 14 Gorman similarly considers a forecasted MRP. This is important because the 15 magnitude of the MRP in Staff's Hamada adjustment impacts the estimated 16 ROE. Conservatively, if I use the historical average MRP, which is lower than 17

9

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⁵¹ Staff/200/Muldoon/43.

⁵² Robert D. Arnott, "Equity Risk Premium Myths," in *Rethinking the Equity Risk Premium* by P. Brett Hammond, Jr. Martin L. Leibowitz, and Laurence B. Siegel (eds.), CFA Institute 2011 ("Arnott 2011).

⁵³ Stephen A. Ross, Randolph W. Westerfield, and Jeffrey Jaffe, "Corporate Finance," 10th Edition, 2013, p. 326

⁵⁴ Arnott (2011) p. 73.

⁵⁵ Fernando Duarter and Carlo Rosa, "The Equity Risk Premium: A Review of Models," Federal Reserve Bank of New York, December 2015. Discussed at NW Natural 400 pp. 20-21.

⁵⁶ Bloomberg as of April 30, 2018 shows a forecasted MRP of 7.34%. Mr. Gorman's forecasted MRP is 7.70% (AWEC 100 p. 49).

the forecasted MRP⁵⁷ at 6.94%, in Staff's model, the estimated ROE increases
 by 17 to 25 basis points.⁵⁸

Q. Do you have any additional concerns with Mr. Muldoon's inputs or
 methodology?

Yes, I have two concerns. First, "Staff declined to incorporate the hyper 5 Α. optimistic GDP projection of the current administration."⁵⁹ Staff may find the 6 forecast optimistic, but the forecast is an official government forecast and merits 7 consideration. After all, the current administration can affect the growth in the 8 economy to a much larger degree than other parties Mr. Muldoon relies upon for 9 his forecast. I therefore believe it should be given some consideration. For 10 example, if Mr. Muldoon had incorporated the forecast with the same weight as 11 that of other government forecast, Mr. Muldoon's GDP forecast would increase 12 from 4.41 to 4.50 percent, which is very similar to Mr. Muldoon's estimate of 13 using the "Near Historical." As Staff's recommendation relies on this figure, there 14 is no numerical impact of Mr. Muldoon ignoring the GDP projection of the current 15 administration. 16

Second, as dividends are paid quarterly, it is preferable to estimate a
 quarterly model rather than an annual model. Because quarterly dividends are
 modeled to be received sooner than annual dividends, the reliance on the actual

⁵⁸ NW Natural/1605.

⁵⁹ Staff/200/Muldoon/28.

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⁵⁷ NW Natural/405/Villadsen/4 estimated the forecasted MRP at 7.44%. Bloomberg's current forecasted MRP is 7.34% and Mr. Gorman's forecasted MRP is 7.70% (AWEC/100/Gorman/49).

- 1 dividend payment schedule will increase the estimated ROE by, in my
- 2 experience, approximately 10 basis points.
- 3 Lastly, I observe that I disagree with Mr. Muldoon's reliance on the current
- 4 yield on government bonds when implementing the CAPM. However, as Staff
- 5 does not rely on the figure, I shall not discuss the issue further.
- 6 Q. What conclusions do you draw from the discussion above?
- 7 A. Mr. Muldoon's exclusive reliance on the multi-stage DCF and low MRP
- 8 downward biases his ROE estimate. Specifically, if I correct the DCF estimates, I
- 9 obtain the results shown below.⁶⁰

10 Figure R-7: Muldoon DCF Estimates and Corrected DCF Estimates

	Muldoon	Corrected
	Estimate	Estimate*
Constant Growth DCF	n/a	9.6%
Multi-stage	8.7% - 9.3%	8.9% - 9.5%
Point Estimate / Midpoint	9.0%	9.4%

11

* Includes Chesapeake

Looking to Figure R-7, it is clear that even small adjustments to Mr. Muldoon's

- 13 inputs will increase the estimated ROE non-trivially. If I further consider the
- 14 impact of modeling quarterly dividends, risk premium models or recently allowed
- 15 ROE, the results increase further.
- 16 For the reasons above, I find that Mr. Muldoon's DCF model under-
- estimates the cost of equity for NW Natural by at least 40 basis points.⁶¹ In

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⁶⁰ The estimates in Figure R-7 were obtained using Mr. Muldoon's models therefore included 12.5 basis points for equity issuance costs.

1		addition to the downward bias in the DCF model, Mr. Muldoon does not consider
2		the CAPM or risk premium models for his recommendation. Both Mr. Gorman
3		and I find that the estimates for the risk premium and CAPM currently are 30
4		basis points or more above multi-stage DCF, so any consideration of these
5		models will add to Mr. Muldoon's estimated ROE. Therefore I find that simple
6		modifications to Mr. Muldoon's DCF model and a consideration of the risk
7		premium and CAPM would result in an ROE of 9.5% to 9.7%. ⁶²
8		C. Comments on Mr. Gorman's Estimation Methods and Inputs
9	Q.	What do you discuss in this section?
10	A.	I discuss the following issues with Mr. Gorman's opening testimony. First, Mr.
11		Gorman acknowledges that recently authorized returns on equity are around
12		9.6% - 9.7% with a range of 9.3% to 9.8%. Yet, he recommends an ROE of
13		9.15% for NW Natural without explaining why NW Natural should be allowed a
14		return that, per his own accord, is 45 to 55 basis points below industry standards.
15		Second, I discuss Mr. Gorman's lack considering financial risk. Third, I focus on
16		Mr. Gorman's DCF models, where a key input is growth rates, where Mr. Gorman
17		uses growth rates from Reuters but not from Value Line. Fourth, I discuss Mr.
18		Gorman's implementation of the risk premium model, where he fails to use a
19		forecasted yield in one of his implementations. Lastly, I consider the CAPM and

⁶¹ The simple change to his inputs show an under estimation of 40 basis points and the lack of consideration of the recent average allowed ROE of 9.6 to 9.8% further indicates an underestimation.

⁶² I use 9.5% as a lower bound in that is assigns only minimal weight to the higher estimates from the CAPM, risk premium, or quarterly dividend payments. I use 9.7% as a rounded upper bound calculated as the 9.4% from the DCF models plus 30 basis points, which is the magnitude by which the risk premium and CAPM is higher than the DCF models.

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- the impact of all adjustments that are needed to make Mr. Gorman's estimates
 reasonable.
- 3

1. Gorman's Recommendation

4 Q. What is your reaction to Mr. Gorman's recommended ROE?

As noted above, Mr. Gorman states that recently authorized returns on equity are 5 Α. around 9.6% - 9.7%, but recommends an ROE of 9.15% for NW Natural although 6 he also acknowledge that the "proxy group is reasonably comparable in 7 investment risk to NW Natural" and the "total financial risk profile for NW Natural 8 ... is in line with the investment risk of the proxy group."⁶³ Mr. Gorman also 9 observes that NW Natural's credit rating is comparable to the proxy group using 10 Moody's ratings, but a notch higher using S&P's rating.⁶⁴ While credit ratings are 11 not a good measure of equity owners risk because credit ratings ultimately are a 12 measure of default risk – not of the risk equity owners face year over year, I shall 13 not discuss that issue further as Mr. Gorman does not appear to rely on this 14 information for the ultimate determination of his recommendation for NW Natural. 15 As Mr. Gorman finds NW Natural's risk characteristics in line with those of 16 comparable companies, I find it puzzling that he recommends an ROE that is well 17 below what has recently been allowed other gas LDCs. This is particularly 18 puzzling given the acknowledgement that interest rates are increasing. 19

⁶³ AWEC/100/Gorman/25.

64 Ibid.

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1		Mr. Gorman finds two of his models to be consistent with a ROE of 9.30%
2		and one to be consistent with and ROE of 9.0% - then recommends 9.15%,
3		which weigh the recommendation towards the lower end of his estimates.
4		However, the main reason for Mr. Gorman's low recommendation is the flaws
5		associated with his implementation of the cost of equity estimation models. I
6		discuss those next.
7		2. Failure to Recognize Financial Risk
8	Q.	What do you mean by failure to recognize financial risk?
9	Α.	Financial risk is caused by the degree of leverage a company has. Staff, Mr.
10		Gorman and myself all rely on financial models to estimate the ROE based on a
11		set of comparable companies, which may have capital structures that differ from
12		that of NW Natural. As Staff explains
13 14		Use of the Hamada adjusted results helps ensure that Staff has captured all material risk in my analysis because it captures
15		additional risk associated with varying capital structure. ⁵⁵
16		Mr. Gorman simply ignores this fact and makes no attempt to consider the impact
17		of such differences.
18	Q.	What is the impact of Mr. Gorman ignoring financial risk?
19	Α.	As the impact of financial risk can be measure using many method, the answer
20		will depend on the method relied upon. However, if Staff's methodology in its

21 entirety was used, Mr. Gorman would be under estimating the ROE by 0.26% to

65 Staff/200/Muldoon/46

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1		0.38%.66 However, if Staff's methodology was used with Mr. Gorman's choice of
2		Market Risk Premium was used; the ROE would be under estimated by 0.43% to
3		0.63%. ⁶⁷ Assuming Mr. Gorman wants to be consistent, he would rely on the
4		same sample as that in his testimony, which corresponds to the higher number
5		and also use the MRP relied upon in his testimony. Therefore, his DCF estimate
6		would increase from 9.0% to 9.6% and his CAPM would increase from 9.3% to
7		9.9%. The risk premium model's estimate would not change as it does not rely
8		on market prices. The midpoint of 9.3% and 9.9% is 9.6%, which would be the
9		end result if Mr. Gorman were simply to implement Staff's Hamada methodology
10		using his sample and his MRP.
11		3. Financial Model Implementation ⁶⁸
12	Q.	What specific issues do you want to raise regarding Mr. Gorman's
13		Implementation of the DCF, CAPM, and risk premium models?
14	A.	The Gorman Testimony relies on growth rates from Zacks, SNL and Reuters. I
15		find the reliance on Reuters' growth rates problematic because little to no
16		information is available regarding their origin or the date of the estimate. In
17		contrast estimates from Value Line, SNL, IBES, or Bloomberg all provide
18		information about those that contribute to the estimate and the date of the

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⁶⁶ Staff/202/Muldoon/4

⁶⁷ NW Natural/1605/Villadsen.

⁶⁸ Mr. Gorman does not include equity issuance cost in the ROE, so I do not include any adjustment to the ROE for equity issuance costs in this section.

- 1 estimate. I also find it inconsistent that Mr. Gorman relies on Value Line to obtain
- 2 his beta estimates yet ignores Value Line's growth rates.

3 Q. What is the impact of this choice of growth rates?

- 4 A. To test the implications of Mr. Gorman's choice of growth rates, I replaced Mr.
- 5 Gorman's growth rates from Reuters with Mr. Muldoon's Value Line growth
- 6 estimates. This changes Mr. Gorman's DCF estimates as follows:
- 7

Figure R-8: Gorman's DCF Using Value Line Instead of Reuters

	Gorman As Filed	Re-Estimated Replacing Reuters with Value Line
Constant Growth DCF	8.94%	9.11%
Sustainable Growth DCF	11.38%	11.38%
Multi-Stage DCF	7.47%	7.66%
Midpoint	9.42%	9.52%
Average	9.26%	9.38%

8

Source: AWEC and NW Natural/1606, Villadsen.

9 Thus, a simple replacement of Mr. Gorman's reliance on Reuters' growth rate

10 with the Value Line growth rates used by Staff will result in an increase in the

11 ROE of about 10 basis points. Additionally, the DCF models merit a financial

- 12 leverage consideration for which I use the 0.6% (rounded) I estimated above.
- 13 Conservatively, the DCF model should therefore result in an estimate of no less
- 14 than 9.9% once the Value Line growth rates and the financial leverage has been

15 incorporated.⁶⁹

This is a conservative estimate as the average / midpoint of the re-estimated DCF models is 9.38% and 9.51%, respectively. If I add the Staff Hamada adjustment with Mr. Gorman's inputs to that the final estimate is 9.98% and 10.11%, respectively.

1 **Q**

Q. How about Mr. Gorman's Risk premium Model?

Mr. Gorman presents two versions of his risk premium model. In one, he 2 Α. estimates the risk premium implicit in allowed ROEs over 30-year government 3 bonds at 5.9% and adds to that his forecast for the 30-year government bond 4 yield of 3.7% to get an ROE of 9.6%.⁷⁰ The more problematic of Mr. Gorman's 5 risk premium estimates is his estimate over utility bond yield, where he finds a 6 premium of 4.7% to which he adds the current yield on Baa rated utility bonds for 7 a ROE of 9.02%.⁷¹ My problem with this estimate is that once the yield on 8 government bond increases, so will the yield on Baa rated utility bonds. Mr. 9 Gorman estimates that the government bond yield will increase by approximately 10 63 basis points (calculated as Mr. Gorman's forecast of 3.7% minus the current 11 yield of 3.07%).⁷² Even if the Baa yield only increases by a fraction of the 12 increase in the 30-year government bond yield, adding the current Baa yield to 13 the risk premium under-estimates the ROE. Assuming that the Baa yield will 14 increase by 50 to 100 percent of Mr. Gorman's expected increase in the 15 government bond yield, an appropriate estimate of the second risk premium 16 model would be 9.3% to 9.6%. Therefore, Mr. Gorman's risk premium based 17

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⁷⁰ AWEC/100/Gorman/44-46 and AWEC/116.

⁷¹ AWEC/100/Gorman/45-46 and AWEC/117.

⁷² AWEC/100/Gorman/47 and Federal Reserve as of April 30, 2018: <u>https://fred.stlouisfed.org/series/GS30</u>

1		estimate of the ROE is downward biased and an appropriate range from this			
2		simple adjustment is 9.3% to 9.6% for a midpoint of no less than 9.45%. ⁷³			
3	Q.	Are there any issues with Mr. Gorman's CAPM implementation?			
4	Α.	The main problem with Mr. Gorman's CAPM implementation is the lack of			
5		consideration of financial risk, which would add approximately 0.6% to the			
6		estimates using Staff's methodology and Gorman's inputs. Additionally, I find the			
7		low end of Mr. Gorman's CAPM estimates too low, but understand he places			
8		primary reliance on the upper end and uses a point estimate of 9.3%. ⁷⁴			
9		Consequently, I would re-estimate Mr. Gorman's CAPM at 9.9% as his			
10		recommendation of 9.3% plus the 0.6% for Staff's Hamada methodology.			
	<u> </u>	What a makesiana da way draw the analysis and discussion above?			
11	Q.	what conclusions do you draw from the analysis and discussion above?			
11 12	Q. A.	Based on the analysis above, I find that Mr. Gorman under-estimates the ROE			
11 12 13	Q. A.	Based on the analysis above, I find that Mr. Gorman under-estimates the ROE for NW Natural by no less than 35-75 basis points. This estimate is based on			
11 12 13 14	Q. A.	Based on the analysis above, I find that Mr. Gorman under-estimates the ROE for NW Natural by no less than 35-75 basis points. This estimate is based on simple corrections to Mr. Gorman's model regarding the lack of financial risk			
 11 12 13 14 15 	Q. A.	Based on the analysis above, I find that Mr. Gorman under-estimates the ROE for NW Natural by no less than 35-75 basis points. This estimate is based on simple corrections to Mr. Gorman's model regarding the lack of financial risk considerations, the use of growth rates from Reuters rather than Value Line, and			
 11 12 13 14 15 16 	д. А.	Based on the analysis above, I find that Mr. Gorman under-estimates the ROE for NW Natural by no less than 35-75 basis points. This estimate is based on simple corrections to Mr. Gorman's model regarding the lack of financial risk considerations, the use of growth rates from Reuters rather than Value Line, and using a forecasted yield on utility bonds rather than the current yield. The results			
 11 12 13 14 15 16 17 	Q. A.	Based on the analysis above, I find that Mr. Gorman under-estimates the ROE for NW Natural by no less than 35-75 basis points. This estimate is based on simple corrections to Mr. Gorman's model regarding the lack of financial risk considerations, the use of growth rates from Reuters rather than Value Line, and using a forecasted yield on utility bonds rather than the current yield. The results from making these modifications to Mr. Gorman's estimates are shown below in			
 11 12 13 14 15 16 17 18 	Q. A.	What conclusions do you draw from the analysis and discussion above? Based on the analysis above, I find that Mr. Gorman under-estimates the ROE for NW Natural by no less than 35-75 basis points. This estimate is based on simple corrections to Mr. Gorman's model regarding the lack of financial risk considerations, the use of growth rates from Reuters rather than Value Line, and using a forecasted yield on utility bonds rather than the current yield. The results from making these modifications to Mr. Gorman's estimates are shown below in Figure R-9.			

19

///

⁷³ The fact that I do not adjust Mr. Gorman's model for the relationship between the risk-free rate and the risk premium should not be taken to mean that I agree. The results from my preferred model is included in my direct evidence.

⁷⁴ AWEC/100/Gorman/51.

1		Figure R- 9: Mr. G	orman's ROE Es	timates as Modified		
			As Filed	Revised Estimate*		
		DCF models	9.0%	9.9%		
		САРМ	9.3%	9.9%		
		Risk Premium*	9.3%	9.5%		
		Recommendation /	9.15%	9.5% - 9.9%		
		Range		(Midpoint 9.7%)		
2 3 4 5		Note that the DCF models a adjustment of 0.6% (using 0 subject to such adjustment.	and the CAPM inclu Gorman's inputs), b	ide Staff Hamada methodology out the Risk Premium is not		
6		VI. <u>Response</u>	s to the Critiq	ue of Villadsen's		
7 8		Direct Testimony				
9	Q.	Based on your review of other testimony, what do you consider a				
10		reasonable return for NW Natural?				
11	Α.	Staff and AWEC critique my estimated ROE as being too high, while Staff				
12		critiques my methodology and CUB states the recommended 10% has not been				
13		justified appropriately. ⁷⁵ Ho	wever, I continue	to consider a ROE of 10.0% the		
14	 best point estimate for NW Natural and continue to view a range of 9.7% to 10.3% as reasonable. This view is confirmed by my analysis of Mr. Muldoon's 					
15						
16		and Mr. Gorman's methods	, where simple mo	odifications to their inputs resulted in		
17		ROE estimates of somewhat	it above 9.5% in t	he case of Mr. Muldoon and 9.5% -		
18		9.9% in the case of Mr. Gor	man before any c	onsideration of NW Natural's		
19		specific risks.				
20	Q.	What issues did other with	nesses raise req	arding your direct testimony?		

⁷⁵ Staff/200/Muldoon/7-8, AWEC/100/Gorman/53, and CUB/100/Jenks-Gehrke/22.

2first. Additionally, Staff took issue with the inclusion of Chesapeake in my3sample, which I addressed in Section V.a above. Staff also objects to the4reliance on methods other than the multi-stage DCF and with the use of the5growth rate from the White House administration. I addressed those issues6Sections V.b and V.a, respectively and shall not repeat the discussion. Mr.7Gorman for AWEC further took issue with (i) my reliance on the ATWACC8methodology when considering financial risk in the DCF model and the Ham9ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu10model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with11elimination of outliers in the multi-stage DCF and the size premium discussion12I addressed the size premium above in Section II and shall not repeat the13discussion, but will address my choice of the range for the multi-stage DCF14below.15A. ECAPM	1	Α.	Both staff and AWEC raised issues with my ECAPM, which I therefore discuss
 sample, which I addressed in Section V.a above. Staff also objects to the reliance on methods other than the multi-stage DCF and with the use of the growth rate from the White House administration. I addressed those issues Sections V.b and V.a, respectively and shall not repeat the discussion. Mr. Gorman for AWEC further took issue with (i) my reliance on the ATWACC methodology when considering financial risk in the DCF model and the Ham ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	2		first. Additionally, Staff took issue with the inclusion of Chesapeake in my
 reliance on methods other than the multi-stage DCF and with the use of the growth rate from the White House administration. I addressed those issues Sections V.b and V.a, respectively and shall not repeat the discussion. Mr. Gorman for AWEC further took issue with (i) my reliance on the ATWACC methodology when considering financial risk in the DCF model and the Ham ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	3		sample, which I addressed in Section V.a above. Staff also objects to the
 growth rate from the White House administration. I addressed those issues Sections V.b and V.a, respectively and shall not repeat the discussion. Mr. Gorman for AWEC further took issue with (i) my reliance on the ATWACC methodology when considering financial risk in the DCF model and the Ham ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	4		reliance on methods other than the multi-stage DCF and with the use of the GDP
 Sections V.b and V.a, respectively and shall not repeat the discussion. Mr. Gorman for AWEC further took issue with (i) my reliance on the ATWACC methodology when considering financial risk in the DCF model and the Ham ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	5		growth rate from the White House administration. I addressed those issues in
 Gorman for AWEC further took issue with (i) my reliance on the ATWACC methodology when considering financial risk in the DCF model and the Ham ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	6		Sections V.b and V.a, respectively and shall not repeat the discussion. Mr.
 methodology when considering financial risk in the DCF model and the Ham ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	7		Gorman for AWEC further took issue with (i) my reliance on the ATWACC
ATWACC in the CAPM and (ii) my use of a regression line in the risk premiu model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below.	8		methodology when considering financial risk in the DCF model and the Hamada /
 model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	9		ATWACC in the CAPM and (ii) my use of a regression line in the risk premium
 elimination of outliers in the multi-stage DCF and the size premium discussion I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	10		model. Finally, Mr. Jenks and Mr. Gehrke on behalf of CUB took issue with my
 I addressed the size premium above in Section II and shall not repeat the discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	11		elimination of outliers in the multi-stage DCF and the size premium discussion. ⁷⁶
 discussion, but will address my choice of the range for the multi-stage DCF below. A. ECAPM 	12		I addressed the size premium above in Section II and shall not repeat the
 14 below. 15 A. ECAPM 	13		discussion, but will address my choice of the range for the multi-stage DCF
15 A. ECAPM	14		below.
	15		A. ECAPM

16 Q. What are the main criticisms of your ECAPM?

A. Staff is concerned that the ECAPM does not have traction in economic or finance practice and note that bankers such as Morgan Stanley have moved towards multi-factor models rather than towards ECAPM.⁷⁷ Mr. Gorman is concerned that

⁷⁶ CUB/100/Jenks-Gehrke/20-21.

⁷⁷ Staff/200/Muldoon/40-41.

- the reliance on adjusted betas from Value Line as well as the ECAPM double count the adjustment.⁷⁸
- 3 Q. What is your response to Staff's critique?
- A. Mr. Muldoon is correct that bankers such as Morgan Stanley (as well as
- 5 academics) rely on multi-factor models along with the CAPM (or instead of the
- 6 CAPM). This is because multi-factor models such as the Fama-French model
- 7 capture phenomena that the CAPM cannot capture; including the fact that the
- 8 empirical security market line is flatter than the theoretical line predicted by the
- 9 CAPM. For example, Fama & French (2004)⁷⁹ find that the CAPM
- 10 underestimates returns for low-beta stocks and overestimates returns for high-
- beta stocks. Thus, these models are capturing the same effect as is the ECAPM.

12 Q. How do you respond to Mr. Gorman's critique?

- A. Mr. Gorman attempts to conflate two separate and distinct empirical findings: (i) the observed market security line is flatter than the theoretical market security line and (ii) adjusted betas are better predictors of expected betas than raw betas. The ECAPM corrects for the former observation, while the Blume adjustment corrects for the latter.
- 18 Getting the relative risk of the investment correct does not correct for the 19 empirical observation that the risk-return trade-off has a "flatter" slope than that

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⁷⁸ AWEC/100/Gorman/67-70.

⁷⁹ Eugene F. Fama and Kenneth R. French, "The Capital Asset Pricing Model: Theory and Evidence," *Journal of Economic Perspectives* 18, 2014, pp. 25-46.

1		posited by the traditional CAPM, nor does adjusting that slope correct for the
2		tendency of raw historical betas to be biased predictors of the true beta that
3		measures systematic risk in forward-looking applications of either the traditional
4		CAPM or ECAPM. Simply put, the ECAPM and the Blume adjustment are not
5		redundant. Both are warranted when deriving a forward-looking estimate of the
6		cost of equity.
7		Interestingly, recent testimony before the Alberta Utilities Commission saw
8		an up-to-date study regarding the use of ECAPM for utilities and especially their
9		use along with long-term interest rates and adjusted betas. ⁸⁰ Mr. Hevert found
10		that the "CAPM tends to underestimate the returns for low-Beta coefficient firms."
11		B. Financial Leverage
12	Q.	How do you respond to Mr. Gorman's claim that you use the ATWACC and
13		Hamada method to increase the ROE?
14	A.	I disagree. As recognized by Staff it is important to recognize differences in
15		financial leverage – I do that using the Hamada method when possible and by
16		assuming the weighted average cost of capital is constant within a reasonable
17		range for models with no beta. Interestingly, the impact I estimate using the
18		Hamada model with tax is of the same magnitude as that of Staff's method for
19		the same choice of MRP. ⁸¹

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⁸⁰ Rebuttal Testimony on behalf of AltaLink, EnMax, and FortisAlberta by Robert Hevert, AUC Proceeding 22570-X0890 p. 49.

⁸¹ Compare AWEC/100/Gorman/65 and NW Natural/1605/Villadsen.

- Financial risk or capital structure is a large topic in financial economics and it is commonly recognized in finance textbooks that financial leverage impacts the cost of equity for a company. A replication of the text from a
- 4 standard MBA textbook is provided below:⁸²

COMMON MISTAKE Is Debt Better Than Equity?

Because debt has a lower cost of capital than equity, a common mistake is to assume that a firm can reduce its overall WACC by increasing the amount of debt financing. If this strategy works, shouldn't a firm take on as much debt as possible, at least as long as the debt is not risky?

This argument ignores the fact that even if the debt is risk free and the firm will not default, adding leverage increases the risk of the equity. Given the increase in risk, equity holders will demand a higher risk premium and, therefore, a higher expected return. The increase in the cost of equity exactly offsets the benefit of a greater reliance on the cheaper debt capital, so that the firm's overall cost of capital remains unchanged.

5	
6	As Professors Berk and DeMarzo further note:
7	The levered equity return equals the unlevered equity return,
9	additional risk depends on the amount of leverage, measured
10	by the firm's market value debt-equity ratio, D/E ⁸³
11	Financial economics simply do not leave any doubt that the cost of equity
12	increases with financial leverage and that financial leverage is measured using
13	market value. I, like other witnesses, estimate the cost of equity using market
14	data in the CAPM-based and DCF-based models and therefore the estimation
15	process uses market data.
16	As described in my direct testimony, I consider several methods to ensure

17 that no one method unduly biases the estimation process. The most commonly

⁸² Jonathan Berk and Peter DeMarzo, "Corporate Finance," Third Edition, 2013 (Berk & DeMarzo 2013), p. 492.

⁸³ Berk & Peter DeMarzo 2013, p. 489. Similar comments appear in Richard A. Brealey, Stewart C. Myers, and Franklin Allen, 2014, *Principles of Corporate Finance*, 11th edition, McGraw-Hill Irwin (Brealey, Myers & Allen 2014), p. 433.

used method in textbooks is the Hamada method, which is also used by Staff. It
converts the equity beta that is estimated for each proxy company into the beta
that would be relevant if the proxy company hypothetically had the same equity
percentage as NW Natural. As an alternative and for the DCF method, I also
calculate the After-Tax Weighted Average Cost of Capital as a weighted average
of the cost of equity and the cost of debt and attempt to ensure that customers
pay the same for capital regardless of capital structure.

Mr. Gorman's suggestion that "[a]pplying the Hamada methodology is just another way of increasing the CAPM results"⁸⁴ is simply wrong. Not only does his suggestion contradict Staff's testimony, but it also is at odds with every MBA textbook I know of.

12 C. Inverse Relationship between Risk-Free Rate and Risk Premium

13 Q. What concern does Mr. Gorman have with your risk premium model?

- A. Mr. Gorman believes that a regression of the allowed ROEs on the risk-free rate
 is too simplistic and may change over time.⁸⁵
- 16 **Q.** How do you respond?

A. While I concur that the relationship between risk-free rates and the allowed return

- may change over time, the critique is misguided. First, Mr. Gorman's proposal
- 19 on how to fix the issue is to assume the risk premium can be estimated as a
- 20

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weighted average of the highest and lowest 5-year rolling average risk premium.

⁸⁴ AWEC/100/Gorman/67.

⁸⁵ AWEC/100/Gorman/62.

1		This is another simplistic estimation method that contrary to my method fails to				
2		take the majority of the observations we have into account. Second, the inverse				
3		relatio	onship between risk-free rates	and the allowed	ROEs (or earr	ned ROEs)
4		was r	not just observed in the 1980s	, ⁸⁶ but continues t	to show a stati	stically
5		signif	ficant result and has varied rer	narkable little ove	er time. To illus	strate this
6		point, I reran my risk premium analysis using data from 2000 only. The results				
7		are reported below. ⁸⁷				
8		Regression Line: Data from 1990 – Q3, 2017 (NW Natural 400)				
9			y = -0.5566x + 8.4776	R ² = .83	ROE = 10.29	% - 10.3%
10		Regre	ession Line: Data from 2000 –	Q3, 2017		
11			y = -0.5978x + 8.6224	R = .77	ROE = 10.29	% - 10.3%
12		For these reasons, I believe the estimation is reasonable.				
13		D.	Choice of Reasonable Ran	ges		
14	Q.	What	t issues were raised regardir	ng your eliminat	ion of outliers	\$?
15	Α.	CUB	witnesses Jenks and Gehrke	stated that I subje	ectively made a	adjustments to
16		the ra	ange associated with the multi-	-stage DCF mode	el, ⁸⁸ while Mr. (Gorman notes
17		that I	eliminate some high-end estir	nates. ⁸⁹		

18 **Q.** How do you respond?

⁸⁸ CUB/100/Jenks-Gehrke/21.

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⁸⁶ AWEC/100/Gorman/62.

⁸⁷ See NW Natural/1606/Villadsen for data.

⁸⁹ AWEC/100/Gorman/55.

1	A.	As noted in my direct testimony NW Natural/400/Villadsen/2, estimates from all
2		other models indicate a higher ROE than does the lowest result from the multi-
3		stage DCF. The range of estimates also indicated a lower ROE than the highest
4		CAPM estimates. To avoid unduly upward or downward biasing my results I
5		eliminated the two highest and the lowest estimate – they were in a statistical
6		sense outliers in the group of estimates. In my professional judgment the lowest
7		(below 9.4) or highest (above 11%) estimates I obtained were not representative
8		for the cost of equity for NW Natural. ⁹⁰
9		E. Conclusions Regarding the Critique of Your Direct Testimony
10	Q.	Have the critiques of your direct testimony changed your estimate of the
11		ROE for NW Natural?
12	Α.	No. I continue to believe that an ROE of 10% is reasonable and find the critiques
13		to be without merit. I provided my conclusions in the introduction and shall not
14		repeat them here.
15	Q.	Does the fact that you do not address each and every critique of your direct
16		testimony imply that you agree with other statements or analyses?
17	Α.	No.
18	0	Doos this conclude your testimeny?

A. Yes.

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⁹⁰ If I alternatively had included both downside and upside outliers, my range would have been substantially wider, but the ultimate recommendation would not change.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Dr. Bente Villadsen

RETURN ON EQUITY EXHIBITS 1601-1606

May 23, 2018

EXHIBITS 1601-1606 - RETURN ON EQUITY

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FRED Graph Observations Federal Reserve Economic Data Link: https://fred.stlouisfed.org Help: https://fred.stlouisfed.org/help-faq Economic Research Division Federal Reserve Bank of St. Louis

GDP

Gross Domestic Product, Billions of Dollars, Quarterly, Seasonally Adjusted A

Frequency: Quarterly		
observation_date	GDP	Annualized Growth
2013-01-01	16475.440	
2013-04-01	16541.390	1.6%
2013-07-01	16749.349	5.1%
2013-10-01	16999.888	6.1%
2014-01-01	17031.324	0.7%
2014-04-01	17320.921	7.0%
2014-07-01	17622.257	7.1%
2014-10-01	17735.933	2.6%
2015-01-01	17874.715	3.2%
2015-04-01	18093.224	5.0%
2015-07-01	18227.689	3.0%
2015-10-01	18287.226	1.3%
2016-01-01	18325.187	0.8%
2016-04-01	18538.039	4.7%
2016-07-01	18729.130	4.2%
2016-10-01	18905.545	3.8%
2017-01-01	19057.705	3.3%
2017-04-01	19250.009	4.1%
2017-07-01	19500.602	5.3%
2017-10-01	19754.102	5.3%
2018-01-01	19965.326	4.3%

nnual Rate

NW Natural/1602 Villadsen/1





NW Natural/1602 Villadsen /2





NW Natural 1603

The following provides the detailed links to the cited decisions:

Minnesota:

https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showP oup&documentId=%7b3D436C2B-37EE-40EB-81EA-63C48EBC5A42%7d&documentTitle=20118-65311-01

South Dakota:

https://puc.sd.gov/commission/orders/electric/2012/el11-019final.pdf

Maryland:

http://www.psc.state.md.us/search-

results/?keyword=+85724&search=all&x.x=15&x.y=12

FERC:

http://cdn.loc.gov/service/ll/fedreg/fr054/fr054146/fr054146.pdf

Alberta

http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2016/20622-D01-2016.pdf

			States with Sig	nificant Activity
Company		States with Some Activity	States	Fraction of Total Rate base
		[A]	[B]	[C]
Spire	[1]	Missouri, Alabama	Alabama Missouri	5% 95%
Southwest Gas	[2]	Arizona, California, Nevada	Nevada Arizona	37% 53%
ONE Gas	[3]	Kansas, Oklahoma, Texas	Kansas Oklahoma	37% 52%
Northwest Natural Gas	[4]	Oregon, Washington	Oregon	88%
Chesapeake Utilities	[5]	Delaware, Florida, Maryland	Delaware Florida	44% 47%
Atmos	[6]	Colorado, Kansas, Kentucky, Louisiana, Mississippi, Tennessee, Texas, Virginia	Mississippi Louisiana Texas	6% 8% 71%

Sources: 'Rate Case History,' SNL RRA Regulatory Focus, accessed September 30, 2017.

Atmos Energy Corporation SEC Form 10-K for the fiscal year ended September 30, 2016.

For calculation of fraction of total rate base within each state, see Workpaper.

Notes:

[A]: States are recorded as having some activity if SNL reports natural gas distribution rate cases. A rate case is not reported by SNL if the company requests a rate change of less than \$5 million and the commission authorizes a rate change of less than \$3 million.

- [B]-[C]: To determine significant activity, the rate bases in each state are ranked for each company. The states with highest rate bases are included to reach at least 80% of the company's rate base (with the exception of Alabama, see note [1][C]).
- [1]: Spire has two utilities within Missouri: Spire Missouri Inc. and Missouri Gas Energy. Spire also has two utilities in Alabama: Spire Alabama Inc. and Mobile Gas Service Corp.
- [6]: For Atmos, rate bases and state activity are determined by information provided in its 2016 SEC 10-K filing.
- [1][C]: Although SNL reports that 95% of total rate base is in Missouri, Alabama is also reported because SNL's rate base figure for Alabama is significantly out of date.

NW Natural/1605 Villadsen/1

	1	2	3	4	5	6	7	8	9	10	11	#	13	14	15	16	17	18	# 20	21
	NWI	N GRC				Yah	Yahoo Finance * Tax C					* Tax Cu	x Cut and Jobs Act Impact				Hamada			
	UG :	344 Staff Hamada	Adjustment	S		\$ Stock Closing Price		3-Day	Div Yield	VL 2018		VL 2018 Ca	o Structure		*		Relevered		Adjustment	
						1st Tradi	ng Day of M	Nonth	Avg \$	at	Return on		% Long	%		2018	Hamada	Beta	Equity	Equity
ĺ		Abbreviated	UG 344	UG 344		Dec.	Jan.	Feb.	Stock	Recent	Common		Term	Common	VL	21%	Unlevered	Equity at	Risk	At
	#	Utility	Company	Staff	Ticker	12/31/2017	1/1/2018	2/1/2018	Price	Price	Equity		Debt	Equity	Beta	Tax Rate	Beta	50.0%	Premiun	n 50.0%
1	1	Atmos	Yes	Yes	ATO	85.89	82.90	81.05	83.28	2.2%	10.5%	1 [44.0	56.0	0.70	21.0%	0.43	0.77	6.94%	0.51%
2	2	Chesapeake	Yes	No	CPK	78.55	73.50	68.00	73.35	1.7%	9.5%		30.0	70.0	0.70	21.0%	0.52	0.94	6.94%	1.64%
3	3	New Jersey	Yes	No	NJR	40.20	38.80	38.80	39.27	2.6%	12.5%		45.5	54.5	0.80	21.0%	0.48	0.86	6.94%	0.44%
4	5	Northwest Natural	Yes	Yes	NWN	59.65	57.35	53.45	56.82	3.3%	8.0%		45.0	55.0	0.70	21.0%	0.43	0.76	6.94%	0.42%
5	6	ONE Gas	Yes	Yes	OGS	73.26	70.83	64.56	69.55	2.4%	8.5%	1 [38.0	62.0	0.70	21.0%	0.47	0.84	6.94%	1.00%
6	7	South Jersey	Yes	No	SJI	31.23	29.44	26.65	29.11	3.8%	8.5%		47.5	52.5	0.85	21.0%	0.50	0.89	6.94%	0.26%
7	8	Southwest Gas	Yes	Yes	SWX	80.48	73.58	68.20	74.09	2.6%	9.5%		48.0	52.0	0.80	21.0%	0.46	0.83	6.94%	0.20%
8	9	Spire	Yes	Yes	SR	75.15	66.50	68.65	70.10	3.0%	8.5%		49.5	50.5	0.70	21.0%	0.39	0.71	6.94%	0.04%
9	11	WGL	Yes	No	WGL	85.84	84.22	83.01	84.36	2.4%	11.0%		46.0	54.0	0.80	21.0%	0.48	0.86	6.94%	0.39%
-		TOTAL PEERS	9 all	5			Dividend Y	'ield = (Ann	ual Divide	nds per Sh	are) / Price p	er S	Share							
			6 w/o M&A	80% Mid Cap			When Value Li	ne (VL) Beta rati	o exceeds 99	.9 or earnings a	re negative, VI sh	ows "	'NMF" for 'no meani	ngful figure'.						
																	A - D I I -	- 4 I		

As Recalculated

St

Staff Gas Screen	0.43%
Company Peer Screen	0.54%
Company Peer Screen - w/o M&A	0.63%
* Difference	Increase of:
Staff Gas Screen	0.20%
Company Peer Screen	0.26%
Company Peer Screen - w/o M&A	0.31%
aff's Original Calculation	
Staff Gas Screen	0.26%
Company Peer Screen	0.33%
Company Peer Screen - w/o M&A	0.38%
* Difference	Increase of:
Staff Gas Screen	0.03%
Company Peer Screen	0.05%
Company Peer Screen - w/o M&A	0.06%

ncreases fro	om Ibbotson MRP	
	Staff Gas Screen	0.17%

Company Peer Screen	0.21%
Company Peer Screen - w/o M&A	0.25%

Source: Staff 200 – Hamada

UG 344 Staff ROE Summary

Stage 3 – Lo	Stage 3 – Long-Term Annual Dividend and EPS Growth Rates									
Component	Real Rate	TIPS Inflation Forecast	20-Yr Nominal Rate	Weight	Weighted Rate					
Energy Information Administration	2.00%	1.99%	4.03%	12.50%	0.50%					
PricewaterhouseCooper	1.80%	1.99%	3.83%	12.50%	0.48%					
Social Security Administration	2.20%	1.99%	4.23%	12.50%	0.53%					
Congressional Budget Office			4.00%	12.50%	0.50%					
BEA Nominal Historical,1980 Q1 – 2017 Q4	2.76%	1.99%	4.80%	50.0%	2.40%					
Composite				100%	4.41%					
Congressional Budget Office Long-Term 20-Year Budget Outlook			4.00%	100.0%	4.00%					
BEA Nominal Historical,1980 Q1 – 2017 Q4	2.76%	1.99%	4.80%	50.0%	2.40%					
Social Security Administration	2.20%	1.99%	4.23%	50.0%	2.12%					
Near Historical			_	100%	4.52%					

Note: Near Historical assumes that various federal initiatives will have greater long-run positive impact than the Congressional Budget Office expects.

Model X: 3 Stage DCF - Dividend Growth with Terminal Value as Perpetuity										
X CBO 4.00% Composite 4.41% Near 4.52%										
Staff Gas Screen	7.43%		7.74%		7.83%		Ham			
Company Peer Screen	7.11%		7.44%		7.52%		to Ri			
Company Peer Screen - w/o M&A	7.20%		7.52%		7.61%		-			

	Model X: 3 Stage DCF - Divide	end Growth with	h Terminal Va	lue as Perpetui	ty (Hamada /	Adjusted)	
	X	CBO 4.00%		Composite	4.41%	Near Historical	4.52%
nada	Staff Gas Screen	7.86%		8.17%		8.26%	
Right	Company Peer Screen	7.65%		7.98%		8.06%	
،	Company Peer Screen - w/o M&A	7.83%	1	8.15%		8.24%	

Model Y: 3 Stage DCF - Dividend Growth with Terminal Value as Sales based upon EPS Growth and Terminal Stock Sale									
Y	CBO	4.00%	Composite	4 41%	Near	4.52%			
	000	4.0070	Composite	4.4170	Historical	4.0270			
Staff Gas Screen	8.61%		8.87%		8.94%		На		
Company Peer Screen	7.87%		8.14%		8.21%		to		
Company Peer Screen - w/o M&A	8.39%		8.66%		8.73%				

ROE

Common Stock Flotation Costs Adjustment Shifts Range of Reasonable ROE's Upward by :								
Range of Modeled Results 8.37% to 9.49%								
Best Fit Range of Reasonable ROEs	8.9%	to	9.5%	ROE				
(Best fit is Staff's Hamada adjusted screened gas utilities that have most similar character	ristics to NWN regulated ga	is operations in Orego	on)					
Midpoint of Best Fit Modeling Results		9.2%	ROE					
(Staff's informed judgement excludes some of the lower range of modeling results depict	(ad abova)							

s informed judegment excludes some of the lower range of modeling results depicted above)
Staff Point ROE Recommendation:
9.2%

	Model Y: 3 Stage DCF - Dividend & EPS Growth with Terminal Value as Stock Sale (Hamada Adjusted)										
	Y	CBO 4.00%		Composite	4.41%	Near Historical	4.52%				
mada	Staff Gas Screen	9.04%		9.30%		9.37%					
Right	Company Peer Screen	8.41%		8.68%		8.75%					
→	Company Peer Screen - w/o M&A	9.02%		9.29%		9.36%					

Source: Staff 200: ROE

Northwest Natural Gas Company

Consensus Analysts' Growth Rates

		Zao	cks	N	11	Reu	ters	Average of			
		Estimated	Number of	Estimated	Number of	Estimated	Number of	Growth			
Line	Company	Growth % ¹	Estimates	Growth % ²	Estimates	Growth % ³	Estimates	Rates		3/16/2018	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)			
									Zacks	<u>SNL</u>	Reuters
1	Atmos Energy Corporation	7.00%	N/A	7.00%	1	7.15%	2	6.67%	7.00%	7.00%	6.00%
2	Chesapeake Utilities Corporation	6.00%	N/A	8.00%	2	6.00%	1	7.27%	6.00%	8.00%	7.80%
3	New Jersey Resources Corporation	6.00%	N/A	7.00%	2	6.00%	2	5.00%	6.00%	7.00%	2.00%
4	Northwest Natural Gas Company	4.00%	N/A	4.33%	2	4.00%	2	5.18%	4.00%	4.33%	7.20%
5	ONE Gas, Inc.	5.60%	N/A	5.00%	2	5.50%	2	6.70%	5.60%	5.00%	9.50%
6	South Jersey Industries, Inc.	10.00%	N/A	7.50%	2	N/A	N/A	7.67%	10.00%	7.50%	5.50%
7	Southwest Gas Holdings, Inc.	N/A	N/A	4.00%	1	N/A	N/A	5.95%	N/A	4.00%	7.90%
8	Spire Inc.	4.50%	N/A	6.00%	1	4.43%	3	5.80%	4.50%	6.00%	6.90%
9	WGL Holdings, Inc.	6.00%	N/A	7.00%	1	N/A	N/A	5.03%	6.00%	7.00%	2.10%
10	Average	6.14%	N/A	6.20%	2	5.51%	2	6.14%			

Sources:

¹ Zacks Elite, http://www.zackselite.com/, downloaded on March 16, 2018.

² S&P Global Market Intelligence, https://platform.mi.spglobal.com, downloaded on March 16, 2018.

³ Reuters, http://www.reuters.com/, downloaded on March 16, 2018.

Source: AWEC 108

Northwest Natural Gas Company

Constant Growth DCF Model (Consensus Analysts' Growth Rates)

Line	<u>Company</u>	13-Week AVG Stock Price ¹	Analysts' <u>Growth²</u>	Annualized Dividend ³	Adjusted <u>Yield</u>	Constant Growth DCF		3/19/2018
		(1)	(2)	(3)	(4)	(5)		
1	Atmos Energy Corporation	\$82.19	6.67%	\$1.94	2.52%	9.18%		
2	Chesapeake Utilities Corporation	\$72.35	7.27%	\$1.30	1.93%	9.19%		
3	New Jersey Resources Corporation	\$39.08	5.00%	\$1.09	2.93%	7.93%		
4	Northwest Natural Gas Company	\$56.89	5.18%	\$1.89	3.49%	8.67%		
5	ONE Gas, Inc.	\$68.64	6.70%	\$1.84	2.86%	9.56%		
6	South Jersey Industries, Inc.	\$28.87	7.67%	\$1.11	4.12%	11.79%		
7	Southwest Gas Holdings, Inc.	\$73.25	5.95%	\$1.98	2.86%	8.81%		
8	Spire Inc.	\$69.07	5.80%	\$2.25	3.45%	9.25%		
9	WGL Holdings, Inc.	\$84.41	5.03%	\$2.04	2.54%	7.57%		
10	Average	\$63.86	6.14%	\$1.72	2.97%	9.11%	8.94%	Original Values to the right
11	Median					9.18%	8.58%	

Sources:

¹ S&P Global Market Intelligence, Downloaded on March 19, 2018.

² AWEC/108.

³ The Value Line Investment Survey, March 2, 2018.

Source: AWEC 109

Multi-Stage Growth DCF Model

		13-Week AVG	Annualized <u>Dividend²</u> (2)	First Stage <u>Growth³</u> (3)	Second Stage Growth					Third Stage	Multi-Stage	
Line	<u>Company</u>	Stock Price ¹ (1)			Year 6	Year 7	Year 8	Year 9	Year 10	Growth ⁴	Growth DCF (10)	
					(4)	(5)	(6)	(7)	(8)	(9)		
1	Atmos Energy Corporation	\$82.19	\$1.94	6.67%	6.29%	5.91%	5.53%	5.16%	4.78%	4.40%	7.24%	
2	Chesapeake Utilities Corporation	\$72.35	\$1.30	7.27%	6.79%	6.31%	5.83%	5.36%	4.88%	4.40%	6.64%	
3	New Jersey Resources Corporation	\$39.08	\$1.09	5.00%	4.90%	4.80%	4.70%	4.60%	4.50%	4.40%	7.42%	
4	Northwest Natural Gas Company	\$56.89	\$1.89	5.18%	5.05%	4.92%	4.79%	4.66%	4.53%	4.40%	8.04%	
5	ONE Gas, Inc.	\$68.64	\$1.84	6.70%	6.32%	5.93%	5.55%	5.17%	4.78%	4.40%	7.64%	
6	South Jersey Industries, Inc.	\$28.87	\$1.11	7.67%	7.12%	6.58%	6.03%	5.49%	4.94%	4.40%	9.29%	
7	Southwest Gas Holdings, Inc.	\$73.25	\$1.98	5.95%	5.69%	5.43%	5.18%	4.92%	4.66%	4.40%	7.51%	
8	Spire Inc.	\$69.07	\$2.25	5.80%	5.57%	5.33%	5.10%	4.87%	4.63%	4.40%	8.12%	
9	WGL Holdings, Inc.	\$84.41	\$2.04	5.03%	4.93%	4.82%	4.72%	4.61%	4.51%	4.40%	7.01%	
10	Average	\$63.86	\$1.72	6.14%	5.85%	5.56%	5.27%	4.98%	4.69%	4.40%	7.66%	7.47%
11	Median										7.51%	7.20%

Sources:

¹ S&P Global Market Intelligence, Downloaded on March 19, 2018.

² The Value Line Investment Survey, March 2, 2018.

³ AWEC/108.

⁴ Blue Chip Economic Indicators, March 1, 2018 at 14.

Source: AWEC 114

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Jorge Moncayo

CAPITAL BUDGET/ OPERATIONS & MAINTENANCE EXHIBIT 1700

May 23, 2018

EXHIBIT 1700 – REPLY TESTIMONY - CAPITAL BUDGET/ OPERATIONS & MAINTENANCE

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ii - REPLY TESTIMONY OF JORGE MONCAYO - Table of Contents

1		I. INTRODUCTION AND SUMMARY
2	Q.	Please state your name, business address, and present occupation.
3	Α.	My name is Jorge Moncayo and my business address is 220 NW Second Avenue,
4		Portland, Oregon 97209. I am employed by NW Natural Gas Company ("NW
5		Natural" or "Company") as the Budget and Financial Planning Director.
6	Q.	Are you the same Jorge Moncayo that previously provided Direct Testimony
7		in this docket?
8	Α.	Yes, I presented NW Natural/600.
9	Q.	What is the purpose of your testimony in this proceeding?
10	Α.	The purpose of my Reply Testimony is to present NW Natural's response to
11		opening testimony filed on April 20, 2018, by the Public Utility Commission of
12		Oregon ("Commission") Staff ("Staff"). Specifically, I will respond to issues
13		presented in the testimony of Staff witnesses Marianne Gardner, John L. Fox, Phil
14		Boyle, Lance Kaufman, Mitchell Moore, Paul Rossow and Kathy Zarate.
15	Q.	How is your testimony organized?
16	Α.	I have organized my testimony first by Staff witness and then by topic as follows:
17	•	Ms. Gardner: I respond to the following topics raised in Ms. Gardner's testimony
18		(a) the appropriate base year; (b) the appropriate method for calculating
19		escalation of operations and maintenance ("O&M" costs), and (c) the appropriate
20		number of full-time equivalents to include in the Company's Test Year.
21	•	Mr. Fox: I respond to the following topics raised in Mr. Fox's testimony (a) the
22		correct amount of plant addition through the Test Year; and (b) the appropriate
23		rate of construction overhead.

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- Mr. Boyle: I respond to Mr. Boyle's discussion of the appropriate projection for
 adoption of the Company's fee free credit card payment program and related
 costs.
- 4 Mr. Kaufman: I respond to Mr. Kaufman's testimony regarding allocation of costs 5 between the Company and its affiliates and/or shareholders. These specific 6 issues are: (a) the appropriate rate to charge the Company's affiliates; (b) 7 allocation of time to the Holding Company; (c) allocation of time to affiliates; (d) 8 allocation of overtime pay to non-utility; (e) overhead costs billed to non-utility 9 items; (f) allocation of insurance policy premiums; (g) allocation of costs 10 associated with the Company's website; and (h) inclusion of certain legal, civic, 11 and investor relations/shareholder services costs in the Test Year.
- Mr. Moore: I respond to Mr. Moore's proposed disallowance of Gas Storage
 Expense, Distribution O&M, General Plant Maintenance and Customer Accounts
 Expense.

Mr. Rossow: I respond to Mr. Rossow's proposed disallowance of professional dues and memberships.

- Ms. Zarate: I respond to Ms. Zarate's proposed disallowance of meals, travel,
 and employee awards costs during the Test Year.
- For each section, I provide an overview of the Company's proposal in addition tothe Company's response to Staff.
- 21

II. Response to Ms. Gardner

Q. Please provide an overview of the Oregon-allocated O&M expense included
 in NW Natural's revenue requirement?

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As detailed in my initial testimony, the Oregon-allocated Test Year O&M expenses 1 Α. 2 included in the revenue requirement in this proceeding are \$148.4 million.¹ This 3 represents the Test Year O&M total, adjusted for state allocations, uncollectible 4 accounts expense, and amounts that represent O&M for which the Company is not 5 seeking cost recovery in this case.²

6 Q. What base year did the Company select and how did the Company establish 7 Base Year O&M costs?

- The Base Year is calendar year 2017.³ The Company's initial filing in this 8 Α. 9 proceeding was submitted in December 2017; therefore, the Company established 10 the Base Year O&M costs using actual expenses for January through September 11 2017 and a forecast of expenses for the remaining three months of 2017.⁴ The 12 total Company Base Year O&M, excluding uncollectible accounts expense, was 13 forecasted to be \$151.8 million or \$136.3 million on an Oregon-allocated basis.⁵
- 14 How were the Test Year O&M costs developed? Q.
- 15 Α. There are three components to the Company's O&M: (a) O&M payroll costs; (b) 16 O&M non-payroll costs; and (c) O&M other cost adjustments.⁶ NW Natural started 17 with the Base Year amounts for each of these three components, which were then forecasted to develop the Test Year expenses.⁷ 18
- 19
 - 1. O&M Payroll Costs

20 What portion of total O&M costs is made up by Payroll O&M? Q.

- ¹ NW Natural/600. Moncavo/2.
- ² NW Natural/600, Moncayo/2.
- ³ NW Natural/600, Moncayo/3.
- ⁴ Id.
- ⁵ Id.
- ⁶ NW Natural/600, Moncayo/3.
- 7 Id.

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A. Payroll O&M makes up the significant majority of total O&M costs for the Company.
 As calculated in this case, payroll O&M accounts for roughly two-thirds of NW
 Natural's total O&M costs.⁸

4 Q. How did the Company calculate the Test Year O&M payroll costs?

A. The Company began by forecasting the number of the Company's full-time
equivalent ("FTE") positions in the Test Year. The Company's forecast for yearend of Base Year 2017 was 1,117.5 regulated FTEs; this number was used for the
Test Year FTE total and is the number the Company has requested to include in
rates.⁹

10 Q. How was the 2017 year-end FTE number projected?

11 The Company started with the number of actual regulated FTEs employed by the Α. 12 Company as of the time the rate filing was completed. Then, the Company's 13 Human Resources Department provided the FTE projection for the final three 14 months of 2017 based on actual FTE counts, projected FTE attrition and projected 15 FTE hires.¹⁰ FTE attrition projections are based on known retirements and 16 departures, as well as recent trends.¹¹ Projected FTE hires are based on positions 17 for which the Company is in the process of hiring, taking into account the stage of 18 the hiring process for each position (e.g., whether the position has progressed to 19 the interview process).¹²

Q. Does the Company's projected FTE count take into account projected vacancies and FTEs allocated to non-utility activities?

- ⁸ NW Natural/600, Moncayo/4.
- ⁹ Id.

¹⁰ NW Natural/600, Moncayo/4.

¹¹ Id.

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¹² See id.

A. Yes. The Company adjusted the FTE count to remove vacant FTE positions and
 FTEs allocated to non-utility activities (referred as "non-regulated FTEs").¹³ This
 resulted in removal of 51.3 unfilled FTE positions and 25.2 non-regulated FTEs.¹⁴
 The Company determines which FTEs are regulated by assigning each utility
 employee, based on work portfolio, to regulated or non-regulated operations (in
 part or in full).¹⁵ Non-regulated activities include time charged to NW Natural's
 affiliates.¹⁶

8

9

Q. Did the Company request rate recovery for any incremental FTEs added after the end of the Base Year?

A. No. The Company may need to add incremental FTEs to support its customer and operational needs in the future; however, the Company is only seeking recovery for the costs associated with the FTE count projected at the end of the Base Year.¹⁷
 In fact, the number of regulated FTEs as of the end of April 2018 was 1,131; this is higher than the 1,117.5 FTEs requested for inclusion in rates in the Company's initial filing.

Q. Does Ms. Gardner make a recommendation regarding the number of FTEs proposed for the Test Year?

- A. No. Ms. Gardner agrees with the number of FTEs proposed for the Test Year;
 however, Ms. Gardner asserts that the Company's O&M Model for the Test Year
 includes incremental pay on a system basis for ten FTE positions whose
 - ¹³ NW Natural/600, Moncayo/4-5.
 - ¹⁴ Id.

¹⁵ NW Natural/600, Moncayo/5.

- ¹⁶ *Id*.
- ¹⁷ NW Natural/600, Moncayo/5.

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descriptions are "unidentified positions."¹⁸ Ms. Gardner states that is not clear
 whether these FTEs were hired by the end of 2017 or what these positions are
 for.¹⁹ As a result, Ms. Gardner recommends excluding the Oregon-allocated basis
 associated with these ten FTEs.²⁰ This recommendation results in a reduction of
 \$1.65 million, which Ms. Gardner allocated entirely to O&M.

Q. Where in the record did these ten FTE positions referred to by Ms. Gardner appear?

A. The Company provided its O&M Model as DR 125 Conf. Supp. Attachment 2.
These ten FTE positions were included in the Company's model.

Q. Has Ms. Gardner correctly interpreted the purpose of the 10 FTEs from the
 Company's O&M Model provided as DR 125 Conf. Supp. Attachment 2?

- 12 No. The Company acknowledges that the presentation of FTEs in its model may Α. 13 be confusing, but in projecting FTEs for the last several months of the Base Year. the model actually subtracts the costs associated with the ten FTEs referenced by 14 15 Ms. Gardner as opposed to adding them. In particular, the tab labeled as 16 "Incremental FTE Count" of the Company's O&M Model shows negative dollar 17 amounts for the positions labeled as "unidentified." Therefore, the costs 18 associated with these positions were ultimately removed from the Company's 19 revenue requirement and no adjustment is necessary.
- Q. If the Company is not proposing to recover any costs associated with these
 FTE positions, why are the positions included in the Company's O&M
 model?

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 ¹⁸ Staff/100, Gardner/34-35 *citing* NW Natural Response to Staff DR 125 and Staff DR 125 Conf. Supp. Attachment 2 (provided as Exhibit NW Natural/1701).
 ¹⁹ *Id.* ²⁰ Staff/100, Carda as (25)

²⁰ Staff/100, Gardner/35.
The Company included these placeholders in its original O&M model because the 1 Α. 2 Company knew that, based on general trends, during the forecast months of the 3 Base Year, it would lose around ten employees due to retirements or resignation. 4 Of course, NW Natural was unable to predict which of its employees might leave 5 Therefore, the placeholders of "unidentified" employees are the Company. 6 included in the model to account for attrition supported by Company trends but 7 where exact information is not available. However, the costs associated with these 8 positions were negative and therefore were not included in the Company's rate 9 base proposal.

10

What was the total number of FTEs as of April 30, 2018? Q.

employees

11 The total number of FTEs as of April 30, 2018 was 1,131. This is 13.5 more than Α. 12 the year end 2017 Base Year forecast that the Company used as the planned Test 13 Year FTE Count.²¹

14 Based on this FTE count, is there any adjustment necessary for the Test Q. 15 Year?

16 Α. No. The Company has already retained FTEs in excess of its Test Year projection. 17 Therefore, no downward adjustment is appropriate.

Ms. Gardner calculates a salary, wages, and incentives adjustment with an 18 Q. 19 impact of \$8.9 million in revenue requirement. Does the Company agree that 20 the calculation was made correctly for each component of the adjustment? 21 Α. No. There are several errors in the calculations for the adjustments. For the 22 Wages adjustment using the Commission's 3-Year Wage Formula, the adjustment 23 all of

24

²¹ NW Natural/600, Moncayo/4.

addressed

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the

employees. However, the adjustment did not allocate any of the disallowed

Company,

including

non-utility

expense to non-utility. The Company calculates about \$32,000 of the system
adjustment that should be applied to non-utility, which results in an Oregon O&M
adjustment of \$521,000 and a capital adjustment of \$259,000. The Staff
adjustment, by comparison, produced an Oregon O&M adjustment of \$543,000
and a capital adjustment of \$270,000.²²

For the Incentives adjustment, the non-utility component was also missing, 6 7 and the correct allocation to non-utility of the disallowed amount of \$236,000 was 8 absent. Also, the Stock Expense disallowed amount was subject to an 9 administrative transfer of 15%, or about \$307,000, which should have been a 10 reduction to capital. The correct outcome to the adjustment should have been an 11 Oregon O&M adjustment of \$5.756 million and a capital adjustment of \$1.595 million. The Staff adjustment, by comparison, produced an Oregon O&M 12 13 adjustment of \$6.249 million and a capital adjustment of \$1.337 million.²³

14

2. <u>O&M Non-Payroll Costs</u>

15 Q. Please explain what costs are included in O&M non-payroll costs.

A. As stated above, Ms. Gardner reviewed the administrative and general non-payroll
costs in FERC accounts 921-935. These costs include office supplies and
expenses (FERC Account 921), regulatory commission expenses (FERC Account
928), miscellaneous general expense (FERC Account 930.2), and rents (FERC
Account 931).

Q. Please explain the Company's escalation methodology for non-payroll costs.

²² Staff electronic workpaper, UG 344 NWN Issue 8 W&S Model (Confidential).
 ²³ Staff/100, Gardner/42.

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A. The Company escalated general non-payroll costs using year-over-year rates of
change in the forecast of the Portland-Salem Consumer Price Index (the "CPI") as
reported in the September 2017 Oregon Economic and Revenue Forecast,
published by the Oregon Office of Economic Analysis ("OEA").²⁴ These escalation
factors were applied on January 1, 2018 and January 1, 2019.²⁵ The Company
also identified a small portion of items where the growth protection was lower or
greater than CPI and adjusted these items with their specific growth rates.²⁶

Q. What adjustments does Ms. Gardner make to the Company's non-payroll
 O&M expense included in this case?

10 A. Ms. Gardner recommends a downward adjustment of approximately \$4.1 million.²⁷

11 Q. How does Ms. Gardner arrive at this adjustment?

- 12 Ms. Gardner ignores the Company's Base Year and projected Test Year expense. Q. 13 Instead, using 2013 as her base year, Ms. Gardner starts with the Company's 2013 14 actual non-payroll expense from A&G FERC accounts 921, 928, 930 and 931. Ms. 15 Gardner takes these accounts and escalates the amounts from 2013 up to the Test 16 Year period using an All Urban CPI, and compares the escalated amount to the 17 Company's proposal as provided in NW Natural's response to SDR 58. In addition 18 to the change in CPI, Ms. Gardner also considered the growth in number of 19 customers from 2013 through the Test Year for each account with the exception 20 of FERC accounts 930 and 931 because Ms. Gardner determined that customer 21 growth and these expenses are not correlated.²⁸ Ms. Gardner then compared her 22 calculation with the Company's proposal and where the Company's proposal is
 - ²⁴ NW Natural/600, Moncayo/7-8.
 - ²⁵ NW Natural/600, Moncayo/8.
 - ²⁶ Id.
 - ²⁷ Staff/100, Gardner/28.
 - ²⁸ Staff/100, Gardner/27.

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higher than Ms. Gardner's calculation, she proposes to remove the "excess"
 amount.

With respect to FERC Account 928 (Regulatory Commission Expenses), Ms.
 Gardner is recommending a complete disallowance based on her assertion that
 there are no historical actuals to use as a comparison.²⁹

6

a) <u>Base Year</u>

- Q. You stated above that the Company selected 2017 as the Base Year. Why
 did the Company select 2017 for its Base Year?
- A. The calendar year 2017 is the period that reflects the most recent historical
 information available and allows for a comparison of the Base Year with historical
 years consisting of the same months.³⁰ This is also consistent with the Company's
 approach in its last general rate case, UG 221.³¹

Q. What is Ms. Gardner's rationale for using a 2013 base year for non-payroll O&M?

- 15 A. Ms. Gardner states that she reviewed the trends for the Company's O&M FERC
- 16 accounts 921, 928, 930, and 931 from 2010 to $2017.^{32}$ Based on this review, Ms.
- Gardner simply states that she selected 2013 as the base year for these categoriesof non-payroll expense.
- 19 Q. Does Ms. Gardner explain why she selects 2013 instead of 2017 as the base
- 20 year?

A. No. Ms. Gardner explains that she selected 2013 *instead of 2010* based on a determination that 2010 was not a representative year because the economy was

- ²⁹ Staff/100, Gardner/27-28.
- ³⁰ NW Natural/600, Moncayo/3.
- ³¹ *Id*.

10 - REPLY TESTIMONY OF JORGE MONCAYO

³² Staff/100, Gardner/24-27.

still recovering from the great recession.³³ However, Ms. Gardner does not provide
 any explanation for why she selected a base year that is almost six years before
 the Test Year, where actual and much more current data is available from 2017.

4 Q. Does the Company agree that 2013 is an appropriate base year?

5 Α. No. 2013 is not reflective of current costs incurred by the Company. Between 6 2013 and 2017, the Company has made changes to its operations including 7 implementation of new programs, and generally is adapting to new operational 8 requirements that impact the costs of doing business. For example, the Company 9 introduced its Employee Equipment Protection Policy during 2017. This program 10 was prudently adopted and implemented and provides the Company's employees 11 with additional protective equipment that is essential for safe operations. 12 Specifically, the program requires that field employees wear high visibility shirts or 13 vests, hard hats, safety glasses, steel toed boots, hearing protection in certain 14 circumstances and flame resistant clothing.

15 The addition of this program is an incremental cost for the Company that did 16 not exist in 2013 and therefore is not captured in Staff's use of a 2013 Base Year. 17 We note that for this particular program, the costs of program implementation were 18 higher than the ongoing program costs that the Company expects in the Test Year. 19 For this reason, we adjusted the Base Year expense for this program downward 20 for the Test Year, but the net result is an increase in the Company's costs that are 21 effectively disallowed, using Staff's approach.

The Company is also facing increased costs requirements for cybersecurity, which have increased significantly since 2013. Another key difference between 24 2013 and 2017 is that the state allocation for Oregon has changed since 2013. For

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³³ Staff/100, Gardner/27.

example, in 2013 the Oregon allocation of rents was 86.98% but has increased to
approximately 89.97% in 2017. This change in state allocation is due to the
Company's purchase of a service center in its Washington state territory; therefore
the allocation of rents to Washington has decreased.

Therefore, selection of 2013 as a base year creates a distorted view of the

- 5
- 6

costs that the Company will necessarily incur.

7

b) All Urban vs. Portland Salem CPI

Q. Why did NW Natural use the Portland-Salem CPI as the escalator for these accounts?

10 Α. NW Natural specifically selected the Portland-Salem CPI because a regional CPI 11 provides a better measure of aggregate price changes than a national CPI. This 12 is true because most of the Company's non-payroll expenditures that are not 13 capitalized are local purchases (i.e., purchases made within Oregon or SW 14 Washington). More than 70 percent of non-payroll expenses such as office 15 supplies, contractors and professional services are sourced locally. Therefore, a 16 regional CPI is more representative of the price changes experienced by the 17 Company.

Q. Is the Company aware of any other entities that operate primarily in Oregon and that use a local CPI as their cost escalator?

A. Yes. The Company is aware of three local government entities that have used regional CPI to escalate payroll costs. The Oregon Public Employees Retirement System ("PERS") has used the Portland Area CPI as its escalator.³⁴ Similarly,

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³⁴ See Public Employees Retirement System, 2018 COLA Increase Starts with Aug. 1 Payments, available at <u>http://www.oregon.gov/pers/ret/pages/2018-cola-increase.aspx</u>.

Multnomah County and the City of Portland have both used a variation of the
 Portland-Salem CPI to calculate their cost of living adjustment.³⁵

Q. Does Ms. Gardner agree that the Company should use a Portland-Salem 4 CPI?

A. No. Ms. Gardner suggests that the Company should have used the All Urban
 Consumers CPI ("All Urban CPI") as published by the State of Oregon Office of
 Economic Analysis for year-over-year escalation of expenses.³⁶

Q. Does Ms. Gardner explain why the All Urban CPI is a more accurate escalation factor for the Company's non-payroll costs?

10 Α. No. Ms. Gardner states that Staff's policy is to use the All Urban CPI and cites to 11 several Commission Orders. However, Ms. Gardner does not offer an explanation 12 for why it would be appropriate to use the All Urban CPI instead of the Portland-13 Salem CPI proposed by the Company.³⁷ This failure to provide an explanation is 14 problematic because the Commission Orders cited by Ms. Gardner do not address 15 a proposal to use the Portland-Salem CPI. For example, in Docket UG 132, NW 16 Natural's 1999 rate case, the Company proposed using the Oregon manufacturing 17 wage index as the escalation factor as the basis for the adjustment to wages and 18 salaries.³⁸ The Commission rejected this proposal and instead relied on the All

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 ³⁵ See, e.g., Multnomah County budget Office, FY 2018 Gen. Fund 5-Year Forecast Update at 17 (Mar. 9, 2017), available at <u>https:multco.us/file/60542/download</u>; see also City of Portland, General Fund Forecast FY 2018-19 through FY 2022-23 at 3 n.2 (Dec. 2017), available at <u>https://www.portlandoregon.gov/transportation/article/668007</u>.
 ³⁶ Staff/100, Gardner/27.

³⁷ Staff/100, Gardner/26.

³⁸ In the Matter of the Application of Nw. Nat. Gas Co. for a Gen. Rate Revision, Docket No. UG 132, Order No. 99-697 at 41 (Nov. 12, 1999). Ms. Gardner also cites to Docket No. UE 116, Order No. 07-787; however, in that proceeding PacifCorp did not propose to use a consumer price index as an escalation factor. Instead, PacifiCorp proposed to escalate wages based on contracts. This Order is therefore even less relevant to the instant proceeding.

Urban CPI based on its determination that the Company had failed to demonstrate 1 2 that the wages of its employees were related to manufacturing wages (*i.e.*, the 3 Oregon Manufacturing Wage Index was not an appropriate index).³⁹ The Portland-4 Salem CPI proposed by the Company in this proceeding is also a local CPI (like 5 the Oregon Manufacturing Wage Index) but is not tied to a specific industry. 6 Instead, the Portland-Salem Index is a local index that reflects the local inflationary 7 pressures being experienced by the Company. As discussed above, the Company 8 acquires most non-payroll items in the Portland-Salem area (e.g., the Company 9 hires contractors and purchases materials in the Portland-Salem area). As a 10 result, inflation pressures experienced in other areas of the United States are not 11 indicative of the Company's experience.

12 In short, the Company used the index that best matched the area and goods 13 for which the estimation was developed. Ms. Gardner offers no reason why this 14 approach is inappropriate, and instead simply proposes that a different, broader 15 index be used.

16 Q. As an urban area of the U.S, is Portland represented in the All Urban CPI?

A. Yes. However, it is important to keep in mind that the urban population of Oregon
represents only 1.8 percent of the total United States urban population. This
means that 98.2 percent of the data included in the calculation of the All Urban CPI
comes from areas outside of the state of the Oregon, and is therefore less relevant
to the costs that NW Natural will incur.

22 Q. Why is Oregon's low representation in the All Urban CPI problematic?

A. The percentage of data from Oregon included in the calculation of the All Urban
 CPI is problematic because it means that characteristics of the Oregon economy—

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³⁹ Order No. 99-697 at 43.

and the Portland-Salem economy in particular—are not being adequately accounted for. These characteristics include the higher than national average minimum wage, costs of real estate and gasoline. For example, gasoline prices have been consistently higher than the national average in Oregon in general and even higher in Portland. The table below shows the year end average gasoline price according to AAA.⁴⁰

	Gas	Price per Ga	% greater than National		
	National	OR		OR	
	Average	State	Portland	State	Portland
12/26/2017	2.444	2.781	2.825	13.79%	15.59%
12/27/2016	2.286	2.432	2.452	6.39%	7.26%
12/29/2015	2.001	2.358	2.369	17.84%	18.39%
12/30/2014	2.376	2.624	2.633	10.44%	10.82%

Oregon has the eighth highest minimum wage in the United States as of
January 1, 2018.⁴¹ The housing prices in Portland have also been consistently
rising at higher rates than the National average as shown in the table below.⁴²

Annual Home Price Increase							
Year	Portland	National					
2014	6.8%	4.5%					
2015	11.4%	5.2%					
2016	10.0%	5.4%					
2017	6.8%	6.2%					
Since 2013	39.6%	23.1%					

10 All of these costs result in increased prices for non-payroll items. As mentioned

11 above, the majority of non-payroll expenses are sourced locally, and the use of the

12 All Urban CPI as the escalation factor fails to adequately capture this reality.

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 ⁴⁰ AAA Oregon, *Gas Price Trends*, available at <u>https://www.oregon.aaa.com/gas-prices/</u> (providing State and Portland prices compared to National Average prices).
 ⁴¹ U.S. Dept. of Labor, *Consolidated State Minimum Wage Update Table* (Jan. 1, 2018), available at <u>https://www.dol.gov/whd/minwage/mw-consolidated.htm</u>.

⁴² S&P Dow Jones Indices, S&P CoreLogic Case-Shiller Portland Home Price NSA Index, available at <u>https://us.spindices.com/indices/real-estate/sp-corelogic-case-shiller-portland-home-price-nsa-index</u>.

All of these costs result in increased prices for non-payroll items. As mentioned
 above, the majority of non-payroll expenses are sourced locally, and the use of the
 All Urban CPI as the escalation factor fails to adequately capture this reality.

4 Q. What is the impact of using the All-Urban CPI versus the Portland-Salem CPI

5

for the period since 2013?

A. Using the Portland-Salem CPI since 2013 results in an increase of 15.00% as
compared to the All-Urban CPI that results in an increase of only 8.94% (*i.e.*, use
of the All-Urban CPI would reduce the escalation factor impact by 6.06%).

	Portland - Salem	US, All Urban	
Year	CPI Rate	CPI Rate	Difference
2014	2.40%	1.60%	0.80%
2015	1.20%	0.10%	1.10%
2016	2.10%	1.30%	0.80%
2017	4.20%	2.10%	2.10%
2018	2.10%	1.70%	0.40%
Jan 2019 - Oct 2019	2.17%	1.83%	0.33%
Compounded Rate since 2013	15.00%	8.94%	6.06%

9

10

c) Specifically Developed Escalation and Known and Measurable

Q. You state above that the Company adjusted certain items at a rate different
 than CPI. Please explain in more detail what these items are and why the
 Company did not use an escalation factor for these items.

A. These costs are contained in FERC Accounts 921 (Office and Supplies) and 931
(Rents). Within these accounts, there are certain items of expense where the future
costs are known and measurable; for these costs it would not be appropriate to use
an escalation factor to project future costs. There are also certain costs where future
costs are not known but the Company determined that an escalation factor other
than CPI was more appropriate. These expenses are set forth in more detail below.

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1	The following expenses are known and measurable:
2	Audit Fees: NW Natural uses PwC as its independent public
3	accounting firm. The Company negotiates these fees on an annual
4	basis. Therefore, the costs associated with this expense are known
5	and measurable for 2018.43
6	 One Pacific Square (the Company's headquarters) lease expense:
7	The Company has included the known expense associated with its
8	headquarters lease. The Test Year expense associated with this
9	lease is set by the relevant lease agreement and therefore is known
10	and measurable. ⁴⁴
11	The following expenses are more appropriately forecast with an escalation factor
12	other than CPI based on known trends:
13	• Employee protection equipment: During the Base Year, a new
14	personal protective equipment policy took effect. It is expected that
15	the Test Year expense will be lower than the Base Year expense
16	because the Company will be incurring equipment replacement costs
17	versus the large upfront roll out costs.
18	 Bank merchant fees: The Company has experienced an increase in
19	customer usage of credit cards for bill pay due to the Company's fee
~ ~	free bankcard program (discussed in greater detail below) As a

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 ⁴³ Copies of the Company's engagement letter and audit fee proposal with PwC setting forth the terms of service for 2018 are provided as NW Natural/1702 (Confidential) and NW Natural/1703 (Confidential), respectively.
 ⁴⁴ Copies of the Company's One Pacific Square lease agreement amendments are provided as

⁴⁴ Copies of the Company's One Pacific Square lease agreement amendments are provided as NW Natural/1704 (OPS Lease 4th Amendment 112005 (Confidential)) and NW Natural/1705 (OPS Lease 5th Amendment 050214 (Confidential)).

result, these costs are projected to increase at a rate higher than
 CPI.

Software Maintenance: Software maintenance expense is increasing
 at a rate higher than CPI due to the need for new applications to meet
 new business requirements while ensuring software compatibility
 and functionality, and the need to implement critical software
 infrastructure upgrades as new threats are identified. As detailed
 below, these increased costs are primarily driven by new
 agreements with Microsoft for the Test Year.⁴⁵

Q. You identify two categories of expense --audit fees and lease expense- where the changes in costs are known and measurable. Please explain why
 it is more appropriate to use these known and measurable cost changes
 instead of an escalation factor.

14 The Company made these adjustments to ensure that the Test Year expense is as Α. 15 accurate as possible. These items change because of fluctuations of contractual 16 agreements that would not be reflected using CPI as the escalation factor. For 17 example, annual rent amounts increase (or decrease) as a result of the Company's 18 lease agreements. This change in rental costs is a known change that the Company 19 can reflect in the Test Year and therefore using CPI as an escalation factor is not 20 necessary and not accurate. Similarly, as discussed above, the Company's audit 21 fees are contractually based and therefore using an escalation factor is 22 inappropriate. An escalation factor should only be relied on where actual costs are 23 unknown or otherwise fail to be indicative of future costs.

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⁴⁵ A copy of the Company's new agreement with Microsoft, a key driver of increased IT costs, is provided as NW Natural/1706 (Confidential).

Q. For those expenses that will escalate at a factor other than CPI, please explain why this is appropriate.

A. The expenses listed above (employee personal protective equipment, bank
merchant fees, software maintenance) are not locked in by contract; however, the
Company does know based on its historic data that applying CPI to the Base Year
will not result in the most accurate projection of costs for the Test Year.

7 For example, the Company implemented its Employee Protection Equipment 8 Program in 2017 and incurred startup costs of approximately \$960,000. This 9 program requires that field employees wear high visibility shirts or vest, hard hats, 10 safety glasses, steel toed boots, and in certain circumstances hearing protection and 11 flame-resistant clothing. However, the Company has determined that it will incur an 12 ongoing annual cost related to the program of only \$620,000 because costs will be 13 limited to equipment for new employees and/or replacement equipment; therefore, the Company had made a downward adjustment to the Test Year to account for this 14 15 difference.46

16 Another example is the Company's Information Technology (IT) costs. The 17 Company's Test Year expense is expected to increase by \$414,000 more than 18 would be projected using the CPI rate. The primary driver for this increase is that 19 during the Test year there are new Microsoft agreements beginning in 2018 (the 20 Test Year).⁴⁷ While not all IT costs are locked in by contract, the new Microsoft 21 agreements for 2018 are a known cost increase that support using an escalation 22 factor other than CPI because with these new agreements it is known that costs 23 will rise faster than CPI.

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 ⁴⁶ NW Natural/1701 (Staff DR 125, Attachment 2 (Supp.) (Confidential)).
 ⁴⁷ See NW Natural/1706 (Confidential).

1 How does Ms. Gardner propose to forecast the costs for these categories of Q. 2 expense (*i.e.*, the categories where the Company has indicated that using CPI 3 as the escalation factor is not appropriate)? 4 Ms. Gardner recommends applying the All Urban CPI to all non-payroll O&M Α. 5 expense, including categories of expense with known and measurable changes or 6 changes that will increase (or decrease) at a rate that is not in line with CPI. The 7 average growth rate under the All Urban CPI would be 1.4% (using 2013 as the base 8 year as recommended by Ms. Gardner).

9 Q. How does the growth rate proposed by Ms. Gardner for these items compare 10 to the actual growth rate?

A. A summary of these changes is presented in the table below. As you can see the
 total projected cost for these five items account for 46.8% percent of the total A&G
 non-payroll expense, hence the importance of identifying the items that are projected
 to grow at rates different than CPI.



Q. Please provide more detail about the changes in lease expense projected during the Test Year.

17 A. The Company has five leases that are expensed to FERC Account 931. With the

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1 exception of one lease (the Albany Service Center land lease), these leases have 2 known growth rates in excess of 1.4%. For example, the Company's 3 communications towers for its IT department have experienced an average annual 4 growth rate of 6.4% since 2013. While the NW Natural headquarters (One Pacific 5 Square) lease expense has increased at an average annual rate of 2.4% since 2013, 6 the costs related to the Company's headquarters will increase during the Test Year 7 at a lower rate than using the Portland-Salem CPI rate and therefore the Company has included the lower contracted escalation amount.⁴⁸ This is another example of 8 9 why using known escalation (or de-escalation) amounts where possible is the most 10 accurate way to calculate the revenue requirement for the Test Year. There is no 11 value in using an escalation factor when costs are known and measurable. Instead, 12 the Commission should approve the use of known contractual costs whenever 13 possible. The Company is providing a summary table of the lease changes during 14



15 Q. Does the Company have any additional adjustments to these lease

- 16 expenses?
- 17 A. Yes. While preparing this testimony, it came to the Company's attention that the
- 18 Test Year included rental expense for the Albany Service Center land (the Company

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⁴⁸ See NW Natural/1705 (OPS Lease 5th Amendment 050214 (Confidential)).

owns the building but leases the land). However, the Company intends to purchase
 the land in September 2018 and has included this capital purchase in rate base in
 this proceeding. Therefore, the lease expense should be removed.⁴⁹ The lease
 expense amount is \$50,457.⁵⁰

5 Q. Is any other information relevant to Ms. Gardner's analysis of FERC Account
921?

A. As described above, Ms. Gardner proposes an adjustment to FERC Account 921
based on its comparison of Ms. Gardner's calculation (the 2013 actual non-payroll
expense escalated up to the test year) with the Company's proposal in NW Natural's
response to Staff SDR 58. Based on this comparison, Ms. Gardner is proposing an
adjustment of (\$3,700,943).

12 This recommendation is based, in part, on an error in the Company's response 13 to Staff SDR 58. In SDR 58, Staff asked for data, and asked that the Company 14 exclude payroll costs. The Company erroneously failed to exclude Long-Term 15 Incentive Plan (payroll) from the Test Year amount provided in the response to Staff 16 SDR 58.⁵¹ The correct amount that should have been excluded in response to Staff 17 SDR 58 was \$1.3 million. If this amount had been excluded in the original version 18 of the Company's response, the recommendation from Ms. Gardner would be lower 19 because the difference between Ms. Gardner's calculation and the Company's 20 proposal would have been substantially lower. Specifically, Ms. Gardner's 21 recommendation would be a reduction of \$2.4 million instead of \$3.7 million. While

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⁴⁹ The Company's proposal to remove the rental expense related to the Albany Service Center property is contingent on approval of the capital purchase in rate base. Without the capital purchase, the Company would propose to continue to recover the lease expense. ⁵⁰ NW Natural/1701 (Staff DR 125, Attachment 2 (Supp.) (Confidential)).

⁵¹ The Company filed a corrected version of this response on May 15, 2018.

the Company does not agree that any adjustment is appropriate, at a minimum,
 Staff's recommendation should be corrected to reflect the Company's revised
 response to Staff SDR 58, which was subsequently provided to Staff by NW
 Natural.⁵²

5 Q. What adjustment does Ms. Gardner propose for FERC Account 928?

- A. Ms. Gardner proposes to disallow all costs booked to FERC Account 928 for
 regulatory commission expenses based on the assertion that no historical actuals
 existed for this account in the data provided by the Company.⁵³
- 9 Q. What items are included in FERC Account 928?

A. This account includes the Company's rate case expense related to this case, as well
 as, a portion of the costs of its depreciation study which the Company is required to
 perform every five years. These costs are appropriate and are based on either
 historical costs (rate case expense) or actual costs incurred by the Company (the
 depreciation study).

15

III. <u>Response to Mr. Fox</u>

- 16 Q. What issues are raised by Mr. Fox that you will be addressing in this
- 17 testimony?
- A. Mr. Fox raises two issues that I respond to: (1) what plant additions should be
 added to rate base in this case; and (2) the appropriate level of construction
- 20 overhead costs to include in the Test Year.
- 21 1. Capital Projects

22 Q. Explain the capital projects for which the Company seeks recovery in this

23 case.

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 ⁵² Staff's disallowance recommendation should be further reduced to reflect use of the Portland-Salem CPI instead of the All Urban CPI, as discussed at length above.
 ⁵³ Staff/100, Gardner/27-28.

- A. The Company seeks to add to rate base its investment in the following categories
 of capital projects:
- All capital projects completed since the Company's last rate case, UG 221
 that will be used and useful as of the rate effective date of this case—
 November 1, 2018. These projects include both the Company's discrete
 and non-discrete projects. For these projects, the Company seeks to
 recover the total investment, less depreciation incurred since the date the
 project was completed.
- 9 2. All capital projects, both discrete and non-discrete, that will be completed 10 during the Test Year. These projects may be completed at various times 11 during that year⁵⁴ The Company used an average through the Test Year 12 so that customers' rates will reflect those investments only to the extent
- that they are used and useful in providing utility service within the Test
 Year.

15 Q. What adjustments does Mr. Fox make to the Company's proposed recovery

- 16 for capital projects?
- A. Mr. Fox makes the following adjustments to the additions to rate base proposed inthis case for capital projects.
- First, Mr. Fox proposes to remove from the case all plant additions proposed
 for completion during the Test Year that will not be used and useful as of

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⁵⁴ The Company is also seeking recovery for its incremental investment made in the Mid-Willamette Valley Feeder (MWVF)—which was completed prior to the rate effective date of the last rate case, but has not yet been included in rates. Staff's recommendation on this investment is contained in Staff/700 testimony, and the Company's rebuttal is contained in the testimony of Joe Karney (NW Natural/1900).

- the rate effective date. Mr. Fox's proposal is a reduction of \$68,419,992 of
 scheduled additions⁵⁵.
- Second, Mr. Fox proposes to remove all investment in capital projects that
 are slated for completion from July of 2018 until the rate effective date of
 November 1, 2018. Mr. Fox's proposal is a reduction of \$65,403,801 of
 scheduled additions⁵⁶.
- Third, Mr. Fox proposes to add back into the Test Year, as well as the July
 1 through November 1, 2018 period, investment related to what Staff refers
 to as "predictable distribution type expense." While Mr. Fox proposes an
 addback, his adjustment is actually a reduction of \$6,801,604⁵⁷
- Fourth, Mr. Fox proposes and adjustment of \$1,437,373⁵⁸ to more
 accurately calculate the land and building component of gross plant. This
 issue is addressed in the reply testimony of Kevin McVay (NW
 Natural/1500).
- Fifth, Mr. Fox, proposes an adjustment to gross plant to reduce amounts of
 construction overhead for years 2013 through June 30, 2018. Mr. Fox is
 proposing a reduction in gross plan of \$49,352,451
- The total net adjustment proposed by Staff for all capital projects is \$191
 million of rate base or \$17.2 million of revenue requirement.
- 20 Q. Could you define the difference between "discrete" and "non-discrete"
- 21 projects?

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⁵⁵ Staff/300, Fox/8.

⁵⁶ Staff/300, Fox/13.

⁵⁷ Staff/302.

⁵⁸ Id.

Α. I will provide more detail on this distinction below. My understanding of how Staff 1 2 uses that term is that, in short, discrete projects are specific jobs proposed by the 3 Company to address a particular concern or need. Discrete projects tend to be 4 relatively large, and have longer planning timelines and require more detailed 5 analysis prior to approval. On the other hand, non-discrete projects include the 6 steady stream of day-over-day investment required for the routine maintenance 7 and extension of the gas delivery system, as well as the plant required to 8 administer the Company's operations.

9 Q. In addition to his adjustments, does Mr. Fox raise any other concerns about 10 the capital projects proposed for recovery?

A. Yes. Mr. Fox states his view that the amount of plant investment for 2018 is"abnormally high".

Q. On what does Mr. Fox base his concern that capital investment is unusually high for 2018?

A. Mr. Fox provides a chart that shows that between 2012 and 2014, the Company
invested in capital additions representing a range from approximately \$101 million
to \$164 million per year. Mr. Fox's chart shows that the Company's forecast
investment for 2018 is approximately \$194 million, which as Mr. Fox points out is
higher than in prior years.

Q. Is the relatively high amount of plant that is going into service in 2018 part of the reason why NW Natural filed this rate case?

A. Yes. One of the main reasons NW Natural needs to increase its rates is to begin
 recovery of the costs of plant investments in its system that have increased in 2017
 and 2018.

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1

2. Test Year Investment

Q. What is Mr. Fox's rationale for removing investment related to capital projects forecast for completion during the Test Year?

- A. Mr. Fox cites to ORS 757.355, which provides that a utility may not recover costs
 for investments in property not presently providing utility service to customers. Mr.
 Fox interprets this statute to prohibit the Commission from including in customer
 rates any investment in projects that are not used and useful as of the date the
 rate is set (with an exception discussed in his fifth adjustment). Based on this view,
- 9 Mr. Fox starts by removing all investment planned to close in the Test Year.

10 Q. Do you agree with Mr. Fox's approach?

11 Α. No. The Company disagrees with Mr. Fox's interpretation of ORS 757.355. I am 12 not a lawyer and so will not provide legal argument on this point. However, the 13 bottom line is that the Company believes that by calculating Test Year rate base on a thirteen-month average basis,⁵⁹ the Company complies with the used and 14 15 useful standard. The Oregon Commission, like other jurisdictions, sets rates by 16 looking at annual periods, and sets the rates to reflect the costs in those periods. 17 By including the costs of investments that are used to provide service in those 18 periods, and only in amounts that reflect the costs during that period, NW Natural 19 is only including in its rate request projects that are used and useful in the Test 20 Period.

21

3. July 1-October 31, 2018 Investment

Q. What is Mr. Fox's rationale for removing investment related to projects that
 are forecast to be completed from July 1 to October 31, 2018?

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⁵⁹ Under the 13-month average approach, the costs related to a project that is completed six months into the Test Year will be reflected at 50 percent of total investment in rate base. Similarly, a project that is completed 9 months into the Test Year will be reflected at one quarter of the total investment.

1 Α. Mr. Fox concedes that even under his interpretation of ORS 757.355, these 2 projects would be used and useful if placed in service during the July 1 to October 3 31, 2018 period. However, Mr. Fox states that he cannot conclude with reasonable 4 certainty that the plant scheduled to come online before the rate effective date will actually be on line at that time.⁶⁰ Moreover, Mr. Fox points out that the number of 5 6 projects anticipated to close between July and September of 2018 is "unusually 7 large" and states that it is unrealistic to anticipate reviewing actual expenditures 8 after June 30, 2018.61

9 Q. What is your response to Mr. Fox's rationale?

A. The Company disagrees with Mr. Fox for several reasons. First, Mr. Fox's position,
if adopted, would mark a shift toward a significantly restrictive approach to
regulation. Not only would essentially all capital used to serve customers in the
Test Year be unable to be added to rates, but every time a utility files a rate case,
it would be forced to remove all capital that is added even before the Test Year to
the extent it goes into service during the latter half of the ten month rate case
proceeding.

I also want to respond to Mr. Fox's observation that an unusually large
amount of plant is expected to close during the July through September 2018
window. This occurs because most capital projects are planned for construction
during the summer months, in order to avoid delays and complications due to
inclement weather. Thus, the fact that many of the Company's large projects for
2018 are scheduled for completion from July to October actually represents the
norm.

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⁶⁰ Staff/300, Fox/13-14. ⁶¹ Staff/300, Fox/14.

1 Moreover, as a practical matter, the Company believes it is possible for Staff 2 to review the status of the projects that are set to close between July 1 and the 3 rate effective date. Information regarding all of these projects has been provided 4 to the parties as responses to data requests. Moreover, to aid and expedite that 5 review, I am attaching to my testimony Exhibit NW Natural/1707 (Summary of Capital Projects), which provides a summary of the critical information about all of 6 7 the larger projects (over \$1 million) that are included in the Company's rate 8 request, that were not yet complete as of the date of the Company's filing. 9 Specifically, Exhibit NW Natural/1707 provides the following information about 10 those projects:

11

• A full description of and justification for the project;

12

- A full description of and justification for the project
- The original forecast of direct and closing costs;
- The original forecast in-service date;
 - The updated forecast of direct costs; and

14 15

13

• The updated forecast in-service date.⁶²

Q. Does Exhibit NW Natural/1707 reflect any changes regarding these projects
 from the filed case?

A. Yes. While most of the projects are projected to be completed as planned, a
handful will be delayed past the Test Year, and a few have been cancelled. The
Company proposes to remove these projects from its requested rate base. In
addition, because several months have passed since the Company filed its

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⁶² This information is attached to my testimony for ease of review. However, questions regarding the engineering projects would be appropriately directed to Joe Karney who is also filing reply testimony in this case (NW Natural/1900). The Company would make additional appropriate managers available to answer any questions regarding the other types of capital projects.

application, the Company is able to provide updated cost information as projects
 are progressing.

Q. Is the Company willing to provide additional updated information on these
 projects as this case proceeds?

- 5 A. Yes. The Company will plan to provide an update in its surrebuttal testimony orother appropriate evidence including attestations.
- 7

4. Predictable Distribution Investment Add-back

Q. What is Mr. Fox's rationale for "adding back" "predictable distribution
 9 expense" forecast to be invested during from July 1 to November 1, 2018,
 10 and during the Test Year?

11 Α. As mentioned above, Mr. Fox generally interprets ORS 757.355 as requiring a bright line test whereby any investment made after the rate effective date must be 12 13 excluded from recovery. Mr. Fox is arguing that Staff must also remove 14 investments planned to close from July 1 to October 31, 2018, because Staff will 15 not have time to review updated information about those projects. However, Mr. 16 Fox does make one exception to these adjustments- for the recovery of what he 17 refers to as "predictable distribution expense." Mr. Fox defines "predictable 18 distribution expense" as the mains, services, meters and regulators, which are "essential for customers [to] connect to the system to receive service."⁶³ Mr. Fox 19 20 also observes that the Commission, in the past, has allowed these additions in rate 21 base proportional to the growth in customers through the Test Year."⁶⁴ Mr. Fox 22 explicitly recognizes that the ability to recover these costs are necessary to match 23 additional customer revenues included in the rate case.65

⁶³ Staff/300, Fox/20.
 ⁶⁴ *Id*.

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⁶⁵ Staff/300, Fox/19.

Q. Does Mr. Fox add back all of the cost forecast by the Company for these distribution expenses?

3 Α. No. Mr. Fox argues that the Company did not provide sufficient information 4 regarding its investment in mains, and so has excluded this investment.66 5 However, Mr. Fox does allow that this investment in mains might be allowed back into rate base allowed in the case as the Company shows and attests that it will be 6 7 used and useful before November 1, 2018.⁶⁷ Regarding meters and regulators, 8 Mr. Fox recommends allowance only for those costs that are consistent with 9 projections for customer growth. Mr. Fox provides information showing that the 10 Company's investment in meters and regulators is increasing at a higher rate than 11 customer growth.

12 Q. Does NW Natural agree with Staff's approach?

13 Α. No. As discussed above, the Company rejects Mr. Fox's view that Test Year rate 14 base additions should be restricted to plant additions required for customer growth; 15 similarly, the Company disagrees with Mr. Fox's view that it cannot be expected to 16 review investments that are forecast to close from July 1 to October 31, 2018. 17 However, even if the Company agreed with Mr. Fox on these points, Mr. Fox has 18 improperly excluded the Company's investment in main, as well as other essential 19 cost categories related to customer acquisition, and therefore underestimates 20 customer acquisition costs.

21 With respect to mains, it is unclear why they have been excluded. Staff's 22 only statement is that "[m]any of these are large projects that should have been 23 fully explained in testimony." He states that services, meters, and regulators,

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⁶⁶ Staff/300, Fox/20.

⁶⁷ Staff/300, Fox/20.

however, are essential for customers to connect to the system, and therefore
should be allowed. This statement ignores that mains are equally as important
and necessary to serve new customers. Additionally, the Company's opening
testimony did provide information about the Company's most significant capital
projects, and the Company has provided much information about mains during this
proceeding to the parties, as discussed more below.

7 And more importantly, Mr. Fox's approach ignores the fact that a very 8 significant percentage of the overall Test Year costs are related to predictable 9 year-over-year costs that—like distribution costs—can be projected with a high 10 degree of certainty, and there is no principled rationale for excluding them from 11 recovery in this case. Thus, while NW Natural agrees that it is important to 12 recognize that utilities make regular, predictable investments in non-discrete 13 projects, the Company disagrees that this predictable investment is limited to 14 distribution expenses.

15 Q. Please explain.

A. As mentioned above, the Company's forecast capital projects can be thought of as
 falling into one of two categories. The first category consists of "discrete projects"
 that the Company has proposed and planned to implement to fulfill a specific
 operational aim, or to address a specific system weakness. These discrete
 projects tend to fall into subcategories of System Betterments (*e.g.* investments in
 Newport LNG, Portland LNG, Mist storage or gate stations), Bare Steel
 Replacement,⁶⁸ System Reinforcement Projects, and Land and Structures. These

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⁶⁸ Although the Company has replaced all known bare steel in its system, it continues to replace a limited amount of bare steel pipe that it discovers in the course of carrying out other maintenance activities.

discrete projects tend to represent lumpy investments, and costs associated with
 these projects can vary widely year over year.

3 The second category can be thought of as "non-discrete projects," in which 4 investments are made consistently year-over-year, and over which the Company 5 generally does not exercise much discretion. These investments include Public 6 Works, Relocates, Damages, Transportation and Equipment, Tools, Construction 7 Overhead, Leakage, Customer Growth and Transmission Integrity Management 8 Program (TIMP) and Distribution Integrity Management Program (DIMP). A 9 significant portion of the Company's Information Technology investment falls under 10 this category as well, and is very consistent year-over-year, following a clear trend 11 line, and is therefore very predictable.

Q. Have you prepared an illustration of the Company's discrete and non discrete capital investment since the time of the last rate case?

A. Yes. The figure below shows capital expenditures, year-over-year in both discrete
and non-discrete capital, and I have added a trend line that shows the increased
spend on non-discrete capital projects over time. As you can see, some of the
categories of non-discrete investment remain quite stable over time—such as for
Public Works, and Damages. Other categories have increased over time due to
factors such as inflation, customer growth or jurisdictional requirements. However,

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on the whole, the spending related to NW Natural's non-discrete investment has
 increased slowly and steadily over time.



Q. In forecasting expenditures in these non-discrete categories for the Test Year, did the Company rely solely on historical trends?

A. No. To forecast certain non-discrete investment for the Test Year, the Company also relied on plans prepared in the regular course of business by managers in charge of each category.

Q. Could you describe the types of investments included in each non-discrete 9 category and summarize how forecasts were prepared for the Test Year for 10 each?

A. Each of these categories are investments that occur consistently and are related to the day-to-day operation of the Company as follows:

Public Works. These are projects that are required by the governmental
 jurisdictions in which the Company operates. These may include moving,
 replacing or adding infrastructure. Typically, at the time budgets are

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- prepared for these projects, the Company has no project-specific
 information about what will be required in the upcoming year, and therefore
 it budgets based on historical trends.
- *Relocates.* These projects involve the relocation of pipe for safety and
 compliance purposes. Projections for relocates are based on historical
 trends.
- Damages. The Company's system incurs damage each year. At the time
 of planning, the Company does not know where and when the damage will
 occur, but based on historic trends, it can forecast the costs with accuracy.
- Transportation and equipment. The Company incurs costs each year to
 replace or improve the aged portion of its fleet of vehicles and construction
 equipment that is necessary to operate the Company. The Company is able
 to forecast these costs based on its annual trends, as well as an ongoing
 assessment of the condition and use of vehicles currently in the Company's
 fleet, and industry standards for lifecycle of the vehicles and equipment.
- Tools. Like transportation and equipment, the Company incurs costs each year to purchase and repair its small tools (items that can be small or larger in nature such as electronics that detect gas) that are necessary for employees to perform their job functions. These costs are projected based on annual trends, the Company's inventories, safety needs, and best practices for replacement of equipment at the end of its useful life.
- Construction Overhead. This category includes the indirect costs
 associated with construction that are allocated based on customer growth,
 allocation of time to capital, and these are all affected by inflation.
 Construction overhead costs are discussed in greater detail below.

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Leakage. Leakage costs are due to replacements of services and mains
 that result from leaks on the Company's system. Like damage and public
 works projects, these projects are not necessarily identified in advance.
 However, the Company is able to rely on historic trends to project the costs
 during the Test Year.

- *Customer Growth.* Customer growth projects are the capital expenditures 6 7 necessary to connect new customers to the Company's system. These 8 projects require extending mains and installing service lines, regulators, 9 meters, and permitting. It should be noted here that this category includes 10 more activities than Staff considered in estimating what it terms "predictable 11 distribution plant." The Company is able to accurately forecast these costs 12 based on its gross customer addition projections. Meter and regulator 13 equipment cost trends are also influenced by periodic changes for cause 14 requirements (*i.e.*, replacements of faulty or outdated equipment).
- *TIMP and DIMP*. These programs are federally mandated, and require the
 Company to undertake projects to increase the safety and reliability of the
 transmission and distribution systems. While these costs are generally
 projected based on historic trends, they have been increasing—and are
 expected to continue to increase-based on the need for in-line inspections⁶⁹
 on the Company's system.
- Information Technology. This category includes radio/electronic
 equipment (*e.g.*, radio, microwave, telemetry equipment) and computer
 software/hardware equipment. These costs tend to increase year-over-

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⁶⁹ In-line inspections require that the company ascertain the status of pipe through inspections from within the pipe, accomplished through using electronic devices that are transported through the pipe. These devices are commonly referred to as "pigs."

year based on new projects and needs. The Company builds these
 projections from the bottom up based on identifiable needs. These costs
 have experienced an increase due to cybersecurity threats and other
 increasing demands and complexity in the IT arena.

5 Q. What do you conclude regarding the Company's costs for non-discrete 6 projects projected to be completed from July 1, 2018 through the end of the 7 Test Year?

A. The costs associated with these categories are highly predictable. The
Commission can be confident that the investments they represent will be
completed and used and useful though the end of the Test Year. Therefore, the
non-discrete investment shown in the illustration above should not be removed
from rate base in this proceeding.

Q. What is your response to Mr. Fox's observation that costs of services,
 meters, and regulators is growing at a higher rate than customer growth?

15 The Company agrees with Mr. Fox's observation, but disagrees with his Α. 16 interpretation and conclusion. One important consideration is that "net customer 17 growth" and "gross customer growth" are different. Net customer growth is the net 18 of gross customer additions less customer losses. Therefore, gross customer 19 growth is higher than net customer growth. While net customer growth is important 20 to the Company, gross customer growth directly impacts customer acquisition 21 capital expenditures. Mr. Fox bases his analysis on net customer growth rates 22 and not on gross customer growth rates.

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Since 2011, gross customer growth has increased significantly. In 2011, the
 Company installed 7,395 new meters. In 2017, the Company installed 13,488 new
 meters; this represents an increase of 82.4 percent in gross additions, compared
 to an 8.2 percent increase in net customer growth. The table below shows the
 differences between net customer growth and gross customer growth over time⁷⁰.

System	2011	2012	2013	2014	2015	2016	2017	2011-17
YE Customers	679,544	685,941	694,804	704,644	714,414	725,146	737,874	8.6% (a)
Gross New Customers	7,395	8,626	10,786	10,674	11,059	12,318	13,488	82.4% (b)
Customer Losses	(1,844)	(2,229)	(1,923)	(834)	(1,289)	(1,586)	(760)	
Net Adds	5,551	6,397	8,863	9,840	9,770	10,732	12,728	
Net Customer Growth	0.82%	0.94%	1.29%	1.42%	1.39%	1.50%	1.76%	
(a) Net Customer Growth								
(b) Gross Customer Growth								

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In addition to gross customer growth, the Company has also experienced significant cost increases during this timeframe related to the following factors:

- Contractual cost increases from Loy Clark, the primary contractors for the
 Company's customer acquisition work. Significant increases in local market
 construction costs have occurred and are expected to continue based on
 increased demand.
- Escalation of materials costs.
- Increased jurisdictional requirements, particularly in the City of Portland,
 have resulted in significant cost increases. These costs now make up
 approximately one-third of the cost of a residential conversion in Portland.
 These increases are the result of increased internal process complexity

⁷⁰ See the Company's Workpaper providing Gross and Net Customer Growth 2011 2017.

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- Increases in the number of customer conversions to natural gas (versus new construction). There were 2,847 customer conversions in 2011 versus 3,755 in 2017. Conversions are more costly than new construction due to complex construction conditions. In addition, most conversions take place in the City of Portland where jurisdictional costs are also increasing rapidly.
 - Annual increases in wages and benefits for NW Natural employees.

9 Q. Do you agree with the calculation associated with adding predictable 10 expenses back into rate base? Please explain.

11 Α. While the Company does not agree with Mr. Fox's approach for the recovery of 12 predictable expenses in rate base, at minimum, Mr. Fox's recommendation should 13 be corrected for an error in his calculation. First, it is important to note that Mr. Fox 14 adjusted all plant additions in the Test Year, amounting to removal of \$68,419,992 of additions scheduled to occur on or after November 1, 2018.⁷¹ Mr. Fox also 15 16 removed \$65,403,801 of additions scheduled to occur from July 2018 through 17 October 2018.⁷² Mr. Fox proposes to add back into rate base the costs for what 18 he defines as predictable type expense that is associated with customer growth.⁷³ 19 Mr. Fox disagrees with the Company's projection of the rate at which NW Natural's 20 services are growing⁷⁴. Based on this disagreement, Mr. Fox re-calculates a 21 services growth rate using the net customer growth rate from December 2016 to 22 October 2019 and recommends an addback amount sufficient to achieve this net

⁷¹ Staff/300, Fox/8.

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- ⁷² Staff/300, Fox/13.
- ⁷³ Staff/300, Fox/19.
- ⁷⁴ Staff/300, Fox/23.

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customer growth in services for the July 2018 through October 2019 period. In
 calculating this adjustment, instead of adding back rate base associated with the
 net customer growth he rate proposed, Mr. Fox makes an additional reduction of
 \$9.4 million.

Q. Does NW Natural feel that Mr. Fox's additional adjustment of \$9.4 million is an error?

7 Α. Yes, the Company believes Mr. Fox made an error in this recommendation. NW 8 Natural has determined that the error resulted from Mr. Fox's adjustments to 9 capital additions during the Test Year and from July 2018 through October 2018; 10 as a result of these adjustments even though Mr. Fox states that he is adding 11 certain predictable type expense back into rate base, his calculation has actually 12 resulted in an additional reduction to rate base of \$9.4 million. Mr. Fox did not 13 provide work papers showing his calculations, but based on the description of his 14 approach, the Company calculates an addback amount of at least \$14.3 million, 15 for a total error in this adjustment of nearly \$24 million of rate base.

Q. What is your response to Mr. Fox's statement that the Company has failed to provide sufficient information about its mains projects?

- A. The Company does not agree with this statement. In response to Staff DR 335,
 the Company provided two files:
- (1) "MX Projects 2012-2017" which provided a list of approximately 1,800
 main extension ("MX") projects for 2013-2017 of which 1,428 were Oregon
 projects. This file provided estimates for therm load, margin, construction costs,
 and customer contributions.
- (2) "MX Project 10 Project Analysis" which provided the result of the manual
 matching exercise necessary to associate estimated therms, margins, and project

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1 costs with actuals for specific main extension projects. This manual process was 2 described in the Company's response to Staff DR 335 and is necessary due to a 3 lack of connections between various Company systems (e.g., Customer Resource 4 Management System, Customer Information System, and the Company's 5 accounting system, SAP). The Company provided a random sample of ten projects due to the extensive time and labor required for this process (i.e., 6 7 providing the analysis for these ten projects required a week of work using 8 knowledgeable Subject Matter Experts). The analysis provided builds the 9 relationship between estimates and actuals for specific projects.

10 The Company has also developed an analysis that demonstrates the prudency 11 of customer connection investments for the period 2012 through 2017. For each 12 year of this analysis, the following data was obtained for Oregon:

- Construction Allowance: Schedule X⁷⁵ specifies the construction allowance per residential dwelling based upon the gas-fired appliances to be installed. For each new customer connected during the period 2012-2017 these allowances were obtained from Company data and a weighted average allowable was determined based on the mix of gas equipment to be installed.
- Construction Cost: The total cost of service lines, meters, permits,
 materials, and main extensions was obtained for 2012-2017.
- Customer Contributions: Customer contributions were subtracted from
 the construction costs to calculate the total cost net of construction
 contribution.

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⁷⁵ NW Natural Schedule X, Distribution Facilities Extensions for Applicant-Requested Services and Mains, available at <u>https://www.nwnatural.com/uploadedFiles/25Xai.pdf</u>.

- 1 The analysis summary shown in the table below for Oregon demonstrates that the
- 2 total construction cost is less than the total construction allowance for each year.

Oregon	2012	2013	2014	2015	2016	2017
Gross New Meters	7,390	8,897	9,065	9,109	10,039	10,818
Total Construction Allowance (\$M)	15.6	18.7	19.1	19.2	21.2	22.8
Total Construction Cost (\$M)	12.6	16.1	15.9	16.9	18.9	22.4
Unspent Allowable (\$M)	(3.0)	(2.6)	(3.2)	(2.3)	(2.3)	(0.4)

The favorable difference between the total construction allowable and net construction costs results in a negative present value of revenue requirement (PVRR) in a financial analysis. This result indicates that NW Natural's investment in mains, services, and meters is prudent and benefits existing customers on the Company's Oregon system.⁷⁶ The data behind this analysis (about 1800 MB) is available on request.

9 Q. What are the total capital expenditures associated with the non-discrete
 10 projects for the Test Year and the July 1 to October 31, 2018 periods?

A. Based on the explanation of non-discrete categories provided above, non-discrete capital expenditures for the Test Year are \$122.4 million and \$43.6 million for the July 1 to October 31, 2018 period.⁷⁷ This results in an average monthly expenditure of \$10.3 million for non-discrete categories. This average is consistent with the projected monthly closings for non-discrete categories.⁷⁸

16 5. CONSTRUCTION OVERHEAD

17 Q. What is construction overhead?

⁷⁷ See the Company's Workpaper providing Non-Discrete Capex Details.
 ⁷⁸ See the Company's Workpaper providing Projected Closings.

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⁷⁶ The analysis above is also responsive to concerns raised by Mr. Kaufman in his testimony, where he stated that new customers may not make sufficient customer contributions. *See* Staff/700, Kaufman/39. In addition to the random samples provided by the Company to Mr. Kaufman, the analysis above shows that the Company is not investing more in main extensions than what results in system growth that benefits all customers.
Construction overhead refers to the costs related to construction activities not 1 Α. 2 attributed to specific projects or work orders. Examples of construction costs 3 included in construction overhead include engineering, operations, supervision, 4 administrative and general office salaries, materials, and other expenses that 5 cannot be directly charged to a project. Construction overhead is allocated to 6 projects or work orders based upon the type of capital project. These costs are 7 appropriately capitalized and added to rate base. In short, construction overhead 8 costs are those that the Company incurs to support the capital infrastructure 9 needed in order to run the natural gas utility.

10 Q. What adjustment does Mr. Fox propose for construction overhead?

A. Mr. Fox proposes a downward adjustment to rate base related to construction
overhead expenditures of approximately \$49 million.

13 Q. What was the basis of Mr. Fox's adjustment?

14 Α. Mr. Fox observes that the level of construction overhead included in the 15 Company's filed case represents a significant increase over the amount included 16 in its last rate case. Specifically, Mr. Fox points out that actual construction 17 overhead in 2012 was \$31 million, and that the increase through 2017 and 18 projected increase through 2019 are 49 percent and 55 percent, respectively. Mr. 19 Fox compares these increases in construction overhead with the increases in 20 direct project costs themselves, which show increases over the same time period 21 of 18 percent and 26 percent, respectively. Mr. Fox states that construction 22 overhead has increased much faster than the Company's capital project activity. 23 Mr. Fox asserts that this disproportionate increase in construction overhead is due

to an alleged effort to "load additional costs into construction overhead."⁷⁹ Based
on these numbers, Mr. Fox proposes to hold the amount of construction overhead
constant to the ratio that was included in the Company's last rate case, which he
calculates as 22.9 percent. Mr. Fox's proposed adjustment removes the total
amount above this percentage from 2013 through June 30, 2018 and then
apportions the amount between states using a plant apportionment factor of 89.06
percent.

8 Q. Do you agree that Mr. Fox's adjustment is appropriate?

9 A. No. I do not. Although the levels of construction overhead have significantly
10 increased since the Company's last rate case, this increase is the result of many
11 factors, all of which have been appropriately accounted for.

12 Q. What are the main categories of construction overhead?

- 13 A. The following figure shows these categories as a percent of total construction
- 14 overhead and the categories are described in more detail below.



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79 Staff/300, Fox/26.

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- 1 Payroll: the main category of construction overhead costs is payroll; this 2 accounts for nearly 70 percent of the total. The administrative transfer is a 3 component of construction overhead payroll costs. The administrative 4 transfer allocates a portion of administrative employee costs, such as the 5 salaries and expenses for Accounting, Human Resources, and general These costs are allocated from O&M to 6 administration to capital. 7 construction as indirect construction overhead. These costs are charged to 8 construction overhead because they cannot be charged directly to specific 9 or individual projects.
- Non-Payroll Administrative Transfer: this category accounts for about 15
 percent of the A&G costs charged to non-payroll O&M expense. Similar to
 the payroll administrative transfer described above, a portion of non-payroll
 administrative and general costs are transferred from O&M to construction
 activities.
- 15 Materials: this category includes the costs of materials delivered to one of \circ 16 the Company's primary mains and services contractors (Loy Clark). When materials like pipe or fittings are issued, the Company does not know the 17 18 specific capital work order or the precise amount of materials used on 19 specific jobs, and as a result, the costs are appropriately charged to 20 construction overhead. This category also includes the costs of materials 21 that are not charged to individual capital work orders including grass seed, 22 concrete, and minor parts.
- Contract work: this category includes the costs of goods and services
 provided by the Company's contractors when such costs cannot be
 specifically charged to individual capital work orders. Examples of the costs
 included in this category include flaggers, construction equipment and
 vehicle rental.
- Other. This category includes relatively minor costs that are not categorized
 above (one percent of the total). Examples include permit fees and parking.

30 Q. Please explain the construction overhead cost increases from 2012 to 2013

- 31 within those categories.
- A. Between 2012 and 2013, total construction overhead grew by 21% or about \$6.5
- 33 million. This increase was driven by several reasons.
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- One driver of increases in payroll was the fact that the pension expense was higher in 2013 compared to 2012. Pension expense is derived by actuarial studies. This item resulted in increased capitalization of pension of \$792,000 in 2014 compared to 2013, explaining 12 percent of the total
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32 33 year over year increase. It is also important to note that pension expense declined in 2014 resulting in an \$817,000 reduction from 2013.

- 3 • Also, in 2013, as part of an overall review of the Company's procedures, 4 NW Natural initiated an evaluation of the indirect time allocated to 5 construction activities. What the Company discovered is that a portion of 6 positions whose duties were in part dedicated to planning and oversight of 7 construction activities had low levels of their compensation charged to 8 The Company responded by adjusting the construction overhead. 9 construction overhead allocations for these positions to an amount that was 10 more reflective of the time and relationship they have with capital projects. 11 Included in this evaluation was the time allocation of some Senior Directors 12 and Officers with accountability over engineering and operations, which was adjusted to reflect the scope of capital-related activities they oversee. As 13 an example, the cost time allocation to COH for the Vice-president of Utility 14 15 Operations changed from 0 percent to 60 percent to better reflect the time 16 spent supervising construction-related activities. Another example, 17 included employees in charge of supporting the addition of capital 18 infrastructure for new customer connections, also taking into account that new customer connections experienced a significant increase. Connections 19 20 were 8,626 in 2012 and 10,786 in 2013, a 25% increase in volume year-21 over-year⁸⁰.
 - Payroll costs between 2012 and 2013 increased by \$1.7 million due to the amounts of at-risk pay provided in those years, with 2012 incentive plan measures being below target. As described more in NW Natural/1800, these costs are a necessary component of providing market pay to employees, including those employees whose time is spent in relation to capital-related activities for the utility.
 - Materials increased by about \$700,000 from 2012 to 2013, representing a 10% year-over-year increase. Indirect materials are impacted by inflation and also by the volume of new customer connections. The new customer connections in 2012 were 8,626, while the new customer connections in 2013 were 10,786,⁸¹ a 25 percent year-over-year increase which more than exceeded the growth in materials cost.
- Non-Payroll administrative transfer increased by about \$320,000. As it
 was mentioned above, this is a transfer of non-payroll administrative and
 general costs from O&M to construction activities. The rates are consistent
 year-over-year, so the increase is driven by inflationary pressures.

⁸¹ See the Company's Workpaper providing Gross and Net Customer Growth 2011 2017.

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⁸⁰ See the Company's Workpaper providing Gross and Net Customer Growth 2011 2017.

In summary, while the cost increase from 2012 to 2013 was significant, it was
the result of several key drivers including improved allocation of time to construction
activities, capitalized costs for performance compensation, and other elements
outside the direct control of the Company such as pension expense, inflation (a
driver of the increases in both payroll and non-payroll costs) and significant customer
growth (which exceeded 25 percent on a year-over-year basis).

7 Q. Please explain the construction overhead cost increase from 2013 to 2017.

8 A. Each of the categories of costs described above has experienced increases

9 between 2013 and 2017 for the following reasons:

10 o Payroll: Payroll has increased mostly as a result of increases in salaries,

wages, and employee benefits. Additionally, employee totals have increased
to some extent, from 1,018 at the end of 2013 to 1,146 at the end of 2017.⁸²

- Non-payroll Administrative transfer: Non-payroll costs have increased largely
 due to inflation. The Compound Annual Growth Rate (CAGR) for the 2013 2017 period is 3.9 percent.⁸³
- Materials: The costs incurred by the Company associated with materials
 have increased as a result of increases in the costs themselves (due to
 inflation), and also due to the larger volume of materials needed. The
 Company has experienced customer growth that has required an associated
 larger volume of mains and services work. For example, new customer
 installations increased from 10.7 thousand in 2013 to 13.5 thousand in 2017⁸⁴
- 22 (6 percent CAGR). Gross new meters are expected to be 16.8 thousand in
- 23 2019, an 8 percent CAGR from 2013 volumes.

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⁸² See NW Natural/1708 (NW Natural's Response to Staff DR 327).

⁸³ See the Company's Workpaper providing COH 2013-2017.

⁸⁴ See the Company's Workpaper providing Gross and Net Customer Growth 2011 2017.

Contract work: The costs associated with contract work have increased due 1 0 2 to inflation and due to the larger volume of capital projects. 3 • Other: This category of miscellaneous costs has also increased due to 4 inflation and due to a larger volume of capital projects driven by customer 5 growth. The figure below shows the CAGR from 2013 through the end of the Test Year. 6 7 The CAGR for the 2013-2017 period was 5.3 percent,⁸⁵ while the CAGR for 2013-Test Year is 3.7 percent.⁸⁶



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- 10 Is the increase in construction overhead from 2013 to the Test Year Q. 11 reasonable?
- 12 Α. The increase is reasonable when the factors described above are taken into 13 consideration.
- 14 Is it appropriate to include construction overhead costs in the Company's Q.
- 15 run rate capital expenditures?

⁸⁵ See the Company's Workpaper providing COH 2013-2017. ⁸⁶ NW Natural/1709 (Staff DR 203, Attachment 2).

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A. Yes. These costs are just as necessary and predictable as the other components
of NW Natural's capital spending required to operate the natural gas system for
customers. As set forth above, the biggest drivers of these costs increases are
payroll and customer growth. The Company is able to project both of these factors
and therefore construction overhead costs are predictable and should be included
as part of run-rate.

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IV. Response to Mr. Kaufman

8 Q. What issues are raised by Mr. Kaufman that you will be addressing?

9 As stated above, I respond to issues raised by Mr. Kaufman regarding affiliated Α. 10 interests and cost allocations (identified in Mr. Kaufman's Opening Testimony as 11 Issue No. 5). This category of issues is divided into the following subcategories: (1) 12 the appropriate rate for billing affiliates; (2) time allocated for activities related to the 13 Holding Company: (3) time charged to affiliates by Company officers; (4) overtime 14 charges; (5) costs not captured in amounts charged to non-regulated affiliates; (6) 15 insurance premium allocation to non-utility entities; (7) allocation of website costs to 16 non-utility entities; and (8) inclusion of the following costs in the Test Year: legal 17 fees related to the North Mist Expansion Project, civic expenses, and costs 18 associated with investor relations and shareholder services.

Q. Please describe the Company's service and cost arrangements with its affiliates.

A. The Company has a number of non-regulated affiliates, and non-regulated
operations within NW Natural. Certain NW Natural employees provide limited
services for these affiliates, including accounting, legal and other services. When
these services are provided, NW Natural must allocate these employees' time to
those entities, in accordance with NW Natural's Cost Allocation Manual (CAM) and

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Master Services Agreement (MSA). Consistent with these documents, all NW Natural employees that provide services to our affiliates record the time devoted to these services using our time tracking system (the CATS module of SAP). The affiliates are then billed for these employees' time. The Company's general procedures for time tracking are discussed in more detail below.

Q. Does the CAM dictate how affiliates will be charged for services provided by NW Natural?

8 Α. Yes. Pursuant to the CAM, which is filed annually with the Commission as part of 9 the Company's affiliate interest report, if a Company employee has any time worked 10 on projects outside of their default home cost center including time worked related 11 to affiliates, the employee records the time worked on these projects in the CATS 12 system. The CATS system then calculates the cost of the reported hours including 13 payroll overhead load and generates an accounting entry in which the costs of the 14 reported hours including payroll overhead load are transferred at the employee 15 average pay rate, by pay grade, from the employee's cost center for the reported 16 activity.87

17 Q. How are these non-utility payroll costs reflected in the Company's rate 18 request?

A. The Company tracks all payroll related to non-utility services, then removes thesecosts from its utility revenue requirement.

Q. What methodology did Mr. Kaufman use to review the Company's affiliate
 transactions?

⁸⁷ NW Natural/1710, Moncayo/3 (the Company's Cost Allocation Manual).

A. Mr. Kaufman reviewed the Company's annual affiliated interest report.⁸⁸ This report
 identifies the transactions between NW Natural and its affiliates and also provides a
 copy of the Company's cost allocation manual. Based on this review, Mr. Kaufman
 addressed the eight issues detailed below.

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1. Issue 1: Rates Charged to Affiliates

Q. What is the first issue raised by Mr. Kaufman regarding the Company's affiliate transactions?

A. Mr. Kaufman takes issue with the fact that the Company always charges its affiliates
at a cost-based rate, raising the concern that the market price for the service being
offered might be higher than NW Natural's cost. Mr. Kaufman acknowledges the
Company's contention that the allocated cost-based rate is equivalent to market, but
believes this is inaccurate. In particular, Mr. Kaufman claims that the Company is
not considering the operating margin that business services build into their pricing
structure.⁸⁹

15 Q. What recommendation does Mr. Kaufman make based on this concern?

A. Mr. Kaufman recommends that instead of simply charging affiliates at cost, the
 Company should obtain annual quotes for the same service or good from an
 independent vendor, compare that against the loaded cost it has been charging
 affiliates, and charge the higher of the two amounts. For the purposes of this case,
 Mr. Kaufman proposes an adjustment to Test Year expense to account for the
 incremental charge that business services firms charge for these services.⁹⁰ Mr.
 Kaufman alleges that the average operating margin for these firms is 9.2 percent

- 88 Staff/700, Kaufman/49.
- ⁸⁹ Staff/700, Kaufman/51-52.
- ⁹⁰ Staff/700, Kaufman/53.

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and therefore for every dollar in costs, these business services firms receive \$1.102
 in revenue, with a margin of \$0.102 per dollar of cost.⁹¹ To make this adjustment in
 this proceeding, Mr. Kaufman recommends applying this market based operating
 margin and NW Natural's cost of non-utility service to the following formula: cost
 divided by 1 minus operating margin.⁹² Mr. Kaufman recommends making this
 adjustment to all non-utility expense.⁹³

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Q. What is the Company's response?

8 Α. Mr. Kaufman is incorrect for three reasons. First, the services that the Company 9 provides to its affiliates are highly specific to the segment of the gas industry in which 10 they operate. For instance, to the extent that our accounting personnel perform work 11 for our gas storage subsidiary, the specific knowledge of the gas industry-which 12 our accounting personnel possess—is highly relevant, and difficult to locate 13 elsewhere. For this reason, there is not a ready market for the precise services our 14 employees provide. Therefore, requiring the Company to identify market prices for 15 these services is inappropriate.

16 Second, the Company's approach ensures that NW Natural's customers do not 17 pay for employee time that is spent on non-utility activities, consistent with the intent 18 of the CAM and MSA. Moreover, because NW Natural charges affiliates for 19 employee time including payroll overhead, customers can be assured that they are 20 not paying for employee time, and are relieved of paying for other related Company 21 resources to the extent those are used to support the employees' time devoted to 22 non-utility business.

⁹¹ Id.

⁹² Staff/700, Kaufman/52-53.

⁹³ Staff/700, Kaufman/53.

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In any event, the Company has performed an analysis of market rates for
 several services provided by NW Natural to its affiliates and determined that these
 rates are in line with the rates charged by the Company.⁹⁴ In fact, the rates charged
 by the Company were approximately 0.95% higher than market rates. The Company
 provides this comparison in Workpaper-Market Cost Analysis (Confidential).

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2. Issue 2: Accounting for Holding Company Costs in the Test Year

7 Q. Please describe the second issue raised by Mr. Kaufman?

8 A. Mr. Kaufman contends that the Company has not sufficiently accounted for holding
 9 company costs.⁹⁵

10 Q. Please describe the holding company costs Mr. Kaufman is referring to.

11 In 2017, NW Natural decided that it would be in the Company's and customers' best Α. 12 interest to reorganize into a holding company structure in order to most efficiently 13 implement its long term corporate growth strategy. For this reason, the Company 14 took affirmative steps to form a holding company (HoldCo). The decision to form 15 HoldCo – and the resulting process for doing so – represented a major strategic 16 initiative on the part of the Company, and therefore required time and attention on 17 the parts of several employees and officers. In addition, the transaction required approval by the Commission under ORS 757.511 and so necessitated regulatory 18 19 and legal resources required to gain approval for the transaction. The Commission has now approved the reorganization,⁹⁶ and the Company is planning on forming 20 21 HoldCo in the second half of 2018. While the Company does not expect that its

⁹⁵ Staff/700, Kaufman/54.

⁹⁴ The rates included in the Company's Workpaper-Market Cost Analysis (Confidential) are based on rates paid by the Company.

⁹⁶ In the Matter of Northwest Natural Gas Company Application for Approval of Corporate Reorganization to Create a Holding Company, Docket No. UM 1804, Order No. 17-526 (Dec. 28, 2017).

utility employees will continue to spend as much time and energy on HoldCo now
that it has been approved, the Company included the costs incurred during 2017 as
an estimate of costs for the Test Year. For this reason, in preparing this rate case
the Company excluded \$153,000 from Test Year costs, connected with ongoing
HoldCo costs.⁹⁷

Q. What is the basis for Mr. Kaufman's assertion that the Company has not sufficiently accounted for the costs it can expect to incur related to HoldCo?

A. Mr. Kaufman asserts that the average charges by the Company's executives during
2016 and 2017 for non-utility was much higher than the amount proposed to be
excluded from rates to account for future Holding Company allocations and other
non-utility activity and this amount should be adjusted.

Q. What information does Mr. Kaufman cite to in support of his argument that the costs allocated by the Company are too low?

- A. Mr. Kaufman points to amounts spent during 2016 and 2017 on HoldCo—combined
 with other non-utility and affiliates—and concludes that these entire amounts should
 be used to calculate HoldCo costs for the Test Year.⁹⁸
- 17 Q. What is the Company's response?
- A. Mr. Kaufman is misinterpreting the information provided in the Company's O&M
 model and this misinterpretation is resulting in a calculation error. Mr. Kaufman
 appears to have averaged all executive charges for non-utilities and affiliates in 2016
 and 2017 based on the information in the Company's response to data request

⁹⁸ Staff/700, Kaufman/54; see also Staff/709, Kaufman/1.

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⁹⁷ The Company has calculated \$153,000 based not only on executive time allocated to HoldCo but based on all employee time. Mr. Kaufman has based his recommendation on executive time only, as set forth in Exhibit Staff/709. Without inclusion of strategic initiatives, the Company's excluded costs associated for HoldCo are higher than the amount presented in Mr. Kaufman's supporting exhibit.

1 OPUC DR 126. Mr. Kaufman then compares this number to the Company's O&M 2 model and determines that the O&M model underrepresents these costs. However, 3 the difference in the numbers noted by Mr. Kaufman is the result of categorization 4 of employees. Mr. Kaufman's use of the response to data request OPUC DR 126 5 results in inclusion of three additional employees that are not categorized as 6 executives in the Company's O&M model (*i.e.*, Company employees Marandu, 7 Weber, and White). Including the charges from these three employees increases 8 the average costs for non-utility and affiliates. However, it is important to note that 9 the Company has calculated its allocation of HoldCo costs based on actual costs 10 incurred during 2016 and 2017. When historic Holding Company costs are 11 considered, the costs proposed by the Company for the Test Year are appropriate 12 and in line with the Company's spending trends.⁹⁹

13 Q. Did Mr. Kaufman provide any basis for why his methodology is appropriate?

A. No. Mr. Kaufman does not explain why he has chosen to compare the costs from2016 and 2017 to the Test Year in this manner.

16

3. Issue 3: Executive Tracking of Non-Utility Time

17 Q. Please describe the third issue raised by Mr. Kaufman?

A. Mr. Kaufman argues that the Company's executives are not tracking their non-utility
 time correctly.¹⁰⁰ Specifically, Mr. Kaufman argues that these executives are
 underreporting their non-utility time and also that the Company's time tracking
 system results in a biased estimate of the amount of utility time.¹⁰¹ Mr. Kaufman
 alleges that this bias is the result of the Company's use of "exception" reporting,

⁹⁹ *Id.* ¹⁰⁰ Staff/700, Kaufman/55.
 ¹⁰¹ *Id.*

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- whereby time spent by utility employees is assumed to be undertaken on behalf of
 the utility, unless specifically tracked as non-utility.¹⁰²
- 3 Q. How does the Company track non-utility time?

4 The Company has a written General Procedure in place that governs Non-Utility and Α. Affiliated Interest Activities (the "Affiliate Procedure").¹⁰³ Pursuant to this Affiliate 5 6 Procedure, any activities that are non-utility, non-rate based, or affiliate activities are 7 not charged to NW Natural customers. This Affiliate Procedure and its policies are 8 controlled by the Company's Cost Allocation Manual and Master Services 9 Agreement. It is the Company's policy and practice to track this time in thirty-minute 10 increments.¹⁰⁴ Aggregate time of less than thirty minutes per day is considered *de* 11 minimis and is not recorded. For example, if an executive had a five-minute 12 conversation regarding an affiliate matter, this time would be considered *de minimis* 13 and is not recorded.

Q. Has the Commission considered whether the Company's time tracking policies are appropriate for allocation of costs to non-utility entities and affiliates?

A. Yes. The Commission considered time tracking as part of the HoldCo settlement
proceeding. In that proceeding the parties agreed to a stipulation of conditions that
included a requirement for the Company (and HoldCo) to maintain robust systems
of tracking employee and executive time, identified to *within an hour*.¹⁰⁵ The
stipulation, including this condition to track HoldCo time to the hour, was approved

¹⁰² *Id*.

- ¹⁰³ A copy of the Affiliate Procedure is provided as Exhibit NW Natural/1711 (G-28 Policy Non-Utility and Affiliated Interests Activities (Confidential)).
- ¹⁰⁴ An example of a Company training presentation on time tracking is provided as Exhibit NW Natural/1712 (Confidential).

¹⁰⁵ In the Matter of Northwest Natural Gas Company, d/b/a NW Natural, Order No. 17-526, Attachment A to Stipulation at 8.



¹⁰⁶ See NW Natural/1712 (Confidential) (Shared Services Training Presentation).
¹⁰⁷ Staff/703, pg. 4.
¹⁰⁸ Staff/700, Kaufman/56 *citing* DR 126 Attachment 1 (Confidential).
¹⁰⁹ Staff/700, Kaufman/56.
¹¹⁰ *Id*.
¹¹¹ *Id*.

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Q. What is Mr. Kaufman's recommendation regarding executive billing of non utility time?

A. Mr. Kaufman is recommending an increase to non-utility allocated executive
 payroll to account for the unbilled time that Mr. Kaufman has identified. Mr.
 Kaufman's

- 6
- 7

Q. Is Mr. Kaufman's conclusion supported by a review of the Board Meeting
 Agenda?

10 A. No. First, it is important to note that Mr. Kaufman has made this recommendation 11 based on one board meeting agenda. Even if Mr. Kaufman's conclusions were 12 correct, this would hardly justify his recommendation to apply the results of this 13 analysis to all executive time. Second, Mr. Kaufman has made incorrect 14 assumptions about the attendance of executives at these meetings, and the 15 Company's time charging practices.

16 Q. What are these incorrect assumptions relied upon by Mr. Kaufman?

A. Mr. Kaufman relies on the following incorrect assumptions to reach his conclusion:
 (1) all officers identified on the agenda were present for the non-utility portions of
 the Board Meeting; and (2) any amount of time (even *de minimis* time) spent on
 non-utility operations should be charged to non-utility operations. These
 assumptions are incorrect.

Q. Why is it incorrect to assume that all executives identified on the agenda
 were present and participating during the alleged non-utility portion of the
 Board Meeting?

At meetings of the Board of Directors, executives are often asked to join the 1 Α. 2 meeting to give a presentation on a topic, but the executives do not stay for the 3 entire meeting. For example, the Vice President of Public Affairs may join the 4 meeting to discuss a Legislative update as reflected in the agenda but would not 5 necessarily remain present for the discussion of "Strategic Matters" because this 6 is not directly related to his responsibilities. Therefore, Mr. Kaufman's assertion 7 that that there should have been 36 entries incorrectly assumes that all executives 8 were present for the entire meeting when this is not usually the case.

9 Q. Why is it incorrect to assume that any and all time spent on non-utility
 10 operations should be charged to non-utility operations?

- 11 As set forth above, the Company has a policy for determining when and how to Α. 12 Under this policy, executives only charge for time charge non-utility time. 13 increments in excess of 0.5 hours during an 8-hour work day. Based on the 14 February 23, 2017 Board Meeting Agenda, the amount of time attributed to the 15 non-utility matters cited in Mr. Kaufman's Testimony with respect to the February 16 23, 2017 Board Meeting would not have met the 0.5 hour time threshold. 17 Therefore, according to Company time-tracking practices, time entries related to 18 these presentations would not be expected.
- 19

4. Issue 4: Allocation of Overtime Costs

20 Q. What is the fourth issue raised by Mr. Kaufman?

A. Mr. Kaufman asserts that the Company has failed to include any overtime costs in
 its non-utility labor allocation.¹¹² Mr. Kaufman states that NW Natural has hard

¹¹² Staff/700, Kaufman/57.

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coded the overtime section of the Company's non-utility allocation overhead as
 zero.¹¹³

3 Q. What is Mr. Kaufman's proposal regarding non-utility overtime pay?

- 4 A. Mr. Kaufman is proposing to apply NW Natural's non-utility labor allocators to base 5 pay and overtime pay, resulting in an increase of to non-utility
- 5 pay and overtime pay, resulting in an increase of **1** to non-utility 6 allocations.

7 Q. Which Company employees support non-utility work?

8 A. Most non-utility work is performed by non-bargaining unit employees. These
9 employees are generally salaried and ineligible to earn overtime pay.

Q. Has the Company confirmed whether there was any overtime work during
 the base year that should be allocated as non-utility?

- A. Yes. The Company confirmed that only 0.203% of overtime was charged for nonutility work in 2017.¹¹⁴ The Company agrees that an adjustment for overtime should be made. Based on the overtime charged in the Base Year, the Test Year the calculated adjustment should be \$8,523, instead of the proposed by Mr. Kaufman.¹¹⁵
- 17

5. Issue 5: Administrative Overhead Rate Charges

18 Q. What is the fifth issue raised by Mr. Kaufman?

A. The fifth issue is whether the Company should have charged an administrative
 overhead rate to the majority of labor allocated as non-utility.¹¹⁶ Mr. Kaufman
 argues that because this labor is provided by NW Natural employees, and NW

¹¹³ Id.

¹¹⁴ NW Natural/1713 (2017 Overtime Detail).

¹¹⁵ NW Natural/1713 (2017 Overtime Detail).

¹¹⁶ Staff/700, Kaufman/57.

Natural incurs payroll expenses, insurance, recruiting and human resource costs,
 management costs, overhead for management, etc.¹¹⁷

3 Q. What costs are included in the overhead rate cited by Mr. Kaufman?

4 The administrative overhead rate used by the Company is 27.5%. This rate Α. 5 approximates the amount of additional, indirect costs incurred by salaried 6 employees of the Company as part of their job duties.¹¹⁸ The specific costs 7 included for calculation of the 27.5% are the following: rents and leases, 8 telephone, cellular phones, office supplies, education, dues/memberships, books 9 and magazines, furniture, utilities, copier lease/management, depreciation, 10 amortization, software maintenance, and hardware maintenance.¹¹⁹ The 11 administrative overhead rate does not include items like insurance, as stated by 12 Mr. Kaufman. As discussed below, insurance policy premiums are allocated and 13 directly charged to each affiliate of the Company based on appropriate allocation 14 factors.

15 Q. Please explain what categories of non-utility payroll labor the Company has 16 excluded from the Test Year?

A. As presented in the table on page 5 of my initial testimony, the Company removed
25.2 non-utility payroll FTEs. These 25.2 non-utility payroll FTEs include FTEs
associated with the Appliance Center, affiliates, Service Solutions, Community
Affairs and Public Relations, and Business Development and other transfers.¹²⁰

Q. How does the Company determine when to charge an administrative overhead rate for non-utility labor?

¹¹⁷ Staff/700, Kaufman/57-58. ¹¹⁸ NW Natural/1714 (Staff DR 285 (Attachment 1)).

¹¹⁹ *Id*.

¹²⁰ NW Natural/600, Moncayo/5.

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1 Α. The Company applies an administrative overhead rate to non-utility labor that 2 requires the Company to incur the indirect costs captured in this rate. For the test 3 year the FTEs that will cause the Company to incur these indirect costs are the 7 4 affiliate FTEs and the Company charges the administrative overhead rate for these 5 FTEs. For example, the Company charges this rate to two subsidiaries, Gas Storage and Gill Ranch, because the Company provides services to these entities 6 7 that require the Company to incur the indirect costs captured by the Company's administrative overhead rate.¹²¹ The administrative overhead rate is included in 8 the Test Year for these two entities.¹²² However, the Company does not charge 9 10 this rate to entities that do not receive services from NW Natural that impact the 11 indirect costs captured in the 27.5% administrative overhead rate (e.g., the 12 Appliance Center and Interstate Storage).

13 Q. What services does NW Natural provide to Gas Storage and Gill Ranch?

A. The Company provides accounting, legal, budgeting and financial planning,
purchasing, tax, and/or executive services to these entities. The NW Natural
employees providing these services cause the Company to incur the indirect costs
accounted for in the 27.5% administrative overhead rate and therefore it is
appropriate to charge the overhead rate to these entities.

Q. Please describe the Company's relationship with the Appliance Center and
 why applying the administrative overhead rate is not appropriate.

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¹²¹ Gill Ranch is a NW Natural affiliate; Gas Storage is also a NW Natural Affiliate and the parent entity for Gill Ranch.

¹²² NW Natural/1701 (Staff DR 125, Attachment 2 (Supp.) (Confidential)); see also NW Natural/600, Moncayo/5 (noting that the Company charges its administrative overhead rate of 27.5% for the 7 Affiliates FTEs are included in the Company's FTE adjustment).

A. The Appliance Center is a self-contained, non-regulated division of NW Natural.¹²³
The Appliance Center has its own billing system and pays separately for its
expenses (*e.g.*, rent, supplies, utilities, etc.). Therefore, it would not be appropriate
to apply the administrative overhead rate to the Appliance Center because the
Company does not provide services that cause the Company to incur the indirect
costs captured by the administrative overhead rate. Instead, the Appliance Center
to apply 1.5% charge for management oversight.¹²⁴

Q. Even if Mr. Kaufman's recommendation to apply the overhead rate in the 9 limited instances where NW Natural does not currently do so were accepted, 10 would additional adjustments to his calculation be necessary?

11 Yes. As discussed above, it is not appropriate to include the labor associated with Α. 12 the Appliance Center in this calculation because the Appliance Center does not 13 use any Company services that are included in the administrative overhead rate. 14 Similarly, the two NW Natural employees working full-time for Gas Storage/Gill 15 Ranch work out of the Company's headquarters on its ninth floor. The ninth floor 16 of the Company's headquarters is separated from the other floors within 17 headquarters, available only for these employees, and dedicated to this subsidiary 18 entity with all costs directly charged to the entity. Therefore, it would be 19 inappropriate to charge an overhead rate. Removing these costs (associated with 20 the Appliance Center and dedicated storage employees) from Mr. Kaufman's 21 calculation would reduce the adjustment to \$358,163. The Company has provided 22 the relevant calculation as Exhibit NW Natural/1716 (Confidential).

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¹²³ NW Natural/1710, Moncayo/2 (CAM).

¹²⁴ NW Natural/1715, Moncayo/1 (NW Natural's Response to Staff DR 284).

1

6. Issue 6: Insurance Policy Premiums Allocation

2 Q. What is Mr. Kaufman's sixth issue?

A. Mr. Kaufman asserts that the Company uses four allocation factors to determine
the appropriate allocation for non-utility operations and affiliates. Mr. Kaufman
argues that three of these factors need to be updated and also proposes changes
to which factors are used by the Company to allocate the premiums associated
with three of its policies.

8 Q. How did the Company allocate insurance premiums?

9 The Company determined the fiscal year 2018-2019 insurance premiums, and Α. 10 these amounts were allocated using the Company's 2017-18 insurance allocation 11 model. The allocation model is designed in compliance with the Company's 12 Affiliate Policy.¹²⁵ Pursuant to the Company's Affiliate Policy, individual premiums 13 are allocated to entities consistent with the nature of the insurance policy. For 14 example, directors and officer ("D&O) insurance policies are allocated 75 percent 15 based on assets and 25 percent according to the number of Directors and Officers 16 (D&Os) sitting on the boards of the various entities. Workers compensation 17 policies are allocated based on payroll, and property insurance is allocated based 18 on total assets.

Q. What are the four allocation factors used by the Company to determine the appropriate allocation of insurance premiums to non-utility operations and affiliates?

A. The Company uses the following four allocation factors: revenues, assets, payroll,and number of director and officers.

¹²⁵ NW Natural/1711.

1	Q.	How did Mr. Kaufman perform his review of the Company's allocation of
2		insurance premium?
3	A.	Mr. Kaufman relied on the fiscal year 2016-17 allocation model referenced in NW
4		Natural's response to Staff DR 128. This data request asked the Company to
5		provide supporting information related to its insurance information for the fiscal
6		year 2016-17.
7	Q.	Did the Company use the fiscal year 2016-17 allocation model to determine
8		insurance premium allocations for the Test Year?
9	A.	No. The Company used the 2017-18 allocation model to calculate the allocation
10		of the Test Year insurance costs. Therefore, because Mr. Kaufman did not use
11		the same base-line allocation factor percentages there may be slight variations
12		between Mr. Kaufman's and the Company's calculations.
13	Q.	Which factors does Mr. Kaufman argue need to be updated?
14	Α.	Mr. Kaufman argues that the following allocation factors should be updated:
15		• Assets: Mr. Kaufman proposes to update Mist Storage to account for the
16		cost of the North Mist Expansion Project;
17		• Payroll: Mr. Kaufman proposes to update payroll to include non-utility
18		payroll;
19		• Number of Directors and Officers: Mr. Kaufman proposes to update the
20		number of Directors and Officers for consistency with the Company's most
21		recent Affiliated Interest Filing.
22	Q.	Does the Company agree with these updates?
23	Α.	No, the Company does not agree that any of these adjustments proposed by Mr.
24		Kaufman are correct.

Q. Why doesn't the Company agree that an update to its asset allocation factor is necessary?

3 Α. Mr. Kaufman has recommended adding \$128,000,000 to the Company's total 4 asset amounts related to Mist Storage to adjust for estimated North Mist Expansion Project ("NMEP") property, plant and equipment ("PP&E"),¹²⁶ not currently in 5 6 service. The NMEP PP&E is not expected to be in service until late 2018 and 7 therefore was not included in the Company's revenue requirement calculation. 8 Therefore, the assets allocation factor should not be adjusted to include these 9 costs. However, if any updates are made to the assets allocation factor, the 10 updates should include all changes since September 30, 2017 (the date used to 11 determine assets in the Company's insurance allocation model).

12 Q. Should the Company's payroll allocation factor be updated to include non-13 utility pay?

A. The Company does not disagree that some non-utility pay should be included in
the allocation factor. The Test Year allocation considered the allocation between
NW Natural employees and Gas Storage employees but did not take into
consideration the non-utility portion of some NW Natural employees.

However, Mr. Kaufman's calculation needs to be updated in order to provide a true comparison with the Company's calculation of this allocation factor. The Company used *base* wages and salaries for the twelve-month period ending September 30, 2016. Staff used *total loaded* payroll (*i.e.*, base wages and salary plus payroll overhead including benefits, bonus, pension, workers compensation, and payroll taxes) for Company employees and then deducted a non-utility portion and divided by 12 to determine the monthly payroll. As a result, loaded monthly

¹²⁶ Staff/710, Kaufman/3.

payroll is being used for NW Natural employees but unloaded full-year gas storage
payroll is being used for NW Natural Gas Storage employees. In order to correct
the calculation, base wages and salaries or total loaded payroll should be used for
both categories of employees. Using the correct calculation would result in a
decrease of only \$2.8k.

6 Q. Does the Company's allocation factor for D&O require updating?

7 No. The minor differences between the Company's D&O allocation factor and the 8 D&O allocation factor proposed by Mr. Kaufman appears to arise from Mr. 9 Kaufman counting all D&Os for all entities, regardless of whether such D&Os 10 provide any substantive duties for these entities. This allocation method is not the 11 best proxy method for predicting liability under the policy. The Company's 12 allocation factor provides a better weighting of Directors and Officers for each 13 entity, based on actual time spent and is more in line with how D&O policies are 14 obtained.

Q. Which insurance policies does Mr. Kaufman argue are not allocated with the most relevant drivers?

A. Mr. Kaufman argues that the allocation factors should be adjusted for theCompany's general, excess, and property insurance premiums.

Mr. Kaufman argues that NW Natural's general liability and excess liability policies are general policies that cover all of NW Natural's and NW Natural's affiliate operations.¹²⁷ The Company uses revenue to allocate the premiums associated with these policies. Using revenue as the allocation factor resulted in a *de minimis* cost allocation to NNGFC, KB Pipeline, The Dock, NW Natural Gas

¹²⁷ Staff/700, Kaufman/59.

Storage, Trail West, and Biogas because these entities do not have revenues.¹²⁸ 1 2 As a result, Mr. Kaufman found that it would be most appropriate to apply all four 3 allocators to the premiums for the general and excess liability policies to ensure 4 that all of the entities that are covered by the policies (including NNGFC, KB 5 Pipeline, The Dock, NW Natural Gas Storage, Trail West, and Biogas) are contributing a "fair share."¹²⁹ Mr. Kaufman argues that this allocation would 6 7 recognize the cost drivers for these policies and result in contributions towards 8 premium costs from all covered entities.¹³⁰

9 Similarly, Mr. Kaufman argues that instead of using payroll to allocate property 10 insurance premiums it would be more appropriate to use assets.¹³¹ Mr. Kaufman 11 argues that assets would provide a more direct cost driver for property 12 insurance.¹³²

Q. Does the Company agree that adjustments to the allocation factor usage are
 necessary?

A. No. As detailed below, the Company's allocation factor usage for these policies
was correct.

17 Q. Please explain why it is not appropriate to apply all four allocation factors to
 18 the Company's general liability or excess liability policies.

A. The Company determines which allocation factor to apply based on which factor(s)
 represent the best proxy measurement for activities that may create liabilities
 covered under the relevant policy. The Company would only apply all four
 allocation factors if it determined that each factor represented an equal risk.

¹²⁸ Staff/700, Kaufman/59-60.
 ¹²⁹ Staff/700, Kaufman/60.
 ¹³⁰ *Id*.
 ¹³¹ Staff/700, Kaufman/60.
 ¹³² *Id*.

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However, this is not the case. The Company's operations, measured through
 revenues, represent the greater risk of liabilities under the general liability policy.
 For this reason, the Company allocates the premiums associated with the general
 liability and excess liability policies based solely on revenues.

Q. Please explain why no adjustment is necessary for the Company's property
 insurance allocation.

A. As discussed above, Staff has relied on the Company's FY 2016-17 allocation
model. While it is correct that the Company allocated its property insurance
premiums based on payroll under that model, the Company has allocated property
insurance based on assets under the 2018-19 FY model (the model used this
proceeding). Therefore, no adjustment for this insurance premium allocation is
necessary.

13

7. Issue 7: Allocation of Website Costs

14 Q. Please describe the seventh issue raised by Mr. Kaufman.

A. Mr. Kaufman alleges that the Company should allocate 20 percent of its costs to
 host and maintain its website to non-utility.¹³³ This 20 percent allocation is
 intended to recognize the costs associated with the Appliance Center information
 contained within the Company's website.¹³⁴

19 Q. Please describe the Company's website and associated costs.

A. The Company maintains nwnatural.com for purposes of providing information,
 facilitating customer billing, etc. The Company's website also includes a page that
 provides information about the Appliance Center. The total costs associated with
 the Company's website are \$9,500.

¹³³ Staff/700, Kaufman/61. ¹³⁴ *Id*.

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Q. How did Mr. Kaufman reach his recommendation to allocate twenty percent of website costs to non-utility?

A. Mr. Kaufman calculated this proposed adjustment of 20 percent based on his
 allegation that one primary menu on the Company's website out of five primary
 menus is devoted to non-utility information (*i.e.*, information about the Appliance
 Center).¹³⁵

7 Q. What is the Company's response?

8 Α. Mr. Kaufman's calculation of costs attributable to the Appliance Center overstates 9 the allocation as a percentage of the total number of pages within the Company's 10 website. While Mr. Kaufman is correct that the Company's website has five main 11 menu categories, the Appliance Center is not one of these five main menu 12 categories (*i.e.*, the Appliance Center information page does not comprise 20% of 13 the Company's website pages). Instead, the Appliance Center information can be 14 found as a sub-sub-page under the Residential menu option; it is the Residential 15 menu option that accounts for 20 percent of the total website.

Q. What percentage of the Company's website is dedicated to Appliance Center Information?

- 18 A. NW Natural has 385 pages on its website, of which the Appliance center is one.¹³⁶
- The page containing Appliance Center information accounts for 0.26 percent of theCompany's website.

Q. Based on this percentage, what is the correct cost allocation for the Appliance Center?

¹³⁵ Staff/700, Kaufman/61.

¹³⁶ See the Company's Workpaper providing the NW Natural Web Site Map.

- A. Based on this percentage, the Oregon costs attributable to the Appliance Center
 information contained in the Company's website are \$22.21.
- 3

8. Issue 8: Legal, Civic, and Shareholder and Investor Relations Costs

4 Q. What is the eighth issue raised by Mr. Kaufman?

A. Mr. Kaufman argues that the Company has included the following costs that should
 be excluded from the Test Year: legal costs associated with the North Mist
 Expansion Project and civic expenses.¹³⁷ Mr. Kaufman also recommends a fifty
 percent disallowance related to shareholder and investor relations expense.¹³⁸

9 Q. Does the Company agree with Staff's recommendation regarding the legal
 10 fees associated with the North Mist Expansion Project?

A. Yes. After additional review, the Company agrees with this recommended
adjustment to the Test Year. This results in exclusion of from the Test
Year.

Q. What is Mr. Kaufman's assertion regarding civic expenses included in the Test Year?

A. Mr. Kaufman alleges that the Company's CAM identifies civic expenses as non utility and therefore these costs should be excluded from the Test Year.¹³⁹

18 Q. What are the civic expenses included in the revenue requirement that Mr.

- 19 Kaufman is referring to?
- A. The civic activities referred to by Mr. Kaufman are not actually civic activities. The
 costs are included in a cost center called Community and Civic Affairs; this cost
 center includes some O&M expense. Mr. Kaufman is recommending to remove
 the entire O&M amount; however, the name of the cost center does not accurately
 - ¹³⁷ Staff/700, Kaufman/61-62.

¹³⁸ Staff/700, Kaufman/62.

¹³⁹ Staff/700, Kaufman/82.

reflect all of the activities it contains. For example, there are O&M costs related to
 utility operations contained in this cost center including management of the Gas
 Assistance Program, management of customer-based Get Ready Emergency
 Preparedness Programs, and service to the incident commander group. These
 utility activities account for approximately 20 percent of the activities contained in
 the Community and Civic Affairs cost center, the other 80 percent are charged to
 non-utility. The costs associated with these activities should be allowed.

Q. Are there any other problems with Mr. Kaufman's recommendation regarding civic activities?

A. Yes. The number included with respect to "civic activities" is actually \$168,000
 and not the \$238,000 included by Mr. Kaufman.¹⁴⁰ Therefore, any adjustment to
 civic activities (which is not necessary) should be applied based on the correct
 number included in the Company's revenue requirement.

Q. What is Mr. Kaufman's argument regarding shareholder and investor relations expense?

- A. Mr. Kaufman states that the Company has included shareholder and investor
 relations expenses in the Test Year and that these expenses primarily benefit
 investors, not ratepayers.¹⁴¹
- Q. Based on Mr. Kaufman's assertion that these expenses primarily benefit
 investors, what is his recommendation?

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 ¹⁴⁰ NW Natural/1701 (Staff DR 125 Conf. Supp. Attachment 2, Non-Payroll Forecast Tab).
 ¹⁴¹ Staff/700, Kaufman/62.

A. Mr. Kaufman is recommending that the investor expenses be shared fifty-fifty
 between customers and shareholders.¹⁴² He reasons that there is some benefit
 to customers that results from maintain relationships with investors.¹⁴³

4 Q. Does the Company agree with Mr. Kaufman?

A. The Company agrees with Mr. Kaufman that there is a benefit to customers that
arises from maintaining relationships with investors, but it is more direct and
comprehensive than described by Mr. Kaufman.

8 NW Natural relies on investments by shareholders to obtain 50% of its total 9 access to capital, and on those who fund NW Natural through debt for the other 10 50%. Maintaining relationships with investors fits squarely in required utility 11 activities, and ensures the financial health and integrity of the Company by allowing 12 the Company to attract capital. A financially strong company is able to access 13 credit at lower rates thereby reducing costs to customers. Thus, the Company 14 maintains that no adjustment to these costs would be appropriate.

15

V. <u>Response to Mr. Boyle</u>

Q. Does Mr. Boyle recommend adjustments to the Company's proposed cost recovery for the fee free bankcard program?

A. Yes. Mr. Boyle recommends that the Commission (1) reduce the cost recovery
associated with the fee free bankcard program during the Test Year based on Mr.
Boyle's analysis of historical data; (2) cap the projected adoption rate at 22.0
percent for the Test Year; and (3) reduce the costs associated with this program
to reflect the possible savings that the Company may be experiencing as a result

¹⁴² Id. ¹⁴³ Id.

of the program's implementation.¹⁴⁴ These recommendations result in a proposed
 adjustment of (\$671,130) to NW Natural's Test Year fee free bankcard program.¹⁴⁵

3 Q. What is the Company's fee free bankcard payment option?

4 As part of the Company's last general rate case (UG 221), the Commission Α. 5 approved the Company's proposal to begin offering a fee free bankcard payment 6 option. Prior to the Commission's approval of this proposal, customers could pay 7 their monthly gas bills with NW Natural using a bankcard, however a processing 8 fee was required to be paid by the customer. Under the fee free bankcard payment 9 option, which is available to residential and small commercial customers, the 10 Company does not charge the program participants directly for these fees, but 11 rather includes the costs in the revenue requirement that is allocated to the rate 12 classes eligible for this option.

Q. What costs associated with the fee free bankcard program has the Company
 included in its filing in this proceeding?

A. For this program, the Company has included \$2,083,000 on an Oregon allocated
 basis in the Test Year. This amount is based on the Company's projection of the
 adoption rate for the fee free program during the Test Year and adjusted by the
 Oregon allocation factor.¹⁴⁶

- 19 Q. How did the Company estimate the adoption rate for the Test Year?
- A. The Test Year incorporates a blend of two forecasting methodologies to derive the
 costs that are included in this proceeding. Bankcard costs that are expensed by
 the Company's Treasury Department were forecasted and normalized for the Test

¹⁴⁴ Staff/500, Boyle/6-7.

¹⁴⁵ Staff/500, Boyle/7.

¹⁴⁶ See NW Natural/1717 (Staff DR 176, Attachment 1 (providing the pre-allocation costs)).

Year as part of examining all of the Company's bank costs.¹⁴⁷ Bankcard costs that 1 2 are expensed by the Account Services Department have had cost of living 3 adjustment rates applied against 2017 actual costs to derive the January 2018 to 4 October 2019 costs.¹⁴⁸ The sum of the Treasury Costs and Account Services costs represents the total cost of the fee free bankcard program.¹⁴⁹ 5

6 7

Q.

Are these forecasts consistent with the Company's experience with the program to date?

8 Α. Yes. The Company's historical trends support these forecasts and indicate that 9 the customer adoption rate will continue to increase, and that use of the mailing 10 option will decrease.¹⁵⁰ For example, since 2013, adoption of the fee free 11 bankcard payment option for the residential segment has increased, in terms of 12 percentage of customers using it, from 7.6 percent to 20.5 percent (through 2017) 13 while use of the mailing option, for example, has decreased from 28.8 percent to 14 20.2 percent for residential customers. This steady increase in adoption of the 15 bankcard program is without any significant promotion of the program by the 16 Company.¹⁵¹ Based on these trends, the Company projects that adoption of the 17 fee free bankcard program will experience a 10 percent increase in adoption for 18 2018 (i.e. another 2.1 percent of customers will adopt the approach) and 2019.

19 Q. What is Mr. Boyle's position on the Company's Test Year costs for the fee free bankcard program?

20

21 Α. Mr. Boyle believes that the Company has overstated the expected adoption rate 22 for the fee free bankcard program based on historical trends. In addition, as noted

¹⁴⁷ See NW Natural/1717, Moncayo/1 (NW Natural's Response to Staff DR 176).

¹⁴⁸ *Id*.

¹⁴⁹ Id.

¹⁵⁰ NW Natural/1718 (NW Natural's Response to Staff DR 346). ¹⁵¹ Id.

1 above, Mr. Boyle recommends capping the projected adoption rate for the Test 2 Year at a level below historical trends. And finally, Mr. Boyle recommends an 3 adjustment to reflect cost savings that the Company can expect due to improved 4 revenue collections and lower billing expenses.

Q.

5

6

On what basis does Mr. Boyle claim that the Company has overstated its costs associated with the fee free bankcard program in the Test Year?

7 Α. Mr. Boyle graphed the NW Natural historical transactions from November 2012 8 through December 2017 from data provided in response to Staff DR 172, added 9 the Company's projected transactions for 2018 through the end of the Test Year 10 from data provided in response to Staff DR 173, and added a trend line.¹⁵² Using 11 this approach, Mr. Boyle concluded that the Company's Test Year projection was not consistent with the historical trend.¹⁵³ Therefore, Mr. Boyle replaced NW 12 13 Natural's transaction projection with his transaction projections to result in what he 14 determined was a more "normal" adoption growth rate.¹⁵⁴ Mr. Boyle asserts that 15 his lower projection is more appropriate based on his analysis.

16 Q. Are there any errors in Mr. Boyle's analysis of the Company's projections?

17 Yes. In calculating his adjustment, Mr. Boyle relied on information about program Α. 18 costs provided in the Company's responses to Staff DRs 172 and 173-which 19 provided program costs on a total system basis. Mr. Boyle then compared the 20 costs associated with the Oregon transactions only, with the number provided for 21 total transactions provided by the Company. By using only the number of 22 transactions in Oregon, Mr. Boyle's transaction projections (see Staff/503, Table 23 were necessarily lower than the Company's transaction projections because Mr.

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¹⁵² Staff/500, Boyle/3; see also Staff/502.

¹⁵³ Staff/500. Boyle/3.

¹⁵⁴ Staff/500, Boyle/3-4; see also Staff/503 and Staff/504.

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Boyle did not include any Washington transactions (see Staff/503/Table 1) and therefore did not provide a true comparison of the two projections.

2

3 It is important to note that the Company was not requesting cost recovery 4 based on the total system transactions. Instead, the Company calculated total 5 costs and applied the appropriate jurisdictional allocation factor to determine the costs included in the case. Accordingly, the costs requested for recovery by the 6 7 Company are not \$2,340,103 as argued by Mr. Boyle but are \$2,083,000. This is 8 more in line with the total costs calculated by Mr. Boyle in Staff/503, Table 2. Mr. 9 Boyle's total cost calculation is \$2,033,129 (*i.e.*, a less than \$50,000 difference). 10 Thus, while the Company does not agree with Mr. Boyle's projection calculation 11 and affirms that its own methodology is correct and based on the most accurate 12 data, any adjustments should be made based on a review of the costs for which 13 the Company is actually seeking recovery.

Q. Please explain Mr. Boyle's proposal to cap the projected adoption rate at a
 level below even its own historical trend modeling.

A. Mr. Boyle has also proposed to cap the adoption rate at 22 percent for the Test
 Year¹⁵⁵, even though his own trend analysis suggests that the adoption rate will
 reach 25 percent by the end of the Test Year. ¹⁵⁶

19 Q. Why has Mr. Boyle proposed to limit the adoption rate during the Test Year?

A. Mr. Boyle argues that it is improbable that the adoption rate will increase
 indefinitely.¹⁵⁷ Based on this belief, Mr. Boyle recommends basing the forecast of
 Test Year fee free bankcard transactions on the month-end October 2018

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¹⁵⁵ Staff/500, Boyle/5.

¹⁵⁶ Staff/500, Boyle/4.

¹⁵⁷ Staff/500, Boyle/4.

projected adoption rate of 22.0 percent.¹⁵⁸ Mr. Boyle argues that this projected
 adoption rate allows for growth in the number of transactions commensurate with
 customer growth.¹⁵⁹ His recommendation to cap the adoption at 22.0 percent
 results in a reduction to the number of Test Year transactions by 415,365.¹⁶⁰

5 **Q. Doe** 6 **the**

Does the Company agree that 22.0 percent is an appropriate adoption rate for the Test Year?

7 No. As discussed above, the Company's historical payment trend does not indicate Α. 8 that adoption of the program is flattening or declining. In fact, all data indicates that 9 customers have an increasing preference for electronic payments instead of mailing 10 payments. This trend is likely to continue beyond the Test Years as electronic 11 payment transactions become more and more common and as the Company's 12 customer population becomes increasingly comfortable with online payment options. 13 There is thus no basis to use a 22 percent adoption rate for the fee free bankcard 14 program. In fact, the adoption rate was already at 22.5 percent as of April 30, 2018. 15 This represents a three percent increase from April 30, 2017 when the adoption rate 16 was 19.5 percent. The adoption rate trend is therefore consistent with the 17 Company's projection (that the adoption rate will increase by approximately three 18 percent per year) and has already exceeded the limit proposed by Mr. Boyle.

Q. Does Mr. Boyle make any other recommendations regarding the fee free bankcard program costs?

A. Yes. Mr. Boyle also recommends that the Company's bank fee costs be reduced by
ten percent to recognize a portion of the savings that may occur due to introduction

¹⁵⁸ Id. ¹⁵⁹ Id. ¹⁶⁰ See id.

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of the fee free bankcard payment option.¹⁶¹ Mr. Boyle argues that these cost savings
 result from reduced collection agency fees, reduced net write-offices, the reduced
 need for reminder notices, and reduced field disconnects.¹⁶² Mr. Boyle also asserts
 that cost savings could be resulting from reduced postage and mailing costs,
 improved cash flow, and "others that have not have been fully reflected in rates."¹⁶³
 Q. How did Mr. Boyle calculate his proposed reduction related to savings
 associated with the fee free bankcard program?

A. In response to OPUC DR 179, the Company provided data regarding the following
metrics: collection agency fees and net write offs, and number of reminder notices
and field disconnects. The Company's data showed a positive trend for these
metrics—meaning cost decreases-- from 2007 to present.¹⁶⁴ The Company also
provided annual costs savings related to each of these metrics from 2012 through
2017 in response to OPUC DR 376.

Mr. Boyle does not make any calculations using this data, noting that the Company has not performed an analysis to determine how much of the savings are directly attributable to the fee free bankcard program.¹⁶⁵ Instead, Mr. Boyle argues that because this analysis has not been performed, it is conservative and appropriate at this time to apply a 10 percent reduction to the overall program cost to recognize that a portion of the savings the Company has experienced for these four metrics *may* be attributable to the fee free bankcard program.¹⁶⁶

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¹⁶¹ Staff/500, Boyle/6.

¹⁶² Staff/500, Boyle/5-6

¹⁶³ Staff/500, Boyle/6.

¹⁶⁴ NW Natural/1719 (NW Natural Response to OPUC DR 179).

¹⁶⁵ Staff/500, Boyle/6.

¹⁶⁶ *Id*.

Q. Does the Company agree that a ten percent reduction of the program costs is appropriate?

A. No. The fee free bankcard program has been around for several years, and the
savings raised by Mr. Boyle are already reflected in the Company's actual base year
O&M results. For example, the Company's collections expense already includes the
impact of the fee free bankcard program; the same is true for postage expense and
collections agency fees. Mr. Boyle's proposal to include a ten percent reduction to
the costs associated with the fee free bankcard program would result in double
counting for the savings impact.

Q. Based on your review of Mr. Boyle's testimony, are any adjustments to the
 costs associated with the fee free bankcard program necessary?

- A. No, they are not. The Company's proposal to include \$2,083,000 in costs is basedon historical trends and an appropriate projection for the Test Year.
- 14
- 15

VI. <u>Response to Mr. Moore</u>

16 Q. What issues raised by Mr. Moore are you responding to?

17 I am responding to adjustments recommended by Mr. Moore to the Company's Α. 18 proposed Test Year expense for gas storage, distribution O&M and general plant 19 maintenance; and customer accounts. Mr. Moore is recommending that the Test 20 Year costs associated with each of these items be calculated using a three-year 21 average. Based on his calculation of these three-year averages, Mr. Moore is 22 recommending the following reductions: (1) \$122,000 to the Company's gas 23 storage operating expense; (2) \$2.1 million to the Company's Distribution O&M 24 and General Plant Maintenance accounts; and (3) \$356,517 to the Company's 25 Customer Accounts expense.

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Q. How did the Company forecast its gas storage operating expense for the Test Year?

3 Α. As described in more detail above in response to Ms. Gardner, the Company 4 began with its actual operating expense incurred from January 2017 through 5 October 2017, in addition to a forecast of the expenses for the remaining three months of 2017 to develop a total Base Year expense. The Company then applied 6 7 an escalation factor to project costs for the Test Year. Based on these calculations, 8 the Company has projected that the non-labor expense associated with its gas 9 storage operations will increase from \$1,649,464 in the Base Year to \$1,719,484 10 during the Test Year (or an increase of approximately four percent).

Q. How does Mr. Moore propose to calculate the appropriate level of gas storage operating expense for the Test Year?

- A. Mr. Moore has proposed to include \$1,600,000 in the Test Year and asserts that
 this is the result of a calculation of the three-year average for this expense.¹⁶⁷ Mr.
- 15 Moore performed this calculation based on his review of NW Natural's actual gas
- 16 storage operating expense for the previous three years.¹⁶⁸

Q. Does Mr. Moore explain why using a three-year average is a more appropriate method for determining these costs?

A. No. Mr. Moore concedes that he was unable to find any Commission ordersaddressing this issue.

Q. What has the Company proposed to include in the Test Year related to distribution O&M and general plant maintenance?

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¹⁶⁷ Staff/800, Moore/5. ¹⁶⁸ Staff/800, Moore/4.

A. The Company has proposed to include \$47.55 million in distribution O&M expense
in the Test Year. Excluding labor expense, this figure is \$13.09 million, which
represents an increase of 5.71 percent over the Base Year. For general plant
maintenance, the Company has included \$4.5 million total expense; \$2.1 million
of this expense is non-labor expense. This represents a 4.0% increase from the
Base Year expense of \$2 million.

7 Q. What analysis of these expenses was performed by Mr. Moore?

8 A. Mr. Moore reviewed the line item transaction details provided by the Company in
 9 response to OPUC SDR 57.¹⁶⁹ Mr. Moore also reviewed the long-term and three 10 year averages for these expenses.¹⁷⁰

Q. Based on this analysis what is Mr. Moore's recommendation for these
 expenses?

A. Mr. Moore is recommending that these expenses be adjusted to reflect the threeyear average for each item. This results in a reduction of the Company's
distribution O&M by \$2.1 million and the Company's plant maintenance expense
by \$113,000.

17 Q. Does Mr. Moore explain why using a three-year average is a more
 18 appropriate method for determining these costs?

A. No. Mr. Moore does not provide any support for using this methodology insteadof the methodology proposed by the Company.

Q. What has the Company proposed to include as customer accounts expense
in the Test Year?

¹⁶⁹ Staff/800, Moore/8. ¹⁷⁰ *Id*.

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1 Α. The Company has proposed to include approximately \$18.2 million in expense 2 related to FERC Accounts 901-903 in its Test Year; this represents a 4.5 percent 3 decrease from the Base Year expense. Mr. Moore reviewed the non-labor portion 4 of this expense which totals \$5.32 million during the Test Year (a 4.5 percent 5 increase from the Base Year). 6 Q. What analysis of this expense was performed by Mr. Moore? 7 Α. Mr. Moore calculated the most recent three-year average of the non-labor expense 8 for customer accounts and determined that it was \$4.964 million.¹⁷¹ 9 What is Mr. Moore's recommendation regarding this expense? Q. 10 Α. Mr. Moore is recommending that the Test Year expense for non-labor customer 11 accounts be reduced by \$356,517 to reflect the most recent three-year average. 12 Q. Does Mr. Moore explain why using a three-year average is a more 13 appropriate method for determining these costs?

A. No. Mr. Moore does not provide any support for using this methodology insteadof the methodology proposed by the Company.

Q. Are these proposals (to use three-year averages) consistent with other
 proposals for determining non-labor O&M expense in this proceeding made
 by Staff?

- 19 A. No. This approach is inconsistent with the approach used by Ms. Gardner.¹⁷² Ms.
- 20 Gardner selected a base year and then inflated the actuals for that base year with
- 21 year over year change in CPI; Ms. Gardner also considered customer growth and
- escalated the expense to account for growth.¹⁷³

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¹⁷¹ Staff/800, Moore/10.
¹⁷² Staff/100, Gardner/26-27.
¹⁷³ Id.

Q. Does Mr. Moore provide an explanation for why gas storage, distribution O&M and general plant maintenance, or customer accounts expense should be treated differently from other O&M expenses?

4 Α. No. Mr. Moore offers no such explanation or acknowledgement of the competing 5 methodologies. While the Company does not agree with all aspects of Ms. 6 Gardner's methodology (as detailed above), application of an escalation factor to 7 the Base Year expense is a more appropriate method for calculating the Test Year 8 Expense. This methodology accounts for inflation and customer growth. Using a 9 three-year average as suggested by Mr. Moore ignores the realities of cost 10 increases that are experienced by the Company with respect to these three 11 categories of expense. It also systematically biases the forecast to be too low 12 despite rising costs.

Q. Please provide more detail regarding the cost increases experienced by the
 Company that are not captured using a three-year average.

15 None of the three-year averages calculated by Mr. Moore capture the most recent Α. 16 data for these categories. For example, within the category of distribution O&M 17 expense are the Company's costs for its Locating Services. To ensure the safety 18 of the public, homeowners, businesses, and contractors are required to call the 19 "One Call Center" prior to engaging in any digging or excavating work. The One 20 Call Center notifies the relevant utilities, including NW Natural, about planned 21 digging work to allow the utility to perform locating and marking services (*i.e.*, to 22 locate and mark where NW Natural equipment is in relation to the proposed digging 23 work in order to prevent damage to the equipment).

24 The Company employs the services of a third-party contractor, Locating, Inc., 25 to provide locating and marking services to the Company. The Company and

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1 Locating, Inc. have a contractual agreement that sets the rate per locate. The 2 Company and Locating Inc. executed their most recent contract in January 2017 3 which runs from January 2017 through December 2019 and includes a negotiated 4 15.4% rate increase, per locate.¹⁷⁴ This increase was reflected in the Company's 5 locating services during the Base Year (2017). Mr. Moore is using a three-year average for the years 2015-2017 and therefore this increase will not be fully 6 7 reflected in his calculation (*i.e.*, his average will be lowered as a result of the lower 8 rates in effect for 2015 and 2016 even though the new, higher rate will be in effect 9 for the Test Year).

10 In addition to this increase in rate per locate, the Company has also 11 experienced an increase in the number of locating services calls it receives. This 12 increase is approximately 4.8% annually since 2015. This increase is due to 13 customer education and customer growth. Mr. Moore's use of a three-year 14 average does not account for any of these changes (increased calls and increased 15 rates). This provides a good example of why use of a three-year average to 16 determine the expense associated with these categories during the Test Year is 17 not appropriate or accurate.

18 Q. Are there any other reasons that the Commission should decline to adopt

Mr. Moore's recommendation to use a three-year average for these expense
 categories?

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¹⁷⁴ Copies of the Company's 2016 and 2017 contracts with Locating, Inc. are provided in Exhibit NW Natural/1720 (Locate Contract Rates ended Dec.31, 2016 (Confidential) and Exhibit NW Natural/1721 (Locating, Inc. Agreement Jan. 1, 2017 (Confidential)). A summary of the costs and number of locating services tickets performed for 2015-2017 is provided in Exhibit NW Natural/1722 (2015-2017 Locate Tickets vs. Units, Aug. Update).

A. Yes. The Commission sets rates to cover the costs incurred during the test year.
A three-year average of historical costs does not reflect projected Test Year
expenses. As illustrated in the chart below, the proposed amount to be included
in rates by Mr. Moore is even lower than the actual expenses in 2016, which is
almost 3 years before the Test Year ending in October 2019



Q. Did the Company issue data requests to Mr. Moore to attempt to understand
 why a three-year average might be more representative of the costs the
 Company will incur during the Test Year than the Company's forecast for the
 Test Year? If so, please explain Mr. Moore's response.

10 A. Yes. The Company issued three data requests regarding Mr. Moore's 11 recommendations, NWN DRs 15-17, asking Mr. Staff to explain why the 12 Company's Test Year forecast of costs fails to accurately represent the costs that 13 will be incurred during the Test Year. Mr. Moore provided the same response to 14 each request stating that "[t]he actual costs are not and cannot be known until they 15 are incurred. Accordingly, it is not possible to determine at this time whether the

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Company's forecast is an accurate representation of future actual costs."¹⁷⁵ Mr. Moore's responses ignore the very nature of future test year costs, *i.e.*, that they will never be known until after the Test Year has concluded. However, the inability to know actual, future cost does not preclude a determination that the Company has used a reasonable and appropriate methodology to forecast these costs.

6

VII. <u>Response to Mr. Rossow</u>

7

Q. What issues raised by Witness Rossow are you responding to?

A. I am responding to Mr. Rossow's recommendations related to the Company's
proposal to include certain dues and memberships in the Test Year. Based on his
review, Mr. Rossow is recommending an adjustment of (\$451,525).

11 Q. What is included in the Company's dues and memberships expense?

12 Α. The Company's dues and memberships expense includes dues paid to 13 organizations where membership is necessary for the Company and its employees 14 to perform their job functions (e.g., the Oregon State Bar, Oregon Board of 15 Accountancy, New York Stock Exchange, Ice Data LP).¹⁷⁶ Dues or membership 16 fees are also paid to organizations that provide educational opportunities for NW 17 Natural employees (e.g., American Institute of Certified Public Accountants, 18 Practicing Law Institute), organizations that certify NW Natural employees for 19 specialized job functions (e.g., the American Board of Industrial Hygiene); or 20 provide opportunities to build and maintain relationships with other entities 21 operating in the natural gas industry (e.g., the American Gas Association, and 22 Better Business Bureau).

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¹⁷⁵ See NW Natural/1724 (Staff's responses to NWN DRs 15-17). The responses to these data requests are identical to data request responses provided by Ms. Gardner regarding her recommendations related to forecasted Test Year costs in Staff's responses to NWN DRs 8-11, and 21.

¹⁷⁶ NW Natural/1723 (NW Natural's Response to Staff DR 137).

Q. How did Mr. Rossow review the expense associated with these dues and memberships?

A. Mr. Rossow reviewed the dues and memberships expense included OPUC DR 57,
Attachment 1 (Supp. 3) allocated to Oregon for 2017; he escalated these amounts
to approximate the Test Year amount by applying the Company's escalators.¹⁷⁷
Mr. Rossow then searched for dues and memberships by using the cost element
name and descriptions provided by the Company.¹⁷⁸

8 Q. Based on his review, what adjustment does Mr. Rossow propose to the 9 Company's memberships and dues?

A. Mr. Rossow made the following recommendations: (1) allow all expenses associated with industry research organizations (*e.g.*, the Gas Technology Institute); (2) apply a 25% reduction to national and regional industry organizations on the basis that a certain level of activity associated with these organizations is lobbying or promotional in nature; and (3) apply a 100% reduction to expenses associated with technical, professional, commercial, trade, community affairs and economic development organizations.¹⁷⁹

17 Q. Does the Company agree that these reductions are appropriate?

A. No. The Company provided greater detail regarding these costs in response to
 OPUC DR 137 and OPUC DR 381¹⁸⁰, and is also providing Exhibit NW
 Natural/1726 which combines these two data responses for ease of review.¹⁸¹
 These data request responses show that the costs for this dues and memberships

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¹⁷⁷ Staff/900, Rossow/2-3.

¹⁷⁸ *Id*.

¹⁷⁹ *Id*.

 ¹⁸⁰ NW Natural's responses to these data requests are provided in Exhibit NW Natural/1725 (Staff DR 381 Attachment 1) and Exhibit NW Natural/1723 (NW Natural's Response to Staff DR 137).
 ¹⁸¹ NW Natural/1726 (NW Natural's combined Responses to DR 137 and DR 381).

are appropriate for inclusion in revenue requirement. First, with respect to the 25%
 reduction to national and regional industry organizations, NW Natural believes that
 all of these organizations provide a benefit to NW Natural's customers, and are
 reasonable business expenses that should be recoverable. These organizations
 keep employees informed and trained, and also in many cases directly take on
 issues that benefit customers.¹⁸²

7 Second, Mr. Rossow's recommendation to remove the costs associated with 8 all technical, professional, commercial, trade, community affairs or economic 9 development organizations ignores the benefits (and requirements) of the 10 Company's memberships in these organizations. As discussed above, these 11 organizations provide a wide range of benefits and certifications, including education, community relations, and networking. In addition, several of these 12 13 memberships are necessary for the Company's employees to perform their jobs or 14 for the Company to operate. For example, one of the memberships for which the 15 Company seeks recovery is for Ice Data LP, which is an energy trading system 16 that allows its members to see real-time natural gas pricing information at the 17 various hubs where the Company purchases gas.¹⁸³ This ability to track real-time pricing allows the Company to ensure that its deals are tracking with the market.¹⁸⁴ 18 19 This membership is therefore not only essential for the operation of the Company 20 but provides a direct benefit to customers.

Finally, it is important to note that Mr. Rossow's recommendations in this proceeding are inconsistent with Commission Staff recommendations in other rate

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 ¹⁸² As Mr. Rossow points out, the American Gas Association does perform some lobbying activities, but these can benefit customers directly, such as when they engaged on federal tax reform.
 ¹⁸³ NW Natural/1723, Moncayo/4 (NW Natural's Response to Staff DR 137).
 ¹⁸⁴ *Id*.

1 cases. Specifically, in the 2016 Cascade Natural Gas rate case staff 2 recommended allowing recovery of professional organization dues and company 3 organization dues at 50% but only until the company (Cascade Natural Gas) 4 provided additional information justifying these expenses by providing a 5 description of the type of membership and associated customer benefit.¹⁸⁵ If the same recommendation were applied to this proceeding instead of Mr. Rossow's 6 7 recommendation to disallow 100% of technical, professional, commercial, trade 8 community affairs, and economic development organizations, no adjustment to the 9 Company's request for cost recovery would be warranted. Based on the 10 Company's response to data requests OPUC DR 137 and OPUC DR 381, the 11 Company provided detailed descriptions regarding each organization for which it 12 is requesting recovery of dues and membership costs; the Company also included 13 a description of the benefits these memberships provide to customers.¹⁸⁶ Thus, 14 under Staff's position in Cascade Natural Gas' most recent rate case, recovery of 15 the Company's dues and memberships for professional and company organization 16 dues should be allowed without adjustment.

For these reasons, Mr. Rossow's recommendations regarding dues and memberships fail to recognize all of the benefits provided by these dues and memberships and should be rejected by the Commission.

20

VIII. <u>Response to Ms. Zarate</u>

Q. What issues are raised by Ms. Zarate in her testimony that you will be
 responding to?

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 ¹⁸⁵ In the Matter of Cascade Nat. Gas Corp. Request for a Gen. Rate Revision, Docket No. UG 305, Staff/600, Zarate/5-6.
 ¹⁸⁶ NW Natural/1726 (NW Natural's combined Responses to DR 137 and DR 381).

 A. Ms. Zarate reviewed the Company's Test Year expense for meals, travel and awards. Based on her review, Ms. Zarate recommends the following adjustments:
 (1) removal of all expense amounts related to awards, gifts and prizes (\$536,509);
 (2) an adjustment of (\$506,673) to the Company's meals expense; and (3) an adjustment of (\$305,775) of the Company's travel expense.

6 **Q**.

7

What is included in the award expense category for which the Company seeks recovery in this proceeding?

- A. The Company has included award expense in the amount of \$536,509. This
 category includes the costs of various awards and activities provided to our
 employees related to exceptional performance and longevity with the Company,
 both of which are items that NW Natural seeks in running its utility business.¹⁸⁷
- Q. How did Ms. Zarate calculate the proposed reduction to the Company's
 award expense?
- A. Ms. Zarate proposes to eliminate the entire expense amount related to awards
 "consistent with Staff's practice in previous rate cases."¹⁸⁸ Ms. Zarate has not
 provided any citations or support for this position.

Q. Does the Company agree that the entire expense related to employee awards should be removed from the Company's rate base?

A. No. This ability to attract and retain qualified workers provides a direct benefit to
 customers, and these awards foster a positive business culture for the Company
 and allow the Company to continue to attract, motivate and retain qualified
 workers.

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¹⁸⁷ NW Natural/1727 (NW Natural's Response to Staff DR 400).¹⁸⁸ Staff/1000, Zarate/3.

Q. What is included in the meals expense category included in the Company's case?

A. The meals expense includes meal allowances and meal per diems under the
 Company's Joint-Accord agreement with its union.¹⁸⁹ These meal allowances and
 per diems are part of the compensation afforded to union employees.¹⁹⁰ The
 meals expense also includes per diems paid to non-bargaining unit employees
 traveling for business purposes and meals provided as part of working meetings.

8 Q. What is Ms. Zarate's recommendation regarding meals expense?

- 9 A. Ms. Zarate recommends a 50/50 sharing adjustment to the Company's meals
 10 expense stating that this is consistent with Commission policy.¹⁹¹ Ms. Zarate's
 11 recommendation for a 50/50 sharing adjustment results in a net reduction of
 12 \$506,673.
- Q. Does the Company agree that Ms. Zarate's proposed adjustment is
 appropriate and consistent with Commission policy?
- A. No. As stated above, the meals expense includes non-discretionary meals
 expenses that are unlike the meals expense discussed in the Commission Order
 cited in Ms. Zarate's testimony.

Q. Please explain why the meal costs addressed in Ms. Zarate's adjustment
 should not be considered discretionary and should be fully recovered by the

- 20 Company.
- A. In answering this question, it is important to break down the types of meals
 addressed. The first category relates to meals allowances and meal per diems

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¹⁸⁹ NW Natural/1727 (NW Natural's Response to Staff DR 400).

¹⁹⁰ See id.

¹⁹¹ Staff/1000, Zarate/4.

provided to the Company's bargaining unit employees. These meal per diems are
 set specifically by the union contracts governing compensation and benefits for
 these employees.¹⁹² As such these meals are non-discretionary, and a mandatory
 aspect of bargaining unit compensation. The cost of bargaining unit meal
 allowances and per diems included in this case is \$131,731.75.¹⁹³

The second category relates to meal per diems for employees traveling on NW 6 7 Natural business. Reimbursement for these meals consumed during required 8 work-related travel is customary in the business world, and therefore an essential 9 aspect of the Company's total compensation. Moreover, reimbursement for these 10 meals is governed by the Company's travel policy (discussed in greater detail 11 below), and is akin to business travel reimbursements.¹⁹⁴ Affording employees the 12 cost of reasonable meals during business travel is not discretionary and should not 13 be split 50/50.

The last category of meals included in this expense are meals provided to employees during working meetings. These meals are provided for efficiency purposes during long meetings.¹⁹⁵ By providing meals to employees at these meetings, the Company is able to achieve more in a shorter time period thereby providing a benefit to customers. Therefore, while theoretically, the Company could avoid scheduling meetings that run over meal times—this practice would

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¹⁹² A copy of the Company's Labor-Management Joint Accord with its Officer and Professional Employees International Union, Local 11, and AFL-CIO is provided in Exhibit NW Natural/1728. The Company's obligation to provide meal allowances and per diems to these employees is set forth at NW Natural/1728, Moncayo/47-48.

¹⁹³ Staff/1000, Zarate/3, Table 1. Ms. Zarate appears to have included mileage expense in meals expense in Table 1, however, mileage is a travel expense. Ms. Zarate's calculations should be adjusted to account for this.

¹⁹⁴ NW Natural/1729 (Staff DR 141, Attachment 1).

¹⁹⁵ Staff/1000, Zarate/3, Table 1.

reduce efficiency. Accordingly, the costs of these meals are appropriately born by
 customers. The total costs associated with these two categories of meals
 expense (*i.e.*, all non-bargaining unit meals expense) is \$675,684.85.¹⁹⁶

4

5

Q. Are there any other factors in support of allowing full cost recovery for the Company's meals expense?

6 Yes. Staff has previously recommended 50/50 sharing of certain meals and Α. 7 entertainment expenses under the theory that this arrangement mirrors treatment 8 of meals and entertainment expenses under the federal tax code.¹⁹⁷ It is important 9 to note that the meals allowances included in the meals expense for bargaining 10 unit employees is considered compensation by the Company; therefore, these 11 meals allowances are not subject to the meals and entertainment limitations of the 12 federal tax code.¹⁹⁸ For these reasons it is appropriate to allow full cost recovery 13 of the Company's meals expense as proposed.

Q. What costs are included in the travel expense category set forth by the Company in this proceeding?

A. The Company has included travel expense related to business travel and
 employee conference travel. These travel costs are charged to procurement credit
 cards (PCards) issued by the Company to certain employees or are costs
 reimbursed to employees by the Company. The Company included a total of
 \$1,270,763 in travel expense in the initial filing.

Q. Does the Company have a travel procurement and expense reimbursementpolicy?

¹⁹⁶ Staff/1000, Zarate/3, Table 1.

¹⁹⁷ See In the Matter of Portland Gen. Elec. Co.'s Request for a Gen. Rate Revision, Docket No. UE 197, Order No. 09-020 at 20 (Jan. 22, 2009).

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¹⁹⁸ NW Natural/1727 (NW Natural's Response to Staff DR 400).

A. Yes. The Company has a policy that applies to all employees and anyone else
 traveling at the Company's expense.¹⁹⁹

Q. How does the Company's travel policy minimize costs to NW Natural and
 ratepayers?

A. The Company uses a travel agent and online reservation tool for all air travel, car
 rentals, and hotel reservations.²⁰⁰ The Company does not reimburse travel
 arrangements that are made without using this discount travel agent.²⁰¹

Q. Are there review and approval processes that apply to employee travel expenses?

10 All business travel expenses must relate to a clearly stated business Α. Yes. 11 purpose.²⁰² Managers, designated as business expense approvers, are 12 responsible for the legitimacy, integrity, and accuracy of the items they approve.²⁰³ 13 In addition to approving travel expenses, these managers are also required to 14 provide their pre-approval before an employee can make a reservation for 15 business travel.²⁰⁴ After a business travel reservation is made, the manager and 16 employee will receive an email from the travel agency confirming payment.²⁰⁵ This 17 email is reviewed by the manger with the employee and prior to the employee's 18 travel dates, this email is provided to accounting as formal documentation of the 19 authorization.²⁰⁶

20 Q. How did Ms. Zarate perform her analysis of the Company's travel expense?

²⁰⁵ *Id*.

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¹⁹⁹ NW Natural/1729 (Staff DR 141, Attachment 1).

²⁰⁰ *Id*.

²⁰¹ *Id.* ²⁰² *Id.*

²⁰² Id. ²⁰³ Id.

²⁰⁴ Id.

²⁰⁶ *Id*.

Ms. Zarate first filtered the Company's travel costs by element: business travel, 1 Α. 2 conference travel, and travel in territory.²⁰⁷ Next Ms. Zarate filtered the travel costs to separate costs charged to PCards.²⁰⁸ The results of this filtering were then 3 4 divided into entries over \$1,000 and entries under \$1,000.209 Ms. Zarate 5 determined that there were a large number of entries under \$1,000 and therefore took a random sampling of 35 entries under \$1,000 and determined which portion 6 7 of these 35 entries supported a determination that the costs should be included in rates.²¹⁰ Ms. Zarate determined that 13 percent of the travel entries under \$1,000 8 9 that she reviewed (13 percent of the random sampling of 35 entries) did not support 10 inclusion in rates.²¹¹ Based on this determination, Ms. Zarate has proposed a 13 11 percent adjustment for all PCard travel entries under \$1,000, for each cost element.²¹² 12

Q. Did Ms. Zarate explain how she determined that 13% of PCard travel entries
 under \$1,000 were not eligible for inclusion in rates?

A. No. Ms. Zarate did not provide any detail in support of her conclusion that only 87
 percent of PCard travel entries under \$1,000 are eligible for cost recovery.²¹³ The
 only explanation offered by Ms. Zarate is that the PCard entry description does not
 support inclusion in rates.²¹⁴

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²⁰⁷ Staff/1000, Zarate/4.

²⁰⁸ Id.

²⁰⁹ *Id*.

²¹⁰ *Id*.

²¹¹ *Id.*

²¹² *Id*.

 ²¹³ The Company has issued a DR for a list of the entries with insufficient descriptions; however, the response was not due before the filing of this testimony.
 ²¹⁴ Staff/1000, Zarate/4.

Q. Does the Company have an internal review and approval process for PCard purchases?

3 Α. Yes. The Company's PCard Program is designed to streamline the procurement 4 process by enabling an efficient, cost-effective method of purchasing and paying 5 small-dollar transactions, meals, travel and other business-related for 6 expenses.²¹⁵ The program has built-in spending controls designed to prevent 7 certain types of inappropriate purchases and also has a policy in place to ensure that purchases are properly reviewed and approved.²¹⁶ PCard holders must 8 9 acknowledge receipt of the PCard policy and undergo PCard training prior to 10 receipt of a PCard.²¹⁷

11 Each month, cardholders are required to review charges made during that 12 billing cycle, code all transactions, and provide supporting backup in the form of 13 receipts to his or her approving supervisor or manager for review.²¹⁸ The 14 approving supervisor or manager must review all charges and account coding 15 against the provided receipts and stated business purpose.²¹⁹ After this review 16 and confirmation that all transactions are correct, appropriate and fully supported. 17 the approving supervisor or manager forwards the package to the PCard administrator for payment.²²⁰ 18

Q. Are there consequences under the PCard policy for inappropriate use of a PCard?

- ²¹⁶ NW Natural/1730, Moncayo/1 (Purchasing Card Procedure).
- ²¹⁷ Id.
- ²¹⁸ NW Natural/1730X, Moncayo/4 (Purchasing Card Procedure).
- ²¹⁹ NW Natural/1730, Moncayo/5 (Purchasing Card Procedure).
- ²²⁰ Id.

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²¹⁵ NW Natural Purchasing Card Procedure dated August 5, 2014, provided in Exhibit NW Natural/1730.

A. Yes. Failure to comply with the PCard policy may result in closure of the PCard
 account in addition to disciplinary action including prosecution and termination of
 employment.²²¹

Q. Based on the Company's strict PCard Policy is it reasonable to apply a 13%
 adjustment to all PCard entries under \$1,000 absent evidence that the PCard
 Policy has not been adhered to?

7 No. These entries have all been vetted by the PCard holder and approved by the Α. 8 PCard holder's supervisor or manager. This review includes a review of supporting 9 documentation. It is therefore very unlikely that only 87 percent of PCard entries 10 under \$1,000 are appropriate for cost recovery. A more reasonable approach 11 would be for Staff to provide a list of entries it has determined may not be supported 12 for inclusion in rates in order to allow the Company to provide additional supporting 13 documentation, including receipts. Without a list of entries from Staff, the 14 Company cannot provide additional details or explanations for why individual 15 entries were appropriately included for recovery. NW Natural is seeking that 16 information from Staff through discovery, but did not have enough time to receive 17 that information before the due date of this testimony.

18 Q. How did Ms. Zarate determine whether PCard entries over \$1,000 were 19 appropriate for inclusion?

A. Ms. Zarate reviewed all PCard entries over \$1,000 and allowed individual entries
 based on her determination of whether the description of the entry supported
 inclusion in rates.²²² Based on this analysis, Ms. Zarate recommends a

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 ²²¹ NW Natural/1730, Moncayo/6-7 (Purchasing Card Procedure).
 ²²² Staff/1000, Zarate/4.

disallowance of \$4,301.91 for PCard entries over \$1,000 due to an alleged lack of
 description for this entry.²²³

3 Q. Does the Company agree that these costs should be removed?

A. No. As discussed above, the Company has a rigorous review and approval
process for all PCard entries that includes a review of supporting documentation
(*i.e.*, receipts).

Q. How did Ms. Zarate review and evaluate travel expenses that were not paid for using PCards?

9 For non-PCard travel expense, Ms. Zarate conducted a similar analysis but noted Α. 10 that descriptions for these transactions were much less consistent.²²⁴ Using the 11 random sampling method described above. Ms. Zarate determined that 95% of 12 non-PCard travel spending was not supported for inclusion in rates.²²⁵ However, 13 Ms. Zarate notes she does not find it reasonable to assume that 95 percent of all 14 entries are incorrect and has therefore proposed to disallow 50 percent of non-15 PCard entries under \$1,000.²²⁶ Ms. Zarate also recommends disallowing 100 16 percent of non-PCard entries over \$1,000 where she determined that adequate 17 descriptions of the entries were missing.²²⁷

Q. What is Ms. Zarate's total recommended adjustment related to travel expense?

A. Ms. Zarate is recommending a total adjustment of (\$305,775.40) related to the
 Company's travel expense.²²⁸

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²²³ NW Natural/1730, Moncayo/6 (Purchasing Card Procedure).
²²⁴ Staff/1000, Zarate/4.
²²⁵ *Id.*²²⁶ *Id.*²²⁷ *Id.*²²⁸ Staff/1000, Zarate/6.

Q. What procedure does the Company follow for review and approval of non PCard travel entries?

A. Where a travel expense cannot be paid using a PCard (tolls, mileage, etc.) or an
employee does not have a PCard, the Company provides expense reimbursement
pursuant to its Employee Expense Account procedure.²²⁹ This policy requires that
an employee submit its expense account form requesting reimbursement within 30
days of expenditures and that the account should cover a period of no longer than
one month.²³⁰ Employees are required to obtain receipts for all expenditures and
to provide these receipts together with their expense account form.²³¹

10 The completed expense account forms are reviewed and approved pursuant to the Employee Expense Account procedure.²³² This procedure includes a 11 12 designation of the appropriate approver. For example, the expense account forms 13 of the Company President are approved by the Chief Executive Officer.²³³ For 14 non-executive employees, expense account forms are reviewed and approved by 15 the manager of the department or the executive to whom the employee reports.²³⁴ 16 The approval process includes three components: (1) the employee must verify 17 the accuracy, timeliness, and completeness of the form including an appropriate business purpose and adequate supporting documentation; (2) the approving 18 19 manager, supervisor and/or Company officer must confirm the propriety of the 20 amounts, business purpose, account distribution, clerical accuracy, timeliness and 21 completeness of the form including adequate description and documented

²³⁰ Id.

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²²⁹ NW Natural/1729, Moncayo/4 (Staff DR 141, Attachment 1).

²³¹ NW Natural/1729, Moncayo/5.

²³² NW Natural/1729, Moncayo/5.

²³³ NW Natural/1729, Moncayo/6.

²³⁴ Id.

1		receipts; and (3) the Accounting Department designee must verify the clerical
2		accuracy, timeliness, and completeness of the form including adequate
3		description, documented receipts and proper authorization. ²³⁵
4	Q.	Does the Company agree that Ms. Zarate's recommendation for disallowance
5		of travel expense is appropriate?
6	Α.	No. As described above, the Company carefully reviews all non-PCard travel
7		expenses and requires backup documentation from employees. Therefore, it is
8		not appropriate to remove these expenses.
9		IX. <u>Conclusion</u>
10	Q.	Does this conclude your testimony?

11 A. Yes, it does.

²³⁵ NW Natural/1729, Moncayo/7.

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Jorge Moncayo

CAPITAL BUDGET / OPERATIONS & MAINTENANCE EXHIBITS 1701-1730

May 23, 2018

EXHIBITS 1701-1730 – CAPITAL BUDGET/ OPERATIONS & MAINTENANCE

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North Coast Transmission ILI - 201679

Initial Cost Estimate¹ (Direct Cost): \$2,981,432 Initial Cost Estimate (Closing Total): \$4,439,305 In-Service Date: March 2018

Updated Cost Estimate (Direct Cost): \$4,533,000 Updated In-Service Date: October 2018

Project Description: Run In Line Inspection Tool (ILI) for the 12" section of the North Coast Trans from Clatskanie to Wauna Mill and for the 10" section of the North Coast Trans from Wauna Mill to Astoria (Wicks Rd.). Additionally upgrades to both the 10" & 12" line will need to be made to allow passage of the ILI tool, as well as, remediation of discovered anomalies to ensure the continued safe operation of the North Coast Trans feeding the isolated distribution systems in Astoria, Seaside, and Cannon Beach.

Objectives/Business Case: The North Coast Trans line from Clatskanie to Astoria has been identified as the highest risk in our transmission system. This ranking is influenced by factors such as age of the pipe, operating pressure, likelihood of 3rd party damages, prior leaks, etc. With these factors in mind this line was selected to be upgraded from performing External Corrosion Direct Assessment (ECDA) for inspection requirements to ILI. This line is also part of a 10 year plan to increase the inspection of transmission lines using inline inspection technology. Current assessment methods are limited to high consequence areas and do not provide a complete analysis of pipeline and associated anomalies. The North Coast Trans line from Clatskanie to Astoria is due for inspection by the end of 2017

Scope: Perform ILI inspection of North Coast Feeder from Clatskanie to Astoria, Perform necessary upgrade to system to allow the passage of the ILI tool, and repair all anomalies found meeting remediation requirements per the NW Natural TIMP manual.

Springfield Transmission 8 inch ILI

Initial Cost Estimate (Direct Cost): \$1,250,000 Initial Cost Estimate (Closing Total): \$1,985,185 In-Service Date: December 2018

Updated Cost Estimate (Direct Cost): \$1,250,000 Updated In-Service Date: December 2021

This project has been deferred to 2020/2021.

Project Description - This transmission pipeline has been identified to be modified for in-line inspection integrity inspection. Project includes construction of launcher and receiver facilities

¹ All references to "initial" estimates refer to costs included in initial filing in this docket.

and modification of pipeline facilities that are not passable by a smart inspection tool, and inspection by 'smart pig' using a qualified vendor.

Need for the Project – NW Natural Transmission Integrity Management Plan requires periodic integrity assessment of transmission pipelines. The Springfield Transmission pipeline has been identified as the one of the highest relative risk from the TIMP model risk rankings. Previous integrity inspections have been completed using ECDA techniques, and completing the assessment by ILI will provide more comprehensive data to evaluate the pipeline.

SW 124th Ave 6" Class D

Initial Cost Estimate (Direct Cost): \$2,596,748 Initial Cost Estimate (Closing Total): \$3,391,116 In-Service Date: March 2018

Updated Cost Estimate (Direct Cost): \$2,170,000 Updated In-Service Date: July 2018

Project Description – Construction of approximately 2 ½ miles of 6" steel high pressure main, district regulator and associated distribution pipe are planned to reinforce supply to the existing distribution system in Sherwood and Tualatin.

Objectives/Business Case: System reinforcement of Sherwood area. The existing piping infrastructure that supports the Tualatin and Sherwood communities consists of a 125 MAOP high pressure feeder that is already at capacity. System modeling indicates that a greater than 50% pressure drop occurs in this area of Sherwood and exceeds our criteria for system reinforcement.

Scope: Construct approx. 2 ¹/₂ miles of 6" steel main. Uprate portion of 125 MAOP system to 400 MAOP

Central Coast ILI

Initial Cost Estimate (Direct Cost): \$2,430,962 Initial Cost Estimate (Closing Total): \$3,820,490 In-Service Date: November 2018

Updated Cost Estimate (Direct Cost): \$2,000,000 Updated In-Service Date: October, 2018

Project Description: Run In-Line Inspection Tools (ILI) for the 10" and 12" sections of the Central Coast Feeder from the McMinnville-Amity Gate to Toledo. Additionally, upgrades to both the 10" & 12" lines will need to be made to allow passage of the ILI tools. In addition to this, remediation of discovered anomalies will be completed to ensure the continued safe

operation of the Central Coast Feeding, which provides service to the Central Coast towns and is the sole connection between our Newport LNG plant and our primary transmission/distribution systems.

Objectives/Business Case: The Central Coast Feeder from the McMinnville-Amity Gate to Toledo has been identified as a high risk critical asset in our transmission system. This is influenced by factors such as age of the pipe, operating pressure, likelihood of 3rd party damages, prior leaks, etc. This pipeline is also the sole connection between our Newport LNG facility and our primary transmission/distribution systems.

With these factors in mind this line was selected to be upgraded from performing External Corrosion Direct Assessment (ECDA) for inspection requirements to ILI. This line is also part of a 10 year plan to increase the inspection of transmission lines using inline inspection technology. Current assessment methods are limited to high consequence areas and do not provide a complete analysis of pipeline and associated anomalies. This pipeline is scheduled for 2018 to help with level loading the ILI Schedule. The assessment is required to occur in or before the 2019 calendar year

Scope: Perform ILI inspection of Central Coast Feeder from McMinnville-Amity Gate to Toledo. Perform necessary upgrades to the system to allow the passage of the ILI tools, and repair all anomalies found meeting remediation requirements per the NW Natural TIMP manual.

Washougal Reinforcement (NOTE: Project in Washington State)

Initial Cost Estimate (Direct Cost): \$1,940,447 Initial Cost Estimate (Closing Total): \$2,451,562 In-Service Date: July 2018

Updated Cost Estimate (Direct Cost): \$5,668,400 Updated In-Service Date: October 2018

Project Description – Construct approximately 1-1/4 to 1-1/2 miles of 6" or 8" steel high pressure gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new pipeline would extend east from the end of the existing high pressure main at C St and 20th and terminate at the connection to the existing 4" steel distribution main at Evergreen Street and 39th Street. Distribution mains would be installed in conjunction with the high pressure to reinforce the existing distribution system to support existing and new customers.

Need for the Project – The objective of the project is to reinforce supply load to the firm Washougal customers by increasing supply by a minimum incremental 500 Therms per hour.

This project was originally identified as the Washougal Extension and initially presented to the WUTC in the 2014 IRP (see Appendix 6). The 2016 IRP discussed the Washougal Extension

project on page 7.14 and it is implicitly incorporated within that IRP's Washington-only Multiyear Action Plan Item Number 2 under "Clark County distribution projects" (see page 1.19). Additionally, the project is part of the Clark County 5 year plan for system reinforcement.

SE Eugene Reinforcement

Initial Cost Estimate (Direct Cost): \$4,818,118 Initial Cost Estimate (Closing Total): \$6,098,113 In-Service Date: August 2018

Updated Cost Estimate (Direct Cost): \$8,149,290 Updated In-Service Date: October 2018

Project Description: Construct approximately 2-1/2 miles of 12" steel HP gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new HP pipeline would extend west from the existing South Eugene Gate and terminate at the connection to the existing 6" steel distribution main at Hilyard Avenue and near 30th Street. Distribution mains would be installed in conjunction with the HP to reinforce the existing distribution system to support existing and new customers. Several pipeline routes are being examined for feasibility. The preferred route selected considers existing infrastructure, available workspace, railroad crossings, and potential traffic impacts.

Gate station modifications may be necessary to serve the new pipeline, and may require that NWN takes over regulation from Williams pipeline. Evaluation of the gate station will be completed during the planning phase.

Objectives/Business Case: The objective of the project is to reinforce the supply load center for Southeast Eugene, OR with approximately 3000 incremental Therms per hour on Peak Day. Providing adequate supplies to the southeast of Eugene, Oregon has been a growing concern for many years. Residential growth continues to expand south, away from existing high pressure supply pipelines, stressing the distribution system to failure. System modeling, verified through cold weather performance checks, project distribution system pressures of less than 5 psig and—for isolated areas under peak hour conditions—an inability to reliably serve existing firm service customers. This level of pressure is below the company's criterion of distribution system reinforcement being critical at pressures less than 10 psig.

The Public Utility Commission of Oregon acknowledged NW Natural's 2016 IRP in Order No. 17-059, including the Action Item "Proceed with the SE Eugene Reinforcement project to be in service for the 2018/2019 heating season and at a preliminary estimated cost of \$4 million to \$6 million."

Scope: Construct approximately 2-1/2 miles of 8" or 12" steel HP gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new HP pipeline would extend west from the existing South Eugene Gate and terminate at the connection to the existing 6" steel distribution main at Hilyard and near 30th Street. Distribution mains would be installed in conjunction with the HP to reinforce the existing distribution system to support existing and new customers. Several pipeline routes are being examined for feasibility.
The preferred route selected considers existing infrastructure, available workspace, railroad crossings, and potential traffic impacts.

West Vancouver Gate (Note Project is in Washington State)

Initial Cost Estimate (Direct Cost): \$1,300,000 Initial Cost Estimate (Closing Total): \$1,630,513 In-Service Date: June 2018

Updated Cost Estimate (Direct Cost): \$360,000 Updated In-Service Date: August 2018

Project Description – Rebuild West Vancouver Station to meet increased demand and planned system improvement projects in the Vancouver area.

Need for the Project – Due to increased demand in the Vancouver area, various system improvement projects are planned. In order to serve the required capacity, the station must be rebuilt. Work at this station is necessary to support the pipeline projects in Clark County and deliver gas to needed supply locations.

Mist Corrosion Abatement Phase 2

Initial Cost Estimate (Direct Cost): \$2,300,000 Initial Cost Estimate (Closing Total): \$2,542,077 In-Service Date: September 2018

Updated Cost Estimate (Direct Cost): \$762,609 Updated In-Service Date: October 2018

Project Description: This project will evaluate the existing conditions of the two of the southern injection/withdrawal pipelines at the Mist Storage Facility and develop plans to evaluate, monitor, and minimize internal and external corrosion of these pipelines. The project is scheduled to be completed in 2018. Note additional pipeline repairs/replacements may be needed and will be handled under a separate project if pipeline anomalies are discovered.

Objectives/Business Case: On June 10, 2016 the EN Engineering Facility Assessment of the Mist Storage Facility was completed. This study recommended a number of improvements that the facility should undertake to improve reliability (Mist Reliability Program), including certain Corrosion Abatement Projects.

ENE recommended developing and implementing an internal and external corrosion monitoring program since:

- There is no internal corrosion monitoring data for the south well lines
- There is strong potential for internal and external corrosion to occur or have occurred within the Mist gathering system

The development and implementation of this program will provide data and trending for NW Natural to better evaluate the conditions in the field and respond appropriately.

On August 26, 2016 Project Request Memos (PRMs) were submitted for:

- 1) Mist Reliability Cathodic Protection Study
- 2) Mist Reliability Internal Corrosion Monitoring

The work included in both PRMs was combined into the "Mist – Corrosion Abatement Project" and will consist of 4 phases. Phase 1 was approved in 2017, is underway, and will be completed in early 2018. This project, Phase 2, will perform in line inspection (ILI) on two pipelines that serve the southern wells and address external corrosion issues. Phase 3 will complete the ILI of the remaining five southern I/W pipelines at Mist in 2019. A subsequent Phase 4 in 2020 will perform ILI on the pipelines to the northern wells. A summary of the phases is as follows:

Phase 1 (2017/18):

• ILI Two 16 inch pipelines between Miller Station and Busch Manifold/Busch Valve Station.

This project is underway and will be completed in early 2018

Phase 2 (2018):

- ILI one 12 inch pipeline between Busch Manifold and Reichhold
- ILI one 8 inch pipeline between Busch Manifold and Schlicker

Phase 3 (2019):

- ILI two 8 inch pipelines between Busch Manifold and Al' View
- ILI two 6 inch pipelines between Al's view and Al's well

• ILI one 8 inch pipeline between Busch Manifold and Busch well Phase 4 (2020):

- ILI 8 inch pipeline between Miller Station and Breuer wells May require multiple segments
- ILI 6 inch line between Miller Station and Breuer wells If required
- ILI 8 inch pipeline loop serving the Flora wells May require multiple segments
- ILI 8 inch line between Meyer and Miller station

Scope:

Internal Corrosion:

In-Line Inspection - Utilize In-Line Inspection (ILI) tools to validate the integrity of the injection/withdrawal pipelines from two of the Mist southern wells (Schlicker and Reichhold) to the Busch Valve Station.

Program Development - Develop plans and procedures for implementation of an internal corrosion monitoring program. Plans may include regular monitoring of internal conditions of the pipeline and environment such as scheduled O&M ILI's, gas and liquid analysis, corrosion coupons, non-destructive examination, etc., to ensure gathering system integrity.

External Corrosion:

Program Development – Follow-up on plans to conduct testing on all possible points of isolation in the stations to ensure that CP current is flowing to all buried piping. Also, develop a site plan to monitor / inspect corrosion beneath piping insulation and other areas of concern.

Mist Instruments & Controls Upgrade Phase 1 – 201664

Initial Cost Estimate (Direct Cost): \$3,138,737 Initial Cost Estimate (Closing Total): \$3,751,427 In-Service Date: May 2018

Updated Cost Estimate (Direct Cost): \$3,235,554 Updated In-Service Date: June 2018 (The project is in service)

Project Description: The project consists of five elements:

- 1. Migrate Miller Station Control Systems
- 2. Migrate SLC5's to CompactLogix
- 3. Replace Two (2) Chromatographs
- 4. Install a Primary Fiber Network to the North Pools
- 5. Upgrade Network Security

Note that this is a restructured and updated version of a previous project request titled, "Mist Control System". This new version now accounts for internal resource needs and costs. The planning phase of the project will evaluate further the current project scope and associated costs of the project including the IT requirements

Objectives/Business Case: The EN Engineering Facility Assessment of the Mist Storage Facility recommended a number of improvements that the facility should undertake to improve site reliability, resulting in the Mist Reliability Program. This particular project consists of the work to be completed in phase one of the instruments and controls upgrades of the facility. Additional improvements will be made as part of the overall Mist Reliability Program such as further instrument upgrades, dehydration improvement projects, and integrity management projects. This project is being executed in conjunction with the Mist – Controls Building Project which will provide the space for the new controls contained within this project. The work proposed is as follows:

Migrate Miller Station Control Systems - Upgrade obsolete PLC5 control system to ControlLogix in addition to installing a new control room system and implementing new data communication systems, network segmentation, and related tasks (similar in scope to Newport Controls Upgrades). The new control room system is to be installed within a new building addition that is being built under a separate project.

Migrate SLC5's to CompactLogix - Upgrade control systems at south pools in anticipation of the manufacturer ending support as of June 2017 and recent failure of equipment.

Replace Chromatographs - Update two (2) systems for more accurate gas composition measurement.

Install Primary Fiber Network (north pools) - Install fiber optic network to augment unreliable radio communications at Bruer & Flora wells.

Upgrade Network Security - Guarantee plant operation cannot be compromised by malicious computer network intrusion.

Scope: Migrate Miller Station Control Systems - Upgrade obsolete PLC5 control system to ControlLogix in addition to installing a new control room system and implementing new data communication systems, network segmentation, and related tasks (similar in scope to Newport Controls Upgrades). The new control room system is to be installed within a new building addition that is under a separate project.

Migrate SLC5's to CompactLogix - Upgrade local south pool control systems in anticipation of the manufacturer ending support. This work has already commenced under project 201648 due to recent failures of two (2) existing systems.

There are currently two (2) separate SLC5's at the manifold station that are to be combined to one (1) CompactLogix and the other three (3) current SLC5's are to be converted one-for-one. Includes new I/O cards, programming, and wiring, as well as an enclosure replacement for the Al's Pool installation.

Replace Chromatographs - Update two (2) chromatographs for more accurate gas composition measurement.

Install Primary Fiber Network (north pools) - Install fiber optic network to augment unreliable radio communications at Bruer & Flora wells.

Upgrade Network Security - Upgrade network security to guarantee plant operations cannot be compromised by malicious computer network intrusions.

South Santiam River 4 inch Exposed Pipe

Initial Cost Estimate (Direct Cost): \$500,000 In-Service Date: July 2018

Updated Cost Estimate (Direct Cost): \$556,081 Updated In-Service Date: October 2018 **Project Description -** Remediation of 5' of exposed 4" High Pressure Distribution Pipe in the South Santiam River. Includes the installation of 1200' of 4" High Pressure pipeline under the river using horizontal directional drill.

Need for the Project – Repair the exposure of the 4" pipe in the South Santiam River.

Mist Instruments & Controls Upgrade Phase 2

Initial Cost Estimate (Direct Cost): \$1,100,000 Initial Cost Estimate (Closing Total): \$1,237,049 In-Service Date: September 2018

Updated Cost Estimate (Direct Cost): \$1,100,000 Updated In-Service Date: December 2021

Project Description – The project would consist of:

- 1. Upgrading approximately 37 flow computers (year 2019)
- 2. Upgrading approximately six (6) moisture analyzers (year 2020)
- 3. Upgrading approximately three (3) flow transmitters (year 2021)

Need for the Project – The EN Engineering Facility Assessment of the Mist Storage Facility recommended a number of improvements that the facility should undertake to improve site reliability, resulting in the Mist Reliability Program. This particular project consists of the work to be completed in Phase 2 of the Instruments and Controls upgrades of the facility following the updating of the control system (Phase 1 in 2018). The Phase 2 work will update critical instrumentation for the facility that is at or has already exceeded useful life and is no longer supported by the original manufacturer. These include flow computers, moisture analyzers, and flow transmitters that are critical components within the plant controls system. Project spans three (3) years as each upgrade requires dedicated specialized resources for installation and testing as well as for integration into the plant controls system.

Newport LNG Glycol Piping Replacement

Initial Cost Estimate (Direct Cost): \$1,605,210 Initial Cost Estimate (Closing Total): \$1,410,382 In-Service Date: November 2018

Updated Cost Estimate (Direct Cost): \$1,425,989 Updated In-Service Date: October 2018 **Project Description:** Replace the glycol piping at Newport LNG Plant to improve reliability and accessibility of the system.

Objectives/Business Case: This project will replace the existing PVC glycol piping at Newport LNG plant with steel pipe. This is part of the Newport LNG Plant modification project and is included in the IRP.

Scope: Replace the underground PVC glycol piping at Newport LNG Plant with above-ground welded steel.

Albany Land Purchase

Initial Cost Estimate (Direct Cost): \$1,000,000 Initial Cost Estimate (Closing Total): \$1,128,458 In-Service Date: February 2018

Updated Cost Estimate (Direct Cost): \$1,000,000 Updated In-Service Date: September 2018

When the building was acquired in August of 2005 the sellers wanted to retain the land for estate planning purposes. NW Natural purchased the building but leased the land with an option to purchase it in 2017. This investment will allow NWN to exercise its option to purchase the land as planned and own both the land and buildings.

Sherwood Testing Building

Initial Cost Estimate (Direct Cost): \$2,585,099 Initial Cost Estimate (Closing Total): \$2,934,488 In-Service Date: August 2018

Updated Cost Estimate (Direct Cost): \$3,083,658 Updated In-Service Date: October 2018

The Sherwood test building is approximately 3,300 sq. ft. and will include capabilities for performing high pressure hydro / nitrogen testing, weld x-rays and sand blasting. These capabilities were included in the original scope / functionality for the Sherwood project and are now in the process of being implemented. The purpose for this project is to improve the safety and efficiency of performing these tests and sandblasting.

Lincoln City Land Purchase

Initial Cost Estimate (Direct Cost): \$1,000,000 Initial Cost Estimate (Closing Total): \$1,110,303 In-Service Date: December 2018

Updated Cost Estimate (Direct Cost): \$1,000,000 Updated In-Service Date: March 2019

Purchase a new and larger site to relocate our existing resource center. We have outgrown the current location and are looking for a site that will accommodate our employees and meet safety and seismic requirements.

Lincoln City Retrofit

Initial Cost Estimate (Direct Cost): \$2,000,000 Initial Cost Estimate (Closing Total): \$ 2,201,927 In-Service Date: December 2018

Updated Cost Estimate (Direct Cost): \$3,000,000 Updated In-Service Date: October 2020

The Lincoln City Resource Center is located on Hwy 101 and increased traffic has created safety concerns for our employees entering and exiting the center and for emergency response times. In addition the facility requires significant systems and seismic upgrades. Current Operations have outgrown the site and require a larger site to meet operational needs. This project represents building a new resource center.

Eugene Retrofit

Initial Cost Estimate (Direct Cost): \$3,645,346 Initial Cost Estimate (Closing Total): \$4,139,171 In-Service Date: September 2018

Updated Cost Estimate (Direct Cost): \$6,135,424 Updated In-Service Date: October 2018

The Eugene Retrofit Project is a remodel and upgrade to NW Natural's Eugene Resource Center to address deteriorating systems and perform seismic retrofitting. The project also expands the yard to allow for future growth and additional functionality and improves the safety and accessibility of the site.

The 12,608 SF facility is an older concrete-block building with a wood-frame roof built in 1975. The site is 3.27 acres. The facility is dated and is suffering from a deteriorated roof and siding, electrical and HVAC systems. The restroom/shower facilities are inadequate and the office space needs to be reconfigured to support current / ongoing operations.

Central Resource Center

Initial Cost Estimate (Direct Cost): \$4,217,609 Initial Cost Estimate (Closing Total): \$4,612,377 In-Service Date: April 2019

Updated Cost Estimate (Direct Cost): \$ 5,602,399 Updated In-Service Date: September 2019

NW Natural owns a parcel of land adjacent to the Appliance Center on the inner east side of Portland. A small resource center was previously located there but was demolished to make way for Tri-Mets new orange max line. The rationale f or building a new resource center on this location is to provide an emergency response and a utility field service presence in the near-down town area of Portland. The new Central Resource Center site will be approx. 101,000 SF. The building will be approx. 6,500 SF.

Eagle Wireless Upgrade

Initial Cost Estimate (Direct Cost): \$3,546,069 Initial Cost Estimate (Closing Total): \$3,980,919 In-Service Date: December 2018

Updated Cost Estimate (Direct Cost): \$2,907,015 Updated In-Service Date: December 2018

Project Description: This project will convert Eagle Advance Automated Meter Reading (AAMR) devices from legacy analog phone lines to wireless technology (primarily cellular or satellite). Of the 700 devices currently installed today, approximately 600 of them will need to be converted; approximately 100 customers will be converted to cycle billing and the AAMR device will no longer be in service.

Project Description: The upgrade is necessary due to a recent FCC ruling that will allow telecommunications providers to eliminate analog phone lines and transition to digital technology. Without this upgrade, the AAMR devices will suffer severe data impairment and ultimately stop functioning after the telecommunication provider's switch to a digital infrastructure. The FCC ruling took effect in 2017 and telecommunication providers and have begun the process of upgrading their legacy equipment. The Eagle AAMR devices are used to transmit hourly interval data for large commercial/industrial customers and are required by tariff for specific rate schedules and billing options. The upgrade will allow us to continue to provide these services to our customers with minimal interruptions.

The successful implementation of the AAMR devices is contingent upon customer installation of utility power to the upgraded device. The project is currently in the execution phase with a schedule of 10 per week with a schedule of completion in December 2018.

Digital Radio System

Initial Cost Estimate (Direct Cost): \$1,300,000 Initial Cost Estimate (Closing Total): \$1,436,610 In-Service Date: December 2018

This project was delayed/cancelled.

Customer Order Management Implementation

Initial Cost Estimate (Direct Cost): \$3,210,861 Initial Cost Estimate (Closing Total): \$3,856,375 In-Service Date: June 2018

Updated Cost Estimate (Direct Cost): \$3,291,848 Updated In-Service Date: June 2018

Project Description: Implementation of a comprehensive system that will provide seamless end to end functionality for pricing and quoting (CPQ), customer order management (COM), and customer relationship management (CRM).

Need for the project: Current system is homegrown with layers of add-ons and updates made over many years. On-going customization to meet emerging business needs has made it more difficult to change/add processes, as this causes breakage to other functionality within the system.

The new system is necessary to serve customers efficiently. It will enable processes to be streamlined, adding financial analysis capabilities, automated tracking, interactivity and ondemand reporting for NWN work streams that involve customers, trade allies, municipalities and prospective customers.

Enterprise Content Management Implementation

Initial Cost Estimate (Direct Cost): \$4,159,805 Initial Cost Estimate (Closing Total): \$4,837,702 In-Service Date: August 2018

Updated Cost Estimate (Direct Cost): \$5,387,996 Updated In-Service Date: October 2018

Project Description: The Enterprise Content Management (ECM) Program will establish the governance framework, business processes and technology platform to effectively manage NW

Natural business information throughout its lifecycle in order to protect this asset, reduce the company's risk and improve employee productivity.

Need for the Project: NW Natural currently has TRIM as its designated records management system. However, NW Natural records are also being kept in a variety of other systems such as SharePoint, SAP and shared drives which present a number of challenges with respect to record identification, location/retrieval and retention. NW Natural has recently completed a significant investment in SharePoint. The usage of SharePoint at NW Natural has grown rapidly, including requests for sites that contain company records. Currently, NW Natural does not utilize SharePoint records management capabilities.

A Records Management (RM) project was chartered in 2013 and was driven by four needs: 1) To improve compliance with legal requirements related to company records including the need to access and deliver records timely to regulatory authorities; 2) To manage the protection and optimization of company assets – i.e., information in a record 3) To replace/upgrade our legacy records management application – TRIM; 4) To manage a large and growing number of records in various systems.

The following are key reasons why an ECM program is important to the Company:

Reduction in risk: 1) Ensure transparency and regulatory/legal compliance; 2) Ensure content is secured; 3) Improve decision making through accuracy and availability of information; 4) Business Continuity
 Improvement in employee and operational efficiencies: 1) Increase responsiveness and reduce cycle time for information requests 2) Allow employees to focus on value added tasks 3) Reduce employee time spent finding and validating content; 4) Reduce redundant content; 5) Slow down increase in storage needs; 6) Consolidate and leverage systems with redundant functionality.

Phase III of this project is now in execution.

OPS Data Center Move/Upgrade

Initial Cost Estimate (Direct Cost): \$2,100,000 Initial Cost Estimate (Closing Total): \$2,325,991 In-Service Date: April 2019

Updated Cost Estimate (Direct Cost): \$1,500,000 Updated In-Service Date: March 2019

Project Description: Move the primary data center from current headquarters

Need for the Project: With the headquarters move in 2019/2020, the primary data center will be moving as well.

ETRM

Initial Cost Estimate (Direct Cost): \$3,357,966 Initial Cost Estimate (Closing Total): \$3,921,276 In-Service Date: June 2018

Updated Cost Estimate (Direct Cost): \$3,562,161 Updated In-Service Date: July 2018

Project Description: The objective of this project is to implement an integrated Energy Trading & Risk Management (ETRM) system to replace the Sungard Aligne system and numerous Excel spreadsheets that are being used today. This new system will handle all significant aspects of the Gas Purchasing business (front/middle/back office).

Need for the Project: The SunGuard Aligne application is outdated, does not meet key needs of the Front and Back Offices and does not support Mid-Office processes. After conducting a thorough RFP process, the Allegro software was chosen to provide a single platform for the three departments that would best meet the requirements of the business. In addition to replacing numerous manual procedures, the system will allow streamlining of processes within and among departments.

Source Control Project

Initial Cost Estimate (Direct Cost): \$2,000,000 Initial Cost Estimate (Closing Total): \$2,040,200 In-Service Date: September 2018

Updated Cost Estimate (Direct Cost): \$500,000 Updated In-Service Date: September 2018

Project Description: In 2012, NW Natural completed the construction of the Gasco Source Control System. The system captures contaminated groundwater along the shoreline at the Gasco site, the water is treated, and the treated water is discharged to the river under a NPDES permit. NW Natural worked to optimize the system and complied with Oregon Department of Natural Resources (DEQ) testing requirements through the end of 2016. At the end of 2016, DEQ concluded that testing was complete and approved a shift into the long-term operation and monitoring phase of the system. NW Natural owns the system.

As part of the long-term operation and monitoring phase it is expected that discrete components of the system will need to be replaced or modified. The following components were identified for replacement or modification in 2018.

- 1. One well replacement
- 2. Purchase and install new augers for incline plate clarifiers

- 3. Purchase and install new inline process sampling instruments
- 4. Install relief line to main plant
- 5. Fabricate and install manhole to T-400 backwash tank
- 6. Installation of new concrete curbing

Need for the Project: The Gasco Source Control System was the remedy selected by DEQ to prevent contaminated groundwater from entering the Willamette River. Implementation of this remedy is a requirement of a voluntary cleanup agreement between NW Natural and DEQ. Economic comparisons with alternatives were evaluated as part of the Groundwater/DNAPL Source Control Focused Feasibility Study (Prepared by Anchor Environmental on behalf of NW Natural) submitted to DEQ in November 2007. Underlying assumptions of the economic analyses are provided in that Study. The need for the replacements and modifications above are consistent with existing long-term operation and monitoring of the system as required by DEQ.

Contingencies: Issues that may impact the long-term operation and monitoring phase of the system in the future include additional DEQ requirements, integration of the system into the final cleanup selected by DEQ, or changes in site conditions. Other factors that may be encountered include site access with neighboring facilities, allocation and potential litigation matters, and other regulatory program requirements.

Portland LNG Secondary Containment Basin 201830

Initial Cost Estimate (Direct Cost): \$5,500,000 Initial Cost Estimate (Closing Total): \$5,610,551 In-Service Date: September 2018

Updated Cost Estimate (Direct Cost): \$3,194,287 Updated In-Service Date: October 2018

Project Description – Modify storage tank secondary containment basin design. The new basin design will result in:

- A higher basin floor elevation (estimated 25 ft.);
- An impermeable liner that will prevent the comingling of rainwater with contaminated groundwater;
- Mechanism including swales and/or drains to separate water runoff from previously contaminated surfaces from making contact with the new impoundment surface.
- Continue meeting the 110% tank capacity regulatory requirement.

Need for the Project – There is an additional amount of contaminated water generated at the Portland LNG/Gasco facility, due to rainwater comingling with contaminated groundwater in the storage tank secondary containment basin. This proposed project will eliminate future rainwater contamination in the containment basin.

The lowest elevation in the containment basin is 20ft. Groundwater in this area that is contaminated with benzene and other constituents of concern is regularly at 22 to 25 feet. The

combination of typical seasonal rain events along with the increase in groundwater levels results in a large volume of contaminated standing water in the containment area. The existing onsite water treatment facility was designed and constructed to pump and treat contaminated groundwater from recovery wells. This system, as currently designed, is not able to treat the additional volume of water generated from the tank containment area.

Following are the reasons that NWN is not able to leave the contaminated water in the containment area:

- 49 CFR 193 requires LNG tank secondary containment basins be free of or minimize standing water present in the impoundment.
- Contaminated standing water in the basin creates a nuisance habitat for wildlife.

Contingencies – List of existing or potential problems which might impact the final cost or successful completion of the project:

- Contractor availability
- o Permit requirements
- o Weather

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 327

327. For each of the calendar years 2009 through 2017, please provide the actual headcount at year end by employee category and by part-time and full-time as illustrated below:

	2009	Etc.
Officers		
Part-time		
Full-time		
Exempt		
Part-time		
Full-time		
Temporary: part-time		
Temporary: full-time		
Non-Exempt		
Part-time		
Full-time		
Temporary: part-time		
Temporary: full-time		
Union		
Part-time		
Full-time		
Temporary: part-time		
Temporary: full-time		

Response:

See UG 344 OPUC DR 327 Attachment 1.

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Officers	1	354							d
Part-time	(73) (73)	(<u>7</u> 3)	:70	0576	2	-61	2	570	979
Full-time	10	10	10	10	11	11	13	10	12
Exempt									
Part-time	9	9	2	2	3	2	1	2	1
Full-time	363	367	409	433	432	438	429	460	485
Temporary: part-time	10	100	(1 6)	85		=	(5) (18
Temporary: full-time	1	747		399	-	4	91	5 4 3	12
Non-Exempt		19					1		
Part-time	7	8	6	6	6	6	6	6	6
Full-time	24	25	25	17	16	15	14	14	13
Temporary: part-time		1	5 3 0	1	1	÷	1911	540	
Temporary: full-time	1	1	122	820	-	ц.	2 1	146	- 625
Union		30.4	E .					10.0	р – Э.
Part-time	16	18	16	12	12	11	6	7	8
Full-time	613	589	582	611	600	601	592	608	619
Temporary: part-time	2	940	622	822	-	22	24	140	e20
Temporary: full-time	15	1 <u>81</u> 23	12	121	3	2	4	1927	2

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Capital Expenditures Forecast	a-Jan 2017	a-Feb 2017	a-Mar 2017	a-Apr 2017	a-May 2017	a-Jun 2017	a-Jul 2017	a-Aug 2017	a-Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018
System Total																
	2 004	2 667	2 704	2 420	2 476	2 752	2 010	2 100	2 601	2 910	2 041	1 675	2 720	2 660	2 126	2 6 2 5
	2,004	2,007	2,704	2,420	2,470	2,755	2,010	2,109	2,601	2,819	2,941	1,075	2,750	2,000	3,130	2,035
NEW WAINS / 10	450	090	497	1024	517	946	00Z	570	004 1E9	015	129	476	105	142	074 206	162
MAINENT COMMAR INDUST 712	123	90 107	(00)	108	55	91	529	70 127	156	114	150	120	105	145	200	102
MAIN EXT - CUMM & INDUST. 712	200	137	(99)	232	159	03	108	127	149	152	162	139	137	144	125	131
MAIN EXT - SYS EXPANSION 713	242	455	534	284	304	794	445	3/1	497	347	441	201	495	394	543	430
NEW SERVICES 720	1,338	1,682	1,632	1,326	1,344	1,092	1,235	1,067	1,382	1,364	1,625	963	1,460	1,173	1,595	1,289
NEW RESIDENTIAL SERVICES 721	621	772	615	616	681	504	625	422	655	654	784	439	828	643	922	725
CONV. RESIDENTIAL SERVICE 722	571	730	761	581	552	436	397	421	497	541	660	369	487	378	542	426
COMM. & INDUS. SERVICES 723	145	180	256	129	111	152	213	224	230	169	180	155	145	152	132	138
Blanket Project Applicant 777										(545)	(5)					
RETAINED CONTRIBUTIONS										(545)	(5)					
Blanket Project Applicant 15	80	62	102	104	89	110	166	43	107	119	85	133	111	114	131	79
	80	62	102	104	89	110	166	43	107	119	85	133	111	114	131	79
BANDON FEEDER	00	02	102	104	05	110	100	45	107	115	05	155		114	101	,,,
METERS	156	234	472	374	526	603	534	422	307	1 267	497	101	342	691	535	540
Blanket Project Applicant 21	91	79	350	206	374	431	395	296	232	1 1 2 3	327	9	249	584	417	411
METER PURCHASES	91	79	350	206	374	431	395	296	232	1,123	327	9	249	584	417	411
Blanket Project Applicant 23	66	155	122	167	152	172	139	127	75	145	170	92	93	108	118	129
	66	155	122	167	152	172	139	127	75	145	170	92	93	108	118	129
	00	155	122	107	152	1/2	155	127	75	145	170	52	55	100	110	125
2 REPLACEMENTS SUPPORTED BY REVENUES																
	12	16	15	1	0	1	13	126	87	5	5	25	15	15	15	15
Blanket Project Applicant 119	12	2		3	0	-		123	84	5	5	20	15	15	15	15
BARE STEEL-MAINS: Non-Project		2	, 7	3			, 7	123	84			20				
Blanket Project Applicant 319	12	15	7	1	0	1	, 6	125	3	5	5	5	15	15	15	15
BARE STEEL-SERVICES	12	15	7	1	0	4	6	4	3	5	5	5	15	15	15	15
TOTAL LEAKAGE	112	30	/5	32	105	39	20		72	J /1	37	37	13	13	13	38
Blanket Project Applicant 113	92	20		32	105	1/	1	23 6	20	25	25	25				22
LEAKAGE RECONSTRUCTION - MAINS: Non Project	92	20	25	3	14	14	1	6	20	25	25	25	27	27	27	22
Blanket Project Applicant 313	20	10	20	29	62	26	19	17	52	16	12	12	17	17	17	17
LEAKAGE RECONSTRUCT - SERVICES	20	10	20	29	62	26	19	17	52	16	12	12	17	17	17	17
	20	10	20	25	02	20	15	17	52	10	12	12	17	17	17	17
Blanket Project Applicant 120	22	1	1	2	3	55	12	165	116	21	90	100	135	135	210	210
201770 South Santiam River 4" Exposed Rine	22	4	4	2	5	55	42	105	110	21	30	100	155	155	210	210
	22	1	4	2	3	55	12	165	116	21	90	100	125	135	210	210
Planket Project Applicant 220	56	-4 E 4	62	16	17	22	42	105	110	12	20	22	133	133	210	210
200826 ABS Services DIMP	0	54	02	10	17	55	14	17	13	15	25	25	52	52	42	22
	56	54	67	16	17	33	14	17	14	13	23	23	52	52	12	22
Planket Project Applicant 112	20	24	147	216	(21)	(4)	242	71	14	£91	23	25	200	202	200	22
201405 B20 Fortile Valley Creek 10" Knappa EINISHED	50	52	147	210	(21)	(4)	242	/1	72	001	75	330	208	208	208	208
201403 F33 FEI LIE Valley CLEEK 10 Kilappa - FINISHED 201501 D82 O Black Mainling Cr Crossing EINISHED	1 (7)	0	1	5	25	I	I									
201301 FOZ O DIALK WAIHING CI CIOSSING - FINISHED	(7)	э					7	э	10							
201401 FILISDULK DITULE REDUILU - FILISTED	1	3					/	3	13				104	104	104	104
220120 Shi ilikilikin Italis 9 ili. ILi													104	104	104	104

NW Natural/1709 Moncayo/2 UG 344 OPUC DR 203 Attachment 2

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Capital Expenditures Forecast	a-Jan 2017	a-Feb 2017	a-Mar 2017	a-Apr 2017	a-May 2017	a-Jun 2017	a-Jul 2017	a-Aug 2017	a-Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018
in \$000s																
201679 North Coast Trans ILI 10 in.	3	11	28	41	426	423	318	644	287	150	150		100	100	300	
201692 Central Coast ILI															25	40
990133 Albany Trans ILI 10 in.																
TRANSMISSION INTEGRITY (TIMP)	29	45	175	261	430	420	568	717	371	831	225	350	413	413	638	353
Blanket Project Applicant 325	3	5	4	13	18	21	19	19	7	10	10	10	40	40	40	40
GUARDPOST PLACEMENT	3	5	4	13	18	21	19	19	7	10	10	10	40	40	40	40
Blanket Project Applicant 751	(234)	(154)	(305)	(328)	(573)	(573)	(677)	(1,067)	(667)	(921)	(390)	(545)	(698)	(698)	(988)	(678)
LESS: UNALLOWED DIMP & TIMP	(234)	(154)	(305)	(328)	(573)	(573)	(677)	(1,067)	(667)	(921)	(390)	(545)	(698)	(698)	(988)	(678)
3. REPLACEMENTS / BETTERMENTS NOT SUPPORTED BY REVENUES	3,382	4,111	4,865	4,319	6,120	8,300	4,475	5,177	6,054	5,415	4,572	3,911	2,943	4,076	5,464	6,214
PUBLIC WORKS	487	983	1,534	1,279	1,195	1,165	663	634	517	652	545	493	535	775	1,225	1,225
Blanket Project Applicant 114	244	460	657	615	666	822	547	546	405	879	520	468	510	750	1,200	1,200
201445 Molalla Ave Grading - FINISHED			0													
201386 Madrona Avenue Grading Phase 1 - FINISHED		0	0	1												
201509 Grahams Ferry HP	10	1	46	221	242	65	26	12	0							
201109 NE 18th St, 4 Seasons to NE 138th St - FINISHED	(0)															
201168 EMX West - FINISHED	0															
201600 McGilchrist St Grading	0	0	0	0	0	0	0	0	0							
201451 S. Parkway Ave Eaton to Rasmussen	68	231	341	121	3	1	4	0								
201455 Glenwood Roundabouts	116	153	108	50	5	1	2	1	6							
201528 Springville Rd. Grading	16	8	90	33	1	3	2	0								
201689 Amazon East	0	7	73	104	132	167	14	7	6							
201545 South Parkway HP & Poly	16	110	141	58	3	33	0	9	0							
PUBLIC WORKS - MAINS: Non Project	470	971	1,457	1,203	1,052	1,093	596	575	418	879	520	468	510	750	1,200	1,200
Blanket Project Applicant 314	17	13	77	76	143	72	67	60	99	(227)	25	25	25	25	25	25
PUBLIC WORKS - SERVICES	17	13	77	76	143	72	67	60	99	(227)	25	25	25	25	25	25
RELOCATES/ABANDONMENTS	588	314	368	545	542	1,000	166	988	729	217	405	495	350	350	610	550
Blanket Project Applicant 116	271	60	54	119	243	474	(274)	566	426	40	205	295	100	100	360	300
201058 Ryan Drive Class D 6" W CD10-038 - FINISHED	1	1	9	(1)	21	12	(0)									
201621 Highway 22 District Reg Replacement - FINISHED	67	3	0	(1)												
201418 South Blocks Phase 1	0	0	0	0	0	0	0	0	0							
201618 Roy Rogers Rd Polygon 12" Widening	0	1	0	1	1	3	7	2	22							
RELOCATES/ABANDONMENTS-MAINS	339	65	63	118	265	489	(267)	568	449	40	205	295	100	100	360	300
Blanket Project Applicant 316	249	249	305	427	277	512	433	420	280	177	200	200	250	250	250	250
RELOCATES/ABANDONMENTS-SERV	249	249	305	427	277	512	433	420	280	177	200	200	250	250	250	250
Blanket Project Applicant 752	234	154	305	328	573	573	677	1,067	667	921	390	545	698	698	988	678
NON REVENUE PRODUCING LEAKAGE/BARE STEEL	234	154	305	328	573	573	677	1,067	667	921	390	545	698	698	988	678
Blanket Project Applicant 115	70	47	72	84	79	76	31	62	120	385	315	300	100	100	100	50
201639 N. Parkrose Neighborhood & PDX Reinforcement - FINISHE	48	6		(1)	(0)											
201720 S Parkway, Rasmussen to Main St				0	0	0	0	0	0							
201219 Camas Reinforcement - Sierra to Pacific Rim	(0)	2	4	6	2	7	6	1	0							
201240 Illahee System Reinforcement - FINISHED	52	36	10	6		(6)		0								
201242 West Salem System Reinforcment	0									100	100					
201584 SW 124th Ave 6in Class D	5	10	44	10	13	163	48	188	129	250	300	450	300	300	150	
201410 Salmon Creek to 119th	75	574	325	385	781	901	394	183	19							
201674 Washougal Reinforcement	0	1	0	1	2	27	23	18	35	5	1	25				300
201675 SE Eugene Reinforcement	1	0	1	0	3	13	75	93	67	5	25	25	5	5	500	750

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in \$000s																
201620 Dallas System Reinforcement	159	296	246	41	3	0	6	4								
SYSTEM REINFORCEMENT	411	973	702	532	883	1,181	583	549	370	745	741	800	405	405	750	1,100
CNG - INTERNAL																
Blanket Project Applicant 14	0	0	0	(27)	(0)	3	(0)	3	(0)			30	10	10	60	10
CATHODIC PROTECTION	0	0	0	(27)	(0)	3	(0)	3	(0)			30	10	10	60	10
Blanket Project Applicant 136	7	29	5	(4)	50	31	3	27	4	10	10	10	10	10	10	10
DAMAGE RECONSTRUCTION - MAINS	7	29	5	(4)	50	31	3	27	4	10	10	10	10	10	10	10
Blanket Project Applicant 336	(2)	17	11	30	20	46	14	38	21	20	20	20	20	20	20	20
DAMAGE RECONSTRUCTION - SERVICES	(2)	17	11	30	20	46	14	38	21	20	20	20	20	20	20	20
METER RELOCATION SERVICES																
REGULATORS	71	67	80	35	176	56	53	107	79	60	205	295	90	15	165	235
Blanket Project Applicant 13	39	63	65	33	173	55	42	92	63	60	205	285	75		150	225
201541 - Seaside Reg. Replacement - FINISHED	17	1	0													
201680 Rock Creek Rebuild													5	5	5	5
DISTRICT REGULATORS	55	64	65	33	173	55	42	92	63	60	205	285	80	5	155	230
Blanket Project Applicant 19	15	3	15	1	3	1	11	15	17			10	10	10	10	5
SERVICE REGULATORS	15	3	15	1	3	1	11	15	17			10	10	10	10	5
GAS SUPPLY	699	667	1,404	1,097	2,370	2,716	1,306	1,509	3,068	2,342	1,753	806	512	1,092	1,107	1,917
Blanket Project Applicant 11	1	1	145	2	(8)	14	3	(1)	36	(85)			10	10	20	120
201507 Elliott Rd Automated Control	0	0	0	0	0	0	0	0	0							
201419 Camas Gate Station	2	2	16	5	5	11	8	6	15	40						
201245 Lacamas Regional Gate Station	6	2	8	1	6	6	3	9	9	5	5	5				
201565 Salmon Creek Gate	6	3	165	24	175	113	28	90	99	300	300	100				
201303 North Vancouver Gate - FINISHED	61	25	6	(111)				(9)								
990014 West Vancouver Gate														200	50	50
990015 Ridgefield Gate														200	100	100
990016 Battleground Gate																
990124 Washougal Gate																
201728 Telemetry Locations										50	50		40	40	40	40
990183 Anderson Hwy Gate Rebuild																
990184 Bell Rd 82nd & Killingsworth Station																
201678 Deer Island Odorizer		0	0	0	13	75	6	34	14							
MISC IMPROVEMENTS-GAS CONTROL	77	34	340	(79)	192	218	48	129	173	310	355	105	50	450	210	310
Blanket Project Applicant 18	1	1	4	1	0	19	5	1	0				42	42	42	42
201347 Mist Reliability Study - FINISHED			0													
201664 Mist Instruments & Controls Upgrades (Phase 1)	27	18	77	23	55	204	119	519	331	538	674	320				100
201659 Mist Control Building	8	108	55	182	45	340	236	319	120	15	294					
201727 Well Casing Replacement					22	9	171	63	938	1,000	60					
201663 Mist Large Dehydrator	4	7	7	5	6	98	10	114	(2)	155	77	2	100	100	100	100
201737 Mist Corrosion Abatement Phase 1					4	6	4	14	88						120	95
201746 Mist Gasoline Tank								7	10	20	20					
201758 Mist Fiber Network								1	1	58	63	48	50	50	75	100
990170 Mist Corrosion Abatement Phase 2													10	10	10	270
990171 Mist Corrosion Abatement Phase 3																
990140 Mist Instrument and Controls Upgrade Ph. 2															50	50
990139 Mist Electrical Systems Upgrade													20	20	20	50

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in \$000s																
201756 Mist Compressor Rebuild 500							10	0	828							
990174 Mist Compressor Building #1 Firewall																
990185 Mist Wastewater Containment																50
990186 Mist Well Rework																
MIST STORAGE	40	134	144	211	132	677	555	1,038	2,315	1,786	1,187	369	222	222	417	857
Blanket Project Applicant 524	0	(0)	(0)	0	(0)	48	67	6	10				42	42	42	92
201226 Portland LNG Salt Bath Heater - FINISHED		1														
201458 Portland LNG Fire & Gas System Study	1	0	0	0	0	27	2	3	6	28	45	181				
201494 Portland LNG Seismic and Geo Study	9	2	2	1	1	1	2	1	2							
201472 Portland LNG Splash Shield/Storm Study	1	1	0	4												
201530 Portland LNG Vaporization	31	19	21	94	887	502	149	51	35							
201651 Portland LNG Process Instrumentation	1	0	0	1	35	34	9	6	7	15	10					
201649 Portland LNG Boiloff/Cryogenic Piipe Insulation	1	14	67	93	27	30	22	5	10	3	21	21				
990144 Port. LNG Control System H7																200
990145 Port. LNG Control System H5													67	67	67	67
990153 Portland Control Building																
990154 Portland Reliability Projects																
201757 Port LNG Liquification Alt Study							3	44	98	108	56	54				
990188 Portland LNG Liquifaction System Replacment																
990189 LNG Tank Seismic Upgrades																
PORTLAND LNG PLANT READINESS	44	37	91	193	950	642	254	116	168	155	132	256	108	108	108	358
Blanket Project Applicant 529	1	1	10	1	1	0	0	2	1				42	42	42	42
200983 Newport LNG - CO2 Remediation	289	302	524	566	240	275	85	61	137							
201193 Newport LNG - Plant Control System Upgrade	172	99	132	123	98	135	75	39	60	30						
201266 Newport LNG - Solar Turbine Modernization Ph. 2					1	1	0	12	33							
201345 Newport LNG - Tank Valve Actuator	0	4	7													
201383 Newport LNG Pump Relief Piping	10	1														
201440 Newport LNG Control Building	12	15	7	10	4	7	1	6	2							
201495 Newport Seismic and Geo Study	6	1	1	1	1	1	1	1	1							
201529 Newport LNG - Vaporizer	34	26	23	65	740	689	271	85	93							
201609 Newport LNG Glycol Piping Replacement						3	0	10	37	21	40	36	10	100	150	150
201547 Newport Oil Separator	14	12	11	4	4		2	1								
990030 Newport LNG - Standby Generator										40	40	40	50	50	100	100
201670 Newport Odorizer	0	2	115	2	8	68	13	9	49							
990169 C1 Compressor Motor										1	1	1	30	120	30	
990190 Newport F3 Replacment										_	_	_			50	50
990191 Newport Seismic Study																50
NEWPORT I NG PLANT READINESS	538	463	830	772	1.096	1,178	449	226	412	92	80	77	132	312	372	392
GENERAL	888	907	455	504	310	1 529	1 010	253	600	449	502	417	313	702	572	469
Blanket Project Applicant 32	354	862	433	123	394	806	774	158	415	135	381	197	6	12	178	253
201460 2016 Transportation Capital Vehicles - EINISHED	7	14	2	2	1	6000	7	1/	-115	155	501	157	0	12	1/0	235
TRANSPORTATION	361	876	428	125	305	812	782	172	420	135	381	197	6	12	178	252
Blanket Project Applicant 35	3/10	(4)	30	275	295 295	012	152	1/2	420 Q/	207	561	157	217	625	3/6	255
	340	(4) (A)	30	275	с р	0	152	0	2/I	207			217	625	346	
Blanket Project Applicant 33	206	26	23	30	24	660	36	50	95	135	5/	247	75	50	50	75
	200	20	23	30	24	660	36	50	95	135	54	247	75	50	50	75
	200	20	25	55	24	000	50	50	55	100	J4	247	15	50	50	15

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in \$000s																
Blanket Project Applicant 40	2	1	17	0	0	0	39	5	0	5	5	5	6	6	6	6
OFFICE FURNITURE	2	1	17	0	0	0	39	5	0	5	5	5	6	6	6	6
Blanket Project Applicant 31		15	0	0	17	64	1	17			96				40	126
OFFICE EQUIPMENT		15	0	0	17	64	1	17			96				40	126
Blanket Project Applicant 571	1	1	1	1	1	1	1	1	1	1	1	1	9	9	9	9
CORPORATE SECURITY	1	1	1	1	1	1	1	1	1	1	1	1	9	9	9	9
Blanket Project Applicant 44	(21)	(7)	(54)	(36)	(133)	(8)				(33)	(33)	(33)			(100)	
SALVAGE - TRANS. & POWER EQUIP	(21)	(7)	(54)	(36)	(133)	(8)				(33)	(33)	(33)			(100)	
BUDGET SAVINGS TO BE ACHIEVED THROUGH PRIORITIZATION																
4. INVESTMENTS REQUIRING ECONOMIC JUSTIFICATION	882	953	797	766	2,771	2,292	686	1,186	1,841	3,262	3,132	2,751	4,040	4,452	4,414	3,818
INFORMATION TECHNOLOGY	853	861	674	694	2,057	1,982	760	1,137	1,762	3,061	2,334	1,977	2,037	1,687	1,639	1,637
Blanket Project Applicant 17	(27)	18	22	31	17	130	65	136	182	10	10	10	183	183	183	183
990076 Avaya Software Upgrades																
201557 Eagle Wireless Upgrade Project	10	1	2	19	1	95	12	14	10	10	100	251	250	250	250	250
201350 Portland LNG Tower	42	6	9		0											
201512 Microwave/Telemetry/Telephony - NOT USED	30	(6)		(4)	0		(0)		0							
990101 West Side Microwave Upgrade										200	100	50				
990102 East Side Microwave Upgrade																
201512 Radio Tower Upgrade	30	(6)		(4)	0		(0)		0							
990104 Digital Radio System													108	108	108	108
990107 Gasco Livingston Microwave										50	40					
990112 Prospect Healy Microwave Upgrade										25	25	10				
RADIO & ELECTRONIC IMPROVEMENTS	84	12	34	42	19	225	76	151	192	295	275	321	542	542	542	542
COMPUTER SOFTWARE/HARDWARE	770	848	640	652	2.038	1.757	685	986	1.570	2.766	2.059	1.656	1.495	1.145	1.097	1.095
Blanket Project Applicant 38	770	848	640	652	2.038	1.757	685	986	1.570	,	,	,	,	, -	,	,
201522 CRM Phase 2 Enhancements 2016 - FINISHED	0	0	0	0	0	0	0	0	,							
COMPUTER SOFTWARE/HARDWARE	770	848	640	652	2.038	1.757	685	986	1.570							
Blanket Project Applicant 38.1	(234)	(197)	(129)	(164)	(1.021)	(550)	(150)	(119)	(477)	(542)	265	214	(47)	240	227	165
990040-1 OPS Data Center Move/Upgrade (HW)	(-)	(-)				()	(/	(- <i>y</i>		(- <i>)</i>						
200067-1 Tech Refresh-Large Servers/Storage (Hardware)	152	104	14	125	6	157	29	4	168	579		20			18	18
200068-1 Tech Refresh-Desktop/Laptop/Periph -Field Laptop Refre	34	72	63	28	1.012	390	113	111	101	104	21	5	376	26	31	92
990507 Applicant 38.1 - Q3 2017 Closed Plant					_,					238	59	39				
990508 Applicant 38.1 - Q4 2017 Closed Plant										9	9	9				
201553-1 Newport ICS Segmentation (HW)	44	17	9	3	6	1	5	3	1							
201637-1 Wireless Network Upgrade (HW)	3	4	44	8	(2)	2	3	0	208	137	37	28	22	18		
38.1 Computer Hardware Only	(0)	0	(0)	0	(0)	(0)	(0)	0	0	525	391	315	351	284	275	275
Blanket Project Applicant 38.2	(471)	(553)	(458)	(433)	(758)	(974)	(460)	(789)	(902)	542	235	186	130	(140)	(144)	(52)
201748 Digital Portal (frmr NWN Website Redesign)	()	()	()	()	()	()	106	111	160	146	131	131		()	()	()
200067-2 Tech Refresh-Large Servers/Storage (Software)	65	45	6	54	2	67	12	2	72	248		8			8	8
201397-2 GMACS Upgrade (Software)	73	71	79	107	63	101	96	95	77	139	139	0			0	0
201531-2 COM (Customer Order Management) (Software)	109	303	149	91	441	186	52	46	62	135	135	110	125	125	125	125
201334-2 SAP upgrade – Phase II (software) FINISHED	0	0	0				0		1							
201314 CRM Integration Implementation phase 1 FINISHED	0 0	0	0	0	0	0	0 0	0	0							
201471-2 ECM Implementation (Software)	77	130	191	175	153	242	125	165	191	257	231	223	250	250	250	250
990085-2 Incident Claims Management (Software)	.,	100	101	1.0	100		120	200		207			200	200	200	200
201401 Cybersecurity Program - FINISHED	10	(1)		з												
	10	(+)		5												

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Capital Expenditures Forecast	a-Jan 2017	a-Feb 2017	a-Mar 2017	a-Apr 2017	a-May 2017	a-Jun 2017	a-Jul 2017	a-Aug 2017	a-Sep 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018
201385 VROI Phase 2 - FINISHED	1		(4)													
990532 Applicant 38.2 - 04.2017 Closed Plant	-		(.)							228	91	50				
990533 Applicant 38.2 - 01 2018 Closed Plant										91	94	65	50	50	50	
990534 Applicant 38.2 - 02 2018 Closed Plant										78	85	67	57	28	50	25
990536 Applicant 38.2 - 0/ 2018 Closed Plant										70	05	07	13	13	13	13
990537 Applicant 38.2 - Q4 2018 Closed Plant													15	15	15	15
990539 Applicant 38.2 - 03 2019 Closed Plant										25	65	65	22	22	22	22
000E40 Applicant 28.2 - Q3 2019 Closed Plant										25	05	05	22	22	22	22
2015E2 2 Nowport ICS Segmentation (SW)	11	17	0	2	6	1	E	2	1							
201535-2 Newport ICS Segmentation (SW) 201548 CMACS/IE Control Room Mamt (aka IE Cas Control Softwa	44	(19)	16		0	12	47	17	16	22	22					
201548 GMAC5/35 CONTON NORTH Might (aka 35 Gas Control Softwa	90	(10)	10	(4)	90	15	47	17	10	55	33					62
990156 Fieldsmart Replace/Opgrade																05
990160 Middleware Opgrade/Replace																
990162 SAP Opgrade (2019-2020)	1	F	1	1	2	2	2	1	-							
201363 BizTaik Upgrade	1	5	1	1	3	2	3	1	5	240	170	100	200	200	200	200
						301	0	330	252	249	1/3	182	300	300	300	300
990105 OPS HIVI PIT3	4			2	(4)			0	50	24	0	7	-	-		
201037-2 Wireless Network Opgrade (SW)	1	1	11	2	(1)	1	1	0	52	34	9	/	5	5		
990040-2 OPS Data Center Move/Opgrade (SW)							c	0	(4)	6	100	100	420	120	120	
201741 HOS - Hours of Service							6	9	(1)	6	190	190	120	120	120	60
201766 North Mist Asset Managment	(0)	(2)	(0)		(2)	(2)	(0)	4	15	28	56	57	/4	88	79	69
38.2 Computer Software Only	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	2,240	1,668	1,341	1,145	861	822	821
CIS																
LAND AND STRUCTURES	29	92	123	71	714	310	(74)	49	79	202	798	774	2,003	2,765	2,776	2,181
990037 Albany Land Purchase														1,000		
990168 Lincoln City Land Purchase															1,000	
LAND														1,000	1,000	
Blanket Project Applicant 36	6	(1)	40	18	(622)	(207)	137	(45)	21	(31)	358	272	26	26	26	26
201349 Portland LNG Tank at Pacific Terminal Services - FINISHED			4	10	638	236	(112)	48	9							
201158 Sherwood Building A Additional	15	18	27	0												
201413 Sherwood BC Buildout - FINISHED	0	0	0							75	100	162				
201632 Sherwood Testing Building	4	52	40	25	40	32	11	(12)	1	29	56	50	56	268	192	251
201775 Coos Bay Retrofit									26	35	36	20	134	201	234	100
990038 Lincoln City Retrofit													50	75	75	100
201631 Eugene Retrofit	4	23	8	7	20	12	2	10	3	42	43	42	56	56	59	465
201349 PacTerm Tank Repairs			4	10	638	236	(112)	48	9							
990148 HQ Project										50	75	75	750	208	208	208
990166 Miller Station TI															50	100
990175 Newport Electric Center Reskin																
201525 Fuel Card Reader Replacement	0	0									88	100				
201776 Central Resource Center									10	2	43	53	97	97	97	97
990901 Source Control Related Capital - Environmental													222	222	222	222
990902 LNG Basin Related Capital - Environmental													611	611	611	611
STRUCTURES	29	92	123	71	714	310	(74)	49	79	202	798	774	2,003	1,765	1.776	2.181
5. STORAGE (Does not include North Mist Storage)	28	53	228	53	56	55	58	111	80	100	100	25	,	,	,	100
TOTAL UTILITY STORAGE	.5	34	208	33	35	35	37	62	57	100	100	25				100
Blanket Project Applicant 569	-		(0)	0	(0)	(0)		26	19			-				100
			1.57		1.57	1-1										

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in \$000s																
201725 Deer Island Meter and RTU Replacement			143	1	1	1				100	100	25				
DEER ISLAND GATE STATION			143	1	1	1		26	19	100	100	25				100
Blanket Project Applicant 562	(0)	0	(0)	(0)	0		(0)	0	(0)							
200083 Adams Storage Project	5	34	65	32	35	34	37	36	38							
ADAMS STORAGE PROJECT	5	34	65	32	35	34	37	36	38							
Blanket Project Applicant 563	20	18	20	20	20	20	21	49	23							
200962 N Mist Project									0							
EMERALD STORAGE - 563	20	18	20	20	20	20	21	49	23							
TOTAL NON-UTILITY STORAGE	3															
Blanket Project Applicant 514	3															
MILLER STATION	3															
BRUER/FLORA WELLS																
MIST TAKEAWAY																
CONSTRUCTION OVERHEAD	3,845	3,925	4,458	3,840	4,170	3,897	3,611	4,207	2,515	4,083	3,806	3,193	3,362	3,749	4,240	4,175
Blanket Project Applicant 43	3,845	3,925	4,458	3,840	4,170	3,897	3,611	4,207	2,515	4,083	3,806	3,193	3,362	3,749	4,240	4,175
UNALLOCATED CAPITAL / COH	3,845	3,925	4,458	3,840	4,170	3,897	3,611	4,207	2,515	4,083	3,806	3,193	3,362	3,749	4,240	4,175
6. UNALLOCATED CAPITAL																
UNALLOCATED CAPITAL / COH																
SUBTOTAL UTILITY AND STORAGE SERVICES EXPENDITURES	10,141	11,709	13,051	11,405	15,593	17,297	11,649	12,790	13,091	15,680	14,551	11,555	13,075	14,938	17,254	16,943

May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
2,749	3,335	2,110	2,985	2,559	3,045	3,641	2,436	3,105	3,105	3,105	3,105	3,105	3,105	3,105	3,105	3,105	3,105	3,105	3,105
782	798	636	797	806	1,034	1,191	772	989	989	989	989	989	989	989	989	989	989	989	989
192	185	142	173	174	203	242	135	247	247	247	247	247	247	247	247	247	247	247	247
91	122	113	153	158	259	275	237	163	163	163	163	163	163	163	163	163	163	163	163
500	491	381	471	474	572	674	400	579	579	579	579	579	579	579	579	579	579	579	579
1,462	1,445	1,127	1,395	1,405	1,715	2,013	1,214	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597
861	829	635	777	780	908	1,086	607	952	952	952	952	952	952	952	952	952	952	952	952
506	487	373	457	458	533	638	357	474	474	474	474	474	474	474	474	474	474	474	474
95	128	119	161	167	273	290	249	171	171	171	171	171	171	171	171	171	171	171	171
(39)	(6)	(44)		(264)	(193)	(6)		(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
(39)	(6)	(44)		(264)	(193)	(6)		(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
81	104	112	97	152	49	99	107	106	106	106	106	106	106	106	106	106	106	106	106
81	104	112	97	152	49	99	107	106	106	106	106	106	106	106	106	106	106	106	106
462	994	279	696	460	441	343	344	459	459	459	459	459	459	459	459	459	459	459	459
375	786	98	528	259	277	260	246	317	317	317	317	317	317	317	317	317	317	317	317
375	786	90	528	255	277	260	246	317	317	317	317	317	317	317	317	317	317	317	317
975	200	192	169	201	164	200	240	142	142	142	142	142	142	142	142	142	142	142	142
87	208	102	108	201	104	65	97	142	142	142	142	142	142	142	142	142	142	142	142
87	208	162	108	201	104	03	97	142	142	142	142	142	142	142	142	142	142	142	142
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
38	38	38	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42	42
22	22	22	27	27	27	27	27	25	25	25	25	25	25	25	25	25	25	25	25
22	22	22	27	27	27	27	27	25	25	25	25	25	25	25	25	25	25	25	25
17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
135	135	135	135	135	135	195	205	167	167	167	167	167	167	167	167	167	167	167	167
		38	38	213	213														
135	135	173	173	348	348	195	205	167	167	167	167	167	167	167	167	167	167	167	167
22	22	22	22	22	52	52	54	56	56	56	56	56	56	56	56	56	56	56	56
22	22	22	22	22	52	52	54	56	56	56	56	56	56	56	56	56	56	56	56
308	208	208	208	208	208	208	208	454	454	454	454	454	454	454	454	454	454	454	454

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104 104 104 104 104 104 104

NW Natural/1709 Moncayo/9 UG 344 OPUC DR 203 Attachment 2 10 Capital Expenditures Detail Page 9 of 14

May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
400	400	300	650	300	150	150													
								42	42	42	42	42	42	42	42	42	42	42	42
813	713	613	963	613	463	463	313	496	496	496	496	496	496	496	496	496	496	496	496
40	40	40	40	40	40	40	40	17	17	17	17	17	17	17	17	17	17	17	17
40	40	40	40	40	40	40	40	17	17	17	17	17	17	17	17	17	17	17	17
(1,063)	(963)	(901)	(1,256)	(1,081)	(961)	(808)	(670)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)
(1,063)	(963)	(901)	(1,256)	(1,081)	(961)	(808)	(670)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)	(792)
7,856	7,682	6,695	6,393	4,728	3,645	2,674	2,323	4,119	4,119	4,119	4,119	4,119	4,119	4,119	4,119	4,119	4,119	13,369	13,369
1,125	1,125	725	725	750	725	575	590	858	858	858	858	858	858	858	858	858	858	858	858
1,100	1,100	700	700	725	700	550	565	833	833	833	833	833	833	833	833	833	833	833	833
1 100	1 100	700	700	725	700	FFO	ECE	077	077	077	077	077	077	022	022	022	022	022	077
1,100	1,100	25	700	725	25	250	202	000	000	000	000	000	000	033	000	000	033	000	000
25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
500	500	350	350	600	680	350	350	458	25 //58	25 458	25 458	25 458	25 158	158	458	25 //58	25 //58	2J 158	158
250	250	100	100	350	430	100	100	208	208	208	208	208	208	208	208	208	208	208	208
200	200	100	100	550	100	100	100	200	200	200	200	200	200	200	200	200	200	200	200
250	250	100	100	350	430	100	100	208	208	208	208	208	208	208	208	208	208	208	208
250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
1,063	963	901	1,256	1,081	961	808	670	792	792	792	792	792	792	792	792	792	792	792	792
1,063	963	901	1,256	1,081	961	808	670	792	792	792	792	792	792	792	792	792	792	792	792
150	50	50	100	225	100	100	100	167	167	167	167	167	167	167	167	167	167	167	167

500 500

500 750 1,000 1,000

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NW Natural/1709 Moncayo/10 UG 344 OPUC DR 203 Attachment 2 10 Capital Expenditures Detail Page 10 of 14

May 2018 Jun 2018 Jul 2018 Aug 2018 Sep 2018 Oct 2018 Nov 2018 Dec 2018 Jan 2019 Feb 2019 Mar 2019 Apr 2019 May 2019 Jun 2019 Jul 2019 Aug 2019 Sep 2019 Oct 2019 Nov 2019 Dec 2019 1,550 1,650 1,300 3,007 2,752 2,142 1,757 1,062 1,248 1,248 1,248 1,248 1,248 1,248 1,248 1,248 1,248 1,248 10,498 10,498

250 250 200 200

NW Natural/1709 Moncayo/11 UG 344 OPUC DR 203 Attachment 2 10 Capital Expenditures Detail Page 11 of 14

May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
250																			
50																			
								83	83	83	83	83	83	83	83	83	83	83	83
1,497	1,142	982	892	542	142	142	142	592	592	592	592	592	592	592	592	592	592	592	592
92	92	92	92	42	42	42	42	42	42	42	42	42	42	42	42	42	42	(3,708)	(3,708)
200	200	200	80	60															
67	67	67	67	67	67	67	67												
								125	125	125	125	125	125	125	125	125	125	125	125
								167	167	167	167	167	167	167	167	167	167	167	167
																		8,500	8,500
																		4,500	4,500
358	358	358	238	168	108	108	108	333	333	333	333	333	333	333	333	333	333	9,583	9,583
42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
150	150	150	150	150	150	150													
100	100	100	100	100	100														
50	50	200	50																
50	50	50	50																
392	392	542	392	292	292	192	42	42	42	42	42	42	42	42	42	42	42	42	42
366	448	888	1,656	910	448	244	(29)	423	423	423	423	423	423	423	423	423	423	423	423
301	483	643	1,525	945	358	179	6	310	310	310	310	310	310	310	310	310	310	310	310
301	483	643	1,525	945	358	179	6	310	310	310	310	310	310	310	310	310	310	310	310
		105						44	44	44	44	44	44	44	44	44	44	44	44
		105						44	44	44	44	44	44	44	44	44	44	44	44
50	50	75	50	50	75	50	50	58	58	58	58	58	58	58	58	58	58	58	58
50	50	75	50	50	75	50	50	58	58	58	58	58	58	58	58	58	58	58	58

NW Natural/1709 Moncayo/12 UG 344 OPUC DR 203 Attachment 2 10 Capital Expenditures Detail Page 12 of 14

May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		50	66					29	29	29	29	29	29	29	29	29	29	29	29
		50	66					29	29	29	29	29	29	29	29	29	29	29	29
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
	(100)			(100)			(100)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)
	(100)			(100)			(100)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)	(33)
3,896	4,182	3,969	4,248	3,271	2,359	2,419	3,588	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642
1,655	1,587	1,273	1,144	1,088	949	1,291	2,302	667	667	667	667	667	667	667	667	667	667	667	667
183	183	183	183	183	183	183	183	42	42	42	42	42	42	42	42	42	42	42	42
						250	250												
250	250	250	250	250	250	250	250												
								63	63	63	63	63	63	63	63	63	63	63	63
108	108	108	108	108	108	108	108												
5/12	542	542	542	542	542	792	792	104	104	104	104	104	104	104	104	104	104	104	104
1 11/	1 045	731	602	542	407	/92	1 510	563	563	563	563	563	563	563	563	563	563	563	563
1,114	1,043	/51	002	547	407	433	1,510	505	505	505	505	505	505	505	505	505	505	505	505
159	214	(28)	79	(39)	44	62	(457)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)
100		(20)		(00)		02	700	64	64	64	64	64	64	64	64	64	64	64	64
88	18	58	58	146	76	76	76	47	47	47	47	47	47	47	47	47	47	47	47
32	34	175	44	64	24	24	34	55	55	55	55	55	55	55	55	55	55	55	55
52	54	175		04	24	24	34	55	35	55	35	35	55	55	55	55	55	35	55
278	265	205	181	170	144	161	353	152	152	152	152	152	152	152	152	152	152	152	152
(47)	(66)	140	34	152	68	51	569	38	93	192	192	192	192	205	213	(587)	213	213	213
38	8	25	25	63	33	33	33	20	20	20	20	20	20	20	20	20	20	20	20
50	0	25	23	05	55	55	55	20	20	20	20	20	20	20	20	20	20	20	20
125	125																		
250	250	250	250					42	42	42	42	42	42	42	42	42	42	42	42

25	25																		
13	13	13	13	13	13	63	63	450	100										
22	22				50	100	100	150 25	100 21	21	20	15	14	9		800			
								46	46	46	46	46	46	46	46	46	46	46	46
63	63	63	63	63	63	63	63												
								42	42	42	42	42	42	42	42	42	42	42	42
								21	21	21	21	21	21	21	21	21	21	21	21
300	300																		
				50	30	30	30												
							300	28	28	28	28	28	28	28	28	28	28	28	28
48	42	36	37	37	8														
835	780	526	421	376	263	338	1,157	411	411	411	411	411	411	411	411	411	411	411	411
2,240	2,595	2,696	3,104	2,183	1,410	1,128	1,286	975	975	975	975	975	975	975	975	975	975	975	975
26	26	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
37/	/18	/18	250	17															
524	410	410	250	1,															
200	300	300	300	300	300														
465	605	701	701	322															
208	208	208	600	600	600	600	600	792	792	792	792	792	792	792	792	792	792	792	792
150	150	200	205																
		200	202																
34	54	9	9	84	484	501	660	157	157	157	157	157	157	157	157	157	157	157	157
222	222	222	222	222															
611	611	611	611	611															
2,240	2,595	2,696	3,104	2,183	1,410	1,128	1,286	975	975	975	975	975	975	975	975	975	975	975	975
100	100	100	100																
100	100	100	100																

May 2018 Jun 2018 Jul 2018 Aug 2018 Sep 2018 Oct 2018 Nov 2018 Dec 2018 Jan 2019 Feb 2019 Mar 2019 Apr 2019 May 2019 Jun 2019 Jul 2019 Aug 2019 Sep 2019 Oct 2019 Nov 2019 Dec 2019

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100

19,257	20,137	17,091	18,166	14,155	12,470	12,071	11,583	12,954	12,954	12,954	12,954	12,954	12,954	12,954	12,954	12,954	12,954	22,204	22,204
.,050	.,000	.,217	.,++0	5,557	5,420	5,557	5,230	.,	.,500	.,	.,	.,	.,	.,	.,000	.,000	.,	.,000	.,000
4,656	4,838	4,217	4,440	3,597	3.420	3,337	3,236	4,088	4.088	4.088	4,088	4.088	4.088	4.088	4.088	4.088	4.088	4.088	4.088
4,656	4,838	4,217	4,440	3,597	3,420	3,337	3,236	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088
4,656	4,838	4,217	4,440	3,597	3,420	3,337	3,230	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088	4,088
100	100	100	100																

May 2018 Jun 2018 Jul 2018 Aug 2018 Sep 2018 Oct 2018 Nov 2018 Dec 2018 Jan 2019 Feb 2019 Mar 2019 Apr 2019 May 2019 Jun 2019 Jul 2019 Aug 2019 Sep 2019 Oct 2019 Nov 2019 Dec 2019

NORTHWEST NATURAL GAS COMPANY COST ALLOCATION MANUAL For the year 2017

Overview

The purpose of Northwest Natural Gas Company's ("NWN") Cost Allocation Manual is to describe the methodologies for allocating direct, indirect and shared services costs between the utility and its non-regulated or non-utility affiliates and activities.

General

NWN is a natural gas local distribution company, which operates in Oregon and Washington, and is regulated by the Public Utility Commission of Oregon (OPUC) and Washington Utilities and Transportation Commission (WUTC). NWN also owns certain other businesses. NWN and the other businesses are "affiliated interests" under ORS 757.015, and RWC 80.16.10. As such, the allocation of costs between these entities is subject to regulation by the OPUC and WUTC, and this manual sets out methodologies, policies, and procedures for ensuring that the allocation of costs is done appropriately.

Management oversight and other labor performed by NWN employees for the benefit of affiliates or non-public utility activities are recorded on the books of the utility in accordance with the labor allocation methods described below. *See* Labor Allocation Methods. Costs of insurance coverage purchased by NWN on behalf of its affiliates and non-public utility activities are allocated as described below. *See* Insurance Cost Allocation Methods. Income and property taxes attributable to affiliate and non-public utility activities are allocated as described below. See "Tax Allocation Methods." Any variation from the general allocation procedures described below is described in the specific description of the particular affiliate or non-public utility activity set forth below.

Affiliates or non-public utility activities are charged directly for materials, supplies and services (e.g., consulting services) purchased by NWN on behalf of the affiliate on the basis of the full cost of the items supplied.

Intercompany balances between NWN and its affiliates are paid on a monthly basis. However, NWN may elect to defer payment of any intercompany balance up to the amount of its net equity contributions to the affiliate for periods of more than one month. If NWN does defer payment, then it will pay monthly interest to the affiliate based on its avoided cost of short-term borrowing for as long as the intercompany balance remains outstanding.

Affiliates & Non-Regulated Activities

The following is a list of NWN's affiliates that currently meet the requirements of ORS 757.015 and RCW 80.16.010, respectively.¹

- 1. NNG Financial Corporation
- 2. KB Pipeline Company
- 3. Northwest Energy Corporation
- 4. NWN Gas Reserves LLC
- 5. Northwest Energy Sub Corporation*
- 6. Northwest Biogas, LLC
- 7. NW Natural Energy, LLC
- 8. NW Natural Gas Storage, LLC
- 9. Gill Ranch Storage, LLC
- 10. Trail West Holdings, LLC
- 11. Trail West Pipeline, LLC
- 12. BL Credit Holdings, LLC
- 13. NW Natural Water Company, LLC
- 14. FWC Merger Sub, Inc.
- 15. Northwest Natural Holding Company**
- 16. NW Natural Merger Sub Inc.**

* Articles of Dissolution were filed for Northwest Energy Sub Corporation on March 6, 2018.

** Northwest Natural Holding Company and NW Natural Merger Sub Inc. were formed on March 7, 2018.

Refer to subsequent organizational chart of NWN and its affiliates.

The following is a list of NWN's non-regulated activities.

- 1. Appliance Center/Miscellaneous Merchandising
- 2. Lan Su Chinese Garden (formerly Classical Chinese Garden) Block
- 3. Company-Owned Life Insurance
- 4. Coos County Pipeline
- 5. Corporate Philanthropy
- 6. Enerfin Contracts
- 7. Interstate Storage
- 8. Lobbying, Civic, and Political Contributions
- 9. Non-Operating Advertising
- 10. Oil Storage Tanks/Dock Lease
- 11. Other Deductions
- 12. Regulatory and Tax Penalties
- 13. Service Solutions
- 14. Sherwood House
- 15. Smart Energy

¹ BlackRock, Inc. and The Vanguard Group hold more than five percent of the voting securities of NWN, however they are not allocated any direct, indirect and shared services costs by NWN. The ownership of voting securities held by these entities are reported pursuant to ORS 757.511 and OAR 860-027-0175.

NW Natural Organizational Chart – as of December 31, 2017



Labor Allocation Methods

Time reporting of all NWN employees is recorded in a SAP time keeping system referred to as "CATS" (the Cross Application Time System). Wages and salaries of all NWN employees are charged to a default account within the employee's home cost center. If an employee has any time worked on any projects outside of their default home cost center including time worked related to affiliates and capital projects, the employee records the time worked on other projects in the CATS system. The CATS system then calculates the cost of the reported hours for each employee, adds the calculated payroll overhead load and generates an accounting entry in which the costs of the reported hours including payroll overhead load are transferred at the employee average pay rate, by pay grade, from the employee's cost center to the cost center for the reported activity.

Examples of time charged via CATS that follows the labor allocation methods are:

- Capital projects,
- Work for other cost centers,
- Work for Non-utility activity within NWN, and
- Work for an affiliate of NWN.

Payroll Overhead Allocation Methods

Payroll overhead is comprised of two types of costs, as follows:

Vacation and Holiday Overhead Load

A vacation and holiday overhead load is added to the pay of all NWN employees to cover the estimated cost of vacations and company-designated paid holidays. This cost is absorbed by the employee's home cost center while they are at work. If exception time is reported by the employee *(see "Labor Allocation Methods")*, the vacation and holiday overhead load follows the payroll dollars.

The accumulated vacation and holiday load amounts are recorded as a liability in a balance sheet account (232). When employees report time for vacation or official holidays, the CATS system charges the direct labor, without vacation and holiday overhead load, to the balance sheet account (232). At year-end, any over- or under- accrual to the balance sheet account is charged or credited to corporate expense. The year-end balance reconciles to the subsidiary records by employee in the payroll system.

Benefits Overhead Load

All NWN employee benefit costs are charged into a clearing account (602). NWN allocates the costs of employee benefits and payroll taxes by adding a benefits overhead load to all labor charges that are in addition to the vacation and holiday overhead load described above. If exception time is reported (see "Labor Allocation Methods"), the benefits overhead load follows the payroll dollars. The benefits overhead load is set at a rate adequate to fully allocate by year-end all actual benefit costs. The rate is determined at the beginning of the year based on

estimated costs. Because benefit cost rates may differ depending on employee grade, employees are categorized into two classes, with different benefits overhead load rates for each class. The employee classes are: (1) Executives, and (2) Non-executives.

In 2017, the following costs were allocated as payroll overhead loadings (company a	verages)	:
---	----------	---

Executives	
Vacation & Holiday Overhead Load	15.57% of payroll
Benefits Overhead Load	91.09% of payroll
Total Executive Payroll Overhead ²	106.66% of payroll
Non-Executives	
Vacation & Holiday Overhead Load	15.57% of payroll
Benefits Overhead Load	79.89% of payroll
Total Non-Executives Payroll Overhead	95.46% of payroll
Overtime and Doubletime Overhead	15.80% of payroll

The benefit overhead load includes the cost of health care, pension, post-retirement medical, workers' compensation, 401K plans, payroll taxes, and bonuses. Quarterly, any over- or under-allocation of costs recorded in clearing accounts (602) via the payroll overhead charge is charged or credited to corporate expense and non-utility activities accordingly.

A separate entry is made to transfer the cost of payroll taxes embedded in the rates charged to O&M to Account 408, as required by FERC accounting.

Service Provider and Administrative Allocations

For affiliate labor charges, an additional administrative overhead load of 27.5% of labor cost is added to cover the cost of rented space, office supplies, IT costs, furniture and equipment.³ In like manner, an appropriate administrative overhead load is also charged from an affiliate to NWN when an affiliate provides services to the parent.

Insurance Allocation Methods

NWN's Risk and Land Department obtains insurance for the consolidated NWN entities in the open market. The cost of all premiums is initially charged to NWN accounts. However, Gill Ranch Storage, LLC ("GRS") pays a portion of its premiums directly. An allocation for affiliated or non- utility activity related insurance coverage is subsequently made by journal entry to the affiliate or activity. Allocation is based on the underwriting principles for each type of policy. NWN's intent is to use an allocation methodology that does not result in the utility subsidizing the affiliate or non-public utility activity.

 $^{^2}$ The executive payroll overhead rates do not include expenses for various elements of our executive compensation program such as stock option expense, restricted stock unit expense or long-term incentive plan expenses.

³ The administrative overhead load will not be charged if the employee providing the Services is located on affiliate premises for which all facilities related costs are borne by the Affiliate receiving the Services.

Tax Allocation Methods

Income Tax

NWN allocates income tax expense or benefit to each affiliate or activity based on the taxable income or loss of the affiliate or activity. Intercompany tax sharing payments are based on amounts that become payable or receivable between the affiliates or activities based on their respective annual income tax results. For all affiliates or activities, the current tax expense payable or current tax benefit receivable is recorded in an intercompany account (146)."

Property Taxes

Property taxes are charged to the subsidiaries or affiliated interest based on the value of the property owned by the subsidiary or affiliated interest.

Individual Affiliate Activities

NNG Financial Corporation ("NNGFC")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

Invoices applicable to NNGFC but billed through NWN are charged directly to the intercompany account 146.

KB Pipeline Company ("KBPC")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

KBPC-related income taxes are offset through the intercompany account of NNGFC.

KBPC pays property taxes indirectly in the two states in which the pipeline operates. The portion of the pipeline located in the state of Washington is considered an asset of Portland General Electric Company ("PGE") (the majority owner), for property tax purposes. PGE pays 100% of property taxes assessed to Cowlitz County, Washington. PGE then bills KBPC for its pro-rata share of these property taxes. The portion of the pipeline located in the state of Oregon is shown on the property rolls of Columbia County, Oregon as property of NWN. See Tax Allocation Methods, above.

Under the Gas Transportation Agreement between KBPC and NWN dated September 26, 1991, NWN pays KBPC a monthly demand charge equal to 96.83 cents per MMBtu under the contract. Based on the contract MDQ of 19,300 MMBtus, this amounts to a total monthly charge of \$18,688.19. NWN charges Account 804 and credits the intercompany account 146016. See NWN's Affiliated Interest Report for further information on this demand charge. Additionally, if KBPC actually transports gas for NWN, there is an additional volumetric/commodity charge payable by NWN to KBPC equal to 1.44 cents per MMBtu of gas transported. The rates charged by KBPC to NWN for gas transportation services on the Kelso-Beaver Pipeline were approved by FERC in KBPC's 1991 certificate order.

All intercompany balances flow through the intercompany account of KBPC's parent company, NNGFC.

Northwest Energy Corporation ("NEC")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate, and the affiliated transactions. Beginning in 2013, NEC began serving as the holding company for NWN Gas Reserves LLC.

Tax amounts are charged directly through the intercompany tax account (146).
NWN Gas Reserves LLC

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions. NW Natural's interests in gas reserves were transferred to NWN Gas Reserves LLC in 2013.

Northwest Energy Sub Corporation ("NESC")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions. Articles of Dissolution were filed with respect to NESC on March 6, 2018.

Northwest Biogas, LLC ("NW Biogas")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

NW Natural Energy, LLC ("Energy")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

NWN will also directly allocate costs to Energy for certain services provided by NWN employees to Energy with respect to special projects not included in the services contemplated under the Shared Services Agreement, effective July 1, 2010, among NW Natural Energy, LLC, NW Natural Gas Storage, LLC and Gill Ranch Storage, LLC (Subsidiary Agreement).

NW Natural Gas Storage, LLC ("NWNGS")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

For management oversight and other labor services provided by NWN to or for the benefit of NW Natural Gas Storage, LLC ("NWNGS") or Gill Ranch Storage, LLC ("GRS"), NWN will bill NWNGS in accordance with the specifications of this allocation manual.

NWN will also directly allocate costs to NWNGS for certain services provided by NWN employees to NWNGS with respect to special projects not included in the services contemplated under the Subsidiary Agreement.

Gill Ranch Storage, LLC ("GRS")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

NWN will bill NWNGS in accordance with the specifications of this allocation manual for management oversight and other labor services provided to or for the benefit of NWNGS or GRS by NWN in accordance with the subsidiary agreement.

NWN will also directly allocate costs to GRS for certain services provided by NWN employees to GRS with respect to special projects not originally included in the services contemplated under the Subsidiary Agreement such as allocation of costs related to accounting software licenses.

GRS as operator of the natural gas storage project co-owned by GRS with Pacific Gas & Electric Company ("PG&E") is obligated to maintain certain insurance, including "All Risk" insurance, workers compensation, automobile liability and umbrella/excess insurance. The policies are endorsed to provide that the insurer shall waive any right of recovery that the insurer may have or acquire against the owners and their affiliates. Each owner is named as an insured. GRS purchases a majority of their insurance directly. Other insurance costs are allocated as set forth above, under Insurance Allocation Methods.

Trail West Holdings, LLC ("TWH")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

Expenses for Trail West Holdings, LLC ("TWH") and its subsidiaries are charged to account 426, and consist of allocations of NWN employee time as described above in Labor Allocation Methods. As an equity investor, Energy receives an allocated share of income from TWH, recorded in 426. TWH is included in NWN's consolidated financial statements as an equity investment.

Trail West Pipeline, LLC ("TWP")

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

BL Credit Holdings, LLC

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

NW Natural Water Company, LLC

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

FWC Merger Sub, Inc.

See NWN's Annual Affiliated Interest Report for ownership information, a narrative description of this affiliate and the affiliated transactions.

Individual Non-Regulated Activities

Appliance Center

NWN's Appliance Center is a retail store that demonstrates and sells natural gas appliances to the general public. NWN has one store located in Portland. The accounting unit for the revenues and expenses for the Appliance Center is 11490.

The accounting for the product sales and cost of sales at the Appliance Center are in one of the following accounts:

Activity 415	Merchandise Revenue
Activity 416	Merchandise Expenses

NWN purchases liability insurance on behalf of the Appliance Center. See Insurance Allocation Methods, above. An additional charge for management oversight is made on a monthly basis by taking 1.5% of the selling expenses in Activity 911, Activity 912, and Activity 916 and charging Activity 416.

Certain NWN employees work exclusively on matters related to the operation of the Appliance Center. The cost of the exempt and hourly employees and all related payroll overheads are charged to Activity 416. In addition, expenses incurred in the operation of the Appliance Center are charged to Activity 416.

NWN owns the building in which the Appliance Center operates and rent is charged to Activity 416 based on the percentage of building square feet that is occupied by the Appliance Center. Revenue that NWN receives from this rent is recorded in activity 412, "Rent from Utility Property." NWN evaluates the need to adjust rent based on market rates. Property taxes are included as a component of the rent. Market rental rates are evaluated annually and are adjusted annually based upon changes in the CPI Index, not to exceed a 3% increase annually. The rent cannot decrease despite any decreases in the CPI Index.

NWN has made Leasehold Improvements to the property and has capitalized these costs in account 186, Appliance Center Leasehold Improvements. NWN is amortizing the cost of these improvements over the life of the Appliance Center lease term. The current lease agreement term expires in June of 2022. Amortization expense is charged to Activity 416. The Accumulated Amortization of the Appliance Center Leasehold Improvements is in account 186.

Lan Su Chinese Garden (formerly Classical Chinese Garden) Block

NWN owns the land that is presently used for the Lan Su Chinese Garden (formerly Classical Chinese Garden). The land is held in Non-Utility Plant in account 121. It consists of one square block from Northwest Second Avenue to Northwest Third Avenue and from Northwest Everett Street to Northwest Flanders Street in Portland, Oregon. NWN has leased the property to the City of Portland under a long-term lease for 100 years for \$1 per year.

NWN provides no insurance coverage. Property taxes are the responsibility of the operator of the Garden.

Company-Owned and Trust Owned Life Insurance

NWN has a Corporate-Owned Life Insurance ("COLI") Plan where it has purchased key-person life insurance contracts to provide informal funding for long-term, people-related liabilities including post-retirement medical benefits. The policies are owned by and payable to NWN and are increasing whole-life insurance. Similarly, NWN also has Trust-Owned Life Insurance ("TOLI") Plans where the policies provide informal funding for non-qualified employee benefits and are owned by and payable to the Trust. Costs and benefits related to these investments, including the build-up of cash surrender value, are recorded in account 426. The investment balance is recorded in account 124.

Coos County Pipeline

An intrastate natural gas transmission pipeline to Coos County was built in 2004 and became operational in January 2005, for the purpose of providing natural gas service to the Southern Oregon Coast service area of NWN's franchise. Coos County owns this pipeline and has contracted with NWN to operate it. NWN and Avista are the only Utility shippers on the Coos County Pipeline, while Knife River Corporation and Southport Lumber Company also utilized the pipeline. NW Natural has one customer located on the Coos Bay North Spit. Service to that customer began in 2011.

NWN collects the costs of operation in a clearing account, activity 616. These costs include payroll costs of management and of operating employees who work on the pipeline. Each month these costs are cleared to Non-Utility Expense account 421. NWN bills Coos County monthly for the operating costs and records this as non-utility revenue in the same account 421. Coos County then bills NWN and Avista Utilities standard monthly amounts based on an annual budget, allocated by projected volumetric flows for each shipper. These costs are trued up at the end of each year, based on actual operating costs and actual volumes delivered for each shipper. NWN charges this payment to Cost of Gas.

NWN bills an additional monthly amount to Coos County as "compensation" to NWN, per the operations contract between the two parties. The contract allows this amount to increase each year for inflation. This revenue is recorded in account 421. Order No. 03-0236 provides the regulatory approval for this contract.

Corporate Philanthropy

NWN generally donates 1% of the average net income before tax for the three years immediately preceding the budget year. Donations are made to non-profit organizations, including those associated with education, arts, social welfare, and the environment.

The donations are directly charged to non-utility accounts 426 for Oregon and Washington. No accounting services are allocated. Labor provided by NWN employees related to Corporate Philanthropy is charged directly to account 426 including the respective payroll overhead load consistent with the Labor Allocations above.

Enerfin Contracts-Mist

NWN has a contract with Enerfin Corporation whereby the price of gas purchased from Enerfin for production at Mist is \$0.01 per therm less than what we collect in rates from our customers. This reduction is intended to offset general plant expenses for NWN's operation of Miller Station. This mutually beneficial agreement allows Enerfin to save money by not duplicating NWN plant and equipment at Miller Station.

The \$0.01 per therm gas savings is credited to income account 415. Labor provided by NWN employees for technical services such as meter calibration is charged directly to account 416 on daily time tickets in CATS. The respective payroll overhead load is also added to the time charge consistent with the Labor Allocations above.

Interstate Storage

NWN owns and operates the Mist underground natural gas storage facility in Columbia County near Mist, Oregon. In addition to the use of such storage facilities for its retail core customers, NWN has pre-built some storage facilities in advance of core need and uses the excess capacity of other existing facilities to provide storage services to customers in the interstate and intrastate market. NWN provides the interstate storage service under a limited jurisdiction blanket certificate issued to it by FERC under Section 284.224 of FERC's regulations. See, Northwest Natural Gas Company, 95 FERC ¶ 61,242 (2001). Under that certificate, NWN is authorized to provide FERC-jurisdictional bundled firm and interruptible storage and related transportation services to and from its Mist storage field in interstate commerce. In addition, NWN provides an intrastate firm storage service for eligible intrastate customers and sites in Oregon under Tariff Schedule 80 (experimental). The terms of Rate Schedule 80 mirror NWN's FERC-authorized interstate service. Since the provision of the storage services is accomplished by the use of some shared storage and transportation assets that are included in the core rate base, NWN has sharing agreements in place with its Oregon and Washington regulators. In Oregon, the sharing arrangement for both storage services and asset optimization assistance is set forth in NWN's Tariff Schedules 185 and 186. These sharing agreements are in lieu of specific allocations of costs.

Labor provided by NWN employees related to Interstate Storage is charged directly to Interstate Storage including the respective payroll overhead load consistent with the Labor Allocations above.

Lobbying, Civic, and Political Contributions

NWN provides employee resources to participate in federal, state, and local government affairs, as well as in local civic organizations and initiatives. The Company also administers PAC funds that receive contributions from both employees and NWN. As a result, the related time spent by two employee's salaries and expenses are charged to account 426.

Direct costs are charged to 426 accounts for the following activities:

- Contributions to political candidates,
- Contributions for ballot measures and opinion research on issues,
- Chamber of Commerce dues, and

• Social club dues.

Non-Operating Advertising

NWN charges some advertising and consumer incentive or contest expense to account 416, a non-utility account.

Other non-operating advertising and promotional concessions charges charged to account 912 and 913 and classified below the line are designed to aid in the retention of customers and attract new customers by promoting the cost and performance benefits of natural gas and a variety of natural gas products.

Oil Storage Tanks/Dock Lease

NWN leases oil storage tanks and a loading/unloading dock at its Linnton property ("Dock") to outside parties for commercial use.

The investment, accumulated depreciation, and deferred income taxes are accounted for in Non-Utility plant, accounts 121, and 283. Rental Income is credited to account 418 and depreciation is charged to account 418.

Income taxes are charged to non-utility taxes, accounts 409. See Tax Allocation Methods, above. Property taxes are billed to, and paid by, the lessee.

NWN purchases liability insurance coverage for the Dock facility. NWN's Risk Services Department obtains insurance for the consolidated corporate entity in the open market. The policies obtained include the Dock facility's replacement value. This insurance is charged to 426. See Insurance Allocation Methods, above. Lessees provide their own insurance coverage.

No accounting or management costs are currently charged to this business segment.

Other Income and Deductions

The Other Deductions account, 426, is used for miscellaneous write-offs or other non-utility expenses not readily classifiable in any other utility or non-utility accounts.

Regulatory & Tax Penalties

Any regulatory or tax penalties are charged to account 426.

Revenue from Utility Property

See "Appliance Center". Rent income received from the Appliance Center is credited to account 412, "Revenue from Utility Property".

Service Solutions

NWN provides a repair and maintenance referral service to customers with equipment problems or who desire equipment servicing. Customers call the Service Solutions Center and a representative connects the customer with a NWN Certified Contractor. Participating dealers agree to complete the service call within one week unless otherwise requested by the customer, or within 24 hours on an emergency basis. Dealers must meet strict qualification standards and agree to pay annual fees that are used to fund the program.

Expenses are tracked in account 416 and offset by fees paid by the participating dealers. This revenue is recorded in account 415. The expenses include directly charged labor and overhead, depreciation on original CIS (Customer Information System) program development expenses, and an answering service vendor.

Sherwood House

The Sherwood House is a residential home located at 24540 SW Old Hwy 99, in Sherwood, Oregon. The home and the land it is on were acquired by NWN because the land was needed for the Sherwood valve site of Phase 4 of the South Mist Pipeline Extension. The home cannot be partitioned from the property; therefore it is being leased to a private party.

The land is classed as utility property since it is needed for the valve site. The house is not needed for utility operations and is carried in account 121. Rental income is recorded in account 418. Depreciation on the house is recorded in account 421.

Smart Energy

Smart Energy is an Oregon-tariffed utility program which provides Oregon customers an opportunity to offset the carbon dioxide emissions from their use of natural gas by purchasing carbon offsets. The program became effective on September 1, 2007. The ongoing costs of this program are paid for by program participants. Any ongoing incidental costs not covered under the tariff are directly charged to account 426.

Labor provided by NWN employees related to Smart Energy is charged directly to the program paid for by the program participants including the respective payroll overhead load consistent with the Labor Allocations above.

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NW Natural/1714 Moncayo/1



Rates & Regulatory Affairs

2016 Operational Audit

Data Request Response

Request No. 2016 Audit-OPUC-IR A252:

According to the Cost Allocation Manuals filed with the Company's annual Affiliated Interest Reports for each of the years 2010, 2011, 2012, 2013, 2014, and 2015, the non-utility and affiliated labor charges include an additional administrative overhead load of 27.5 percent of labor cost. Please:

a. Provide the underlying calculations for the 27.5 percent,

b. Provide a narrative explaining why 27.5 percent of labor cost is a proper estimation of the actual amount of administrative expenses incurred,

c. Explain why the 27.5 percent figure has remained unchanged since 2010.

Response:

a. The Company calculates the additional administrative overhead load using annual amounts recognized for Total Administrative Overhead costs of the Utility divided by Total Cost of Salaried Employees of the Utility.

Total Occupancy cost is inclusive of the following items, with the 2015 amounts shown below:

RENTS AND LEASES	\$ 4,338,432	Α
TELEPHONE	\$ 765,901	
CELLULAR PHONES	\$ 634,493	
OFFICE SUPPLIES	\$ 195,121	
EDUCATION	\$ 502,256	
DUES/MEMBERSHIP	\$ 854,621	
BOOKS AND MAGAZINES	\$ 49,837	
FURNITURE < 500	\$ 15,799	
UTILITIES	\$ 987,337	
COPIER LEASE/MAINT	\$ 124,933	
DEPRECIATION	\$ 6,924,526	В
AMORTIZATION	\$ 262,658	
SOFTWARE MAINT	\$ 2,714,401	
HARDWARE MAINT	\$ 628,724	
Total Administrative Overhead Cost	\$ 18,999,037	Х

Notes

A – includes only amounts for rent at One Pacific Square.

B – includes only depreciation for FERC 303.1: Software, FERC 391.1: Office Furniture, FERC 391.2: Computers.

Total Cost of Salaried Employees is calculated as follows, with the 2015 amounts shown below:

Total Payroll	\$ 69,060,091	D
PAYROLL OVERHEAD	\$ 24,587,908	С
VACATION, SICK & HOL	\$ 4,883,247	С
SALARY P/T PAYROLL	\$ 81,036	
SALARY BONUS PAYROLL	\$ 3,973,842	
SALARY OVERTIME	\$ 3,641	
SALARY PAYROLL	\$ 35,530,417	

Notes

C – Vacation, Sick and Holiday and Payroll overhead costs for salaried employees is determined using Salaried Employee payroll costs as a percent of total payroll costs.

D – Total payroll, for purposes of this calculation, is limited to salaried employees, as hourly employees do not typically cross-charge amounts to non-Utility subsidiaries. Accordingly, the amounts included in Total Administrative Overhead costs primarily relate to indirect costs related to the work of salaried employees.

Total Administrative overhead load is calculated as follows:

Total Administrative Overhead Cost	\$ 18,999,037	X
Total Payroll	\$ 69,060,091	D
Total Administrative Overhead	27.5%	

- b. The 27.5% Administrative Overhead load factor is appropriate as it approximates the amount of additional, indirect costs incurred by salaried employees of the Utility as part of performing their job duties. As such, the calculation considers the major classes of indirect costs that are incurred in order for salaried employees to carry out their responsibilities. Accordingly, when services are performed for non-Utility subsidiaries, a portion of these costs should be charged to the respective entity for which the service is performed rather than expensed as a cost of doing business for Utility Operations.
- c. The 27.5% Administrative Overhead load factor has remained consistent since 2010, as the cost profile of the major expense categories in both total administrative overhead and total payroll of salaried employees has remained relatively consistent. In addition, the proportion of these expenses in relation to another has also remained consistent. The Company has consistently applied the methodology detailed above in order to validate its assumption that a 27.5% administrative load remains appropriate, which is supported by the calculation outlined above for 2015.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 284

284. Please refer to page 40 of NW Natural's 2016 Affiliated Interest Report and Cost Allocation Manual which identifies payroll overhead rates.

a. Please explain why these rates differ from the rates in attachment 1 of the response to Staff DR 123.

b. Please explain how vacation and benefit overhead is recovered for work billed to affiliates.

c. Please explain how NW Natural allocates administrative overhead associated with non-utility labor.

Response:

- a. The payroll overhead rates on page 40 of NW Natural's 2016 Affiliated Interest Report and Cost Allocation Manual are the rates that are included in attachment 1 of the response to Staff DR 123. See response to Staff DR 283 in which we have reconciled DR 123 attachment 1 to the administrative overhead rates of 27.5 percent on page 40 and 18 percent. The payroll overhead rates included in the table on page 40 are also reflected in the response to DR 123. The payroll charged to affiliates is 'fully loaded' with the payroll overheads and already includes the payroll overheads.
- b. As noted in a) above, the vacation and benefit overhead is charged along with the payroll directly to affiliates for work billed to affiliates. The payroll charge includes the payroll overheads in the 'payroll charged' total. For example, for a \$190.35 payroll charged to affiliates transaction is actually comprised of payroll of \$100 and vacation and benefits overhead of \$90.35.
- c. NW Natural allocates administrative overhead associated with non-utility affiliates but does not allocate administrative overhead associated with other non-utility labor that does not relate to affiliates with the exception of the Appliance Center. As the Appliance Center is a separate business, an additional charge for management oversight by Utility employees is made monthly at 1.5 percent. Non- utility activities are charged directly for materials, supplies and services (e.g., consulting services) purchased by NWN on behalf of the affiliate or non-utility activities on the basis of the full cost of the items supplied. Non-utility activities are also charged directly for labor costs including payroll overheads.

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NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 176

176. Provide the projected transaction costs of fee free bankcard payments by month beginning January 1, 2018 through the test year, broken down by residential and non-residential sectors.

Response:

Attached is UG 344 OPUC DR 176 Attachment 1, a worksheet that incudes budgeted bankcard costs for the period requested (January 2018 – October 2019). There are two different forecasting methodologies to derive the costs.

Bankcard costs that are expensed by the Treasury Department were forecasted and normalized as part of the UG 344 test year.

Bankcard costs that are expensed by the Account Services Department have had a COLA rate applied against 2017 actual costs to derive the January 2018 to October 2019 costs.

The sum of the Treasury costs and Account Services cost represents the total cost of the fee free bankcard program. A breakdown by residential and non-residential customer class is not available.

UG 344 DR 176 Attachment 1

Bankcard Projected Costs January 2018 - October 2019

	Proiected	Bankcard Costs											
	Bankard					Ch	narged to A	Account Se	ervic	es Dept			Total
	Transaction	Ch	arged to					Adj for				B	Jankcard
	Volume	Trea	asury Dept	2017	7 Actual	201	8 Budget	CPI ^{1/}	Te	est Year	Total	1	Cost
Jan-17	129,702			\$	21,047						\$ 21,047		
Feb-17	132,251			\$	21,268						\$ 21,268		
Mar-17	140,663			\$	22,904						\$ 22,904		
Apr-17	137,595			\$	21,569						\$ 21,569		
May-17	132,967			\$	22,440						\$ 22,440		
Jun-17	120,683			\$	21,421						\$ 21,421		
Jul-17	114,823			\$	20,245						\$ 20,245		
Aug-17	124,041			\$	22,442						\$ 22,442		
Sep-17	120,202			\$	20,559						\$ 20,559		
Oct-17	130,672			\$	21,656						\$ 21,656		
Nov-17	126,955			\$	22,627						\$ 22,627		
Dec-17	135,002			\$	22,121						\$ 22,121		
Jan-18	152,042	\$	199,366			\$	24,109				\$ 24,109	\$	223,475
Feb-18	154,709	\$	193,554			\$	24,406				\$ 24,406	\$	217,960
Mar-18	164,216	\$	192,339			\$	25,466				\$ 25,466	\$	217,805
Apr-18	160,317	\$	176,704			\$	25,031				\$ 25,031	\$	201,735
May-18	154,627	\$	153,027			\$	24,398				\$ 24,398	\$	177,425
Jun-18	140,078	\$	128,114			\$	22,776				\$ 22,776	\$	150,890
Jul-18	133,033	\$	116,376			\$	21,990				\$ 21,990	\$	138,366
Aug-18	143,456	\$	116,407			\$	23,152				\$ 23,152	\$	139,559
Sep-18	138,774	\$	116,861			\$	22,631				\$ 22,631	\$	139,492
Oct-18	150,605	\$	129,476			\$	23,948				\$ 23,948	\$	153,424
Nov-18	146,078	\$	135,549			\$	23,445	2.30%	\$	23,147	\$ 23,147	\$	158,696
Dec-18	155,085	\$	179,281			\$	24,448	2.30%	\$	22,630	\$ 22,630	\$	201,911
Jan-19	174,383	\$	228,660					2.40%	\$	24,688	\$ 24,688	\$	253,348
Feb-19	177,166	\$	221,650					2.40%	\$	24,992	\$ 24,992	\$	246,642
Mar-19	187,768	\$	219,925					2.40%	\$	26,077	\$ 26,077	\$	246,002
Apr-19	183,039	\$	201,748					2.40%	\$	25,632	\$ 25,632	\$	227,380
May-19	176,286	\$	174,462					2.40%	\$	24,984	\$ 24,984	\$	199,446
Jun-19	159,473	\$	145,853					2.40%	\$	23,323	\$ 23,323	\$	169,176
Jul-19	151,243	\$	132,305					2.40%	\$	22,518	\$ 22,518	\$	154,823
Aug-19	162,871	\$	132,161					2.40%	\$	23,708	\$ 23,708	\$	155,869
Sep-19	157,346	\$	132,500					2.40%	\$	23,174	\$ 23,174	\$	155,674
Oct-19	170,538	\$	146,613					2.40%	\$	24,523	\$ 24,523	\$	171,136

^{1/} Rate Case Escallation Factors: 2018 = 2.30% and 2019 = 2.40%.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 346

346. Company testimony in UG 221 states the company expected bankcard transactions to increase from 2% to 15% over a two to three year period beginning in 2013. In UG 344, the number of transactions reported in the Company's response to Staff DR 172 reflects a combined residential and commercial bankcard adoption rate of 20.3% by the end of 2017. Please provide any data or information the company has or is aware of that discusses or analyzes the maximum bankcard adoption rate that can be expected in the utility industry and what the company believes to be the maximum expected adoption rate for both residential and non-residential sectors over time.

Response:

The Company has not conducted any analysis on what the potential maximum bankcard adoption rate may be for its customer base. However, we do anticipate that it will continue to grow. An additional challenge is finding adequate benchmarking on this topic since the utilization of bankcards to pay energy utility bills is relatively new to the industry.

Our historical bankcard payment trend pattern does not indicate that adoption rate is yet flatting out. Adoption rates (percentage of total payments) for the month of December for the years 2013 to 2017 are 8.9%, 12.1%, 15.4%, 18.0% and 21.0%, respectively. Each year indicates about a 3 percentage point increase over the prior year.

Customers continue to prefer electronic payments over mailed payments. Since 2013 mailed residential payments have reduced from 28.8% to 20.2% and non-residential from 67.2% to 57.0%. As this payment channel continues to decline, some portion will migrate toward bankcard payments.

The degree in which the payment channel is promoted by the company would also have an impact on adoption rates. Currently the company does not heavily promote the bankcard payment option, though it is referred to in much of our regular customer communications like bills, notices, and website/IVR payment options.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 179

179. Provide any data or analysis the company has which examines whether the fee free bankcard payment program results in savings to the company in other areas, such as improved cash flow, reduced write-offs, reduced collection expenses, reduced billing costs, etc.

Response: Response: The Company tracks several metrics which all show positive results from 2007 to current. We believe the implementation of bankcard payment program in 2012 is one of several key drivers which have contributed to the improvement in these metrics as shown below. Other factors, we believe have also contributed to the improvement include: 1) economic cycle, 2) continued operational focus, and 3) technology advancements. The Company has not completed an analysis to determine the specific contribution of each of these drivers and others due to the complexity.



NW Natural/1719 Moncayo/2 UG 344 OPUC DR 179 NWN Response Page 2 of 2



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2015	OR Tickets	OR Units	WA Tickets	WA Units	Total Tickets	Total Units	Delta
Jan	13,506	13,708	1,494	1,548	15,000	15,256	1.7%
Feb	12,773	13,124	1,620	1,666	14,393	14,790	2.8%
Mar	14,576	14,927	1,898	1,967	16,474	16,894	2.5%
Apr	18,258	18,704	2,248	2,333	20,506	21,037	2.6%
May	14,572	14,893	1,842	1,893	16,414	16,786	2.3%
Jun	17,967	18,397	2,411	2,498	20,378	20,895	2.5%
Jul	15,177	15,648	2,049	2,153	17,226	17,801	3.3%
Aug	14,835	15,163	1,878	1,918	16,713	17,081	2.2%
Sep	17,878	18,202	2,244	2,320	20,122	20,522	2.0%
Oct	13,916	14,191	1,692	1,723	15,608	15,914	2.0%
Nov	11,208	11,490	1,433	1,493	12,641	12,983	2.7%
Dec	11,793	12,096	1,548	1,577	13,341	13,673	2.5%
Total	176,459	180,543	22,357	23,089	198,816	203,632	2.4%

OR	Units 2.3% Higher	
WA	Units 3.2% Higher	
Combined Units	2.4% Higher	

2016	OR Tickets	OR Units	WA Tickets	WA Units	Total Tickets	Total Units	Delta
Jan	12,726	13,044	1,219	1,255	13,945	14,299	2.5%
Feb	13,451	13,830	1,397	1,450	14,848	15,280	2.9%
Mar	18,287	18,755	1,442	1,468	19,729	20,223	2.5%
Apr	16,096	16,418	2,003	2,066	18,099	18,484	2.1%
May	16,209	16,598	2,204	2,273	18,413	18,871	2.5%
Jun	19,465	19,851	2,657	2,727	22,122	22,578	2.1%
Jul	15,048	15,343	1,960	2,009	17,008	17,352	2.0%
Aug	15,401	15,647	2,308	2,386	17,709	18,033	1.8%
Sep	18,331	18,597	2,057	2,121	20,388	20,718	1.6%
Oct	13,913	14,130	1,829	1,922	15,742	16,052	2.0%
Nov	15,786	16,070	2,285	2,375	18,071	18,445	2.1%
Dec	9,414	9,513	1,457	1,523	10,871	11,036	1.5%
Total	184,127	187,796	22,818	23,575	206,945	211,371	2.1%

OR	Units 2.0% Higher	
WA	Units 3.2% Higher	
Combined Units	2.1% Higher	

2017	OR Tickets	OR Units	WA Tickets	WA Units	Total Tickets	Total Units	Delta
Jan	12,799	12,929	1,887	1,967	14,686	14,896	1.4%
Feb	13,071	13,479	1,741	1,765	14,812	15,244	2.9%
Mar	15,541	18,669	2,703	2,724	18,244	21,393	17.3%
Apr	17,047	17,061	2,218	2,243	19,265	19,304	0.2%
May	19,058	19,252	2,455	2,496	21,513	21,748	1.1%
Jun	18,973	19,094	2,630	2,701	21,603	21,795	0.9%

Jul	16,751	16,829	2,404	2,453	19,155	19,282	0.7%
Aug	17,378	17,454	2,257	2,293	19,635	19,747	0.6%
Sep					-	-	#DIV/0!
Oct					-	-	#DIV/0!
Nov					-	-	#DIV/0!
Dec					-	-	#DIV/0!
Total	130618	134767	18295	18642	148,913	153,409	3.0%

OR	Units 3.6% Higher	
WA	Units 2.0% Higher	
Combined Units	3.2% Higher	

NW Natural/1722 Moncayo/3

	Actual Number of Tickets							
	<u>2015</u>	<u>2016</u>	<u>2017</u>					
Jan	15,000	13,945	14,686					
Feb	14,393	14,848	14,812					
Mar	16,474	19,729	18,244					
Apr	20,506	18,099	19,265					
May	16,414	18,413	21,513					
Jun	20,378	22,122	21,603					
Jul	17,226	17,008	19,155					
Aug	16,713	17,709	19,635	5.0% < Ra	ite for 1st 8 n	nonths		
Sep	20,122	20,388	21,400	<calculated based="" on<="" td=""><td>n 1st 8 month</td><td>s(estimated)</td><td></td></calculated>	n 1st 8 month	s(estimated)		
Oct	15,608	15,742	16,523	<calculated based="" on<="" td=""><td>n 1st 8 month</td><td>s(estimated)</td><td></td></calculated>	n 1st 8 month	s(estimated)		
Nov	12,641	18,071	18,968	<calculated based="" on<="" td=""><td>n 1st 8 month</td><td>s(estimated)</td><td></td></calculated>	n 1st 8 month	s(estimated)		
Dec	13,341	10,871	11,410	<calculated based="" on<="" td=""><td>n 1st 8 month</td><td>s(estimated)</td><td></td></calculated>	n 1st 8 month	s(estimated)		
Total	198,816	206,945	217,214	227,042	237,314	4.5% <cagr (2015-2017)<="" td=""><td>4.5% <cagr (2015-2019)<="" td=""></cagr></td></cagr>	4.5% <cagr (2015-2019)<="" td=""></cagr>	
		4.1%	5.0%	223,914	230,821	3.1% <straigh annual="" growth="" line="" rate<="" td=""><td></td></straigh>		

	Actual Number of Units						
	2015	<u>2016</u>	<u>2017</u>	•			
Jan	15,256	14,299	14,896				
Feb	14,790	15,280	15,244				
Mar	16,894	20,223	21,393				
Apr	21,037	18,484	19,304				
May	16,786	18,871	21,748				
Jun	20,895	22,578	21,795				
Jul	17,801	17,352	19,282				
Aug	17,081	18,033	19,747	5.7% <	Rate for 1st 8 n	nonths	
Sep	20,522	20,718	21,901	<calculated based<="" td=""><td>on 1st 8 month</td><td>ns(estimated)</td><td></td></calculated>	on 1st 8 month	ns(estimated)	
Oct	15,914	16,052	16,969	<calculated based<="" td=""><td>on 1st 8 month</td><td>ns(estimated)</td><td></td></calculated>	on 1st 8 month	ns(estimated)	
Nov	12,983	18,445	19,499	<calculated based<="" td=""><td>on 1st 8 month</td><td>ns(estimated)</td><td></td></calculated>	on 1st 8 month	ns(estimated)	
Dec	13,673	11,036	11,666	<calculated based<="" td=""><td>on 1st 8 month</td><td>ns(estimated)</td><td></td></calculated>	on 1st 8 month	ns(estimated)	
Total	203,632	211,371	223,444	234,062	245,184	4.8% <cagr (2015-2017)<="" td=""><td>4.8% <cagr (2015-2019)<="" td=""></cagr></td></cagr>	4.8% <cagr (2015-2019)<="" td=""></cagr>
		3.8%	5.7%	230,691	238,172	3.2% <straigh annual="" growth="" line="" rate<="" td=""><td></td></straigh>	
		2.1%	2.9%	3.1%	3.3%	< Annual Increase in Units	

	Extra # Units	Extra # Units for Long Locates & etc.				
	<u>2015</u>	<u>2016</u>	2017			
Extra Units above tickets	4,816	4,426	6,230			
% of Extra Units	2.4%	2.1%	2.9%			

	Annual Cost	S					
<u>2015</u>	<u>2016</u>		<u>2017*</u>	<u>2018</u>	<u>2019</u>		
\$ 2,329,495	\$ 2,958,820	\$	3,614,068	\$ 3,777,588	\$ 3,948,506	15.8% <cagr (2015-2017)<="" th=""><th>11.1% <cagr (2015-2019)<="" th=""></cagr></th></cagr>	11.1% <cagr (2015-2019)<="" th=""></cagr>
		\$	3,608,771	\$ 3,780,252	\$ 3,959,882		

					Avg	
			8 N	Ionth Costs	\$ 16.64	< Avg price based on tickets
			\$	2,477,657	\$ 16.15	< Avg price based on number of units
	<u>2015</u>	<u>2016</u>		<u>2017</u>	<u>2018</u>	<u>2019</u>
Average Cost per/ticket	\$ 11.72	\$ 14.30	\$	16.64	\$ 16.64	\$ 16.64
		22.0%		16.4%	0.0%	0.0%
Average cost per/Locate	\$ 11.44	\$ 14.00 22.4%	\$	16.15 15.4%	\$ 16.15 0.0%	\$ 16.15 0.0%

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 137

137. Please provide a list of all memberships and dues, including a description of how they benefit Oregon ratepayers.

Response:

Below is a listing of all organizations to which NW Natural pays dues or memberships, along with a brief description of the nature of the organizations and NW Natural's involvement or benefit associated with them.

Organization	Description of Benefit
AMERICAN BOARD OF INDUSTRIAL HYGIENE	The American Board of Industrial Hygiene® (ABIH®) has been the world's largest, organization for certifying professionals in the practice of industrial hygiene. ABIH is not a member organization, so it does not provide services typically offered by member organizations; neither does it does call for involvement in any member organization as a requirement for certification. The purpose of ABIH is to administer the Certified Industrial Hygienist® (CIH®) credential, which is a means to objectively assess and measure the professional knowledge and understanding of practitioners engaged in industrial hygiene. NWN has employees in our safety office certified by ABIH.
AMERICAN GAS ASSOCIATION	The American Gas Association (AGA) represents companies delivering natural gas safely, reliably, and in an environmentally responsible way to help improve the quality of life for their customers every day. AGA's mission is to provide clear value to its membership and serve as the indispensable, leading voice and facilitator on its behalf in promoting the safe, reliable, and efficient delivery of natural gas to homes and businesses across the nation.
AMERICAN INSTITUTE OF ARCHITECTS	Strengthens our relationship with architects. Facilitates contact with the allies who impact building design and influence energy decisions. Allows us to share information about natural gas industry and gain insights about the design and planning realm.
AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS	The AICPA sets ethical standards for the profession and U.S. auditing standards for private companies, nonprofit organizations, federal, state and local governments. It develops and grades the Uniform CPA Examination, and offers specialty credentials for CPAs who concentrate on personal financial planning; forensic accounting; business valuation; and information management and technology assurance. This membership helps protect Oregon consumers by ensuring only qualified accountants practice in accordance with professional standards.
AMERICAN MARKETING ASSOCIATION	Organization used in Smart Energy, which is a self-funded program whose costs is only paid by participating customers; not all ratepayers. This organization is a not-for-profit organization providing access to marketing resources that include research and education. This helps educate customers about climate change and growing participation in the Smart Energy program. Staying current on market trends, changing consumer preferences for communications, shifts in marketing channel effectiveness and fair market value for products and services allow NWN to utilize program funds prudently and effectively.

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AMERICAN PAYROLL ASSOCIATION	The American Payroll Association provides education through seminars and webinars. They administer the payroll certification courses and they also publish the Payroll Source Guide which is considered the Payroll Bible for payroll professionals.
AMERICAN SOCIETY OF CIVIL ENGINEERS	ASCE stands at the forefront of a profession that plans, designs, constructs, and operates society's economic and social engine – the built environment – while protecting and restoring the natural environment. Primary benefit is from training and educating NWN employees
AMERICAN SOCIETY OF HEATING, REGRIDGERATING & AIR CONDITIONING ENGINEERS	ASHRAE is an association of engineers who work in the HVAC markets. Our participation and contact (through NWN engineers) strengthens our relationship with critical influencers in our markets. Allows us to share information about natural gas industry and gain insights about the engineering concepts, trends, and developments.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS	ASME is a professional society on the cutting edge technology such as energy storage, power generation, and advanced manufacturing processes. ASME also provides other services such as periodic technical conferences and vendor information
AMERICAN SOCIETY OF SAFETY ENGINEERS	The American Society of Safety Engineers (ASSE) is the world's oldest professional safety society. ASSE promotes the expertise, leadership and commitment of its members, while providing them with professional development, advocacy and standards development. It also sets the occupational safety, health and environmental community's standards for excellence and ethics.
AMERICAS SAP USERS GROUP	Participation in the SAP user group provides NWN with access to best practices, education and training materials around utilization of SAP. This in turn benefits NWN operations, HR and Finance departments that rely on SAP in their daily operations.
ASPHALT PAVEMENT ASSOCIATION OF OREGON	The Asphalt Pavement Association of Oregon, Inc., (APAO) is a nonprofit trade organization representing the interests of the asphalt paving industry. The APAO is dedicated to promoting the use of asphalt concrete by developing customer-driven programs to enhance quality and excellence in all aspects of asphalt technology.
ASSOCIATION ADVANCING OCCUPATIONAL AND ENV. HEALTH	ACGIH® is a 501(c)(3) charitable scientific organization that advances occupational and environmental health. This organization encourages the interchange of experience amount industrial hygiene workers and to collect and make accessible such information and data as might be of aid to them in the proper fulfillment of their duties. This organization is used by employees in occupational safety.
ASSOCIATION FOR FINANCIAL PROFESSIONALS	Benefit to customers are employee networking opportunities, education/knowledge, explore best practice opportunities and lessons learned, Industry and regulation updates, and shared experiences.
ASSOCIATION FOR TALENT DEVELOPMENT	The Association for Talent Development is a non-profit international group that supports trainers, instructional designers and workplace learning professionals. Membership provides us with articles, videos, and best practice information in the field of learning and development. This membership is used to generate content used to onboard new hires and train internal employees as well as build team effectiveness. This is helpful to customers because effective onboarding gets our new employees effective in their roles faster and ensures they are aligned and demonstrating our company values. Training is done to enhance their skills and effectiveness in their jobs
ASSOCIATION OF CORP COUNSEL (ACC)	The Association of Corporate Counsel (ACC) serves the professional needs of in-house counsel and is the premier source for information, networking opportunities and education for the in-house legal practitioner.
ASSOCIATION OF STRATEGIC PLANNING	The Association for Strategic Planning (or ASP) is a non-profit professional society whose mission is to help people and organizations succeed through improved strategic Thinking, Planning and Action.
BETTER BUSINESS BUREAU	Membership provides an avenue for ratepayers to lodge a concern or complaint with NW Natural and to arbitrate through BBB. It also allows potential customers to read reviews of NW Natural.

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BOARD OF CERTIFIED SAFETY PROFESSIONALS	Its sole purpose is to certify practitioners in the safety profession. Safety professionals identify hazards and evaluate them for the potential to cause injury or illness to people or harm of property and the environment. The safety professional recommends administrative and engineering controls that eliminate or minimize the risk and danger posed by hazards. NWN has certified safety professionals to ensure customer and employees' safety practices.
BUILDER INDUSTRY ASSOCIATION OF CLARK COUNTY	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in Clark County.
BUILDING OWNERS & MANAGERS ASSOCIATION INTERNATIONAL	BOMA is an association of commercial real estate professionals, developers, tradespeople and engineers. Our involvement (though NWN engineers) allows us to be informed about trends in this critical customer category and to build relationships with key stakeholders.
CHAMBERS OF COMMERCE	In general, the Chambers are the conveners of community leaders in the communities we serve. They work to provide healthy economic conditions in our communities that ultimately benefit our ratepayers. Our Community Affairs Managers also use the meetings and events to develop leads for potential residential and commercial customers.
CITIZENS' UTILITY BOARD OF OREGON	In support and to sponsor the 2017 CUB Policy Conference. The Citizens' Utility Board of Oregon advocates on behalf and protect the rights of the residential customers of investor-owned utilities in Oregon.
COALITION FOR RENEWABLE NATURAL GAS	A national organization of utilities, policy makers and RNG developers. This group is the only national association formed around RNG development and is helping NW Natural lead the way in determining the best path forward to interconnect RNG on our system and to assist in developing policy that will overcome barriers to RNG development and interconnection.
COLUMBIA CORRIDOR ASSOCIATION	Columbia Corridor is the single largest economic corridor in Oregon. It's the largest industrial area in the state, with 2,500 businesses employing 65,000 people (many who are our ratepayers) with more middle wage jobs than anywhere else in the state. Ratepayers benefit from the economic activity and the growth of new customers in the Corridor area.
COLUMBIA COUNTY ECONOMIC TEAM	CCET's membership includes representatives from public and private sector organizations throughout the county, all working together to stimulate private investment and job creation. Ratepayers benefit from this job creation and prospect of restoring the vitality of Columbia County's economy.
COLUMBIA RIVER ECONOMIC	Serving the greater Vancouver area, the CREDC business growth and economic vitality to the region. Many of the companies represented by the Council are current customers of NW Natural or potential customers. Ratepayers benefit from living wage jobs produced through their efforts.
COLUMBIA-WILLAMETTE CLEAN CITIES COALITION	Information obtained through the membership helps inform decisions on what CNG/RNG alternatives and services to offer customers. Transportation is an important sector in NWN's effort to lower greenhouse gas emissions via our Low Carbon Pathway.
COMMON A USERS GROUP	Common Users group is an institution supporting IBM's I-Series platform which our CIS runs on. This group provides an annual conference that is essential for system and administrators and DBAs supporting the system. They are also a user forum that shares technical information and troubleshooting tips and tricks.
COMMUNITY ACTION PARTRTNERSIP OF OREGON (CAPO)	State association for Oregon's community action network of agencies to alleviate and eliminate poverty. CAPO also works to alleviate the high energy burden of low-income residents by assisting utilities and the State of Oregon in providing energy assistance and weatherization programs. NW Natural manages the OLGA, GAP and OLIEE programs for our customers and partners extensively with CAPO and the State's energy assistance agencies.

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CORPORATE EXECUTIVE BOARD	(Recently acquired by Gartner) CEB/Gartner offers advisory services and technology solutions for corporations and NW Natural is a member of its Contact Center Leadership Council. They provide surveys, research, white papers and a variety of training programs, seminars and workshops to their members as well. NW Natural has recently consulted with CEB/Gartner on the development of a new Quality Monitoring form for our CCC to improve and optimize customer experience, a new Talent Assessment program to attract, find and hire the best candidates for contact center work, and new and extensive Coaching Certification and Customer Experience Training programs.
DC BAR	The legal bar of the District of Columbia; maintain active membership for certain in-house attorneys. At the core of the Bar's mission is the charge to not only assist members but to protect the public; it shapes the way the organization conducts its business and activities.
DIRECT MARKETING ASSOCIATION INC	Organization used in Smart Energy, which is a self-funded program whose costs is only paid by participating customers; not all ratepayers. This organization is a not-for-profit organization providing access to marketing resources that include research and education. This helps educate customers about climate change and growing participation in the Smart Energy program. Staying current on market trends, changing consumer preferences for communications, shifts in marketing channel effectiveness and fair market value for products and services allow NWN to utilize program funds prudently and effectively.
EB ENTERPRISE RISK MA	Once a year event sponsored by Stoel Rives/PWC/MARSH current risk management topics that are related to risk NW Natural and other Portland companies are exposed to.
EB SAP-CENTRIC EAM MA	This is a conference focused on Enterprise Asset Management best practices. Participation in this conference allows NWN to gain insights that can be leveraged to improve asset management processes at NW Natural
FINANCIAL ACCOUNTING STANDARDS BOARD	Financial Accounting Standards Board (FASB) is the independent, private-sector, not-for-profit organization based in Norwalk, Connecticut, that establishes financial accounting and reporting standards for public and private companies and not-for-profit organizations that follow Generally Accepted Accounting Principles (GAAP). Being a part of this organization is a requirement as part of our being a public company registered on the NYSE
HELP DESK INSTITUTE	Help Desk Institute is a professional organization that provides conferences, webinars, and user forum to share ideas to continually improve service desk functions.
HOME BUILDERS ASSOC	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in Portland-metro. We have board-level representation with this group and benefit from the exchange of information.
HR PEOPLE + STRATEGY	HR People + Strategy is the premier network of executives and thought leaders in the field of human resources. As SHRM's Executive Network, HR People + Strategy provides members access to forward- thinking exchanges, research and publications and executive-level networking opportunities. They facilitate dialogue between thought leaders and executive practitioners, creating solutions to drive success for people and organizations.
ICE DATA LP	ICE = InterContinental Exchange, which is an energy trading system used throughout North America. We have several subscriptions that our gas buyers use to see real-time natural gas pricing information at the various hubs at which we are buying and hedging our gas commodity purchases to ensure that our deals are tracking the market.
IDEALLIANCE	Idealliance is a global industry association that represents the communications industry, comprised of content creators and print service providers. This organization provides invaluable information on best practices, leading edge technology and management best practices. They offer extensive networking, education, an industry publication and industry advocacy. We receive daily e-mails that contain questions asked by industry, and answered by industry. Idealliance provides research and are a vital source of information for the industry. Because we process all mail for NW Natural, spending hundreds of thousands of dollars each year just in postage, it is vital to keep up to date on industry trends and have a network of industry professionals to help ensure that the Company is

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	maintaining these costs at a reasonable level.
IF BY PHONE - DIALOGTECH	Service used to enable monthly tracking of phone calls through the Find a Contractor tool on the NW Natural website. Visitors to the website are able to select a contractor for service or repair of their natural gas equipment. Phone calls to the contractor are tracked to analyze the effectiveness of the tool and measure which contractors are be selected.
IHS GLOBAL INC	The IHS subscription provides a forecast of escalation factors for natural gas assets. The company uses the forecast of natural gas escalation factors to forecast future capital investments, and more specifically, the company used the escalation factors in the company's cost of service (LRIC) in the Oregon rate case to forecast asset costs by rate schedule out to the company's test year for the case.
INFORMATION SYSTEMS AND CONTROL ASSOCIATION	The ISACA organization is an independent, nonprofit, global association which engages in the development, adoption and use of globally accepted, industry-leading knowledge and practices for information systems auditors. The Company's internal audit (IA) department is required to perform IT audits each year. The IA departments' membership in ISACA provides information/knowledge/tools that enable the IA staff to remain current on auditing standards and skilled at performing IT audits each year. An example of an IT audit performed by the IA department includes an independent review of the Company's disaster recover / business continuity policies and practices which help ensure the Company could recover critical data and continue to serve its customers (ratepayers) in the event of a disaster. Another example of an IT audit here are adequate controls over customer data as contained within the Company's IS systems.
INFORMATION SYSTEMS AUDIT AND CONTROL ASSOCIATION	Customers benefit by having a staff at NW Natural who have demonstrated competencies and training in information security, accounting, SEC compliance and internal controls as they relate to Sarbanes Oxley. The annual membership dues ensures that these individuals have maintained their level of competency through continuing professional education (CPE). Ratepayers benefit through a lower risk of material errors, misstatements, fraud and data breach.
IN-PLANT PRINTING & MAILING ASSOCIATION	In Plant Print and Mail is an organization dedicated to guide, educate and support in-house print and mail professionals. Because we manage both the in-house copy center and bill print and inserting, this organization has been extremely valuable. They provide a forum for members to exchange ideas and offer solutions. They provide networking with in-class managers and industry experts, as well as educational programs. They have also provided a wealth of information and networking contacts to discuss the possibility of outsourcing these functions, its value, pros and cons. They provided an analysis of my operation to help understand the cost of outsourcing versus the cost of an in-house operation.
INSTITUTE FOR OPERATIONS RESEARCH AND THE MANAGEMENT SCIENCES	INFORMS is a professional society that publishes articles on decision analysis tools, their application to real-world business problems, and insights that be applied to other industries. INFORMS also provides other services such as periodic conferences and a web-based hiring system that to the Company uses to broaden the applicant pool for certain open positions.
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS	IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

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INSTITUTE OF INTERNAL AUDITORS	The IIA is an organization that provides global leadership to the internal audit profession. Specifically the IIA provides comprehensive internal audit standards, educational and developmental opportunities including the dissemination of knowledge and best practices concerning internal auditing and its appropriate role in control, risk management, and governance. The IA departments' membership in the IIA enables the IA staff to remain knowledgeable/current on internal auditing standards and skilled at performing internal audits. An example of a compliance audit performed by the IA department includes an independent review of the processes and controls which ensure that the rates charged to the Company's customers (ratepayers) align with prescribed tariffs. Another example of a compliance audit performed by the IA department or performed by the IA department is the PCI DSS audit of the company's controls over customer credit card information as required by the Company's merchant bank when accepting credit cards from customers (ratepayers). In addition, the membership in IIA provides IA with Enterprise Risk Management (ERM) tools which aid management with performing its annual ERM risk assessment and controlling/managing risks that impact customers/ratepayers.
INSTITUTE SUPPLY MGMT	A professional association that advances the practice of Supply Management (Purchasing/Stores) to drive value and competitive advantage, and contribute to a prosperous, sustainable world. They provide training and conferences about best practices. This helps the NW Natural supply chain obtain best value with purchase of goods and services and effectively manage warehouse inventory.
INTERNATIONAL ENERGY CREDIT ASSOCIATION	We use the IECA with all of our financial contracts. They wrote the amendments to allow us to comply with the Dodd-Frank Act. In addition to the amendments they offer conferences and training that allow us to stay current on all things credit. The IECA provides a platform to aid professionals in the world of energy finance with everything from networking, to furthering education, to a forum for the exchange of ideas relevant to credit and financial management of the energy industry. IECA helps its members navigate this complex business by promoting the education and understanding of credit and risk management in relation to energy commerce.
INTUIT PAYMENET	ORACCA is an association of HVAC industry individuals/companies. Membership strengthens our relationship with the residential furnace and A/C trades. Facilitates contact with the allies who impact our customer markets. We have board-level representation with this group and benefit from the exchange of information.
J J KELLER & ASSOCIATE	J. J. Keller & Associates, Inc. provides the tools and expert information they need to create safe, productive and compliant workplaces for NWN employees. The products and services offered help protect employees who rely on the consistent application of best practices.
JAPAN-AMERICA SOCIETY OF OREGON	The organization supports and promotes Japanese business doing business in Oregon, and provides cultural education. By participating we are supporting our business customers and supporting diversity in our communities.
MULTIPLE ENGINEERING COOPERATIVE PROGRAM	MECOP is an internship program designed to enhance and expand industry driven internships in cooperation with Oregon universities. NW Natural has selected one to two engineering interns annually since joining the program. The interns are paired with company engineers and perform assignments such as supporting large construction projects, updating engineering specifications and standards, and reviewing new materials and tools for use at the company. Since joining the program two of the interns have subsequently been hired by the company for full time employment.
MULTNOMAH BAR ASSOCIATION	For over 100 years, the Multnomah Bar Association (MBA) has provided a forum for lawyers to gather together for collegiality, to improve the justice system, to provide law-related community service and to access services and benefits that strengthen professionalism, satisfaction and success. The MBA provides CLE opportunities and topical committees that provide business and legal information to the Company's legal team.
NATIONAL ASSOCIATION OF CORPORATE DIRECTORS	NACD identifies, interprets, and delivers insights on critical issues that shape board agendas. Through actionable resources, NACD enhances directors' ability to fulfill their roles to enhance the success of the enterprise.

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NATIONAL ASSOCIATION OF CORROSION ENGINEERS	NACE is recognized globally as the premier authority for corrosion control solutions. The organization offers technical training and certification programs, conferences, industry standards, reports, publications, technical journals, government relations activities and more. NW Natural employees in the Corrosion group are required to have NACE certification to perform their job functions. NACE standards are used to meet corrosion control and integrity management regulation. Attendance at local and national meetings allows the company to learn current best practices and earn continuing education credits for maintaining certification.
NATIONAL ASSOCIATION OF STOCK PLAN PROFESSIONALS	The NASPP is the leading membership association devoted to meeting the needs of stock plan professionals. The NASPP has nearly 6,000 members whose responsibilities relate, directly or indirectly, to stock plan design and administration, including compensation and human resources professionals, stock plan administrators, securities and tax attorneys, accountants, compensation consultants, corporate secretaries, transfer agents, stock brokers, and software vendors. The Association provides opportunities for education, networking and information exchange through its national office, local chapters and national and local conferences
NATIONAL INVESTOR RELATIONS INSTITUTE	NIRI (National Investor Relations Institute) is a professional organization that is dedicated to the education and advancement of its members. NIRI provides essential information and updates for its members on a variety of topics impacting the IR profession. These topics include, but are not limited to, investor and shareholder investment trends, corporate governance and legal issues surrounding the profession, communication best practices, trends and practices at the stock exchanges, and a variety of resources to help with special topics and events. NW Natural, its customers, and shareholders benefit from having a well-informed Investor Relations department that can understand changes in the landscape from new regulations or trends and continue evolving to meet investors' needs.
NATIONAL SAFETY COUNCIL	The National Safety Council (NSC) is a 501(c)(3) nonprofit, nongovernmental public service organization promoting health and safety in the United States of America. The group focuses on areas where the greatest number of preventable injuries and deaths occur, including workplace safety. Our occupational safety staff are members of this organization
NC BOARD FOR LICENSING OF GEOLOGISTS	Employee who is a licensed geologist, with their original license obtained in North Carolina and their Oregon license obtained through reciprocity. They also have a Washington geologist license obtained by reciprocity. The company relies on the employees' credentials and qualifications in order to perform their duties appropriately, and professional registrations are important for the kind of work they do, so they maintain them. The charge from this board was for registration renewal.
NET-ZERO - SOCIALGOOD	Our participation allows us to engage stakeholders in the Zero Net Energy movement and insure that natural gas interests are being represented and understood.
NEW YORK STOCK EXCHANGE	Annual membership fee to remain a company publically traded on the NYSE
NORTH AMERICAN ENERGY STANDARDS BOARD	NAESB is an organization of natural gas and electric companies such as pipelines, local utilities, and energy marketers across North America. As a member, our particular focus is on the wholesale natural gas segment, for which NAESB has developed and continues to refine the gas scheduling standards used by pipeline companies, as well as contract templates used for wholesale gas purchase/sale transactions.
NORTH COAST BUIDERS ASSOCIATION	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in the Northern Oregon coast region.
NORTHWEST ENERGY ASSOCIATION	Northwest Energy Association is an association with petroleum industry development/gas storage/infrastructure development in the Northwest (Oregon, Washington and Idaho). Both Gas Storage, Legal and Risk & Land are involved as it relates to Mist & GRS gas storage.

NW Natural/1723 Moncayo/8 UG 344 OPUC DR 137 NWN Response Page 8 of 12

NORTHWEST GAS ASSOCIATION	The Northwest Gas Association's mission is to advance the safe, dependable and responsible use of natural gas as a cornerstone of the region's energy, environmental and economic foundation. Its efforts foster greater understanding and informed decision-making among industry participants, opinion leaders, and governing officials in the Pacific Northwest on issues related to natural gas.
NW ENERGY COALITION	The NW Energy Coalition is an alliance of about 100 environmental, civic, and human service organizations, progressive utilities, and businesses in Oregon, Washington, Idaho, Montana and British Columbia. They promote development of renewable energy and energy conservation, consumer protection, low-income energy assistance, and fish and wildlife restoration on the Columbia and Snake rivers.
NW MOUNTAIN MINORITY SUPPLIER DEVELOPMENT COUNCIL	An organization that provides Minority Business Enterprises (MBE) business training, executive education, events, networking and valuable resources to help them succeed. They also provide MBE Certification. They are a good source for NW Natural to find qualified minority/small business contractors, as part of our supplier diversity program, intended to support local minority and small emerging businesses.
OR BOARD OF ACCOUNTANCY	Necessary to be licensed CPA. The Board is responsible for licensing and regulating Certified Public Accountants (CPA's) and Public Accountants (PA's) in Oregon; The mission of the Oregon Board of Accountancy is to protect Oregon consumers by ensuring only qualified licensees practice public accountancy in accordance with established professional standards and promulgated rules.
OR STATE BOARD OF EXAMINERS FOR ENGINEERING & LAND SURVERYING	The Oregon State Board of Examiners for Engineering and Land Surveying regulates the practice of engineering, land surveying, photogrammetric mapping, and water right examination as they relate to the welfare of the public in safeguarding life, health and property. All engineers at NW Natural with a Professional Engineering license are required to renew their license every other year to maintain the active status of their license. A Professional Engineering license is necessary for several functions at the Company including the Chief Engineer and the Responsible Managing Individual for the company's contractor's license.
OREGON ASSOCIATION OF MINORITY ENTREPRENEURS	An association that promotes entrepreneurship and economic development for ethnic minorities in Oregon and SW Washington. They are a good source for NW Natural to find qualified minority/small business contractors, as part of our supplier diversity program, intended to support local minority and small emerging businesses.
OREGON BOILER PRESSURE VESSEL ASSOCIATION	They offer the continual education needed to maintain a Boiler License which our Industrial Technicians need to get access to NWN's large customer's boiler rooms for troubleshooting various service calls. This knowledge and certification enhances our safety protocols with these customers. We also get updates on Oregon boiler codes.
OREGON BUILDERS OFFICIALS ASSOCIATION	This is a statewide association of building inspectors and code enforcement personnel. Membership helps to facilitate contact with officials who impact code enforcement in areas of new construction and retrofit that are of importance to our customer markets. We use the engagement as a means to share information about NW Natural practices and standards.
OREGON BUSINESS COUNCIL	The Oregon Business Council is an association of more than 40 business community leaders focused on public issues that affect Oregon's life and future. OBC embraces the vision of the Oregon Business Plan, an economic development forum that calls for growing more well-paying jobs, increasing state per capita income to exceed the national average, and substantially reducing poverty.
OREGON DEPARTMENT OF CONSUMER & BUSINESS SERVICES	Tri-annual (every three years) fee to maintain the professional Journeyman Electrician license. This is required to maintain these qualifications, plus continuing education, to hold a Journeyman's License. We have around 9 employees that work at the company that have similar requirements.

NW Natural/1723 Moncayo/9 UG 344 OPUC DR 137 NWN Response Page 9 of 12

OREGON EMERGENCY MANAGEMENT ASSOCIATION	The OEMA is an association of Emergency Managers from throughout the State. Our membership in this association gives a few things: 1) Networking with all of the public and private Emergency Managers within our service territory. 2) Information on EM and utility-related legislation being proposed. 3) Annual training conference. 4) Access to the Oregon Certified Emergency Management Specialist (ORCEMS) process, which is a certification of my training and experience.
OREGON ENERGY COORDINATORS ASSOCIATION	Oregon Energy Coordinators Association (OECA) is a non-profit professional organization working to develop and provide better energy solutions for Oregon's low income households. OECA's membership includes representatives from Community Action organizations, state agencies, tribal organizations, public and private utilities and other non- profit organizations.
OREGON REMODELERS ASSOCIATION	Remodeling tradespeople are primary members of this group. Membership strengthens our relationship with the residential remodeling trades. Facilitates contact with the allies who impact our customer markets.
OREGON RESTAURANT & LODGING ASSOCIATION	This organization supports our hospitality & food service customers with educational opportunities. The customers also have better access for information from NWN. Helps to promote economic prosperity Membership helps NW Natural understand the current state of the industry in order to serve it successfully.
OREGON SOCIETY FOR HEALTHCARE ENGINEERING	This organization's members are some of NWN largest commercial customers. This gives us direct contact with the design and maintenance contacts from the hospitals. Membership helps us understand the needs of the industry and also avenues to assist with information such as conservation.
OREGON STATE BAR	The Oregon State Bar (OSB) was established in 1935 by the Oregon Legislative Assembly to license and discipline lawyers, regulate the practice of law and provide a variety of services to bar members and the public. The bar is a public corporation and an instrumentality of the Oregon Judicial Department, funded by membership and program fees. It is not a state agency and does not receive any financial support or taxpayer dollars from the state's general fund. Membership is necessary to practice law in Oregon.
OREGON WOMEN LAWYERS	To transform the practice of law and ensure justice and equality by advancing women and minorities in the legal profession. OWLS is a great way to develop a network of support and make meaningful connections with other professionals with similar interests. There is a unique camaraderie that can be found in a predominantly female professional organization. OWLS offers the opportunity to meet and connect with colleagues in a variety of ways.
PORTLAND HUMAN RESOURCE MANAGEMENT ASSOCIATION	PHRMA is a regional non-profit organization that advances the HR profession and individual growth by providing networking and development opportunities to HR practitioners, business professionals, students, and volunteers in the greater Portland metropolitan area. Educational opportunities are provided to members through monthly meetings, workshops, annual conferences, webinars and focused special interest groups. PHRMA also provides SHRM HR certification study groups. Certification provides HR practitioners education in all aspects of HR and tests for knowledge to receive certification. This benefits ratepayers by helping to ensure our HR practices and policies are in compliance with the law and we are informed of the latest and best practices available. PHRMA is a local chapter of the Society for Human Resource Management (SHRM).
PRACTISING LAW INSTITUTE	Practicing Law Institute ("PLI") is nonprofit learning organization dedicated to keeping attorneys and professionals at the forefront of knowledge and expertise, as well as preparing them to fulfill their pro bono responsibilities. This organization provides vast research capabilities and CLE opportunities for legal team.
PROJECT MANANGEMENT INSTITUTE	All Senior project managers are required to have a certification in project management. The Project Management Institute is a global organization which oversees the most widely noted accreditation, the Project Management Professional (PMP) and many of the PMO project managers hold this accreditation. This requires not only membership in the organization but also continuing education to maintain the certification. This benefits the customers by ensuring the PM's have the skills, knowledge and experience to successfully manage projects

NW Natural/1723 Moncayo/10 UG 344 OPUC DR 137 NWN Response Page 10 of 12

	for NWN.
PUBLIC COMPANY ACCOUNTING OVERSIGHT BOARD	The Public Company Accounting Oversight Board (PCAOB) is a private-sector, nonprofit corporation created by the Sarbanes–Oxley Act of 2002 to oversee the audits of public companies and other issuers in order to protect the interests of investors and further the public interest in the preparation of informative, accurate and independent audit reports. Being a part of this organization is a requirement as part of our being a public company registered on the NYSE
QUALITY ASSURANCE AND TRAINING CONNECTION (QATC)	This organization provides education and information-sharing amongst Quality Assurance and Training professionals. They are also recognized authorities in the fields of contact center operations and training. NW Natural's CCC/ECC has performed quality monitoring for years and recently formalized the Quality Assurance/Quality Monitoring program in our department using materials and attending the annual conference provided by QATC. Our aim is to improve and optimize customer experience for NW Natural's customers.
REGISTER.COM	Service used to purchase and register website domains names (URL's). This service is necessary to enable customer access to NW Natural websites. The service also protects the company from other companies purchasing URL's that are similar to nwnatural.com.
RISK MANAGEMENT SOCIETY	RIMS (Risk and Insurance Management Society) is a global risk managers association that is related to all insurance risks faced by the marketplace.
RMG FINANCIAL CONSULTING INC	Benefit to customers are employee networking opportunities, education/knowledge, explore best practice opportunities and lessons learned, Industry and regulation updates, and shared experiences.
ROTARY CLUB OF PORTLAND	Support business and networking along with educational and service opportunities.
SHAREHOLDER SERVICES ASSOCIATION	Through standing and ad hoc committees, written communication and personal contact, the SSA is active in communicating the membership's views on vital issues facing our industry. SSA membership enables you to keep abreast of public policy that impacts securities issues and can be a valuable tool to channel your feedback. This organization helps the shareholder services area of NWN continue their education as it pertains to issues facing their area of expertise.
SLIDETEAM	Slideteam is really more of a license to use prebuilt slides with graphics such as pipelines and flowcharts. This content forms the basis of some of our training materials used in group activities as well as gas class. This helps customers because these training sessions help our employees understand our business better so they can support customer needs. An example would be if the call center has a good sense about our pipelines and process they can better respond to customer calls about new installations.
SMART GROWTH AMERICA	Smart Growth America works with elected officials, real estate developers, chambers of commerce, transportation and urban planning professionals, and leaders in Washington. Our work with SGA will allow us to better understand our role in sustainable community development.
SOCEITY OF PETROLEUM ENGINEERS	Annual fee for membership to a Professional Society, Petroleum Engineers. This membership is for our Reservoir Engineers. 3 in total. Membership allows us to keep abreast of industry trends and share best practices with our peers.

NW Natural/1723 Moncayo/11 UG 344 OPUC DR 137 NWN Response Page 11 of 12

SOCIETY FOR HUMAN RESOURCE MANAGEMENT	SHRM is the world's largest HR professional society, representing 285,000 members in more than 165 countries. Their vision is to be a preeminent and globally recognized authority whose leadership, perspective, resources and expertise are sought and utilized to address the most pressing, current and emerging human resource management issues. SHRM exists to serve the HR professional, and advances and leads the HR profession. SHRM provides education, thought leadership, certification, community and advocacy to enhance the practice of human resource management and the effectiveness of HR professionals in the organizations and communities they serve. They bring together HR's best ideas, people and practices and make them available to every HR professional. They organize hundreds of virtual and in-person events and dozens of state and national conferences. These gatherings strengthen the collective work of HR. The company can easily gather the latest information and practical tools from SHRM on relevant topics such as performance management, rewards, talent, diversity and inclusion, harassment and other hot issues that arise like reforming our entire tax system and overhauling our health care system and the effect on payroll and benefit programs, which can profoundly affect our workforce. SHRM resources helps us prepare and give our input on these important topics. Several employees in HR hold SHRM certification, the gold standard in professional HR development. Certified individuals have a knowledge base of HR laws and policies; they also are able to apply concepts and demonstrate an understanding of the HR practice. The certification is built around the competencies and knowledge and, more importantly, the practices that make HR work.
SOCIETY OF CORPORATE COMPLIANCE AND ETHICS	This organization provides training, education, certification, networking and other resources to compliance professionals
SOUTHWEST WASHINGTON CONTRACTORS ASSOCIATION	The SWCA is a professional organization representing the construction industry in southwest Washington. The SWCA has a plan center that provides a single location for developers and contractors to submit and review project plans. They are also involved in construction training, safety, and educational programs for students
STRATEGIC ECONOMIC DEVELOPMENT CORPORATION MEMBERSHIP	SEDCOR focuses on supporting and growing traded sector businesses in the region. The key industries are advanced manufacturing, agriculture and food processing, technology, wood products and forestry, transportation and distribution and aviation and aerospace. The key industries have the best potential for job growth, to pay higher wages, and to bring new dollars into the greater Salem-area economy, ultimately benefiting ratepayers.
TAX EXECUTIVES INSTITUTE	Tax Executives Institute, Inc. is the preeminent, global association of in-house tax professionals. TEI's members are business executives responsible for the tax affairs of their employers in an executive, administrative, or managerial capacity. TEI serves its members and advances the profession by education, networking, and advocacy throughout the world
TEXAS STATE BAR	Necessary to practice law. The mission of the State Bar of Texas is to support the administration of the legal system, assure all citizens equal access to justice, foster high standards of ethical conduct for lawyers, enable its members to better serve their clients and the public, educate the public about the rule of law, and promote diversity in the administration of justice and the practice of law.
THE NATURAL GAS VEHICLE COALITION	Information obtained through the membership helps inform decisions on what CNG/RNG alternatives and services to offer customers. Transportation is an important sector in NWN's effort to lower greenhouse gas emissions via our Low Carbon Pathway.
THE STATE BAR OF CALIFORNIA	Necessary to practice law. The State Bar of California's mission is to protect the public and includes the primary functions of licensing, regulation and discipline of attorneys; the advancement of the ethical and competent practice of law; and support of efforts for greater access to, and inclusion in, the legal system.
UTILITIES TECHNOLOGY COUNCIL	The Utilities Technology Council (UTC) is a global trade association dedicated to serving critical infrastructure providers. Through advocacy, education and collaboration, UTC creates a favorable business, regulatory and technological environment for companies that own, manage or provide critical telecommunications systems in support of their core business
NW Natural/1723 Moncayo/12 UG 344 OPUC DR 137 NWN Response Page 12 of 12

WA BOARD OF ACCOUNTANCY	Necessary to be licensed CPA. Customers benefit by having a staff at NW Natural who have demonstrated competencies and training in information security, accounting, SEC compliance and internal controls as they relate to Sarbanes Oxley. The annual membership dues ensures that these individuals have maintained their level of competency through continuing professional education (CPE). Ratepayers benefit through a lower risk of material errors, misstatements, fraud and data breach.
WASHINGTON STATE BAR ASSOCIATION	Necessary to practice law. The mission of the Washington State Bar Association is to serve the public and the members of the Bar, to ensure the integrity of the legal profession, and to champion justice.
AMAZON WEB SERVICES	Service used to host the NW Natural Environmental Positioning website. This service is necessary to enable public access to lesswecan.com.
WEB.COM	Another service used to purchase and register website domains names (URL's). This service is necessary to enable customer access to NW Natural websites. The service also protects the company from other companies purchasing URL's that are similar to nwnatural.com.
WESTERN ENERGY INSTITUTE	Western Energy Institute (WEI) is a trade association serving the electric and natural gas industries throughout the Western United States and Canada. WEI facilitates valuable, direction connections between electric and natural gas industry professional. Through committees, member-driven programs, forums and symposiums, members receive a wide range of access to education, collaboration and training opportunities.
WESTSIDE ECONOMIC ALLIANCE	The Alliance advocates for a healthy economic environment on the Westside of the Portland metropolitan region. Westside Economic Alliance provides its members with a common voice on local, regional and state issues, and operates as a problem solver and a one-stop-shop for the entire Westside business community. Ratepayers benefit from the economic activity and the growth of new customers in the area.
WILLAMETTE VALLEY HOME BUILDERS ASSOCIATION	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in the Willamette Valley.
WISTIA	Video hosting service for the NW Natural website. This service enables visitors to the website the ability to view video content providing a more valuable customer experience.
WORLDATWORK	WorldatWork is a nonprofit professional association supporting individuals and organizations focused on compensation, benefits, work-life effectiveness and Total Rewards.



NW Natural/1724 Moncayo/1

Rates & Regulatory Affairs

Oregon General Rate Case – December 2017

Standard Data Request Response

<u>Request No. 15</u>: For each of the four most recent debt security issuances, please provide:

- a. The name of each firm that provided legal counsel and, for each firm, a breakdown of legal counsel fees, a summary description of the specific services provided, copies of the pricing schedules, and copies of invoices;
- b. The name of each firm that provided auditor/accounting services and, for each firm, a breakdown of auditor/accounting fees, a description of the specific services provided, copies of the pricing schedules, and copies of invoices;
- c. The name of each credit rating agency that provided services and, for each agency, a breakdown of credit rating fees, a description of the specific; services provided, copies of the pricing schedules, and copies of invoices; and
- d. The name of each company that provided printing and engraving services, a breakdown of printing and engraving fees, a description of the specific services provided, copies of the pricing schedules, and copies of invoices.

Response:

Below is a summary description of services provided by vendors that perform work related to the Company's last five debt security issuances. Costs are allocated to debt issues based on the Company's policy G-26 "Securities Issuance Costs".

GRC 18 SDR 15 NWN Response Page 2 of 2 NW Natural/1724 Moncayo/2

Q1	5 - LTD Issue Costs	ssue:									Mo
		\$75,000,000		\$35,000,000		\$40,000,000		\$25,000,000		\$75,000,000	
		First Mortgage		First Mortgage		First Mortgage		First Mortgage		First Mortgage	
		SEC Registered, Sec	ured	SEC Registered, Sec	ured	SEC Registered,		SEC Registered,		SEC Registered, Sec	cured
		Issue Dte: 12/05/1	6	Issue Dte: 12/05/1	6	Issue Dte: 12/05/1	6	Issue Dte: 09/13/20	17	Issue Dte: 09/13/20)17
		Maturity Dte: 12/05/	18	Maturity Dte: 12/05/	26	Maturity Dte: 12/05/	46	Maturity Dte: 9/13/20	27	Maturity Dte: 9/13/2	047
			Note		Note		Note		Note		Note
a).	Legal Fees/Other Shelf Fees	\$282,507.12	(1)	\$131,837.15	(1)	\$150,669.97	(1)	\$67,660.84	(1)	\$202,937.55	(1)
	MRTG 22 Supp Indenture & Trustee Release										
	Prepare/review SEC registration statements and re	lated documents									
	Prepare/review MTN distribution agreements										
	Prepare/review Form S-3 and related documents										
	Revise Appendix A of the broker dealer agreement										
	Prepare/review MTN prospectus supplement										
	Review due diligence documentation										
b).	Auditor/Accounting Fees (PricewaterhouseCoopers)	\$1,363.64	(2)	\$636.36	(2)	\$727.27	(2)	No Time Billed		No Time Billed	
	Preparation of comfort letters	81 54	10.00		1.7.9		85.40				
	Professional services performed in conjunction with	Form S-3									
c).	Credit Rating Agency Fees	\$150,029.00	(3)	\$150,029.00	(3)	\$150,029.00	(3)	\$88,000.00	(3)	\$155,000.00	(3)
	Moody's - New Issue Fee										
	Standard & Poors - New Issue Fee										
	Standard & Poors - CUSIP Fee										
d).	Printing & Engraving Fees	\$3,093.19	(4)	\$1,443.62	(4)	\$1,649.57	(4)	\$887.50	(5)	No Fees Allocated	
	RR Donnelley Edgar Preparation & Transmission										
	RR Donnelley Form S-3 Registration Statement										

Notes:

(1) Legal invoices contain privileged attorney-client communications and are not provided.

(2) Auditor/Accounting Invoices - See attachment 1

PWC Invoice		2 Year Note	1	10 Year Note		30 Year Note		Equity Issuance		Future Issue		nvoice	Attachment Page &
	\$	75.0	\$	35.0	\$	40.0	\$	56.9		Alloc.		Sum	Note
Allocation %	100	27.27%		12.73%	-	14.55%	Ĩ.	20.68%		24.77%			
Allocated Fees (181997)	\$	1,364	\$	636	\$	727	\$	1,034	\$	1,239	\$	5,000	P1

(3) Rating Agency Invoices - See attachments 2, 3, 4, 5, 6

(4) Printing & Engraving Invoices - See attachment 7

Donnelley Invoice		2 Year Note		10 Year Note		30 Year Note		Equity Issuance		Future Issue		nvoice	Attachment Page &	
13	\$	75.0	\$	35.0	\$	40.0	\$	56.9		Alloc.		Sum	Note	
Allocation %		27.27%		12.73%	1	14.55%	5	20.68%		24.77%			~	
Allocated Fees (181997)	\$	2,564	\$	1,197	\$	1,368	\$	1,944	\$	2,329	\$	9,402	P3 B, P5 C	
Direct Fees	\$	529	\$	247	\$	282		992 - 19 19			\$	1,058	P1A	

(5) Printing & Engraving Invoices - See attachment 8



Rates & Regulatory Affairs

Oregon General Rate Case – December 2017

Standard Data Request Response

<u>Request No. 16</u>: Please provide, in electronic spreadsheet format, for each long-term debt anticipated to be outstanding as of December 31 of last year; as of December 31 of the current year; and as of December 31 of the test year; and over the remaining term on an annual basis:

- a. Projected principal payments; and
- b. Projected interest payments.

Response:

Please see Excel file 'GRC 18 SDR 16 Attachment 1 - LTD.xls'. Long-term debt principal and interest payments have been projected through December 31 of the test year.



Rates & Regulatory Affairs

Oregon General Rate Case – December 2017

Standard Data Request Response

Request No. 17: For each long-term debt issued since January 1 of the third year preceding the test year where the proceeds were used in whole or in part to redeem a then existing debt, please provide, in electronic spreadsheet format, a cost-benefit analysis demonstrating the cost effectiveness of each redemption and identify the security or securities or other debt redeemed. Please indicate if the cost-benefit analysis was performed prior to or contemporaneous with the redemption or performed subsequently and, if performed subsequently, please provide the approximate date the analysis was performed. For each security redeemed, please provide a detailed breakdown of the redemption expenses and a detailed description of how these expenses were calculated.

Response:

All Company long-term debt issuances redeemed from January 1, 2016 through December 31, 2017 were redeemed at maturity.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 381

381. Please provide the organization name and the associated expense for each organization listed in NW Natural's response to Request No. UG 344 OPUC DR 137. (Please include each organization expense for the Base Year and 2016.)

Response:

Please see UG 344 OPUC DR 381 Attachment 1.

Organization
AMAZON WEB SERVICES
AMERICAN BOARD OF INDUSTRIAL HYGIENE
AMERICAN GAS ASSOCIATION
AMERICAN INSTITUTE OF ARCHITECTS
AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS
AMERICAN MARKETING ASSOCIATION
AMERICAN PAYROLL ASSOCIATION
AMERICAN SOCIETY OF CIVIL ENGINEERS
AMERICAN SOCIETY OF HEATING, REGRIDGERATING & AIR CONDITIONING ENGINEERS
AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AMERICAN SOCIETY OF SAFETY ENGINEERS
AMERICAS SAP USERS GROUP
ASPHALT PAVEMENT ASSOCIATION OF OREGON
ASSOCIATION OF CORP COUNSEL (ACC)
ASSOCIATION FOR FINANCIAL PROFESSIONALS
ASSOCIATION FOR TALENT DEVELOPMENT
ASSOCIATION OF ENERGY ENGINEERS
ASSOCIATION OF STRATEGIC PLANNING
BETTER BUSINESS BUREAU
BOARD OF CERTIFIED SAFETY PROFESSIONALS
BUILDER INDUSTRY ASSOCIATION OF CLARK COUNTY
BUILDING OWNERS & MANAGERS ASSOCIATION INTERNATIONAL
CHAMBERS OF COMMERCE
CITIZENS' UTILITY BOARD OF OREGON
COALITION FOR RENEWABLE NATURAL GAS
COLUMBIA CORRIDOR ASSOCIATION
COLUMBIA COUNTY ECONOMIC TEAM
COLUMBIA RIVER ECONOMIC
COLUMBIA-WILLAMETTE CLEAN CITIES COALITION
COMMON A USERS GROUP
COMMUNITY ACTION PARTRTNERSIP OF OREGON (CAPO)
CORPORATE EXECUTIVE BOARD
DC BAR
DIRECT MARKETING ASSOCIATION INC
EB ENTERPRISE RISK MA
EB SAP-CENTRIC EAM MA
EXECUTIVE PRESS

Organization
FINANCIAL ACCOUNTING STANDARDS BOARD
HELP DESK INSTITUTE
HOME BUILDERS ASSOC
HR PEOPLE + STRATEGY
ICE DATA LP
IDEALLIANCE
IF BY PHONE - DIALOGTECH
IHS GLOBAL INC
INFORMATION SYSTEMS AND CONTROL ASSOCIATION
INFORMATION SYSTEMS AUDIT AND CONTROL ASSOCIATION
IN-PLANT PRINTING & MAILING ASSOCIATION
INSTITUTE FOR OPERATIONS RESEARCH AND THE MANAGEMENT SCIENCES
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
INSTITUTE OF INTERNAL AUDITORS
INSTITUTE SUPPLY MGMT
INTERNATIONAL ENERGY CREDIT ASSOCIATION
INTUIT PAYMENET
J J KELLER & ASSOCIATE
JAPAN-AMERICA SOCIETY OF OREGON
MULTIPLE ENGINEERING COOPERATIVE PROGRAM
MULTNOMAH BAR ASSOCIATION
NATIONAL ASSOCIATION OF CORPORATE DIRECTORS
NATIONAL ASSOCIATION OF CORROSION ENGINEERS
NATIONAL ASSOCIATION OF STOCK PLAN PROFESSIONALS
NATIONAL INVESTOR RELATIONS INSTITUTE
NATIONAL SAFETY COUNCIL
NC BOARD FOR LICENSING OF GEOLOGISTS
NET-ZERO - SOCIALGOOD
NEW YORK STOCK EXCHANGE
NORTH AMERICAN ENERGY STANDARDS BOARD
NORTH COAST BUIDERS ASSOCIATION
NORTHWEST ENERGY ASSOCIATION
NORTHWEST GAS ASSOCIATION
NW ENERGY COALITION
NW MOUNTAIN MINORITY SUPPLIER DEVELOPMENT COUNCIL
OR BOARD OF ACCOUNTANCY
OR STATE BOARD OF EXAMINERS FOR ENGINEERING & LAND SURVERYING

Organization
OREGON ASSOCIATION OF MINORITY ENTREPRENEURS
OREGON BOILER PRESSURE VESSEL ASSOCIATION
OREGON BUILDERS OFFICIALS ASSOCIATION
OREGON BUSINESS COUNCIL
OREGON DEPARTMENT OF CONSUMER & BUSINESS SERVICES
OREGON EMERGENCY MANAGEMENT ASSOCIATION
OREGON ENERGY COORDINATORS ASSOCIATION
OREGON REMODELERS ASSOCIATION
OREGON RESTAURANT & LODGING ASSOCIATION
OREGON SOCIETY FOR HEALTHCARE ENGINEERING
OREGON STATE BAR
OREGON WOMEN LAWYERS
PORTLAND BUSINESS ALLIANCE
PORTLAND HUMAN RESOURCE MANAGEMENT ASSOCIATION
PRACTISING LAW INSTITUTE
PROJECT MANANGEMENT INSTITUTE
PUBLIC COMPANY ACCOUNTING OVERSIGHT BOARD
QUALITY ASSURANCE AND TRAINING CONNECTION (QATC)
REGISTER.COM
RISK MANAGEMENT SOCIETY
RMG FINANCIAL CONSULTING INC
ROTARY CLUB OF PORTLAND
SHAREHOLDER SERVICES ASSOCIATION
SLIDETEAM
SMART GROWTH AMERICA
SOCEITY OF PETROLEUM ENGINEERS
SOCIETY FOR HUMAN RESOURCE MANAGEMENT
SOCIETY OF CORPORATE COMPLIANCE AND ETHICS
SOCIETY OF CORPORATE SECRETARIES
SOUTHWEST WASHINGTON CONTRACTORS ASSOCIATION
STRATEGIC ECONOMIC DEVELOPMENT CORPORATION MEMBERSHIP
SUPREME COURT OF COLORADO
SUPREME COURT OF OHIO
TAX EXECUTIVES INSTITUTE
TEXAS STATE BAR
THE NATURAL GAS VEHICLE COALITION
THE STATE BAR OF CALIFORNIA

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UTILITIES TECHNOLOGY COUNCIL

WA BOARD OF ACCOUNTANCY

WASHINGTON STATE BAR ASSOCIATION

WEB.COM

WESTERN ENERGY INSTITUTE

WESTSIDE ECONOMIC ALLIANCE

WILLAMETTE VALLEY HOME BUILDERS ASSOCIATION

WISTIA

WORLDATWORK

OTHER DUES/MEMBERSHIPS

Total Dues/Memberships

R&D MEMBERSHIPS (In 2016 these were incorrectly charged to GL 501900 (Dues/Memberships) and should have instead been charged to the R&D GL Account (GL 507100); this was corrected for the base year 2017, and also for the test year.

Total Dues/Membership (GL 501900) Expenses

DR 381			DR 137	
Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
AMAZON WEB SERVICES	\$0	\$70	Service used to host the NW Natural Environmental Positioning website. This service is necessary to enable public access	\$65
			to tesswecan.com. The American Board of Industrial Hygiene® (ABIH®) has been the world's largest, organization for certifying professionals in the practice of industrial hygiene ABIH is not a member arranization, and it does not provide any idea trained to affect hy	
	¢525	¢265	member organizations; neither does it does call for involvement in any member organization as a requirement for	¢2.44
AMERICAN BOARD OF INDUSTRIAL HYGIENE	\$535	\$365	certification. The purpose of ABIH is to administer the Certified Industrial Hygienist® (CIH®) credential, which is a means to	\$341
			objectively assess and measure the professional knowledge and understanding of practitioners engaged in industrial bygiene NWN bas employees in our safety office certified by ABIH	
			The American Gas Association (AGA) represents companies delivering natural gas safely, reliably, and in an	
AMERICAN GAS ASSOCIATION	\$424 169	\$413 224	environmentally responsible way to help improve the quality of life for their customers every day. AGA's mission is to provide	\$385 700
	¢ 12 1,100	\$110,221	clear value to its membership and serve as the indispensable, leading voice and facilitator on its behalf in promoting the	\$555,755
			sare, reliable, and efficient delivery or natural gas to nomes and businesses across the nation. Strengthens our relationship with architects. Facilitates contact with the allies who impact building design and influence	
AMERICAN INSTITUTE OF ARCHITECTS	\$0	\$1,250	energy decisions. Allows us to share information about natural gas industry and gain insights about the design and planning	\$1,167
			The AICPA sets ethical standards for the profession and U.S. auditing standards for private companies, nonprofit	
AMEDICAN INSTITUTE OF CERTIFIED DUBLIC ACCOUNTANTS	\$3 105	\$2 705	organizations, federal, state and local governments. It develops and grades the Uniform CPA Examination, and offers	\$2.525
	ψ0,190	φ2,703	and information management and technology assurance. This membership helps protect Oregon consumers by ensuring	φ2,020
			only qualified accountants practice in accordance with professional standards.	
			Organization used in Smart Energy, which is a self-funded program whose costs is only paid by participating customers; not	
AMERICAN MARKETING ASSOCIATION	\$0	\$805	all ratepayers. This organization is a not-ror-proint organization providing access to marketing resources that include secarch and education. This helps educate customers about climate change and growing patientation in the Smart Energy	\$751
	ψ υ		program. Staving current on market trends, changing consumer preferences for communications, shifts in marketing	ψ/01
			channel effectiveness and fair market value for products and services allow NWN to utilize program funds prudently and	
AMERICAN PAYROLL ASSOCIATION	\$254	\$219	The American Payroll Association provides education through seminars and webinars. They administer the payroll	\$204
			certification courses and they also publish the Payroll Source Guide which is considered the Payroll Bible tor payroll	
AMERICAN SOCIETY OF CIVIL ENGINEERS	\$400	\$270	engine – the built environment – while protecting and restoring the natural environment. Primary benefit is from training and	\$252
			educating NWN employees	• •
			ASHRAE is an association of engineers who work in the HVAC markets. Our participation and contact (through NWN	
AMERICAN SOCIETY OF HEATING, REGRIDGERATING & AIR CONDITIONING ENGINEERS	\$776	\$251	engineers) strengthens our relationship with critical influencers in our markets. Allows us to share information about natural	\$234
			ASME is a professional society on the cutting edge technology such as energy storage, power generation, and advanced	
AMERICAN SOCIETY OF MECHANICAL ENGINEERS	\$523	\$310	manufacturing processes. ASME also provides other services such as periodic technical conferences and vendor	\$289
			The American Society of Safety Engineers (ASSE) is the world's oldest professional safety society. ASSE promotes the	
AMERICAN SOCIETY OF SAFETY ENGINEERS	\$880	\$1,090	expertise, leadership and commitment of its members, while providing them with professional development, advocacy and	\$1,017
			standards development. It also sets the occupational safety, health and environmental community's standards for excellence and ethics	
	\$2.200	\$2.425	Participation in the SAP user group provides NWN with access to best practices, education and training materials around	\$2.262
AWERICAS SAF USERS GROUP	\$2,300	\$2,420	utilization of SAP. This in turn benefits NWN operations, HR and Finance departments that rely on SAP in their daily	\$2,203
	¢0	\$900	The Asphalt Pavement Association of Oregon, Inc., (APAO) is a nonprofit trade organization representing the interests of the capital paving industry. The ABAO is dedicated to promoting the use of capital constrate by developing customer driven	¢747
	ψυ	\$000	aspriat paring industry. The ALAO is dealed to protoing the use of asphalt concrete by developing customer-driven programs to enhance quality and excellence in all aspects of asphalt technology.	ψ1 <i>41</i>
			The Association of Corporate Counsel (ACC) serves the professional needs of in-house counsel and is a leading source of	
			information and education for in-house lawyers. Membership in the ACC provides NW Natural attorneys access to programs	
			and educational materials on issues that are central to the company, including corporate compliance, contracts, corporate average, and employment and labor law. Through ACC membership, NW Natural stormeys also gain access to ACC's	
ASSOCIATION OF CORP COUNSEL (ACC)	\$2,010	\$1,285	library of sample contracts and other legal documents relevant to the company's business activities. ACC membership also	\$1,199
			provides various formal and informal networking opportunities that can be a valuable resource when assessing legal matters	
			relevant to the company. These programs, materials, and opportunities help NW Natural's in-house attorneys effectively	
			support NW Natural management in the business affairs of the company, and this effective representation benefits NW	
	¢1 735	\$1.750	Benefit to customers are employee networking opportunities, education/knowledge, explore best practice opportunities and	¢1 633
	\$1,733	\$1,750	lessons learned, Industry and regulation updates, and shared experiences.	φ1,000
			The Association for Talent Development is a non-profit international group that supports trainers, instructional designers and underlace learning and provide the state of th	
			learning and development. This membership is used by me and my OE team to generate content used to onboard new hires	
ASSOCIATION FOR TALENT DEVELOPMENT	\$229	\$428	and train internal employees as well as build team effectiveness. This is helpful to customers because effective onboarding	\$399
			gets our new employees effective in their roles faster and ensures they are aligned and demonstrating our company values.	
			Training is done to enhance their skills and effectiveness in their jobs	
			100 countries. The mission of AEE is "to promote the scientific and educational interests of those engaged in the energy	
			industry and to foster action for Sustainable Development." AEE offers a full array of informational outreach programs	
ASSOCIATION OF ENERGY ENGINEERS	\$0	\$415	including seminars (live and online), conferences, journals, books, and certification programs. AEE's network of over 98	\$387
			local chapters meets regularly to discuss regional issues. AEE's roster of Corporate Members is a veritable "who's who" from	
			all commercial, industrial, instructional, governmental, energy services, and dainy sectors. Our membership enhances our ability to partner with the Energy Tust to deliver high quality programs.	
ASSOCIATION OF STRATEGIC PLANNING	\$0	\$405	The Association for Strategic Planning (or ASP) is a non-profit professional society whose mission is to help people and	\$378
	\$0	φ405	organizations succeed through improved strategic Thinking, Planning and Action.	φ3/6
BETTER BUSINESS BUREAU	\$3,275	\$3,275	membership provides an avenue for ratepayers to lodge a concern or complaint with NW Natural and to arbitrate through RBB. It also allows potential customers to read reviews of NW Natural	\$3,057
	1	<u> </u>	Its sole purpose is to certify practitioners in the safety profession. Safety professionals identify hazards and evaluate them	
BOARD OF CERTIFIED SAFETY PROFESSIONALS	\$440	\$220	for the potential to cause injury or illness to people or harm of property and the environment. The safety professional	\$775
	φ440	\$630	recommends administrative and engineering controls that eliminate or minimize the risk and danger posed by hazards.	φ//S
			NWN has certified safety professionals to ensure customer and employees safety pracitices.	

Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
BUILDER INDUSTRY ASSOCIATION OF CLARK COUNTY	\$200	\$815	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new	\$761
BUILDING OWNERS & MANAGERS ASSOCIATION INTERNATIONAL	\$2,266	\$2,616	BOMA is an association of commercial real estate professionals, developers, tradespeople and engineers. Our involvement (though NWN engineers) allows us to be informed about trends in this critical customer category and to build relationships with key stateholders	\$2,442
CHAMBERS OF COMMERCE	\$22,564	\$21,092	In general, the Chambers are the conveners of community leaders in the communities we serve. They work to provide healthy economic conditions in our communities that ultimately benefit our ratepayers. Our Community Affairs Managers also use the meetings and events to develop leads for potential residential and commercial customers.	\$19,687
CITIZENS' UTILITY BOARD OF OREGON	\$6,000	\$6,000	In support and to sponsor the 2017 CUB Policy Conference. The citizen utility board of oreogn advocates on behalf and	\$5,600
			protect the rights of the residential and small business custoemrs of investor-owned utilities in Oregon. A national organization of utilities, policy makers and RNG developers. This group is the only national association formed	
COALITION FOR RENEWABLE NATURAL GAS	\$0	\$15,000	around RNG development and is helping NW Natural lead the way in determining the best path forward to interconnect RNG on our system and to assist in developing policy that will overcome barriers to RNG development and interconnection. Oregon customers will benefit if NW Natural can use RNG as a relatively low cost compliance option for meeting future GHG requirements on cas utilities.	\$14,001
COLUMBIA CORRIDOR ASSOCIATION	\$0	\$875	Columbia Corridor is the single largest economic corridor in Oregon. It's the largest industrial area in the state, with 2,500 businesses employing 65,000 people (many who our ratepayers) with more middle wage jobs than anywhere else in the state. Ratepayers benefit from the economic activity and the growth of new customers in the Corridor area.	\$817
COLUMBIA COUNTY ECONOMIC TEAM	\$0	\$5,000	CCET's membership includes representatives from public and private sector organizations throughout the county, all working together to stimulate private investment and job creation. Ratepayers benefit from this job creation and prospect of restoring the vitality of Columbia County's economy.	\$4,667
COLUMBIA RIVER ECONOMIC	\$0	\$5,000	Serving the greater Vancouver area, the CREDC business growth and economic vitality to the region. Many of the companies represented by the Council are current customers of NW Natural or potential customers. Ratepayers benefit fron living wage jobs produced through their efforts.	\$4,667
COLUMBIA-WILLAMETTE CLEAN CITIES COALITION	\$300	\$2,530	Information obtained through the membership helps inform decisions on what CNG/RNG alternatives and services to offer customers. Transportation is an important sector in NWN's effort to lower greenhouse gas emissions via our Low Carbon Pathway.	\$2,361
COMMON A USERS GROUP	\$400	\$199	Common Users group is an institution supporting IBM's I-Series platform which our CIS runs on. This group provides an annual conference that is essential for system and administrators and DBAs supporting the system. They are also a user forum that shares technical information and troubleshooting tios and tricks.	\$186
COMMUNITY ACTION PARTRTNERSIP OF OREGON (CAPO)	\$0	\$4,556	State Association for Oregon's community action network of agencies to alleviate and eliminate poverty. CAPO also works to alleviate the high energy burden of low-income residents by assisting utilities and the State of Oregon in providing energy assistance and weatherization programs. NW Natural manages the OLGA, GAP and OLIEE programs for our customers and partners extensively with CAPO and the State's energy assistance agencies.	\$4,253
CORPORATE EXECUTIVE BOARD	\$42,000	\$42,000	(Recently acquired by Gartner) CEB/Gartner offers advisory services and technology solutions for corporations and NW Natural is a member of its Contact Center Leadership Council. They provide surveys, research, white papers and a variety of training programs, seminars and workshops to their members as well. NW Natural has recently consulted with CEB/Gartner on the development of a new Quality Monitoring form for our CCC to improve and optimize customer experience, a new Talent Assessment program to attract, find and hire the best candidates for contact center work, and new and extensive Coaching Certification and Customer Experience Training programs.	\$39,203
DC BAR	\$0	\$176	At the core of the Bar's mission is the charge to not only assist members but to protect the public; it shapes the way the	\$164
DIRECT MARKETING ASSOCIATION INC	\$1,500	\$1,550	organization conducts its business and activities. Organization used in Smart Energy, which is a self-funded program whose costs is only paid by participating customers; not all ratepayers. This organization is a not-for-profit organization providing access to marketing resources that include research and education. This helps educate customers about climate change and growing participation in the Smart Energy program. Staying current on market trends, changing consumer preferences for communications, shifts in marketing channel effectiveness and fair market value for products and services allow NWN to utilize program funds prudently and	\$1,447
EB ENTERPRISE RISK MA	\$0	\$75	Once a year event sponsored by Stoel Rives/PWC/MARSH current risk management topics that are related to risk NW Natural and other Portland companies are exposed to	\$70
EB SAP-CENTRIC EAM MA	\$0	\$2,090	This is a conference focused on Enterprise Asset Management best practices. Participation in this conference allows NWN to gain insights that can be leveraged to improve asset management processes at NW Natural	\$1,951
EXECUTIVE PRESS	\$10,000	\$11,920	NW Natural's Corporate Secretary department serves as a resource to the Board of Directors and senior management, providing advice and counsel on board responsibilities and logistics. As such, NW Natural and its customers benefit from having a well-informed and legaly compliant Corporate Secretary department that understands and is current on changes in the landscape of new regulations, trends, and evolving standards affecting corporate governance (including executive compensation issues), corporate organization, stockholder communications and related disclosures. The Executive Press membership consists in subscriptions to "Compensation Standards," which provides guidance in the area of executive compensation and executive compensation disclosures; "Corporate Counsel" and "TheCorporateCounsel.net", which provides guidance on legal issues involving corporate and securities regulation and corporate governance practices; and "Corporate Executive", which identifies the latest best practices for executive compensation on the area of executive (NYSE) with access to public debt and equity markets. As an NYSE listed public company, NW Natural is required to have a Board of Directors. NW Natural benefits from being a public company, NW Natural is required to have a Board of Directors. The depart department in supporting to support those Directors, and as such EP Executive Press provides an important method to keep NW Natural's Corporate Secretary apprised of current developments in everemence. Incal comparised of largely independent and Knowledgeable directors with necessary and subcide to have as load expertise. The Corporate Secretary department is important to supporting those Directors, and as such EP Executive Press provides an important method to keep NW Natural's Corporate Secretary apprised of current developments in everemence. Lead complicate advectors balance and base is noncet for the development to Howebore to Loadonse in advector to the standards balance balance mode to forconte for provid	\$11,126
FINANCIAL ACCOUNTING STANDARDS BOARD	\$770	\$1,600	Norwark, connecticut, that establishes financial accounting and reporting standards for public and private companies and no for-profit organizations that follow Generally Accepted Accounting Principles (GAAP). Being a part of this organization is a requirement as part of our being a public company registered on the NYSE.	\$1,493
HELP DESK INSTITUTE	\$0	\$295	continually improve service desk functions.	\$275
HOME BUILDERS ASSOC	\$2,629	\$3,235	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in Portland-metro. We have board-level representation with this group and benefit from the exchange of information.	\$3,020

Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
HR PEOPLE + STRATEGY	\$0	\$990	HR People + Strategy is the premier network of executives and thought leaders in the field of human resources. As SHRM's Executive Network, HR People + Strategy provides members access to forward-thinking exchanges, research and publications and executive-level networking opportunities. They facilitate dialogue between thought leaders and executive practitioners, creating solutions to drive success for people and organizations.	\$924
ICE DATA LP	\$43,450	\$43,450	ICE = InterContinental Exchange, which is an energy trading system used throughout North America. We have several subscriptions that our gas buyers use to see real-time natural gas pricing information at the various hubs at which we are buying and hedging our gas commodity purchases to ensure that our deals are tracking the market.	\$40,556
IDEALLIANCE	\$0	\$2,013	Idealliance is a global industry association that represents the communications industry, comprised of content creators and print service providers. This organization provides invaluable information on best practices, leading degle technology and management best practices. They offer extensive networking, education, an industry publication and industry advocacy. I receive daily e-mails that contain questions asked by industry, and answered by industry. I've been able to learn about specific types of equipment, USPS mailing changes, etc. I have also met with Idealliance staff at tradeshows to ask specific questions about my operation. They do research and are a vital source of information for the industry. Because we process all mail for NW Natural, spending hundreds of thousands of dollars each year just in postage, it is vital to keep up to date on industry trends and bave a network of industry professionals.	\$1,878
IF BY PHONE - DIALOGTECH	\$0	\$1,130	Service used to enable monthly tracking of phone calls through the Find a Contractor tool on the NW Natural website. Visitors to the website are able to select a contractor for service or repair of their natural gas equipment. Phone calls to the contractor are tracked to analyze the effectiveness of the tool and measure which contractors are be selected.	\$1,054
IHS GLOBAL INC	\$27,379	\$17,500	The IHS subscription provides a forecast of escalation factors for natural gas assets. The company uses the forecast of natural gas escalation factors to forecast future capital investments, and more specifically, the company used the escalation factors in the company's cost of service (LRIC) in the Oregon rate case to forecast asset costs by rate schedule out to the company's test year for the case.	\$16,334
INFORMATION SYSTEMS AND CONTROL ASSOCIATION	\$195	\$205	The ISACA organization is an independent, nonprofit, global association which engages in the development, adoption and use of globally accepted, industry-leading knowledge and practices for information systems auditors. The Company's internal audi (A) department is required to perform IT audits each year. The IA departments' membership in ISACA provides information/knowledge/tools that enable the IA staff to remain current on auditing standards and skilled at performing IT audits each year. An example of an IT audit performed by the IA departments' membership in ISACA of the Company's disaster recover / business continuity policies and practices which help ensure the Company could recover critical data and continue to serve it's customers (ratepayers) in the event of a disaster. Another example of an IT audit is an independent review of the Company's cybersecurity program which helps ensure that there are adequate controls over customer data as contained within the Company's systems.	\$191
INFORMATION SYSTEMS AUDIT AND CONTROL ASSOCIATION	\$600	\$160	Customers benefit by having a staff at NW Natural who have demonstrated competencies and training in information security, accounting, SEC compliance and internal controls as they relate to Sarbanes Ox4ey. The annual membership dues ensures that these individuals have maintained their level of competency through continuing professional education (CPE). Ratepavers benefit through a lower risk of material errors, misstatements, fraud and data breach.	\$149
IN-PLANT PRINTING & MAILING ASSOCIATION	\$0	\$325	In Plant Print and Mail is an organization dedicated to guide, educate and support in-house print an mail professionals. Because I manage both the in-house copy center and bill print and inserting, this organization has been extremely valuable. They provide a forum for members to exchange ideas and offer solutions. They provide networking with in-class managers and industry experts, as well as educational programs. I joined recently when the company began looking at outsourcing bill print and insert function. They have provided a wealth of information and networking contacts to talk about outsourcing, it's value, pros and cons. They provided an analysis of my operation for free to help understand the cost of outsourcing versus	\$303
INSTITUTE FOR OPERATIONS RESEARCH AND THE MANAGEMENT SCIENCES	\$158	\$158	INFORMS is a professional society that publishes articles on decision analysis tools, their application to real-world business problems, and insights that be applied to other industries. INFORMS also provides other services such as periodic conferences and a web-based hiring system that I had Human Resources use last year in an attempt to broaden the applicant pool for an open position that I was fillion.	\$147
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS	\$1,499	\$478	lEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.	\$446
INSTITUTE OF INTERNAL AUDITORS	\$895	\$1,800	The IIA is an organization that provides global leadership to the internal audit profession. Specifically the IIA provides comprehensive internal audit standards, educational and developmental opportunities including the dissemination of knowledge and best practices concerning internal auditing and its appropriate role in control, risk management, and governance. The IA departments' membership in the IIA enables the IA staff to remain knowledgeable/current on internal auditing standards and skilled at performing internal audits. An example of a compliance audit performed by the IA department includes an independent review of the processes and controls which ensure that the rates charged to the Company's customers (ratepayers) align with prescribed tariffs. Another example of a compliance audit performed by the IA department is the PCI DSS audit of the company's controls over customer credit card information as required by the Company's merchant bank when accepting credit cards from customers (ratepayers). In addition, the membership in IIA provides IA with Enterprise Risk Management (ERM) tools which aid management with performing it's annual ERM risk assessment.	\$1,680
INSTITUTE SUPPLY MGMT	\$2,008	\$3,482	A professional association that advances the practice of Supply Management (Purchasing/Stores) to drive value and competitive advantage, and contribute to a prosperous, sustainable world. They provide training and conferences about best practices. This helps the NW Natural supply chain obtain best value with purchase of goods and services and effectively manage watehouse inventory.	\$3,250
INTERNATIONAL ENERGY CREDIT ASSOCIATION	\$0	\$350	We use the IECA with all of our financial contracts. They wrote the amendments to allow us to comply with the Dodd-Frank Act. In addition to the amendments they offer conferences and training that allow us to stay current on all things credit. The IECA provides a platform to aid professionals in the world of energy finance with verything from networking, to furthering education, to a forum for the exchange of ideas relevant to credit and financial management of the energy industry. IECA helps its members navigate this complex business by promoting the education and understanding of credit and risk management in relation to energy commerce.	\$327
INTUIT PAYMENET	\$0	\$400	ORACCA is an association of HVAC industry individuals/companies. Membership strengthens our relationship with the residential furnace and A/C trades. Facilitates contact with the allies who impact our customer markets. We have board- level representation with this group and benefit from the exchange of information.	\$373
J J KELLER & ASSOCIATE	\$5,124	\$899	J. J. Keller & Associates, Inc. provides the tools and expert information they need to create safe, productive and compliant workplaces for NWN employees. The products and services offered help protect employees who rely on the consistent application of best practices.	\$839
JAPAN-AMERICA SOCIETY OF OREGON	\$550	\$650	The organization supports and promotes Japanese business doing business in Oregon, and provides cultural education. By participating we are supporting our business customers and supporting diversity in our communities.	\$607

Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
MULTIPLE ENGINEERING COOPERATIVE PROGRAM	\$4,200	\$4,200	MECOP is an internship program designed to enhance and expand industry driven internships in cooperation with Oregon universities. NW Natural has selected one to two engineering interns annually since joining the program. The interns are paired with company engineers and perform assignments such as supporting large construction projects, updating engineering specifications and standards, and reviewing new materials and tools for use at the company. Since joining the program two of the interns have subsequently been hired by the company for full time employment.	\$3,920
MULTNOMAH BAR ASSOCIATION	\$270	\$420	For over 100 years, the Multnomah Bar Association (MBA) has provided a forum for lawyers to gather together for collegiality, to improve the justice system, to provide law-related community service and to access services and benefits that strengthen professionalism, satisfaction and success	\$392
NATIONAL ASSOCIATION OF CORPORATE DIRECTORS	\$18,240	\$11,330	NACD provides the Board of Directors with actionable resources on topics including legal and ethical conduct, board processes and performance, assessment of board performance, selection and orientation of directors and the oversight of the CEO and other senior managers. NACD membership benefits include a dedicated NACD Membership advisor; access to blue ribbon commission reports, Fortune 500 advisory council summaries, benchmarking surveys, while papers, handbooks, templates, and tools; daily publications on governance news and emerging board leadership issues; networking and director education events; and boardroom services. These resources are necessary and beneficial to the customer because they contribute to a well-functioning Board of Directors. NW Natural benefits from being a public company listed on the New York Stock Exchange (NYSE) with access to public debt and equity markets. As an NYSE listed public company, NW Natural is required to have a Board of Directors comprised of largely independent and knowledgeable directors with necessary qualifications, experience and expertise. The NACD membership provides an important method to keep NW Natural's directors apprised of current developments in governance, legal compliance and best practices, to help them most effectively anower the business and affairs of the company.	\$10,575
NATIONAL ASSOCIATION OF CORROSION ENGINEERS	\$1,910	\$1,790	NACE is recognized globally as the premier authority for corrosion control solutions. The organization offers technical training and certification programs, conferences, industry standards, reports, publications, technical journals, government relations activities and more. NW Natural employees in the Corrosion group are required to have NACE certification to perform their job functions. NACE standards are used to meet corrosion control and integrity management regulation. Attendance at local and national meetings allows the company to learn current best practices and earn continuing education credits for maintaining certification	\$1,671
NATIONAL ASSOCIATION OF STOCK PLAN PROFESSIONALS	\$910	\$985	The NASPP is the leading membership association devoted to meeting the needs of stock plan professionals by providing benefits including up-to-the minute news and guidance on stock compensation information, timely webcasts, networking and peer-to-peer guidance opportunities, in-depth resources for stock plans, industry-leading conferences, comprehensive industry analysis of stock plan design and practices, and practical guidance with respect to the accounting, tax and securities law guidance associated with stock compensation plans. Membership in the NASPP contributes to NW Natural's ability to design and administer stock compensation plans that will attract and retain the workforce necessary to provide the Company's services to customers.	\$919
NATIONAL INVESTOR RELATIONS INSTITUTE	\$670	\$750	NIRI (National Investor Relations Institute) is a professional organization that is dedicated to the education and advancement of its members. NIRI provides essential information and updates for its members on a variety of topics impacting the IR profession. These topics include, but are not limited to, investor and shareholder investment trends, corporate governance and legal issues surrounding the profession, communication best practices, trends and practices at the stock exchanges, and a variety of resources to help with special topics and events. NW Natural, its customers, and shareholders benefit from having a well-informed Investor Relations department that can understand changes in the landscape from new regulations or trends, and continue evolving to meet investors' needs.	\$700
NATIONAL SAFETY COUNCIL	\$395	\$790	The National Safety Council (NSC) is a 501(c)(3) nonprofit, nongovernmental public service organization promoting health and safety in the United States of America. The group focuses on areas where the greatest number of preventable injuries and deaths occur, including workplace safety. Our occupational safety staff are members of this organization	\$737
NC BOARD FOR LICENSING OF GEOLOGISTS	\$85	\$85	Employee who is a licensed geologist, with thier original license obtained in North Carolina and their Oregon license obtained through reciprocity. They also have a Washington geologist license obtained by reciprocity. The company relies on the employees credentials and qualifications in order to perform their duties appropriately, and professional registrations are important for the kind of work they do, so they maintain them. The charge from this board was for registration renewal.	\$79
NET-ZERO - SOCIALGOOD	\$0	\$1,000	Our participation allows us to engage stakeholders in the Zero Net Energy movement and insure that natural gas interests are being represented and understood.	\$933
NEW YORK STOCK EXCHANGE	\$52,500	\$59,500	Annual membership fee	\$55,537
NORTH AMERICAN ENERGY STANDARDS BOARD	\$0	\$14,000	NAESB is an organization of natural gas and electric companies such as pipelines, local utilities, and energy marketers across North America. As a member, our particular focus is on the wholesale natural gas segment, for which NAESB has developed and continues to refine the gas scheduling standards used by pipeline companies, as well as contract templates used for wholesale gas purchase/sale transactions.	\$13,068
NORTH COAST BUIDERS ASSOCIATION	\$450	\$450	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in the Northern Oregon coast region	\$420
NORTHWEST ENERGY ASSOCIATION	\$0	\$80	Northwest Energy Association is an association with petroleum industry development/gas storage/infrastructure development in the Northwest (Oregon, Washington and Idaho). Both Gas Storage, Legal and Risk & Land are involved as it relates to Mist & GRS gas storage.	\$75
NORTHWEST GAS ASSOCIATION	\$88,610	\$100,120	The Northwest Gas Association's mission is to advance the safe, dependable and responsible use of natural gas as a comerstone of the region's energy, environmental and economic foundation. Its efforts foster greater understanding and informed decision-making among industry participants, opinion leaders, and governing officials in the Pacific Northwest on issues related to natural gas.	\$93,451
NW ENERGY COALITION	\$9,274	\$9,274	The NW Energy Coalition is an alliance of about 100 environmental, civic, and human service organizations, progressive utilities, and businesses in Oregon, Washington, Idaho, Montana and British Columbia. They promote development of renewable energy and energy conservation, consumer protection, low-income energy assistance, and fish and wildlife restoration on the Columbia and Snake rivers.	\$8,656
NW MOUNTAIN MINORITY SUPPLIER DEVELOPMENT COUNCIL	\$3,300	\$3,500	An organization that provides Minority Business Enterprises (MBE) business training, executive education, events, networking and valuable resources to help them succeed. They also provide MBE Certification. They are a good source for NW Natural to find qualified minority/small business contractors, as part of our supplier diversity program, intended to support local minority and small emerging businesses.	\$3,267
OR BOARD OF ACCOUNTANCY	\$4,504	\$2,836	Necessary to be licensed CPA. The Board is responsible for licensing and regulating Certified Public Accountants (CPA's) and Public Accountants (PA's) in Oregon; The mission of the Oregon Board of Accountancy is to protect Oregon consumers by ensuring only qualified licensees practice public accountancy in accordance with established professional standards and promulgated rules.	\$2,647

Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
OR STATE BOARD OF EXAMINERS FOR ENGINEERING & LAND SURVERYING	\$730	\$1,245	The Oregon State Board of Examiners for Engineering and Land Surveying regulates the practice of engineering, land surveying, photogrammetric mapping, and water right examination as they relate to the welfare of the public in safeguarding life, health and property. All engineers at NW Natural with a Professional Engineering license are required to renew their license every other year to maintain the active status of their license. A Professional Engineering license is necessary for several functions at the Company including the Chief Engineer and the Responsible Managing Individual for the company's contractor's license.	\$1,162
OREGON ASSOCIATION OF MINORITY ENTREPRENEURS	\$2,500	\$2,500	An association that promotes entrepreneurship and economic development for ethnic minorities in Oregon and SW Washington. They are a good source for NW Natural to find qualified minority/small business contractors, as part of our supplier diversity program, intended to support local minority and small emerging businesses.	\$2,333
OREGON BOILER PRESSURE VESSEL ASSOCIATION	\$425	\$430	They offer the continual education needed to maintain a Boller License which our Industrial Technicians need to get access to NWN's large customer's boller rooms for troubleshooting various service calls. This knowledge and certification enhances our safety protocols with these customer. We also get updates on Oregon boller codes.	\$401
OREGON BUILDERS OFFICIALS ASSOCIATION	\$0	\$250	This is a statewide association of building inspectors and code enforcement personnel. Membership helps to facilitate contact with officials who impact code enforcement in areas of new construction and retrofit that are of importance to our customer markets. We use the engagement as a means to share information about NW Natural practices and standards.	\$233
OREGON BUSINESS COUNCIL	\$26,583	\$18,688	The Oregon Business Council is an association of more than 40 business community leaders focused on public issues that affect Oregon's life and future. OBC embraces the vision of the Oregon Business Plan, an economic development forum that calls for growing more well paying jobs, increasing state per capita income to exceed the national average, and substantially reducing poverty.	\$17,443
OREGON DEPARTMENT OF CONSUMER & BUSINESS SERVICES	\$83	\$233	Tri-annual (every three years) fee to maintain the professional Journeyman Electrician license. This is required to maintain these qualifications, plus continuing education, to hold a Journeyman's License. We have around 9 employees that work at the company that have similar requirements.	\$217
OREGON EMERGENCY MANAGEMENT ASSOCIATION	\$163	\$215	The OEMA is an association of Emergency Managers from throughout the State. Our membership in this association gives a few things: 1) Networking with all of the public and private Emergency Managers within our service territory. 2) Information on EM and utility-related legislation being proposed. 3) Annual training conference. 4) Access to the Oregon Certified Emergency Management Specialist (ORCEMS) process, which is a certification of my training and experience.	\$200
OREGON ENERGY COORDINATORS ASSOCIATION	\$0	\$400	Oregon Energy Coordinators Association (OECA) is a non-profit professional organization working to develop and provide better energy solutions for Oregon's low income households. OECA's membership includes representatives from Community Action organizations, state agencies, tribal organizations, public and private utilities and other non-profit organizations.	\$373
OREGON REMODELERS ASSOCIATION	\$1,015	\$15	Remodeling tradespeople are primary members of this group. Membership strengthens our relationship with the residential remodeling trades. Facilitates contact with the allies who impact our customer markets.	\$14
OREGON RESTAURANT & LODGING ASSOCIATION	\$500	\$500	This organization supports our hospitality & food service customers with educational opportunities. The customers also have better access for information from NWN. Helps to promote economic prosperity Membership helps NW Natural understand the current state of the industry in order to serve it successfully.	\$467
OREGON SOCIETY FOR HEALTHCARE ENGINEERING	\$100	\$100	this organization's members are some of NWN largest commercial customers. This gives us direct contact with the design and maintenance contacts from the hospitals. Membership helps us understand the needs of the industry and also avenues to assist with information such as conservation.	\$93
OREGON STATE BAR	\$2,370	\$4,397	Necessary to practice law. The Oregon State Bar (OSB) was established in 1935 by the Oregon Legislative Assembly to license and discipline lawyers, regulate the practice of law and provide a variety of services to bar members and the public. The bar is a public corporation and an instrumentality of the Oregon Judicial Department, funded by membership and program fees. It is not a state agency and does not receive any financial support or taxoaver dollars from the state's general	\$4,104
OREGON WOMEN LAWYERS	\$485	\$265	The Oregon Women Lawyers Association (OWLS) was established to transform the practice of law and ensure justice and equality by advancing women and minorities in the legal profession. OWLS provides opportunities for women and minorities in the legal profession to support and educate one another through education and networking programs and activities. OWLS networking resources enhance and support members' abilities to effectively represent their clients. For instance, through the OWLS online listserv, members gain access to an extensive community of experienced legal practitioners who can provide valuable input and information on legal issues relevant to their practice areas. OWL membership also supports informal peer relationship-building that serves as a community for members to tap into for support on issues faced while representing clients. These resources provide NW Natural attorneys with valuable tools to effectively represent the company and this effective representation benefits NW Natural customers.	\$247
PORTLAND BUSINESS ALLIANCE	\$29,522	\$0		\$0
PORTLAND HUMAN RESOURCE MANAGEMENT ASSOCIATION	\$150	\$377	PHRIMA is a regional non-protition organization that advances the HK protession and individual grown by providing networking and development opportunities to HK practitioners, business professionals, students, and volunteers in the greater Portland metropolitan area. Educational opportunities are provided to members through monthly meetings, workshops, annual conferences, webinars and focused special interest groups. PHRMA also provides SHRM HR certification study groups. Certification provides HR practitioners education in all aspects of HR and tests for knowledge to receive certification. This benefits ratepayers by helping to ensure our HR practices and policies are in compliance with the law and we are informed of the latest and best practices available. PHRMA is a local chapter of the Society for Human Resource Management (SHRM).	\$352 f
PRACTISING LAW INSTITUTE	\$8,500	\$4,000	Continuing legal education (CLE) programs allow NW Natural attorneys to keep up-to-date on changes in the law and to educate them on legal issues relevant to their practice. Completion of a minimum number of CLE hours is also a requiremen for bar membership. The Practicing Law Institute (PLI) is a nonprofit learning organization offering CLE programs to legal professionals throughout the country and the world. Membership in PLI provides access to PLI's extensive calendar of CLE programs, including on many topics that are key to NW Natural's business activities, such as corporate law, environmental law, contracts, real property, intellectual property, insurance, SEC compliance, and litigation. Participation in PLI programs enhances the ability of NW Natural lawyers to effectively represent the company, and NW Natural customers benefit from in- house counsel's enhanced understanding of legal logics important to the company.	\$3,734
PROJECT MANANGEMENT INSTITUTE	\$325	\$518	All Senior project managers are required to have a certification in project management. The Project Management Institute is a global organization which oversees the most widely noted accreditation, the Project Management Professional (PMP) and many of the PMO project managers hold this accreditation. This requires not only membership in the organization but also continuing education to maintain the certification. This benefits the customers by ensuring the PM's have the skills, knowledce and experience to successfully manage projects for NWN.	\$483
PUBLIC COMPANY ACCOUNTING OVERSIGHT BOARD	\$0	\$13,100	The Public Company Accounting Oversight Board (PCAOB) is a private-sector, nonprofit corporation created by the Sarbanes–Oxley Act of 2002 to oversee the audits of public companies and other issuers in order to protect the interests of investors and further the public interest in the preparation of informative, accurate and independent audit reports. Being a part of this organization is a requirement as part of our being a public company registered on the NYSE	\$12,227

Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
QUALITY ASSURANCE AND TRAINING CONNECTION (QATC)	\$295	5 \$295	This organization provides education and information-sharing amongst Quality Assurance and Training professionals. They are also recognized authorities in the fields of contact center operations and training. NW Natural's CCC/ECC has performed quality monitoring for years and recently formalized the Quality Assurance/Quality Monitoring program in our department using materials and attending the annual conference provided by QATC. Our aim is to improve and optimize customer exoerience for NW Natural's customers.	\$275
REGISTER.COM	\$2,294	\$1,877	Service used to purchase and register website domains names (URL's). This service is necessary to enable customer access to NW Natural websites. The service also protects the company from other companies purchasing URL's that are similar to nvnatural.com.	\$1,752
RISK MANAGEMENT SOCIETY	\$0	\$650	RIMS (Risk and Insurance Management Society) is a global risk managers association that is related to all insurance risks faced by the marketplace.	\$607
RMG FINANCIAL CONSULTING INC	\$750	\$750	Benefit to customers are employee networking opportunities, education/knowledge, explore best practice opportunities and	\$700
ROTARY CLUB OF PORTLAND	\$575	5 \$600	support business and networking along with educational and service opportunities.	\$560
SHAREHOLDER SERVICES ASSOCIATION	\$625	5 \$625	The Shareholder Services Association (SSA) provides essential information, and industry and regulatory updates for its members on topics impacting the shareholder profession including, but not limited to, industry trends and best practices, new rules and regulations, corporate governance, including proxy, annual shareholder meeting, and corporate actions, escheatment, legal issues surrounding the profession, communication and shareholder best practices, and a variety of resources to help with special and relevant topics and corporate actions. A well-informed and legally compliant shareholder services department is necessary and beneficial to NW Natural's customers because it helps to facilitate the access to capital markets necessary for the Company's capital raising that is important for Company operations, the stockholder memory including program for effective governance and lend promiliance of the Company and compliance with faderal and compliance of the Company's capital raising that is important for Company operations, the stockholder memory including program for effective the faderal and the Company and compliance of the Company and compliance of the Company and compliance of the Company is and compliance of the Company is and compliance of the Company and comp	\$583
SLIDETEAM	\$0	\$150	Sildeteam is really more of a license to use prebuilt slides with graphics such as pipelines and flowcharts. This content forms the basis of some of our training materials used in group activities as well as gas class. This helps customers because these training sessions help our employees understand our business better so they can support customer needs. An example would be if the call center has a good sense about our pipelines and process they can better respond to customer calls abou new installations.	\$140
SMART GROWTH AMERICA	\$0	\$1,000	Smart Growth America works with elected officials, real estate developers, chambers of commerce, transportation and urban planning professionals, and leaders in Washington. Our work with SGA will allow us to better understand our role in sustainable community development.	\$933
SOCEITY OF PETROLEUM ENGINEERS	\$269	\$220	Annual fee for membership to a Professional Society, Petroleum Engineers. This membership is forour Reservoir	\$205
SOCIETY FOR HUMAN RESOURCE MANAGEMENT	\$1,335	9 \$960	SHRM is the world's largest HR professional society, representing 285,000 members in more than 165 countries. Their vision is to be a preeminent and globally recognized authority whose leadership, perspective, resources and expertise are sought and utilized to address the most pressing, current and emerging human resource management issues. SHRM exists to serve the HR professional, and advances and leads the HR profession. SHRM provides education, thought leadership, certification, community and advocacy to enhance the practice of human resource management and the effectiveness of HR professionals in the organizations and communities they serve. They bring together HR's best ideas, people and practices and make them available to every HR professional. They organize hundreds of virtual and in-person events and dozens of state and national conferences. These gatherings strengthen the collective work of HR. The company can easily gather the latest information and practical tools from SHRM on relevant topics such as performance management, rewards, talent, diversity and inclusion, harassment and other hot issues that arise like reforming our entire tax system and overhauling our health care system and the effect on payroll and benefit programs, which can profoundly affect our workforce. SHRM resources helps us prepare and give our input on these important topics. Several employees in HR hold SHRM certification, the gold standard in professional HR development. Certified individuals have a knowledge base of HR laws and policies; they also are able to apply concepts and demonstrate an understanding of the HR practice. The certification is built around the compatible concepts and demonstrate an understanding of the HR practice. The certification is built around the compatible concepts and theore importantly. The accidees that make HB work	\$896
SOCIETY OF CORPORATE COMPLIANCE AND ETHICS	\$885	5 \$885	As a regulated utility and publicly traded company, a strong business integrity and compliance program is essential to NW Natural's operations. SCCE is a member-based association for compliance professionals that provides training, certification, networking, and other resources to educate and update members with respect to meeting regulatory requirements and championing ethical practices and compliance standards. NW Natural benefits from being a public company listed on the New York Stock Exchange (NYSE) with access to public debt and equity markets. As an NYSE listed public company, NW Natural is required to maintain a robust Ethics and Compliance Program and to operate a Hotline permitting employees and third parties to report suspected misconduct. The Chief Compliance Officer and Business Integrity Team are important components of a robust Ethics and Compliance Program. The SCCE provides an important method to keep the Chief Compliance Officer and Business Integrity Team apprised of current developments in governance, legal compliance and best practices, in the arena of Ethics, and Compliance. To help them most effectively support the Company's Business.	\$826
SOCIETY OF CORPORATE SECRETARIES	\$1,200	\$1,200	NW Natural's Corporate Secretary department serves as a resource to the Board of Directors and senior management, providing advice and counsel on board responsibilities and logistics. As such, NW Natural and its customers benefit from having a well-informed Corporate Secretary department that understands and is current on changes in the landscape of new regulations, trends, and evolving standards affecting corporate governance (including executive compensation issues), corporate organization, stockholder communications and related disclosures. The Society for Corporate Secretaries, now known as the Society for Corporate Governance, Inc. seeks to be a positive force for responsible corporate governance, providing news, research and "best practice" advice and providing professional development and education through seminars and conferences. These resources are necessary and beneficial to the customer because they support the Corporate Secretary Department in supporting a well-functioning Board of Directors. NW Natural benefits from being a public company listed on the New York Stock Exchange (NYSE) with access to public debt and equity markets. As an NYSE listed public company, NW Natural is required to have a Board of Directors comprised of largely independent and knowledgeable directors with necessary qualifications, experience and expertise. The Corporate Secretary department is important to supporting those Directors, and as such the Society for Corporate Governance provides an important method to keep NW Natural's Corporate Secretary apprised of current developments in governance, legal compliance and best exections to hable them more affectively used the society for corporate secretary department the society for corporate for an eard of faile of the commonue.	\$1,120
SOUTHWEST WASHINGTON CONTRACTORS ASSOCIATION	\$395	5 \$395	plan center that provides a single location for developers and contractors to submit and review project plans. They are also involved in construction training, safety, and educational programs for students	\$369

Organization	2016 Amount	2017 Amount	Description of Benefit	OR Test Year Amount
STRATEGIC ECONOMIC DEVELOPMENT CORPORATION MEMBERSHIP	\$0	\$2,500	SEDCOR focuses on supporting and growing traded sector businesses in the region. The key industries are advanced manufacturing, agriculture and food processing, technology, wood products and forestry, transportation and distribution and aviation and aerospace. The key industries have the best potential for job growth, to pay higher wages, and to bring new dollars into the greater Salem-area economy, ultimately benefiting ratepayers.	\$2,333
SUPREME COURT OF COLORADO	\$130	\$130	NW Natural attorneys must pay annual fees to state organizations in order to retain their bar licenses. One current NW Natural attorney is a member of the Colorado state bar, and another is a member of the Ohio state bar. NW Natural and its customers benefit from the company employing talented and experienced lawyers. In order to be competitive in attracting and retaining good lawyers. NW Natural offers competitive benefits to employment, including payment of bar membership	\$121
SUPREME COURT OF OHIO	\$0	\$350	NW Natural attorneys must pay annual fees to state organizations in order to retain their bar licenses. One current NW Natural attorney is a member of the Colorado state bar, and another is a member of the Ohio state bar. NW Natural and its customers benefit from the company employing talented and experienced lawyers. In order to be competitive in attracting and retaining good lawyers. NW Natural offers competitive benefits to employment. including payment of bar membership	\$327
TAX EXECUTIVES INSTITUTE	\$225	\$225	Tax Executives Institute, Inc. is the preeminent, global association of in-house tax professionals. TEI's members are business executives responsible for the tax affairs of their employers in an executive, administrative, or managerial capacity TEI serves its members and advances the profession by education, networking, and advacacy throughout the world	. \$210
TEXAS STATE BAR	\$66	\$90	Necessary to practice law. The mission of the State Bar of Texas is to support the administration of the legal system, assure all citizens equal access to justice, foster high standards of ethical conduct for lawyers, enable its members to better serve their clients and the public, educate the public about the rule of law, and promote diversity in the administration of justice and the practice of law	; j \$84
THE NATURAL GAS VEHICLE COALITION	\$0	\$46,948	Information obtained through the membership helps inform decisions on what CNG/RNG alternatives and services to offer customers. Transportation is an important sector in NWN's effort to lower greenhouse gas emissions via our Low Carbon Pathway.	\$43,821
THE STATE BAR OF CALIFORNIA	\$430	\$420	Necessary to practice law. The State Bar of California's mission is to protect the public and includes the primary functions or licensing, regulation and discipline of attorneys; the advancement of the ethical and competent practice of law, and support of efforts for greater access to, and inclusion in, the legal system.	\$392
UTILITIES TECHNOLOGY COUNCIL	\$7,125	\$8,906	The Utilities Technology Council (UTC) is a global trade association dedicated to serving critical infrastructure providers. Through advocacy, education and collaboration, UTC creates a favorable business, regulatory and technological environment for companies that own, manage or provide critical telecommunications systems in support of their core	\$8,313
WA BOARD OF ACCOUNTANCY	\$525	\$295	Necessary to be licensed CPA. Customers benefit by having a staff at NW Natural who have demonstrated competencies and training in information security, accounting, SEC compliance and internal controls as they relate to Sarbanes Oxley. The annual membership dues ensures that these individuals have maintained their level of competency through continuing professional education (CPE). Ratepayers benefit through a lower risk of material errors, misstatements, fraud and data breach.	\$275
WASHINGTON STATE BAR ASSOCIATION	\$583	\$555	Necessary to practice law. The mission of the Washington State Bar Association is to serve the public and the members of the Bar to ansure the intentity of the legal profession, and to champion justice	\$518
WEB.COM	\$396	\$500	Another service used to purchase and register velocities and another approximates (URL's). This service is necessary to enable customer access to NW Natural websites. The service also protects the company from other companies purchasing URL's that are similar to numatural com.	\$467
WESTERN ENERGY INSTITUTE	\$24,346	\$23,572	Western Energy Institute (WEI) is a trade association serving the electric and natural gas industries throughout the Western United States and Canada. WEI facilitates valuable, direction connections between electric and natural gas industry professional. Through committees, member-driven programs, forums and symposiums, members receive a wide range of access to education, collaboration and training opportunities.	\$22,002
WESTSIDE ECONOMIC ALLIANCE	\$0	\$2,300	The Alliance advocates for a healthy economic environment on the Westside of the Portland metropolitan region. Westside Economic Alliance provides its members with a common voice on local, regional and state issues, and operates as a problem solver and a one-stop-shop for the entire Westside business community. Ratepayers benefit from the economic activity and the growth of new customers in the area.	\$2,147
WILLAMETTE VALLEY HOME BUILDERS ASSOCIATION	\$482	\$482	Strengthens our relationship with the home builder trades. Facilitates contact with the allies who impact our residential new construction markets in the Willamette Valley.	\$450
WISTIA	\$664	\$832	Video hosting service for the NW Natural website. This service enables visitors to the website the ability to view video content providing a more valuable customer experience.	\$776
WORLDATWORK	\$1,105	\$1,590	WorldatWork is a nonprofit professional association supporting individuals and organizations focused on compensation, benefits, work-life effectiveness and Total Rewards.	\$1,484
OTHER DUES/MEMBERSHIPS	\$9,772	\$20,456		\$19,093
Total Dues/Memberships	\$924,452	\$1,010,884		\$943,552
R&D MEMBERSHIPS (In 2016 these were incorrectly charged to GL 501900 (Dues/Memberships) and should have instead been charged to the R&D GL Account (GL 507100); this was corrected for the base year 2017, and also for the test year.	\$575,000	\$0		
Total Dues/Membership (GL 501900) Expenses	\$1,499,452	\$1,010,884	1	

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 400

400. Are any of the above categories subject to the 2017 Tax Act regarding Meals & Entertainment deductions? Please explain.

Response:

Note: The above inquiry refers to 'the above categories' that were listed in DR 399. These categories included Meal Tickets, Employee Awards, and Mileage Reimbursement.

Meal Tickets -

The meal tickets expenditure is to record meal allowances and meal per diems, under the Joint-Accord agreement with the union. The amount of the allowance is included in employee compensation. Since the expenditure is actually compensation from the Company's perspective (vs. a meal expenditure) it is not subject to the meals and entertainment limitations under the 2017 Tax Act. The amount of the per diem is not a compensation expense, but is similar to a business expense reimbursement to an employee. Since the reimbursement results in the per diem being treated as if the Company incurred the meal expense directly, it would be subject to the meals and entertainment limitations under the 2017 Tax Act.

Employee Awards -

This category includes awards for employee anniversaries at 5, 10, 15, etc. years. The award is an actual tangible item and would not be subject to a meals and entertainment limitation. This category also includes items like refreshments (beverages and snacks) served at an event acknowledging exceptional employee performance / retirement, or a monetary award for a particular occasion. The expenditures for refreshments, or similar meal related charges, would be subject a meals and entertainment limitation.

Mileage Reimbursements -

The mileage reimbursement charges are made pursuant to a qualified employee expense reimbursement plan and the amount per mile that is reimbursed is the amount published annually by the Internal Revenue Service. Since the charge is treated from the Company's perspective as if the Company incurred a charge for vehicle mileage, the expenditure is not subject to a meals and entertainment limitation.

Joint Accord

A vested interest in a successful future.

Effective: June 1, 2014-November 30, 2019



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LABOR-MANAGEMENT JOINT ACCORD

THIS COLLECTIVE BARGAINING AGREEMENT, hereinafter called "Joint Accord" or "Accord," is entered into on June 1, 2014, between NORTHWEST NATURAL GAS COMPANY, a corporation, its successors or assigns, hereinafter called "the Company," and OFFICE AND PROFESSIONAL EMPLOYEES INTERNATIONAL UNION, LOCAL 11, AFL-CIO, hereinafter called "the Union," collectively referred to as "the parties," to promote a balance between the needs of the Employees and those of the Employer while fostering an environment of mutual respect and cooperation.

PARTNERSHIP MISSION STATEMENT

The Union and the Company will work together to:

- Achieve collaborative and transparent relationships at all levels of the organization;
- Share information necessary to make decisions and implement change;
- Foster an environment in which employees are valued and supported in their development, engagement and success; and
- Champion NW Natural's core values and continued success.

ARTICLE 1 GUARANTEES AND FLEXIBILITY

1.1 Introduction

To support our ability to acquire and serve customers, and to outperform our competitors, thereby promoting employment security and enhancing job opportunities, the parties share responsibility for developing and rewarding a flexible and skilled work force. To successfully compete requires the ability to quickly adjust our products, services and processes.

1.2 Flexibility

The parties agree that during the term of this Joint Accord, the Company has the flexibility to redesign and change its business operations, the work and the workforce. In exchange, the Company agrees that certain Employees shall have Employment Security and Pay Guarantees, as defined in this Joint Accord.

1.3 Involvement

It is the Company's right and responsibility to make business decisions, including such matters as redesigns, changes in business operations, the work and the workforce. The Company continues to value input from our Employees and Union partners, which we believe contributes to productivity, satisfaction, engagement, and success.

The Union and the Company agree to work collaboratively on those items that are mandatory subjects under the law and on those items identified by the Company for Union involvement which the law would allow an Employer to change unilaterally. The agreed to process is in the Involvement JAG.

The Union and the Company will, not later than the first quarter of each year, meet with representatives selected by each party to review the number of contractor personnel working, the type of work performed, and the current and projected workload to determine the feasibility of increasing the regular work force or using overtime when practical and economical as an alternative.

1.4 Employment Security

- 1.4.1 The parties agree that during the term of this Joint Accord there will be no layoff of any Regular Employee whose current period of employment was on or before November 30, 2013.
- 1.4.2 Employees without employment security are subject to layoff for any reason. However, the Company will not contract work to others that would cause Employees to be laid off if that contracting activity directly results in the annualized average of the Bargaining Unit falling below 600*.

*Calculated as total Regular Employees working plus those positions currently vacant and unfilled, minus any reductions that may have occurred as allowed in this Accord. See the Employment Security JAG. Comparisons will be based upon the previous twelve (12) month annualized average at the time of the event. This recognizes that training efficiency requires hiring in larger groups.

1.5 Pay Guarantee

Pay for Regular Employees in jobs that are affected by work redesign, regional lack of work, or certain disability situations, will be guaranteed at no less than their current rate of pay, as provided for in 10.6.

1.6 Compensation

The parties agree to ensure that there will be a compensation system that supports business operations while maintaining internal and external equity.

ARTICLE 2 GENERAL PROVISIONS

2.1 Application and Coverage

2.1.1 Definition of Bargaining Unit

- 2.1.1.1 This Joint Accord applies to and covers individuals who are employed in the jobs shown in the Job Titles by Grade list of this Joint Accord as to areas and properties now served or owned by the Company. The terms of this Joint Accord do not extend to any NW Natural affiliate.
- 2.1.1.2 It is not the intent to have Supervisors perform the job duties of Bargaining Unit personnel except in circumstances such as training, testing, inspection/QA, emergency, or in occasional circumstances where needed to support the continuity of local business operations, a task, or a job.
- 2.1.1.3 The Union and the Company agree to a standard process by which new jobs will be evaluated for inclusion in the Bargaining Unit. Inclusions or exclusions of the Bargaining Unit will be considered utilizing the Adding New Jobs JAG.

2.1.2 Employee and Other Worker Definitions

2.1.2.1 Employee

An Employee is a common-law employee of NW Natural whose job is within the Bargaining Unit as defined in 2.1.1.

2.1.2.2 Regular Employee

A Regular Employee is an Employee who is employed by NW Natural to work on a full or part-time basis.

- 2.1.2.2.1 A Full-Time Regular Employee is a Regular Employee who is employed by NW Natural to work an average of forty (40) or more hours per work week.
- 2.1.2.2.2 A Part-Time Regular Employee is a Regular Employee who is employed by NW Natural to fill a continuing work requirement that averages less than forty (40) hours per work week.
- 2.1.2.2.3 A Job-Share Employee is a Part-Time Regular Employee who is employed by NW Natural to share the responsibilities of one (1) full-

time position with one (1) other Job-Share Employee. Refer to the Job Sharing JAG.

2.1.2.3 Term Employee

A Term Employee is an Employee engaged for a limited duration to complete a special project as specifically defined in his or her Term Employment Agreement. Term Employees have only those benefits and rights expressly defined in their Term Employment Agreements and in the Term Employee JAG.

2.1.2.4 Probationary Employee

A Probationary Employee is a newly hired or rehired Employee in his or her first year of employment (365 calendar days) with NW Natural. Probationary Employees who are Regular Employees retain all rights and benefits of Regular Employees except as limited in 4.3.2 and 19.1. Probationary Employees who are Term Employees retain only the rights and benefits provided to Term Employees. The probationary period for Employees whose date of hire is prior to the date of this Accord will remain at 180 calendar days.

2.1.2.5 Temporary Worker

A Temporary Worker is an external agency worker engaged for an assignment lasting for ninety (90) or fewer calendar days. Temporary Workers are not Employees of the Company and do not have Union membership rights or Employee benefits. Any extension of a Temporary Worker on the same assignment beyond ninety (90) calendar days requires the mutual agreement of the Union and the Company.

2.1.3 Recognition

The Company recognizes the Union as the exclusive Bargaining Agent for the Employees covered by this Joint Accord.

2.1.4 Union Membership Requirements

- 2.1.4.1 It shall be a condition of employment that all Employees covered by this document shall pay dues to OPEIU Local 11, and all new Employees shall, on the last calendar day of the month following the beginning of such employment, begin payment of dues and such initiation fee as is customary to the Union.
- 2.1.4.2 Upon receipt of a written request signed by an Employee, the Company will deduct and remit to the Union dues and other fees from the pay of the Employee once in each month and an accounting for such deductions. Such form will be provided by the Union.

- 2.1.4.3 Any person covered by this Joint Accord as a Temporary Worker must obtain a working permit from the Union after each thirty (30) days worked.
- 2.1.4.4 In case any Employee shall fail to tender the initiation fee and periodic dues uniformly required as a condition of acquiring or retaining membership (which payment of fees and dues shall be a condition of continued employment), the Union will notify the Executives responsible for labor relations. A Company representative will then notify the delinquent Employee in writing by the end of his or her next workday that, unless the Executives responsible for labor relations receives from the Union Office notification of the Employee's tender of required dues, the Employee will be terminated within the next ten (10) working days.

2.2 Management Rights

The Company retains all rights to manage its business and direct its work force, except as those rights are limited by the express and specific language of this Joint Accord. The Company's rights expressly include, but are not limited to, the right and flexibility to redesign and change its business operations, the work and the workforce; determine the number and nature of positions needed across the Company and by work location; protect and preserve Company property; open and close work locations; contract work*; set schedules; assign and direct work; define work duties, including duties performed within any job description or job family; implement and utilize existing and new automation and technologies; and require that work be performed, including overtime.

*It is the intent and preference of the Company to use women and minorityowned contractors as well as utilize union contractors whenever practical.

2.3 No Strike, No Lockout

- 2.3.1 There shall be no strike, work stoppage, work slowdown, sympathy strike, lockout, or other interruption of work during the life of this Joint Accord. The Union shall take every reasonable means within its power to prevent such occurrences and induce Employees engaged in or supporting any such prohibited conduct to cease such activity.
- 2.3.2 Any member of OPEIU Local 11 employed by the Company who recognizes a lawful primary picket line sanctioned by OPEIU Local 11 shall not be disciplined for recognizing that picket line, notwithstanding the provisions of 2.3.1, provided that such Employee shall have no greater rights under law or contract than does a striking Employee.

2.4 Union Member Time Off

2.4.1 The Union's stewards shall be allowed time off with pay to investigate and present issues/grievances as necessary to fulfill their duty of fair representation. Whenever possible, such time shall be scheduled in

advance with the steward's supervisor to minimize the impact on business operations.

2.4.2 Upon written request from the Union, union members shall be given shortterm leaves of absence to transact Union business and be paid by the Union. An Employee covered by this Joint Accord who is elected, appointed or hired to an office in the Union requiring a long-term leave of absence from the Company, shall, upon two (2) weeks' written notice, be granted a voluntary leave of absence without pay not to exceed two (2) years.

2.5 Compliance with Laws Governing the Workplace

- 2.5.1 NW Natural is an equal employment opportunity employer. The Company prohibits discrimination, harassment or retaliation on the basis of race, age, color, religion, gender, national origin, disability, marital status, sexual orientation, gender identity, eligible veteran status, or any other status or characteristic protected by applicable law. The Union shares the Company's commitment to maintaining a business environment free from discrimination, harassment or retaliation and supports business and workplace decisions promoting diversity.
- 2.5.2 The Company promptly investigates and addresses complaints regarding discrimination, retaliation or harassment. The Union recognizes the importance of the prompt and effective investigation and resolution of such complaints and will support and cooperate with the Company in the Company's investigation and resolution of such complaints.
- 2.5.3 The parties strive to comply with all applicable laws, rules and regulations governing the workplace, including but not limited to laws addressing discrimination in employment. To the extent such provisions include exceptions applicable to parties in a collectively bargained relationship, this provision does not address or waive the application of such exceptions.

2.6 Modifications and Agreements

- 2.6.1 In the past, the Union and the Company have reserved the right to renegotiate the Joint Accord in the event there are external events or significant business changes which in the opinion of either party require renegotiation of the Accord. The Union and the Company continue to reserve this right during this Accord. Amendments to this Joint Accord, are made by a Memorandum of Agreement (MOA), must be in writing, agreed to, and signed by both parties.
- 2.6.2 Joint Accord Guidelines (JAGs) are referenced throughout this Joint Accord. These guidelines are published to provide details on the intent of the Joint Accord language, current practices and processes, or to provide supplementary procedural guidance. JAGs are published and maintained by

the Joint Accord Committee (JAC). Changes or additions to these guidelines must be with the approval of the JAC.

- 2.6.3 Additionally, during the life of this Joint Accord, Interpretations and Agreements may be made.
 - 2.6.3.1 Interpretations are prepared at the direction of the JAC Co-Chairs to clarify intent of language in the Joint Accord and are submitted to the JAC for approval.
 - 2.6.3.2 An Agreement is a written document signed by both the Union and the Company that states what the Union and the Company agree to when they reach agreement on something other than what is stated in the Joint Accord or related terms and conditions of employment of covered Employees. Agreements can remain in effect for the duration of the current Joint Accord or may be limited to a specific period of time.
- 2.6.4 Except as expressly noted otherwise, this Joint Accord supersedes all prior Joint Accords, JAGs, Interpretations, Agreements, and other understandings between the parties. To the extent the terms of this Joint Accord were to conflict with any JAG, Interpretation, Agreement, or other understandings between the parties, the terms of this Joint Accord control.

ARTICLE 3

SENIORITY

3.1 Company Seniority

- 3.1.1 Company Seniority is established on the date of hire as a Regular Employee. When multiple Regular Employees are hired on the same day, Company Seniority is then established based on name at date of hire in ascending alphabetical order of last name, then first name.
- 3.1.2 In the event any previously terminated Employee is rehired as a Regular Employee, Company Seniority is established on the rehire date. Any previous Regular Employee who was separated due to disability (industrial or non-industrial) and is subsequently awarded or placed in a position under Article 14 is eligible for adjusted seniority abridgement of Company Seniority.

3.2 Job Seniority

Job Seniority is based on the days that a particular job is held. When multiple Regular Employees have the same number of days the job was held, the ranking will be based on Company Seniority. Job Seniority is only accumulated for jobs that are not in a Line of Progression.

3.3 Line of Progression Seniority

Line of Progression Seniority is based on the days that any job within that Line of Progression is held. When multiple Regular Employees have the same number of days in the Line of Progression, the ranking will be based on Company Seniority. For jobs in a Line of Progression, Job Seniority is not accumulated.

3.4 Term Employee Seniority

- 3.4.1 Term Employees do not establish or accumulate any seniority while in Term employment. For those Term Employees who are subsequently hired as Regular Employees with no break in service refer to 3.4.2 and 3.4.3.
- 3.4.2 Job or Line of Progression Seniority (as applicable) is calculated for positions involving the same type of work as that done as a Term Employee.
- 3.4.3 Company Seniority is established on the date of hire as a Term Employee.

3.5 Job and Line of Progression Seniority Accumulation

Accumulation of seniority is based on straight-time days of employment. For Full-Time Regular Employees, this is equivalent to five (5) eight-hour work days per seven (7) calendar days. For Part-Time Regular Employees, seniority will be accumulated at seventy-five percent (75%) of the rate of Full-Time Regular Employees.

3.6 Seniority Retained

Seniority accumulated by a Regular Employee in a Job or in a Line of Progression is retained. Any Employee who leaves the Bargaining Unit or terminates employment will not retain any Job, Line of Progression or Company Seniority. Any previous Regular Employee who was separated due to disability (industrial or non-industrial) and is subsequently awarded or placed in a position under Article 14 is eligible for adjusted seniority abridgement of Company Seniority.

3.7 Application of Seniority

For the application of seniority, refer to the appropriate articles within this Joint Accord.

3.8 Line of Progression and Job Seniority Calculations

For the process of seniority calculations related to the definitions under this Joint Accord refer to the Line of Progression and Job Seniority Calculations JAG.

ARTICLE 4

SELECTION AND ASSIGNMENT

4.1 General

This Article describes the selection and assignment provisions and processes for Regular Employees. Term Employees are not eligible for these provisions or processes, as explained in the Term Employee JAG.

4.2 Defining the Work, Positions and Job Descriptions

Job and position descriptions will be maintained for all jobs and positions in the Bargaining Unit. The Company has the right to change and create job and position descriptions. Refer to the Job Description JAG.

4.3 Postings and Consideration of Bids

- 4.3.1 When a position posting has been approved, the position will be posted Company-wide for seven (7) calendar days.
- 4.3.2 All applications received from Regular Employees* prior to the expiration of a position posting shall be considered. Refer to the Position Posting and Bidding JAG. Probationary Employees will only be allowed to apply as external candidates.

*Regular Employees already in the Construction line of progression at the resource center where a posted position in Construction is located are considered auto-bidders and automatically included in the bidding process. If an auto-bidder declines an award, he or she must sign a Progression Waiver (existing rate retention will be forfeited).

- 4.3.3 The Union and the Company agree to use and continue to refine the currently agreed to internal bidding and selection processes as outlined in the Internal Bidding and Selection Process JAG.
- 4.3.4 Employees who are off on PTO, Short-Term Disability, Long-Term Disability, Workers' Compensation, unpaid active status, or protected leave as defined by Company policy for an entire posting period shall be eligible to submit a bid on any posted position within the seven (7) calendar days following the expiration of the posting period. Refer to the Position Bidding and Award Eligibility for Regular Employees JAG.

4.4 Position Awards

4.4.1 Seniority and qualifications will be considerations in awarding a posted position. With agreement between the Union and the Company, certain positions will be awarded based on qualifications first and then seniority. Bidders will be considered for posted positions regardless of their currently

assigned Company-based location except as provided for in 4.10. Refer to the Job Description JAG.

- 4.4.2 Position awards will be published within fourteen (14) calendar days of acceptance by the Employee. Employees will be moved to the new position as soon as possible, usually within twenty-one (21) calendar days of accepting the award.
 - 4.4.2.1 Extensions to the above timelines from twenty-two (22) calendar days up to a maximum of 120 calendar days may be made after discussion with the Employee and upon mutual agreement between the releasing and receiving Supervisors.
 - 4.4.2.2 Employees not in the new position after fourteen (14) calendar days from the position award will receive any applicable pay increases and begin accumulating either Job Seniority or Line of Progression Seniority as of the fourteenth (14th) calendar day from the Employee's acceptance of the award.
- 4.4.3 The following are the principles that apply when awarding positions for: Open Jobs, Line of Progression Jobs, and Jobs involving Progression without Bidding (unless otherwise agreed that the position is selected on qualifications first and then seniority).

4.4.3.1 Open Jobs

Qualified bidders will be awarded positions based on seniority in the following order:

- Job Seniority for the position posted for bid, then
- Company Seniority.

4.4.3.2 Line of Progression Jobs

Qualified bidders will be awarded positions based on seniority in the following order:

- Line of Progression Seniority in the line of the position posted for bid, then
- Company Seniority.

4.4.3.3 Jobs Involving Progression without Bidding

Employees will progress based on meeting the qualifications and performance standards for the higher level position. Progression may be limited by position availability. In this case, the most senior qualified person will progress, based on seniority in the following order:

• Job Seniority in the lower position, then

- Company Seniority.
- 4.4.4 For a list of Jobs Involving Progression without Bidding refer to the Job Description JAG.

4.5 Performance Qualifying Standards

- 4.5.1 An Employee awarded a new position must satisfy the Performance Qualifying Standards during the established qualifying period.
- 4.5.2 There are four circumstances where an Employee becomes subject to failure to qualify:
 - 4.5.2.1 For failure to qualify during the established qualifying period, refer to the Failure to Qualify During Qualifying Period JAG.
 - 4.5.2.2 For subsequent failure to meet Performance Qualifying Standards at any time after initial qualification requirements are satisfied, refer to the Failure to Maintain Performance Qualifying Standards JAG.
 - 4.5.2.3 For failure to qualify on welding qualification requirements, refer to the Oxy-Acetylene Welding Procedure to Recertify JAG and/or Mechanic Welder Procedure to Recertify JAG.
 - 4.5.2.4 For failure to qualify on other testing requirements, refer to the Field Operations Testing Failure to Qualify JAG.

4.6 Right to Return to Former Position

- 4.6.1 Employees have sixty (60) calendar days after reporting to a new and different position to voluntarily return to their former position. This right provides a one-time ability to return for any reason. Any subsequent request to return to their former position within a rolling five (5) year period from the date of award must be mutually agreed upon by the Union and the Company. An Employee still retains the right to bid on any position posting at any time. The Employee will not continue to accumulate Job or Line of Progression Seniority while he or she is away from the former position.
- 4.6.2 Right to Return to Former Position does not apply to situations where movement is to the same position at any location.

4.7 Waivers

A waiver is a mechanism for an Employee to voluntarily return to a former position or to forego advancement. There are two types of waivers: Progression (Advancement) Waivers and Position Waivers. The waiver definitions and processes are described in the Waivers JAG.

4.8 Workplace Location Exchange

Employees may request a workplace location exchange by completing a "Workplace Location Exchange Request" form. Refer to the Workplace Location Exchange JAG for criteria and process.

4.9 Retention of Higher Rate

- 4.9.1 Jobs awarded based on qualifications are not eligible for rate retention. See the Job Description JAG.
- 4.9.2 When an Employee in a Line of Progression position is working up a grade, the Employee will be paid at the entry level rate for the first 260 working days. Once an Employee in a Line of Progression position has worked up a grade for 260 working days, the Employee will continue to receive the higher rate of pay at the experienced level, until such Employee leaves his or her position or signs a Progression Waiver.
- 4.9.3 When an Employee with less seniority in a Line of Progression works up a grade ahead of a senior Employee in the same Line of Progression at the same Company-based location, the most senior Employee will also be paid entry level at the higher rate for the day, except when the less senior Employee is working up into a qualifications based job (e.g., Construction 4).
- 4.9.4 If a less senior Employee at the same Company-based location reaches rate retention prior to a senior Employee at the same Company-based location in the same Line of Progression because the senior Employee was on a Short-Term Assignment, the senior Employee will be designated as rate retained.
- 4.9.5 When working up into qualification based jobs (e.g., Construction 4) only the Employee working up is paid the higher rate for the day.
- 4.9.6 Effective June 1, 2014, rate retention is not allowed for the Construction 4 positions. All Construction 3 positions will on June 1, 2014, go to the published rate for that position and will not be considered "Rate Retained" in the Construction 4 position.

4.10 Temporary Positions/Internal Assignment of Employees

4.10.1 Short-Term Assignment of Employees

4.10.1.1 Employees may be temporarily assigned for 120 calendar days or less per calendar year to a position for which they qualify or may be trained based on Company needs. Any individual Employee assignment longer than 120 calendar days shall be by mutual agreement of the Union and the Company. The Chief Stewards will be notified by management no later than the start of any Short-Term Assignment expected to last longer than seven (7) calendar days.

- 4.10.1.2 Consecutive assignments for the same position longer than 240 calendar days shall be by mutual agreement of the Union and the Company.
- 4.10.1.3 An Employee who is assigned to perform a higher grade position will be compensated at the higher of the Employee's current or assigned rate for the hours worked at that rate up to four (4) hours of the day. An Employee who works four (4) hours or more is paid for the full day at the higher rate.
- 4.10.1.4 Employees will continue to accumulate Job or Line of Progression seniority in their regular position during such assignments.
- 4.10.1.5 An Employee returning from an authorized absence may be temporarily assigned to other work regardless of seniority.

4.10.2 Long-Term Special Assignment

A Long-Term Special Assignment (LTSA) is a special, voluntary work opportunity that is up to twelve (12) months in length. Requests for extensions beyond the initial term will be mutually reviewed and agreed upon by the Union and the Company. All LTSAs are subject to the Long-Term Special Assignment JAG.

4.10.3 Assignment to Non-Bargaining Position

An Employee may be assigned to a non-bargaining position, either exempt or nonexempt. The Company's non-bargaining unit processes apply with respect to the assignment, however, the Employee will continue to retain Union membership status (including benefits) and pay Union dues. The Company will notify the Chief Stewards no later than the start of the non-bargaining assignment.

4.10.4 Relief Positions

Relief positions may be posted only after careful consideration of all other alternatives including workload redistribution, overtime, part-time positions, temporary assignment, Temporary Workers, Term Employees, and contracting work. All relief positions require approval by the Union and the Company. All relief positions are subject to the Relief Positions JAG.
ARTICLE 5 WORKING CONDITIONS

5.1 Schedules and Overtime

5.1.1 General

This Article recognizes the fact that we must provide uninterrupted service to our customers as a matter of public safety and health. The Company retains the right to manage the business and direct the work and workforce, including the right to determine schedules and require overtime, subject to the rules listed below.

5.1.2 General Definitions and Rules

- 5.1.2.1 For the purposes of calculating overtime and establishing schedules, the workweek for all Employees begins at 12:01 a.m. on Monday and ends at 12:00 a.m. (midnight) on Sunday.
- 5.1.2.2 A regular full-time schedule will typically be five (5) workdays of eight (8) hours duration. Alternate schedules may be required by Management, based on business needs.
- 5.1.2.3 Each Employee's workday begins at the start of his or her shift and continues for twenty-four (24) hours or until the beginning of his or her next shift, whichever is sooner.
- 5.1.2.4 An Employee's shift is defined as scheduled working hours within a workday.
- 5.1.2.5 Shift types are defined based on the scheduled start time as follows:

<u>Regular Shift:</u>	<u>Start time:</u>
Day Shift	06:00 a.m 9:59 a.m.

Alternate Shifts:	Start time:
Swing Shift	10:00 a.m 5:59 p.m.
Graveyard Shift	06:00 p.m 5:59 a.m.

- 5.1.2.6 Work schedules define the workdays and shifts and shall be documented by each department and/or workgroup as appropriate.
- 5.1.2.7 An Employee who reports for work on a regularly scheduled workday and is then sent home for lack of work shall be paid for his or her scheduled shift at the rate such Employee would have received.
- 5.1.2.8 Unless otherwise stated, overtime is calculated on actual hours worked, not hours paid.

5.1.2.9 If pay is due an Employee under two (2) or more provisions of 5.1, only the highest payment required under any provision of 5.1 shall be paid. This should only be used when a situation is ambiguous and all sections of the Joint Accord have been reviewed.

5.1.3 Flexible Schedules

- 5.1.3.1 An Employee may work a flexible work schedule (e.g., four [4] ten-hour days) and/or make up lost time in his or her work schedule within the same workweek if mutually agreed upon by the Employee and Management.
- 5.1.3.2 If an Employee requests a temporary flexible work schedule, this temporary schedule is not considered a regularly scheduled workweek and Saturday/Sunday and Alternate Shift Work premiums will not apply for the shift(s) impacted by the temporary schedule change.

5.1.4 Unplanned Schedule and Shift Changes

5.1.4.1 Unplanned Schedule Changes

Changes in an Employee's scheduled workdays affecting the Employee's scheduled days off made with less than forty-eight (48) hours advanced notice are considered Unplanned Schedule Changes.

5.1.4.2 Unplanned Shift Changes

- 5.1.4.2.1 Changes in an Employee's scheduled working hours (i.e., shift) made with less than twelve (12) hours notification prior to the start of the new shift are considered Unplanned Shift Changes.
- 5.1.4.2.2 An Employee already at the reporting location up to one (1) hour before the Employee's scheduled shift may be assigned to an earlier start time. The shift for that Employee will be moved to one (1) hour earlier from the start of the Employee's regular shift and such change is not considered an Unplanned Shift Change or a Call-In. Employees may be required to work through to the end of their original shift and may be required to work additional overtime.
- 5.1.4.2.3 An Employee in the process of commuting in an assigned Company vehicle to or from the reporting location may be assigned an extended shift and such change is not considered an Unplanned Shift Change or Call-In. If commuting away from the reporting location, the time from the end of the shift to the time of the request is considered time worked.
- 5.1.4.2.4 When an Employee meets the conditions to be afforded a rest under 5.1.8 is required to return to work before the end of the Employee's

eight (8) hour rest period, all hours worked are considered an Unplanned Shift Change.

- 5.1.4.2.5 After the start of an Employee's shift, if an Employee is released and rescheduled for a later start time, all hours worked are considered an Unplanned Shift Change.
- 5.1.4.2.6 This language is illustrated in the Call-in and Shift Change Intent JAG.

5.1.5 Overtime Pay

- 5.1.5.1 An Employee shall be paid at one and one-half $(1-\frac{1}{2})$ times the regular rate, including the applicable premiums, for:
 - The first twelve (12) hours worked on the first scheduled day off for any time worked.
 - The first twelve (12) hours worked on an Unplanned Schedule Change or an Unplanned Shift Change except as provided for in 5.1.5.2.
 - Hours worked in excess of an Employee's shift (minimum eight [8] hours) when working a regular full-time schedule.
 - Hours worked in excess of forty (40) regular hours in a workweek when working a regular full-time, flexible or part-time schedule.
- 5.1.5.2 An Employee shall be paid at two (2) times the Employee's regular rate, including the applicable premiums, for:
 - More than four (4) hours worked in excess of an Employee's shift (minimum eight [8] hours), or hours worked in excess of forty (40) regular hours plus twenty (20) time-and-one-half hours in a workweek.
 - All hours worked on the second scheduled day off in a workweek when no schedule change is involved. This applies only if an Employee works at least eight (8) hours on the first scheduled day off.
 - All hours worked on a Sunday that is a scheduled day off.
 - Call-Ins as provided for in 5.1.7.
 - All hours worked on an Unplanned Shift Change, where the original shift has been moved to an earlier start time by greater than four (4) hours.

- All hours worked on Holidays as provided for in 13.5.
- 5.1.5.3 Short duration work on a scheduled day off will be paid at a minimum of two (2) hours at the appropriate overtime rate.

5.1.6 On-Call Assignment

- 5.1.6.1 On-Call Assignments shall be filled between the qualified resource center, department and/or workgroup Employees as equitably as practicable; qualified Employees are those identified by Management as having the necessary skills to handle emergency response work.
- 5.1.6.2 If Employees are assigned a Company vehicle for the purposes of emergency response when On-Call, travel to and from work is not considered commuting for the purposes of 5.1.4.2 nor is it considered paid time. Employees working On-Call Assignment are required to accept any Call-Ins.
- 5.1.6.3 Employees are responsible for the accuracy of their contact information. On-Call guidelines shall be documented by each department and/or workgroup as applicable.
- 5.1.6.4 On-Call Assignment on an Employee's regularly scheduled workday begins at the end of the Employee's regular work shift including overtime worked beyond the end of the Employee's regular shift and ends at the start of the Employee's next shift the following day. On-Call Assignment on an Employee's scheduled days off (typically Saturday/Sunday) begins at 7:00 a.m. and ends after twenty-four (24) hours or the start of the Employee's next regular shift.

5.1.6.5 Pay for On-Call Assignment

- \$50.00 for each On-Call Assignment on an Employee's regularly scheduled workday,
- \$75.00 for each On-Call Assignment on an Employee's scheduled days off, and
- \$100 for each On-Call Assignment that begins on an actual (not an Observed) Holiday as defined in 13.1.

Effective December 1, 2015, the amounts listed in 5.1.6.5 will be increased annually at the same time and percentage as the Scheduled Annual Increase in 10.2.2.1.

5.1.6.6 Recognition for On-Call Assignments

- 5.1.6.6.1 Employees who have between seventy-five (75) and ninety-nine (99) On-Call Assignments in a calendar year will receive a payment of one point five percent (1.5%) of that Employee's regular and overtime earnings for that same calendar year payable in a lump sum on the second regularly scheduled paycheck in January of the next year.
- 5.1.6.6.2 Employees who have 100 or more On-Call Assignments in a calendar year will receive a payment of two point five percent (2.5%) of that Employee's regular and overtime earnings for that same calendar year payable in a lump sum on the second regularly scheduled paycheck in January of the next year.
- 5.1.6.7 Call-In pay is in addition to On-Call Assignment pay, as provided in 5.1.7. On-Call Assignment periods are not to be counted as time worked for the purpose of calculating overtime.

5.1.7 Call-In

The language of 5.1.7 is illustrated in the Call-in and Shift Change Intent JAG.

- 5.1.7.1 When an Employee is notified to report for emergency, immediate or unplanned work within the same workday after completion of the Employee's shift, or on a scheduled day off, the time worked shall be considered a Call-In except as described below.
 - 5.1.7.1.1 If the Call-In abuts the next regular shift, the Call-In will be considered as an Unplanned Shift Change as per 5.1.4.2. This shift change is not eligible for alternate shift work pay.
 - 5.1.7.1.2 It is not a Call-In when:
 - An Employee is requested to extend hours in conjunction with a regular shift;
 - An Employee is commuting in an assigned Company vehicle per 5.1.4.2.3, except for an Employee on an On-Call Assignment per 5.1.6.2;
 - An Employee is on site within one hour of start of shift and requested to start his or her shift early per 5.1.4.2.2;
 - An Employee is requested at least twelve (12) hours in advance to work additional hours on a scheduled day off. A minimum of two (2) hours at the appropriate overtime rate will apply and the work time shall start at the reporting location.

- 5.1.7.2 Call-In procedures shall be developed and documented by each department and/or workgroup as appropriate utilizing the Guide for Partnership Decision Making JAG.
- 5.1.7.3 For immediate response (unplanned), paid time for the Call-In begins when the Employee goes "en route" to the reporting location. En route status will be established by phone or electronic notification to the Company that the Employee is traveling to the reporting location.
- 5.1.7.4 For non-immediate response (planned), paid time for the Call-in begins when the Employee arrives at the reporting location, unless an Employee is assigned a Company vehicle during this time period, in which case time starts when the Employee goes "en route." En route status will be established by phone or electronic notification to the Company that the Employee is traveling to the reporting location.
- 5.1.7.5 Call-Ins end upon completion of work and return to the reporting location unless an Employee is assigned a Company vehicle during this time period, in which case time ends when the Employee returns to his or her originating location.
- 5.1.7.6 Employees called in will be paid a minimum of two (2) hours at two (2) times their rate of pay. All subsequent Call-Ins that begin on the same scheduled day off or workday will be paid at two (2) times the Employee's rate of pay for actual hours worked. Employees called in are obligated to remain in contact and be available to work for the full two (2) hours that they are being compensated.

5.1.8 Time Excused Due to Extended Work

The language of 5.1.8 is illustrated in the Call-in and Shift Change Intent JAG.

- 5.1.8.1 The Employee will be afforded the opportunity of taking eight (8) hours of non-worked time and returning to complete the remainder of the scheduled shift when within the twelve (12) hour period before the start of the regularly scheduled shift the Employee works:
 - A total of six (6) or more hours duration (consecutive or aggregate); or
 - Three (3) or more Call-Ins and the Employee has less than eight (8) hours of non-worked time immediately prior to the start of the Employee's next scheduled shift.
- 5.1.8.2 Additionally, for safety reasons, following unscheduled work and/or Call-Ins prior to a regularly scheduled shift, Management reserves the right to

excuse an Employee for some or all of the Employee's regularly scheduled shift.

Time excused or worked for the remainder of the regular shift shall be paid at the straight-time rate and shall be counted as time worked for the purpose of calculating overtime.

5.2 Work Reporting Methods

5.2.1 General

Work reporting methods, including facility-based reporting, jobsite reporting and telecommuting, are defined below. All Employees have a work reporting method, in addition to a Company-based location, both of which are determined and assigned by the Company. The Company may change Employees' Company-based location and work reporting method based on business needs.

- 5.2.1.1 Work reporting methods contained in 5.2 do not address mileage reimbursement or compensation for time spent traveling. Refer to the Compensation for Travel JAG for these provisions.
- 5.2.1.2 When a work reporting method other than facility-based reporting is utilized, department/workgroup guidelines addressing the application of the method will be established utilizing the Guide for Partnership Decision Making JAG.

5.2.2 Facility-Based Reporting Method

The facility-based reporting method establishes a location to which the Employee reports (e.g., resource center, corporate office or storage facility). Under this method, the Company-based location is the reporting location. The Employee must be at that reporting location and ready to work at the Employee's scheduled start time.

5.2.3 Jobsite Reporting Method

The jobsite reporting method establishes varying reporting locations (e.g., job sites, facilities or geographic work areas) to which the Employee reports. The Employee must be at the Employee's reporting location and ready to work at his or her scheduled start time. Additionally, the Employee must be at the Employee's reporting location at the end of his or her shift, unless otherwise directed. Under this method, the Company-based location is not considered the fixed official work location/station.

5.2.4 Telecommuting Method

The telecommuting method establishes a reporting location off Company property, which is typically the Employee's residence. An Employee who is telecommuting must log in to the appropriate corporate software systems and be ready to work at the Employee's scheduled start time. Under this method, the Company-based location is

not considered a fixed official work location/station. Company policies and department guidelines will define additional requirements for telecommuting.

5.3 Health and Safety

- 5.3.1 It is the Company's responsibility to provide a safe work environment and to operate its system safely. The parties mutually agree to promote safe work practices, which include providing appropriate personnel and equipment to meet health and safety obligations. Changes to protective gear and related allowances provided by the Company will be mutually agreed to by the Union and the Company, unless otherwise required by applicable law.
- 5.3.2 All Employees are subject to the Company's Drug and Alcohol policies.

5.4 Emergency Operations

If adverse or emergency conditions exist, Employees may be given alternative work assignments and/or work locations.

ARTICLE 6 EMPLOYEE DISPLACEMENT

6.1 General

Employee displacement includes work redesign, redeployment, lack of work, bumping process, and layoff.

6.2 Work Redesign

Work redesign may occur within a department, a workgroup, a resource center, or company-wide resulting in Employee position status change or displacement from position. See the Work Redesign Process JAG for the process that addresses the impact on Employees as a result of work redesign.

6.3 Redeployment

- 6.3.1 Redeployment is a process utilized to retain a Regular Employee whose job has been eliminated due to work redesign, or may be used in a regional lack of work if mutually agreed upon by the Union and the Company. This process may also be used as a result of Failure to Qualify During Qualifying Period as defined in 4.5.2.1.
- 6.3.2 This process shall include preferential consideration for the displaced Regular Employee in the bidding and selection process for equivalent or lower grade positions for which the Employee meets bidding qualifications. As an alternative to bumping, the Company may assign such Employee to a position for which the Employee meets bidding qualifications. Refer to the

Redeployment Process and Failure to Qualify During Qualifying Period JAGs.

6.4 Lack of Work

- 6.4.1 If the Company declares a regional lack of work in a location or workgroup, Regular Employees may be permanently assigned from one work location to another. Regular Employees involved in regional lack of work will have their pay guaranteed per 1.5. Once the Company has declared a regional lack of work, the impact and application of that determination shall be mutually agreed upon by the Union and the Company.
- 6.4.2 If the Company declares a Company-wide lack of work, the bumping process shall be applied per 6.5.
- 6.4.3 The Union and the Company agree that in the case of unforeseen events that could cause the need for a temporary reduction in the amount of work available either Company-wide, in a location, or workgroup, the Union and the Company will meet to determine the method by which they may meet the challenges of the unforeseen event(s). Prior to the Company initiating any forced reduction in available work hours, the Union and the Company will endeavor to use as many voluntary means they deem appropriate and which meet the joint interests of the parties. Situations covered under 6.4.3 are not considered a permanent event and will not be subject to other provisions of this agreement such as layoff or bumping rights.

6.5 Bumping

Bumping, as described in the Bumping Process JAG, may be available for use in the following circumstances:

- Redeployment resulting from work redesign (refer to the Redeployment Process JAG),
- Redeployment resulting from Failure to Qualify During Qualifying Period (refer to the Redeployment Process JAG), and
- Company-declared lack of work.

6.6 Layoff

- 6.6.1 The parties agree that a layoff will only occur when the Company determines a need to reduce its workforce. The Company may layoff any Employee who has not earned Employment Security as defined in 1.4.
- 6.6.2 Regular Employees shall be given ten (10) working days advance notice before a layoff expected to last longer than ten (10) working days.

ARTICLE 7

PERFORMANCE DEVELOPMENT AND MANAGEMENT

7.1 Performance Appraisal

Management is responsible for maintaining an appraisal system to measure a Regular Employee's level of performance and provide feedback. Performance qualifying standards will be established by Management with appropriate partnership involvement. Refer to the Involvement JAG. The results of the appraisal process will determine if performance requirements have been or continue to be satisfied for:

- Probationary period,
- Qualifying period,
- Incumbents ongoing performance appraisal, at least annually, and
- Advancement to the Experienced pay rate for the position (see 10.1.2)

7.2 Performance Development Plan

A Performance Development Plan (PDP) shall be used for incumbent Regular Employees who have been assessed as "not meeting" performance qualifying standards. However, Performance Development Plans are not to be used for Term Employees, Probationary Regular Employees, and Regular Employees in their qualifying period, or situations warranting immediate use of the progressive discipline process. Refer to the Performance Development Plan JAG.

7.3 Statement of Expectations

- 7.3.1 A Statement of Expectations is a non-disciplinary coaching tool a Manager or Supervisor may use to outline and help an Employee understand the Manager's or Supervisor's expectations of the Employee.
- 7.3.2 At times a Manager or Supervisor may choose to provide an Employee with a Statement of Expectations to further communicate or document expectations. A Statement of Expectations may be open-ended or end-dated and is retained in the Employee's personnel file.

ARTICLE 8 ATTENDANCE

- **8.1** The Union and the Company agree that Employees' regular and reliable attendance is critical to the success of the Company. The Union and the Company further agree that late arrivals to work, early departures from work, and other unscheduled and unapproved absences are disruptive and should be avoided. Employees are expected to be at work each scheduled workday, on time and ready and able to work and all Employees are expected to have regular, reliable and punctual attendance. Appropriate use of PTO, disability benefits (Short-Term Disability, Long-Term Disability and Workers' Compensation), and protected forms of leave as defined by Company policy are essential to Employee well-being, a healthy work environment, and a committed workforce, which are integral factors in Company performance.
- **<u>8.2</u>** The details of the Company's attendance requirements for Employees are stated in the Company's Attendance policy and in the Attendance JAG.

ARTICLE 9 ISSUE RESOLUTION

9.1 Introduction

The Issue Resolution Process is the agreed to method to address questions, conflicts and disputes of a non-disciplinary nature. (Disciplinary actions including involuntary terminations are addressed through the Grievance Process.) The Issue Resolution Process is not intended to be a substitute for direct dialogue between Employee and Supervisor. The objective of the Issue Resolution Process is to promote open and continuous communication to determine what's right, not who's right, regarding concerns in the workplace. This process is established on the premise of trust, respect and the mutual goal of resolving issues at the earliest opportunity and appropriate level.

9.2 Issue Resolution Process

- 9.2.1 The Employee and the Supervisor should first meet informally to resolve the Issue(s). In the event there is no resolution and the Steward was not present, the Employee and Supervisor should inform the Steward of the Issue(s) discussed and any recommendation(s) regarding resolution(s) to the Issue(s) and attempt to further resolve the Issue(s) informally.
- 9.2.2 Issues that cannot be resolved informally can be filed by the Employee or a Steward on behalf of an Employee and should be processed as outlined below unless approved or directed otherwise by the JAC Co-Chairs. Issues may necessitate meeting more than once at any particular step and/or obtaining information from additional sources, however, each step will be addressed in an expedient manner.

- 9.2.3 Issues that impact more than a single department enter this process at Step 2.
- 9.2.4 Resolutions that are changes to work rules/conditions, or other items that may impact other workgroups or employees shall be submitted to the JAC Co-Chairs for review and approval.
- 9.2.5 Issues not resolved at 9.2.1 shall follow the steps below.

<u>Step 1:</u> Participants: Employee, Steward and First Line Supervisor and other parties as necessary

- <u>Scope:</u> Unresolved Issue after informal discussion. The Issue shall be formally documented on the appropriate form and submitted to the Employee's Supervisor.
- Procedure: The Union Steward and/or Employee have ten (10) working days to file an Issue for the Employee(s) or the Union Steward on behalf of the Employee(s) from the event or knowledge of the event. The Supervisor and Steward shall meet within a reasonable period of time not to exceed thirty (30) calendar days. Resolved and unresolved outcomes of the Issue Resolution meeting will be documented. Copies will be sent to the Chief Steward and Manager for final approval. Copies of the approved resolutions will be submitted to Human Resources and the Union Office within ten (10) working days from the Step 1 approval. Unresolved Issues will enter the Step 2 process.

Unresolved issues will be documented with any recommendations and forwarded within ten (10) working days to the Manager by the Supervisor and to the Chief Steward by the Steward.

Step 2:Participants: Individuals involved in Step 1 plus ChiefSteward(s) and Manager(s) responsible for department(s) (or
representative) and other parties as necessary

- <u>Scope:</u> Unresolved Issues with documentation from Step 1 or unresolved Issues referred back from Step 3. Issues may be introduced to Step 2 due to impact to multiple departments and/or workgroups.
- Procedure: The Chief Steward and Manager shall meet within a reasonable period of time not to exceed thirty (30) calendar days. The Chief Steward and Manager should mentor Step 1 parties to identify underlying interests and pursue resolution of the Issue. The Chief Steward and Manager along with the participants from the previous Step will include any other appropriate stakeholders in the effort to resolve the issue.

Resolved outcomes of the Issue Resolution meeting will be documented. Copies will be sent to the Union Office by the Chief Steward and to Human Resources by the Manager within ten (10) working days from the Step 2 meeting. JAC Co-Chairs will review and approve resolutions that are changes to work rules/conditions, or other items that may impact other workgroups or employees.

Unresolved Issues will be documented with any recommendations and forwarded within ten (10) working days by the Chief Steward and Manager to their respective JAC Co-Chair for review and recommended action prior to entering the Step 3 process.

Step 3: Participants: Appropriate members of the Joint Accord Committee or other parties as necessary

- <u>Scope:</u> Unresolved Issues from Step 2 as determined by the JAC Co-Chairs and other items referred from the JAC Co-Chairs or by the Company's Executives responsible for labor relations and the Executive Secretary-Treasurer of OPEIU Local 11.
- <u>Procedure:</u> JAC Co-Chairs review documentation and determine appropriate action within a reasonable time not to exceed thirty (30) calendar days from receipt of the Issue form or referral. Referrals must be documented on the Issue form. Such form or referral shall indicate the reason the Issue was not resolved at the previous Step or the reason for the referral.

Appropriate action may include, but is not limited to:

- Resolution of the Issue,
- Referral back to Step 2 of the Issue Resolution Process,
- Referral to a committee for recommendations (Interpretations, Communications, Compensation, Training, and/or Ad Hoc Committee),
- Referral to JAC, and
- Referral to JAC Leadership Team (LT) for resolution. (The JAC Leadership Team is defined as the JAC Co-Chairs and the Company's Executives for labor relations and the Executive Secretary-Treasurer of OPEIU Local 11.)
- 9.2.6 If the Issue is advanced to and retained by the LT, the LT will review the Issue and make such determination they deem necessary to resolve the Issue. In cases only where the Issue is a claimed violation of the Accord and remains unresolved at the LT, either party may direct the Issue to Level 3 of the Grievance Process. The Issue is then closed. Issues directed to the Grievance Process will be resolved in that process and end there. The LT will provide notification of the referral to the Grievance Process to all parties involved within ten (10) working days.

- 9.2.7 All Step 3 documented resolutions must be approved by the Company's Executives responsible for labor relations and the Executive Secretary-Treasurer of OPEIU Local 11. Resolutions reached at this step will be final and binding on both parties and documentation forwarded to the filing parties within ten (10) working days of the decision.
- 9.2.8 All timelines above may be extended by mutual agreement of the Union and the Company. If extended, notification will generally be provided to all parties along with status and anticipated action within three (3) working days of the decision to extend or as soon as possible thereafter.
- 9.2.9 Nothing in this language precludes a party from withdrawing an Issue at any time with notification to the Union Office and Human Resources.

ARTICLE 10 WAGES

10.1 Pay Rates

Each job will be placed in a pay grade. Each pay grade will have at least two pay steps.

10.1.1 Entry Rate

This rate of pay is one step below the Experienced Rate.

An Employee entering a position which has only two pay steps shall receive the Entry Rate when:

- Entering a new position in a higher pay grade,
- Entering a new position in the same grade when an Employee is currently receiving the entry pay rate,
- Entering the same or lower position and an Employee has never received the Experienced Rate for either position.

10.1.2 Experienced Rate

This is the top rate of pay an Employee will receive for that grade.

- 10.1.2.1 Before receiving the Experienced Rate an Employee must successfully complete all of the following:
 - Any applicable In Training programs.

- Receive the Entry Rate for the new position for a period not less than 260 working days (credit towards the 260 working days will be given for any previous days worked in the same or higher grade at the Entry Rate).
- The qualifying period for the position.
- Receive satisfactory performance evaluation(s).
- 10.1.2.2 Employees who have previously held the same or higher grade and who received the Experienced Rate for the same or higher grade shall also be paid the Experienced Rate.

10.1.3 Additional Pay Steps

Under certain circumstances, positions may have additional pay steps. These positions must be mutually agreed to and have formal In Training programs. Refer to the Positions with Additional Pay Steps JAG.

An Employee entering a position with these additional pay steps will receive the appropriate rate of pay in accordance with the Positions with Additional Pay Steps JAG. The starting rate shall not be less than eighty percent (80%) of the Experienced Rate.

10.2 Scheduled Annual Increases

Increases to wages are incorporated into the 2014 Wage Scale at the end of this Accord. These negotiated rates were achieved utilizing the guiding principle of alignment with market practices. This principle was applied to the agreed to comparable companies, surveys and job matches to develop the 2014 Wage Scale.

10.2.1 Effective June 1, 2014

An Employee's rate of pay shall be adjusted depending upon the Employee's current rate of pay as follows:

- 10.2.1.1 All Employees shall receive the rate of pay contained in the Wage Scale, except:
 - Employees whose current rate of pay is equal to or less than one percent (1%) below that listed in the Wage Scale shall on June 1, 2014, receive a one percent (1%) wage increase.
 - Employees whose current rate of pay is greater than that listed in the Wage Scale shall receive a wage increase of one percent (1%).

- Employees in positions covered by pay guarantees in 1.5 are covered in 10.6 below.
- 10.2.1.2 Wage Scales for subsequent years shall be published and distributed in November of each year.

10.2.2 Effective December 1, 2015

10.2.2.1 For Employees whose current rate of pay is equal to that contained in the Wage Scale, the minimum Scheduled Annual Increase is specified in the table below.

Scheduled Annual Increases			
Effective Date	Percentage Increase		
December 1, 2015	3%		
December 1, 2016	3%		
December 1, 2017	3%		
December 1, 2018	3%		

- 10.2.2.2 In the event the Consumer Price Index for Urban Wage Earners and Clerical Workers-US City Average (CPI-W) for the previous year is equal to or greater than four percent (4%), the percentage of the Scheduled Annual Increase will be adjusted in accordance with the Cost of Living Allowance Adjuster (COLA Adjuster) in 10.3.
- 10.2.2.3 Employees whose current rate of pay remains above the Wage Scale prior to the Scheduled Annual Increase shall receive increases when the:
 - Wage rate remains more than three percent (3%) above that contained in the Wage Scale prior to the Scheduled Annual Increase. The Employee shall receive a one percent (1%) increase in the Employee's current wage rate plus a lump sum* equivalent to the difference between the one percent (1%) wage increase and the Scheduled Annual Increase plus COLA Adjuster, if any.
 - Wage rate remains less than three percent (3%) above that contained in the Wage Scale prior to the Scheduled Annual Increase. The Employee shall receive that percentage amount of the Scheduled Annual Increase necessary added to the Employee's current wage rate to achieve the rate of pay equal to that amount specified in the Wage Scale. The difference between the percentage amount received and the Scheduled Annual Increase plus COLA Adjuster, if any, shall be in a lump sum* amount.
 - Employees with pay guarantees in 1.5 are covered in 10.6.

*Lump sums owed under these provisions shall be calculated based on the Employee's regular and overtime earnings for pay periods ending in the preceding twelve (12) month period between December 1 and the following November 30, and shall be paid on the Employee's first pay check in December of each year.

10.3 Cost of Living Allowance (COLA Adjuster)

10.3.1 Adjustments to the Scheduled Annual Increase shall only occur when the CPI-W for the twelve (12) month period ending June of the current year, is equal to or greater than four percent (4%) for that year. In such cases, the Scheduled Annual Increase for that year shall be adjusted upward by eighty-five percent (85%) of that amount of the CPI-W that is in excess of the Scheduled Annual Increase. In no case shall the COLA Adjuster plus the Scheduled Annual Increase exceed six percent (6%). There shall be no downward adjustment.

Example One:

If the CPI-W for the twelve (12) month period ending in June 2015 is four percent (4%), eighty-five percent (85%) of the CPI-W in excess of the three percent (3%) Scheduled Annual Increase will be added to the Scheduled Annual Increase for a total wage increase of three point eight-five percent (3.85%). (3% Scheduled Annual Increase + [.85 of 1% = .85%] = 3.85%).

Example Two:

If the CPI-W for the twelve (12) month period ending June 2015 is two percent (2%), the Scheduled Annual Increase will be three percent (3%). There will be no downward adjustment.

10.3.2 In November of each year, the Company shall publish and distribute a new Wage Scale based upon the Scheduled Annual Increase plus COLA Adjuster, if any.

10.4 Market Evaluation

10.4.1 The Company shall conduct a market evaluation of wages during the term of this Accord using the same comparable companies, surveys and job matches, and methodology used in the negotiations for the current Accord. The evaluation shall occur as near to the midpoint of the Accord as is practicable. Only those positions outside of a (+/-) five percent (5%) range will be adjusted as appropriate.

10.4.2 Job matches that have changed, between the beginning of the Accord and the market evaluation, will be substituted for the job matches used during negotiations.

10.5 Job Compensation Evaluations

The JAC Compensation Committee composed of Union and Company representatives, will evaluate pay grades as described in the Job Description JAG.

10.6 Honored Pay Rate Employees

- 10.6.1 Effective June 1, 2014, Honored Pay Rate Employees whose current rate of pay is in excess of the rate contained in the Wage Scale shall receive a lump sum amount in 2014, equal to one percent (1%), payable on the first pay period following June 1, 2014. Calculation will be based on the Employee's regular and overtime earnings for pay periods ending in the preceding twelve (12) month period between June 1, 2013, and May 31, 2014.
- 10.6.2 Effective 2015 and for the term of the Accord, Honored Pay Rate Employees shall receive a lump sum equal to the Scheduled Annual Increase and COLA Adjuster, if any. This lump sum payment shall continue until the difference between their current rates of pay prior to the Scheduled Annual Increase is less than three percent (3%) more than the rate of the Wage Scale. At that time, they will receive that percentage amount necessary for their current wage to equal that in the Wage Scale with the difference between that amount and the Scheduled Annual Increase plus COLA Adjuster, if any, in a lump sum*.

*Lump sums owed under these provisions shall be calculated based on the Employee's regular and overtime earnings for pay periods ending in the preceding twelve (12) month period between December 1 and the following November 30 and shall be paid on the Employee's first pay check in December of each year.

10.6.3 In the event an Honored Pay Rate Employee bids into a position with a Wage Scale rate lower than the pay rate for the position the Employee was placed or preferentially bid into that resulted in the pay guarantee, the Employee's pay shall be decreased to the rate contained in the Wage Scale for the position into which the Employee bid.

10.7 Key Goals

- 10.7.1 Key Goals for 2014 and 2015 will be determined by the Company and focused on sharing profits above the budgeted earning per share target for the year.
- 10.7.2 Beginning in 2016, the Key Goals opportunity between zero (0) and three percent (3%) will be based upon Key Goals measures as determined by the

Key Goals Committee. Any opportunity for awards above three percent (3%) will be determined by profits above the budgeted earnings per share target for the year as determined by the Company. The Key Goals Committee will be composed of Company selected representatives and representatives selected by the Union.

10.7.3 The maximum annual Key Goals award will be no greater than seven percent (7%) of eligible earnings and is only attainable if the Company has an exceptional year. The Key Goals Program contains definitions of eligible earnings and Employee eligibility.

10.8 Premium Pay Rates

10.8.1 Saturday/Sunday Pay

Hours worked on Saturday and/or Sunday as part of the Employee's regularly scheduled workweek shall be compensated an additional \$2.25 per hour.

10.8.2 Alternate Shift Work Pay

Hours worked on Swing and/or Graveyard shift as part of the Employee's regularly scheduled workweek shall be compensated an additional \$0.75 per hour.

Effective January 1, 2016, the rate per hour in 10.8.2 will be increased to \$1.00.

10.8.3 HAZWOPER Work Pay

Employees trained to perform duties identified by the Company as HAZWOPER (Hazardous Waste Operations and Emergency Response) will receive an additional \$2.00 per hour when performing such duties.

10.8.4 Bilingual Pay

All hours worked by an Employee who is qualified for and participating in an approved Bilingual Program shall be compensated an additional \$0.75 per hour.

Effective January 1, 2016, the rate per hour in 10.8.4 shall be increased to \$1.00.

10.8.5 High Angle Work Pay

Employees identified, trained and certified in high angle work and rescue skills shall be paid an additional \$2.00 per hour when performing such duties.

When an Employee is eligible and earning premium pay under any of the categories listed in 10.8, that premium pay will be included when calculating the Employee's overtime rate.

ARTICLE 11 PAID TIME OFF (PTO)

11.1 General

- 11.1.1 Paid Time Off (PTO) benefits are available to Employees and may be used for vacation, illness, accident, family illness, medical appointments, or other personal business. PTO shall accrue according to Length of Service with the Company as defined in 11.3.
- 11.1.2 Employees will be required to take a minimum number of PTO hours annually (Annual Minimum Usage) as described in 11.2.2, but will otherwise be able to carry over accrued but unused PTO up to a total of 480 PTO hours. See the PTO JAG.
- 11.1.3 The JAC Co-Chairs may approve payout of Annual Minimum Usage time not taken that otherwise would be forfeited due to the inability to schedule the minimum because of a disability or protected leave. In all other cases, for Employees who do not take the full Annual Minimum Usage of PTO, the PTO will be forfeited.

11.2 Accrual

- 11.2.1 Regular Employees begin to accrue PTO benefits from the first day of regular employment. PTO benefits are credited to the Employee's account at the end of each pay period.
- 11.2.2 The rate of PTO accrual is based on a Regular Employee's Length of Service as follows:

Length of Service	Annual PTO Accrual	Annual Accrual In Hours	Annual Minimum PTO Usage* (*See the PTO JAG)
0 to less than 1 year	16 days	128 Hours	0
1 to less than 5 years	16 days	128 Hours	40 Hours
5 to less than 13 years	21 days	168 Hours	80 Hours
13 to less than 22 years	26 days	208 Hours	120 Hours
22 years and more	31 days	248 Hours	160 Hours

- 11.2.3 During the year in which an increase in annual PTO accrual occurs, the change will take place during the pay period of the Regular Employee's anniversary date and will be prorated for the calendar year.
- 11.2.4 Term Employees accrue PTO only as provided for in their Term Employment Agreement and the Term Employee JAG.

- 11.2.5 Employees who qualify for Short-Term Disability (STD), Workers' Compensation (WC) or protected leave as defined in Company policy will continue to accrue PTO during their first six (6) months of absence.
- 11.2.6 Employees do not accrue PTO while on Long-Term Disability (LTD) or after six (6) months on WC or protected leave as defined in Company policy, unless otherwise required by applicable law.
- 11.2.7 PTO will not accrue during a voluntary unpaid leave of absence of any duration (See 11.7).
- 11.2.8 Employees may borrow PTO in advance up to their current year annual accrual. An Employee who terminates employment with a negative PTO balance will be required to reimburse the Company for the PTO advanced to the Employee. Employees agree and understand that this reimbursement will be deducted from the Employee's final paycheck and that such deduction is specifically authorized as a term of this Joint Accord.
- 11.2.9 PTO accrual for Part-Time Regular Employees will be prorated based on the actual hours worked as compared to a full-time year of 2,080 hours.

11.3 Length of Service

- 11.3.1 Length of Service for purposes of determining PTO accrual shall be defined to include:
 - The time during which the Regular Employee was an Employee and received income (pay) or income replacement (e.g., STD, LTD, WC), regardless of whether that previous service was as a Regular or Term Employee; and
 - An approved period of absence without pay that is less than sixty (60) consecutive calendar days. In such a circumstance, the Regular Employee will retain his or her original hire date for the calculation of the Length of Service.
- 11.3.2 Length of Service does not include periods of absence without pay of sixty (60) or more consecutive calendar days, unless otherwise required by applicable law.
- 11.3.3 Regular Employees who have a break in service may be eligible for an adjusted PTO abridgement date for PTO accrual if their prior eligible Length of Service is greater than the time they were not an Employee of the Company. If so eligible for abridgement date, the duration of the break in service will not be credited toward Length of Service. The determination of this adjustment will be done at the time of rehire.

11.3.4 Section 11.3 addresses Length of Service for purposes of determining PTO accrual. Length of Service may be defined differently in other benefits plans, including, for example, the Retirement Plan for Bargaining Unit Employees. In such cases, the terms of the individual plan(s) control.

11.4 Buy Back Provision

Employees may request a buy back of their annual PTO accrual which exceeds the minimum usage requirement. Requests for buy back will be permitted so long as the PTO balance is not reduced below thirty-two (32) hours. The thirty-two (32) hour buy back restriction does not apply to the scheduling of PTO (i.e., PTO can be scheduled to a zero [0] balance, but not sold below the thirty-two [32] hour balance). Requests must be submitted prior to December 1st of each year. Buy back will be at 100% of the Employee's current rate of pay.

11.5 Rate of Pay

The rate of pay for PTO shall be computed at the Employee's wage rate for the Employee's current awarded position. If rate retained, this higher rate applies. In addition, the rate of pay shall include the appropriate Alternate Shift Work Pay and other premium pay if the Employee works (is scheduled to work) shift work and/or receives premium pay every working day.

11.6 Scheduling of PTO

- 11.6.1 Except for emergencies, bereavement and PTO for unanticipated illness as described in 14.1, requests for PTO for full or partial day absences must be made forty-eight (48) hours in advance and require prior Supervisor approval. The minimum increment of time that may be used for PTO is fifteen (15) minutes.
- 11.6.2 Employees will schedule PTO on a Company Seniority basis according to workgroup, department or resource center Guidelines. Refer to the PTO JAG.

11.7 Voluntary Leave of Absence Without Pay

A voluntary unpaid leave of absence is a leave of absence without pay that does not fall within any category of protected leave as defined in Company policy. Employees are eligible for a voluntary unpaid leave of absence only as provided for in Company policy. Annual PTO accrual must be exhausted before an Employee may take a voluntary unpaid leave of absence and PTO will not accrue during a voluntary unpaid leave of absence of any duration. Under certain business conditions the Executive Officer responsible for Human Resources may waive the requirement to use the annual PTO accrual prior to allowing voluntary leave without pay.

11.8 PTO Counts as Time Worked

Any PTO used by an Employee shall be treated as if it were time worked for the purpose of computing overtime.

ARTICLE 12 PAID BEREAVEMENT LEAVE

12.1 General

- 12.1.1 Regular Employees who have completed the probationary period of employment with the Company are eligible for Paid Bereavement Leave in the event of the death of a covered family member. Eligible employees may take up to a maximum of three (3) workdays of Paid Bereavement Leave for each death of a covered family member to grieve and attend to matters related to the loss. A covered family member is defined in the Company's Bereavement Leave policy.
- 12.1.2 Employees must notify the Company as soon as practical when taking Paid Bereavement Leave or any extension of bereavement leave covered by PTO in accordance with departmental absence reporting practices. Employees may be required to provide documentation.

12.2 Rate of Pay

The rate of pay for Paid Bereavement Leave shall be computed in the same manner as PTO as described in 11.5.

ARTICLE 13 HOLIDAYS

13.1 Holidays Defined

13.1.1 Paid Holidays

New Year's Day Memorial Day Independence Day Labor Day Thanksgiving Day Day after Thanksgiving Christmas Day Three (3) Floating Days per calendar year One (1) Additional Designated Holiday

13.1.2 Paid Holidays Falling on a Saturday and/or Sunday

Any Holiday which falls on a Sunday shall be observed on the following Monday; any Holiday which falls on a Saturday shall either be observed on another day or be paid at the Employee's regular straight-time pay as determined by the Manager (Observed Holiday). However, for Employees with regular schedules that include scheduled workdays of Saturday and/or Sunday, the Holiday shall be recognized on the actual date of the Holiday and not on the Observed Holiday.

13.2 Holiday Pay

- 13.2.1 Full-Time Regular Employees shall receive Holiday pay based upon an eight (8) hour day regardless of assigned shift (e.g., ten [10] or twelve [12] hours).
- 13.2.2 Part-Time Regular Employees receive Holiday pay based on the actual hours compensated in the two (2) full pay periods prior to the pay period in which the Holiday occurs as compared to a normal two (2) full pay periods of 160 hours.

13.3 Floating Days

13.3.1 Floating Days are additional paid days off which are not defined Holidays and during which the Company will remain open. Employees are eligible for three (3) Floating Days per calendar year. Floating Days must be used within the calendar year or they are forfeited. Floating Days will be made available by Management to the limit required by the department to assure appropriate business staffing. Employees must schedule their Floating Days within these limits with the mutual agreement of their Supervisor.

Examples of Floating Days typically requested by Employees include:

Martin Luther King's Birthday Presidents' Day Veterans' Day Employee's Birthday

13.3.2 Employees in their first year of employment will be eligible for Floating Days during that calendar year as follows:

Hire Date	Floating Days Qualified For		
January 1 through April 30	Three (3) 8-hour days		
May 1 through September 30	Two (2) 8-hour days		
October 1 through November 30	One (1) 8-hour day		
December 1 through December 31	0 days		

13.3.3 Scheduled Floating Days qualify as a Holiday for pay. Part-Time Regular Employees receive pay for Floating Days per 13.2.2.

13.4 Additional Designated Holiday

- 13.4.1 Employees will be given one Additional Designated Holiday to be used on the workday before or after Christmas or New Year's Day. The day or days available for scheduling the Additional Designated Holiday will be based upon staffing requirements as determined by the department Manager, which may vary by Employee if the department is not closed.
- 13.4.2 Scheduled Additional Designated Holidays qualify as a Holiday for pay.

13.5 Holiday Allowance for Work on a Holiday

- 13.5.1 Employees who work during a Holiday, Additional Designated Holiday, or on a previously scheduled Floating Day shall be paid at two (2) times the Employee's regular rate and the rate of pay shall include the shift differential and other applicable premium pay if the Employee works or is scheduled to work an alternate shift and/or receives premium pay every working day. In addition, the Employee will receive a Holiday allowance of eight (8) hours pay or may select a day off mutually agreed to by the Supervisor and the Employee.
- 13.5.2 Employees whose scheduled workday is on the actual date of the Holiday (not the Observed Holiday) shall be paid at two (2) times the Employee's regular rate and be granted either the eight (8) hours pay or an alternate day off, and will receive regular pay for working a scheduled workday on the Observed Holiday.

13.6 Holiday Pay if Absent

- 13.6.1 Employees who are absent are eligible for Holiday pay when on:
 - Approved PTO or absences the days before or after a Holiday;
 - Paid status for a continuous absence for a period of not more than six
 (6) months and when the pay is in some form directly from the Company;
 - Unpaid status in conjunction with a protected leave; or
 - Short-Term Disability (STD). The Employee receives Holiday pay to supplement the portion of the Employee's earnings not paid through STD, calculated at the Employee's regular straight-time rate not to exceed a total of 100% of the Employee's regular pay.
- 13.6.2 Employees are not eligible for paid Holiday(s) when the Employee is:

- Absent the day before or the day after the scheduled Holiday(s) and the absence is unapproved;*
- On Workers' Compensation (Industrial Disability) paid leave. The Employee will continue to receive time loss payments from the Workers' Compensation carrier;
- Absent for six months or more;
- On a voluntary unpaid leave of absence of any duration;
- On a period of absence for which the Employee is already receiving full pay from the Company; or,
- On Long-Term Disability (LTD). The Employee receives LTD pay through the LTD provider and is not eligible for Holiday pay.

*When an Employee has an unapproved absence due to treatment at an urgent care facility, emergency room, or admission to a hospital and the Employee provides documentation of such treatment, the Employee shall be eligible for Holiday pay.

13.7 Holiday Counts as Time Worked

Paid Holidays shall be counted as time worked for the purposes of computing overtime if the Holiday falls on an Employee's scheduled workday. If the Holiday falls on an Employee's scheduled day off, it shall be treated the same as a Saturday; i.e., it shall either be observed on another day or be paid at the Employee's regular straight-time pay as determined by the Manager.

ARTICLE 14

DISABILITY

14.1 Non-Industrial Disability

14.1.1 Short-Term Disability (Non-Industrial)

- 14.1.1.1 Short-Term Disability (STD) benefits are available to eligible Regular Employees. Regular Employees are to use PTO to cover each absence for the same non-industrial illness or injury lasting up to four (4) consecutive or non-consecutive workdays in a consecutive fourteen (14) calendar day period.
- 14.1.1.2 Qualified absences for eligible Full-Time Regular Employees that exceed four (4) consecutive or non-consecutive workdays in a

consecutive fourteen (14) calendar day period for the same nonindustrial illness or injury are covered under STD subject to the provisions and eligibility requirements of the NW Natural Short Term Disability Income Protection Plan (STD Plan). For Part-Time Regular Employees the elimination period will be prorated based on the actual hours compensated in the two (2) full pay periods prior to the pay period in which the initial absence occurs as compared to a normal two (2) full pay periods of 160 hours.

14.1.1.3 STD income replacement is based on a Regular Employee's Length of Service, as defined in 11.3, as follows:

Length of Service	Percentage of Income Replacement
0 to less than 10 years	70%
10 to less than 15 years	80%
15 years and more	85%
Date of hire 1994 and earlier	100%
(honored)	

- 14.1.1.4 STD benefits are provided to eligible Regular Employees for as long as they have an accepted disability claim as determined by the disability carrier. However, the maximum period for a STD claim is 180 consecutive calendar days. All STD requests require documentation from a qualified healthcare provider supporting the illness/injury. A period of short-term disability may require a qualified healthcare provider's release to return to work when directed by the third party STD Plan Administrator.
- 14.1.1.5 Regular Employees may elect to supplement their STD income replacement up to 100% of their regular rate of pay by drawing on their PTO account.
- 14.1.1.6 For more details regarding STD, including eligibility requirements, refer to the STD Plan summary plan description or contact Human Resources.

14.1.2 Long-Term Disability (Non-Industrial)

14.1.2.1 Long-Term Disability (LTD) benefits are available to eligible Regular Employees. A qualified disability for eligible Regular Employees that extends beyond 180 calendar days will be covered under LTD subject to the provisions and eligibility requirements of the Group Long Term Disability Insurance Program - BU (LTD Plan). The LTD Plan provides income continuation at sixty percent (60%) of the Regular Employee's pay for as long as disabled, until the Regular Employee reaches the Maximum Duration of Benefits as outlined in the LTD Plan. Each period of Long-Term Disability requires a qualified healthcare provider's release to return to work as coordinated through the third party LTD Plan Administrator. For more details regarding LTD, including eligibility requirements, refer to the LTD Plan or contact Human Resources.

- 14.1.2.2 A Regular Employee's employment will end on the anniversary date of the first day of absence, as defined in Consecutive Disability Period (14.5). LTD benefits may continue as described above and per the terms of the LTD Plan. Nothing in Article 14 is intended to indicate a guarantee of employment; employment may be ended for other reasons during the year, subject to other provisions of this Joint Accord.
- 14.1.2.3 A Regular Employee whose employment has ended as described in 14.1.2.2 will retain the right to apply for an open and available position as an internal bidder for a time period equal to two (2) years or one (1) month per full year completed from date of hire, whichever is greater, from the date of first absence related to the disability. The Employee's Company, Job and/or Line of Progression seniority accumulated as of the last day of employment will be used for bids and awards per the Line of Progression and Job Seniority Calculations JAG.

14.2 Workers' Compensation (Industrial Disability)

If an Employee is injured on the job, the Employee may be eligible for Workers' Compensation benefits, including industrial disability pay. If injured on the job, the Employee must contact his or her Supervisor immediately to report the injury and complete any required form(s) in a timely manner. In no case shall an Employee receive non-industrial disability pay and industrial disability pay for the same period(s) of time. If for any reason an Employee's Workers' Compensation claim is denied, the Employee may apply for coverage of the disability using the non-industrial disability programs outlined in 14.1.1 and 14.1.2.

14.3 Workers' Compensation (Industrial Disability) Supplemental Pay Allowance

Industrial disability pay or "time loss" in connection with a Workers' Compensation claim generally begins following a waiting period (currently three [3] days). The Company will compensate the Employee during the waiting period with a supplemental allowance equal to the Employee's statutory rate of sixty-six point six seven percent (66.67%) of an Employee's regular straight-time pay on a tax-free basis.

14.4 Reemployment and Reinstatement Arising from Industrial Disability

14.4.1 If it is determined that a Regular Employee has ongoing restrictions which prevent him or her from returning to his or her current regular job, the Union and the Company will consider applicable ADA (Americans with Disability Act) reasonable accommodations and/or State workers' compensation reemployment or reinstatement provisions to explore options for that Employee. The Regular Employee also continues to be eligible to bid on any available and suitable posted job openings for which he or she meets bidding qualifications.

- 14.4.2 If a Regular Employee exceeds one (1) year of Consecutive Disability Period (as defined in 14.5) related to the covered industrial disability, the Employee's employment will end. Workers' Compensation benefits may continue, subject to eligibility in accordance with applicable Workers' Compensation laws. The Regular Employee also retains the right to apply for any open and available position for which he or she meets bidding qualifications as an internal bidder for a time period equal to two (2) years from date of separation of employment. The Employee's Company, Job and/or Line of Progression seniority accumulated as of the last day of employment will be used for bids and awards per the Line of Progression and Job Seniority Calculations JAG.
- 14.4.3 A Regular Employee who is placed, awarded, or reemployed in a lower classification per 14.4 shall have his or her pay administered as an Honored Pay Rate Employee subject to provisions in 10.6.
- 14.4.4 A Regular Employee whose employment is ended per 14.4.2 will be eligible for a COBRA (Consolidated Omnibus Budget Reconciliation Act) subsidy equivalent to the amount and duration provided through the LTD Plan. This subsidy will be adjusted to match the LTD benefit as needed.

14.5 Consecutive Disability Period (Industrial and Non-Industrial)

- 14.5.1 The Consecutive Disability Period starts with the first day of absence for the covered disability and includes time off on STD and/or LTD and/or Workers Compensation. Any return to work for twenty-nine (29) calendar days or less does not restart or extend this Consecutive Disability Period.
- 14.5.2 The Consecutive Disability Period ends when an Employee returns to work, without restriction (with or without accommodation), for a period of thirty (30) or more consecutive calendar days in either the Employee's original position or a new regular position. Any subsequent absence related to the same initial disability would start a new Consecutive Disability Period.

14.6 Family and Medical Leave Act and Americans with Disabilities Act (ADA)

As detailed in 2.5, the parties strive to comply with all applicable laws, rules and regulations governing the workplace, including but not limited to the Family and Medical Leave Act (and applicable state law) and the Americans with Disabilities Act (and applicable state law). To the extent applicable laws include exceptions for parties in a collectively bargained relationship, 14.6 does not address or waive the application of such exceptions.

14.6.1 Family and Medical Leave Act (and Related State Laws)

Federal and State laws permit eligible Employees to take unpaid leave in certain circumstances. These laws include, for example, the federal Family and Medical Leave Act (FMLA), the Oregon Family Leave Act (OFLA), the Washington State Family Leave Act (WFLA), the Washington State Family Leave Act (WFLA), the Washington State Family Care Act (WFCA), and the Washington State Military Family Leave Act (WMFLA).

14.6.2 Americans with Disabilities Act (and Related State Laws)

Employees must be able to perform essential job functions with or without reasonable accommodation.

ARTICLE 15

HEALTHCARE

15.1 Employees

15.1.1 General

- 15.1.1.1 The Company shall pay into the Western States Health & Welfare Trust Funds of the OPEIU, hereinafter the Welfare Trust Fund, the costs necessary to establish and maintain coverage for medical, dental, vision, and life insurance benefits for eligible Employees through the Welfare Trust Fund, including that percentage specified in 15.1.1.4 and 15.1.1.5 as the responsibility of the Employee. The terms and conditions of coverage are set forth in the Welfare Trust Fund's plan documents and are not the subject of negotiation between the Union and the Company.
- 15.1.1.2 These Company payments will be made only for eligible Employees who are regularly scheduled to work twenty (20) or more hours per week. Term Employees are eligible only for the benefits identified in their Term Agreements and the Term Employee JAG.
- 15.1.1.3 For the term of the Accord the Company will share in the cost of benefits with employees as necessary to provide benefits under the Welfare Trust Fund, on the effective dates and in the amounts described below.
- 15.1.1.4 Effective June 1, 2014, the Company and eligible Employees shall be responsible for the same percentage of the premium cost in effect on May 31, 2014.

On May 31, 2014, the percentage share of the premium is eighty-three percent (83%) paid by the Company and seventeen percent (17%)* paid by the Employee.

*The Employee 2014 premium share is partially subsidized by Welfare Trust Funds in an amount equal to four percent (4%). Such subsidy was at the discretion of the Trustees of the Welfare Trust Fund and is scheduled to end on December 31, 2014.

- 15.1.1.5 Effective with the benefit year beginning January 1, 2015 and for the term of the Accord, eligible Employees shall be responsible for twenty percent (20%) of the cost of the premium. However, if an eligible Employee completes the annual health risk assessment and biometric screening prior to the open enrollment period for each year, the Employee will only be responsible for fifteen percent (15%) of the total premium. In both cases, the Company will be responsible for the remaining portion of the premium.
- 15.1.1.6 The premium share payments for the Company and Employees described above are based on composite rates provided by the Welfare Trust Fund and will apply regardless of the number of dependents that the Employee enrolls. If the Trustees of the Welfare Trust Fund make alternate rates available during the term of this Accord, the parties agree to negotiate the impact of any alternate rates.
- 15.1.1.7 The Company is authorized to deduct from each eligible Employee's wages the percentage amount described above as the Employee's cost of premium in such amount that is necessary to maintain coverage under the Welfare Trust Fund.

15.1.2 Spouses or Partners Both Working for NW Natural

15.1.2.1 Effective until December 31, 2014 only, if an eligible Employee is married to, or in a domestic partnership with, a current or former Company Employee who is eligible for Company-paid medical, dental, and vision benefits, only one member of the couple will be eligible for these Company-paid benefits.

> In the case of two active Employees covered by this Joint Accord, the Company will pay contributions to the Welfare Trust Fund only on behalf of the Employee with the later birth date, and the spouse, or domestic partner, of that Employee will receive a cash payment of \$300 per month in lieu of Company payments to the Welfare Trust Fund.

In the case of an eligible Employee married to, or in a domestic partnership with, a Company Retiree eligible for Company-paid retiree

medical benefits, the Company will make payments to the Welfare Trust Fund on behalf of the eligible Employee, and the Company Retiree will receive a cash payment of \$200 per month in lieu of Company-paid retiree medical benefits.

15.1.2.2 Effective January 1, 2015, an Employee who is married to, or in a domestic partnership with, a current or former Company Employee who is eligible for Company payments to the Welfare Trust Fund will not be required to opt out of coverage, but may elect to opt out. In which case, the Employee will be covered under the voluntary provisions of 15.1.3.

15.1.3 Opt Out Due to Other Coverage

Employees eligible for Company payments to the Welfare Trust Fund may voluntarily opt out of Welfare Trust Fund medical, dental, and vision coverage, provided that they produce evidence of other such coverage. Employees who opt out of coverage will receive a cash payment of \$300 per month in lieu of Company payments to the Welfare Trust Fund. This monthly cash payment can be applied to other benefits offered by the Company (such as additional life insurance or additional LTD, subject to the terms of those benefits), deferred into the RKSP 401(k) Plan, taken as cash, and/or directed into the Flexible Spending Account.

15.1.4 Timing of Elections

In any case where an Employee can elect a cash payment in lieu of Company payments to the Welfare Trust Fund, the Employee's election must be made under, and in compliance with, a cafeteria plan under Section 125 of the Internal Revenue Code, as amended (Code). The provisions of 15.1 shall be interpreted and applied in a manner that complies with Section 125 of the Code.

15.2 Retirees

15.2.1 General

- 15.2.1.1 Except for Employees covered in 15.2.3, the Company shall pay into the Welfare Trust Fund a portion of the costs necessary to maintain medical coverage for Covered Retirees through the Welfare Trust Fund. The terms and conditions of coverage are set forth in the Welfare Trust Fund's plan documents and are not the subject of negotiation between the Union and the Company.
- 15.2.1.2 A Covered Retiree is a former Employee who (i) is eligible for and elects to retire at or after age sixty (60) with a total of fifteen (15) years of service, under the Retirement Plan and (ii) enrolls in retiree coverage through the Welfare Trust Fund. A Covered Retiree may enroll his or her eligible dependents (as defined by the Welfare Trust Fund). Retiree medical coverage through the Welfare Trust Fund ends

when the Covered Retiree becomes Medicare eligible, currently age sixty-five (65). The Company's obligations under this Joint Accord to make payments to the Welfare Trust Fund for retiree medical coverage end on November 30, 2019.

- 15.2.1.3 Effective January 1, 2016, a Covered Retiree is a former Employee who (i) is eligible for and elects to retire at or after age sixty (60) with a total of fifteen (15) years of service, or at or after age fifty-eight (58) with a total of twenty (20) years of service, under the Retirement Plan and (ii) enrolls in retiree coverage through the Welfare Trust Fund. A Covered Retiree may enroll his or her eligible dependents (as defined by the Welfare Trust Fund). Retiree medical coverage through the Welfare Trust Fund ends when the Covered Retiree becomes Medicare eligible, currently age sixty-five (65). The Company's obligations under this Joint Accord to make payments to the Welfare Trust Fund for retiree medical coverage end on November 30, 2019.
- 15.2.1.4 There will be no change in the premium rates paid by the Company and the Covered Retiree from June 1, 2014, through December 31, 2014.
- 15.2.1.5 Effective January 1, 2015, and for the term of this Accord, the premium necessary to maintain benefits for each Covered Retiree under the Welfare Trust Fund shall be paid by the Company and Covered Retiree, as of the effective date of this Accord (seventy-five percent [75%] Company/twenty-five percent [25%] Covered Retiree).
- 15.2.1.6 The premium share payments for the Company and Covered Retirees are based on composite rates and will apply regardless of the number of dependents (if any) that the Covered Retiree enrolls. If the Trustees of the Welfare Trust Fund make alternate rates available during the term of this Accord, the parties agree to negotiate the impact of any alternate rates.

15.2.2 Retirees with Spouses or Partners Eligible for Company-Paid Benefits

15.2.2.1 Effective until December 31, 2014, only, if a Company Retiree is eligible for retiree medical coverage under 15.2 and is married to, or in a domestic partnership with, an active Company Employee or a Company Retiree who is eligible for coverage under the Welfare Trust Fund, only one member of the couple will receive Company-paid benefits. If the Retiree is married to, or in a domestic partnership with, an active Employee, the active Employee shall receive Company-paid medical benefits, and the Retiree will receive \$200 per month in lieu of retiree medical coverage. If the Retiree is married to, or in a domestic partnership with, another eligible Retiree, one of the Retirees shall elect to be the Covered Retiree, and the Company shall pay \$200 per month to the other retiree in lieu of the Company contribution to the Welfare Trust Fund.

15.2.2.2 Effective January 1, 2015, a Company Retiree who is eligible for coverage under the Welfare and Trust Fund will not be required to opt out of coverage but may elect to opt out. In which case, the Company Retiree will be covered under the voluntary provisions of 15.1.3.

15.2.3 Exclusion of Certain Employees

Employees hired on or after January 1, 2010, are not eligible for retiree medical coverage under the Welfare Trust Fund or for Company payments to the Welfare Trust Fund. Employees who terminate employment with the Company and who are rehired on or after January 1, 2010, are not eligible for retiree medical coverage under the Welfare Trust Fund or for Company payments to the Welfare Trust Fund. This exclusion applies regardless of the length of the rehired Employee's break in Company employment and regardless of whether the rehired Employee previously would have been eligible for retiree medical benefits.

ARTICLE 16

OTHER BENEFITS

16.1 Meal Allowance

- 16.1.1 An Employee shall be provided a meal allowance for:
 - Working three (3) or more hours beyond the normal shift duration (minimum eight [8] hour shift), except while on per diem;
 - Each four (4) hours of continuous overtime beyond the original three (3) hours;
 - Unplanned Shift Change without at least three (3) hours advance notice to provide for a meal, unless the Employee is already at the reporting location or in the process of commuting in an assigned Company vehicle; or,
 - After four (4) consecutive hours of work on a Call-In.
- 16.1.2 Employees who work beyond the minimum overtime required to earn a meal allowance shall be paid for one-half (½) hour to eat the meal. The one-half (½) hour will be paid one (1) time per continuous work period whether the Employee breaks to eat the meal or works straight through to complete the work.

16.1.3 Effective June 1, 2014, the meal allowance is \$20.00. The meal allowance will be adjusted annually by the same percentage adjustment made to the per diem rate, if any. The dollar amount of meals will be recalculated annually by indexing it to the Government Services Administration's per diem rate for the State of Oregon as described in 16.2.2.

16.2 Per Diem

- 16.2.1 An Employee shall be provided per diem for each day the Employee is temporarily assigned job duties away from the regular work area which requires an overnight stay, including the first and last scheduled workdays. Such allowance shall include all personal expenses other than lodging and travel, and is provided to cover such items as meals, tips, personal phone calls, and local transportation. Meal allowances are not provided when receiving per diem.
- 16.2.2 Effective June 1, 2014, the per diem rate is \$56.00. The per diem rate will be adjusted annually by averaging the Government Services Administration's, State of Oregon rates as published on the web site (www.gsa.gov). This per diem rate will be adjusted not less than thirty (30) days after publication by averaging the Meals and Incidental rate column for the close of the government fiscal year, published approximately October of each year for the following twelve (12) month period.

16.3 Compensation for Travel

For guidance on compensation for travel, refer to the Compensation for Travel JAG.

16.4 Transportation

16.4.1 Basis of Allowance

Employees who use their personal vehicles for Company business shall be compensated at the rate authorized by the Company, taking into consideration the rate established by the Internal Revenue Service (IRS).

16.4.2 Parking

The Company has no obligation to provide Employee parking, but will make parking available to the extent possible.

16.5 Jury Duty

- 16.5.1 Employees will receive their regular straight-time rate of pay while serving on jury duty, provided the Employee has:
 - Promptly notified a designated Company representative and presented a legally enforceable subpoena,

- Requested a transfer to a Monday through Friday Day Shift schedule, if applicable, and
- Called a designated Company representative on weekdays when excused from jury duty to determine whether to report to work.
- 16.5.2 Employees shall retain any compensation paid by the court while performing this civic function.

16.6 Recognition Programs

In recognition of employee flexibility and support of continuous operations, departments or workgroups may develop recognition programs utilizing the Guide for Partnership Decision Making JAG. Any new recognition programs are subject to approval of the JAC Leadership Team.

ARTICLE 17

RETIREMENT PLANS

17.1 Bargaining Unit Employees' Retirement Plan (Retirement Plan)

- 17.1.1 The Company shall continue to maintain the Retirement Plan. The Company will make contributions to the Retirement Plan in amounts determined by the Company in consultation with an enrolled actuary, that are sufficient on a sound actuarial basis to provide for the payment of benefits.
- 17.1.2 Regular Employees employed on or before December 31, 2009, are eligible to participate in the Retirement Plan to the extent provided for in the written terms and conditions of the Retirement Plan. Term Employees are eligible only for the benefits described in their Term Agreements and the Term Employee JAG. Term Employees are not eligible to participate in the Retirement Plan.
- 17.1.3 Regular Employees hired on or after January 1, 2010, are not eligible to participate in the Retirement Plan. Regular Employees who terminate employment with the Company and who are rehired on or after January 1, 2010, are not eligible to participate in, or to accrue any additional benefits under, the Retirement Plan. This exclusion applies regardless of the length of the rehired Employee's break in Company employment and regardless of whether the rehired Employee previously participated in the Retirement Plan.
17.2 Retirement K Savings Plan (RKSP 401(k) Plan)

17.2.1 General

- 17.2.1.1 Except as provided in this Joint Accord and the Joint Accord Guidelines, Employees shall be eligible to participate in the RKSP 401(k) Plan under the terms and conditions set forth in the RKSP 401(k) Plan document. For purposes of 17.2, Employees participating in the RKSP 401(k) Plan shall be referred to as "RKSP Participants." During the term of this Joint Accord, the Company will make a cash matching contribution each pay period on behalf of each RKSP Participant who has made elective deferrals to the RKSP 401(k) Plan during that pay period. For the period from the effective date of this Accord to the last pay period in 2015, the matching contribution shall continue to be equal to fifty percent (50%) of the RKSP Participant's elective deferrals (excluding catch-up contributions under Code Section 414(v)) for the pay period, but disregarding elective deferrals exceeding four percent (4%) of the RKSP Participant's compensation, as defined in the RKSP 401(k) Plan, for the pay period.
- 17.2.1.2 Effective January 1, 2016, and for the term of the Accord, beginning with the first pay period of 2016, the matching contribution shall be equal to fifty percent (50%) of the RKSP Participant's elective deferrals (excluding catch-up contributions under Code Section 414(v)) for the pay period, but disregarding elective deferrals exceeding six percent (6%) of the RKSP Participant's compensation, as defined in the RKSP 401(k) Plan, for the pay period.
- 17.2.1.3 Term Employees are eligible only for the benefits identified in their Term Agreements and the Term Employee JAG.

17.2.2 Enhanced RKSP 401(k) Plan Contribution for Employees Hired or Rehired On or After January 1, 2010

For Employees hired or rehired on or after January 1, 2010, who are eligible to participate in the RKSP 401(k) Plan, the Company will separately contribute four percent (4%) of the Employee's compensation for each plan year to the RKSP 401(k) Plan account (Enhanced RKSP 401(k) Plan Benefit). This Enhanced RKSP 401(k) Plan Benefit is available only to Employees hired or rehired on or after January 1, 2010, as they are not eligible to participate in the Retirement Plan.

ARTICLE 18

EMPLOYEE STOCK PURCHASE PLAN

Employees are eligible to participate in the Company's Employee Stock Purchase Plan ("ESPP") according to the terms and conditions set forth in the written ESPP document. The Company shall continue to have sole discretion to determine the terms and

conditions of the ESPP applicable to Employees, including contributions, benefits and administrative provisions. The Company retains the right to terminate the ESPP at any time and will notify the Union of such decision prior to its implementation. Term Employees are eligible only for the benefits identified in their Term Agreements and the Term Employee JAG.

ARTICLE 19

PROGRESSIVE DISCIPLINE

19.1 General

The Company reserves the right to discipline or terminate any Employee for just cause and to determine the appropriate level of discipline based on the facts and circumstances presented. The Employee has the right to Union representation in disciplinary matters. Notwithstanding the inclusion of just cause in 19.1, the Union and the Company agree to a reasonable person standard to determine what's right, not who's right, in matters of discipline. To ensure the reasonable person standard is adhered to, discipline defense based purely on just cause must be approved by the Executive Secretary-Treasurer of OPEIU Local 11 or his or her designee.

Any Probationary Employee can be terminated for any reason without intervention by the Union and without right of appeal to the Grievance and Mediation/Arbitration Process in Article 20.

19.2 Definitions

19.2.1 Documented Verbal Warning (DVW)

A disciplinary document a Manager or Supervisor may use that identifies in writing an Employee's performance problems or other conduct that requires correction.

19.2.2 Disciplinary Action Plan (DAP)

A written disciplinary document a Manager or Supervisor may use that states specific performance problems or conduct requiring correction and requires that the Employee fully correct the problem within a specified period of time.

19.3 Process

19.3.1 Progressive discipline shall normally include the following steps:

19.3.1.1 Documented Verbal Warning (DVW)

Supervisor is to keep the original in the Supervisory file. A copy will be given to the Employee by a Company representative.

19.3.1.2 Disciplinary Action Plan (DAP)

Copies of the DAP will be sent to Human Resources to be placed in the Employee's personnel file and given to the Employee, the Union Office and the appropriate Chief Steward. Typically a DAP will be in effect for up to 180 calendar days. Duration of DAPs longer than 180 calendar days must be signed by the Manager and the Chief Steward with copies to the JAC Co-Chairs.

Five (5) years after the satisfactory completion of a DAP, it will be considered moved from the Employee's personnel file to the Employee's "Employee history file," provided no additional DAPs have been issued to the Employee. This "Employee history file" will be retained in Human Resources and will be considered a part of the Employee's personnel record.

- 19.3.1.3 Repetition of the infraction or failure to complete an action plan within the time specified may lead to further discipline up to and including termination.
- 19.3.2 As stated in 19.1, any infraction may also warrant an immediate DAP or termination.
- 19.3.3 Bidding on positions, advancing in a Line of Progression, or Progression without Bidding may be affected as a condition of progressive discipline.
- 19.3.4 The Employee may file a written Grievance appealing disciplinary action per Article 20.

ARTICLE 20

GRIEVANCE AND MEDIATION/ARBITRATION PROCESS

20.1 Introduction

This Grievance Process is limited to matters of discipline. This Grievance Process is established on the premise of trust, respect and the mutual goal of resolving differences at the earliest opportunity and appropriate level. It is not intended to be a substitute for direct dialogue between Employee and Supervisor or to be used for events covered under the Issue Resolution Process in Article 9. Additionally, Grievances may be referred from Step 3 of the Issue Resolution Process to Level 3 of this Grievance Process at the direction of the JAC Leadership Team. (The JAC Leadership Team [LT] is defined as the JAC Co-Chairs and the Company's Executives for labor relations and the Executive Secretary-Treasurer of OPEIU Local 11.)

20.2 Grievance Process

- 20.2.1 Grievances are filed by the Union for the Employee(s) or on behalf of the Employee(s) and should be processed as outlined below unless approved or directed otherwise by the JAC Co-Chairs. Grievances related to an Employee's involuntary termination will bypass Levels 1 and 2 and enter this process at Level 3. Grievances may necessitate meeting more than once at any particular level or obtaining information from additional sources, however, each level will be addressed in an expedient manner.
- 20.2.2 The Steward and the Supervisor should first meet informally to understand and potentially resolve the unfiled Grievance.

Level 1: Participants: Employee, Steward and First Line Supervisor

- <u>Scope:</u> Level 1 of the Grievance Process is only for matters of discipline and includes Grievances unresolved informally or referred back from Level 2.
- Procedure: The Union Steward has ten (10) working days to file a formally documented Grievance for the Employee(s) or on behalf of the Employee(s) from the event or knowledge of the event and should be submitted to the Supervisor of the Employee(s). The Supervisor will schedule a meeting with the Steward to occur within five (5) working days of receiving the documented Grievance to potentially resolve the Grievance. Resolved and unresolved outcomes of the Grievance resolution meeting will be documented. Copies will be sent to the Union Office and the Chief Steward by the Steward and to Human Resources and the Manager by the Supervisor within ten (10) working days from the Level 1 meeting. Unresolved Grievances will enter the Level 2 process.
- Level 2: Participants: Individuals involved in Level 1 plus Chief Steward and Manager(s) responsible for department (or representative)
 - <u>Scope:</u> Unresolved Grievances with documentation from Level 1 or unresolved Grievances referred back from Level 3.
 - <u>Procedure</u>: Within ten (10) working days of receipt of the unresolved Grievance Form, the Manager will arrange a meeting with the Chief Steward; this meeting is to occur at a mutually agreeable time. The Manager and Chief Steward should mentor Level 1 parties to identify underlying interests and pursue resolution of the Grievance.

Resolved outcomes of the Grievance resolution meeting will be documented. Copies will be sent to the Union Office by the Chief Steward and to Human Resources by the Manager within ten (10) working days from the Level 2 meeting. Unresolved Grievances, within ten (10) working days from the Level 2 meeting, will be documented with recommendations and forwarded by the Manager and Chief Steward to their respective JAC Co-Chairs for review and recommended action prior to entering the Level 3 process.

Level 3: Participants: Appropriate members of the Joint Accord Committee

- <u>Scope:</u> Unresolved Grievances from Level 2 as determined by JAC Co-Chairs, terminations, and express violations of the Joint Accord as referred from the Issue Resolution Process, Step 3.
- <u>Procedure:</u> JAC Co-Chairs review documentation and determine appropriate action within fifteen (15) working days of receipt of the Level 3 documentation.

Appropriate action may include, but is not limited to:

- Resolve the Grievance,
- Convene a Grievance panel,
- Refer back to Level 2 of the Grievance Process, and
- Refer to the JAC Leadership Team (LT) for resolution.

JAC Co-Chairs may determine that resolution of this Grievance is best served by referring it to Issue Resolution. When the Grievance is referred to Issue Resolution, it cannot return to any Level of the Grievance Procedure. Documentation will be forwarded. See 9.2.5 Step 3 for options available to the JAC Co-Chairs for resolution.

- 20.2.3 All Level 3 documented resolutions must be approved by the Company's Executives responsible for labor relations and the Executive Secretary-Treasurer of OPEIU Local 11, or their designees. Resolutions reached at this level will be final and binding on both parties and documentation will be forwarded to the filing parties within ten (10) working days of the decision.
- 20.2.4 All timelines above may be extended by mutual agreement of the Union and the Company. If extended, notification will generally be provided to all parties along with status and anticipated action within three (3) working days of the decision to extend, or as soon as possible thereafter.

20.3 Mediation and Arbitration

20.3.1 If the Grievance cannot be resolved at Level 3, the Union and the Company may, by mutual agreement, seek the assistance of the Federal Mediation and Conciliation Service in a non-binding attempt to resolve the dispute. Mediation communications are not admissible in arbitration.

- 20.3.2 In the event the Grievance has not been settled, the Union or the Company may seek arbitration. The arbitrator shall be selected by Union and Company representatives from a panel obtained from the Federal Mediation and Conciliation Service or as otherwise mutually agreed by the parties. The authority of the arbitrator is limited to interpreting the express provisions of this Joint Accord or related terms and conditions of employment of covered Employees. The decision of such arbitrator shall be final and binding upon both parties. The parties shall each pay their own fees and costs, and each shall pay one-half (½) of the arbitrator's fees and any other joint costs of the arbitration.
- 20.3.3 Nothing in this Article precludes a party from withdrawing a Grievance at any time with notification to the Union Office and to Human Resources.

ARTICLE 21

SEPARABILITY OF PROVISIONS

If any provision of this Joint Accord shall be found to be invalid by any court having jurisdiction in respect thereof, such finding as to such provision shall not affect the remainder of this Joint Accord, and all other terms and provisions hereof shall continue in full force and effect as set forth herein. If the provision is found to be invalid by the court having final jurisdiction in respect thereof, the parties shall promptly negotiate and endeavor to reach agreement upon a suitable substitute for said provision.

Nothing in this Joint Accord shall be interpreted or enforced to cause a violation of any applicable federal or state law or regulation.

ARTICLE 22

TERM OF ACCORD AND METHOD OF REOPENING

The Joint Accord and all terms and provisions hereof shall be and continue in effect from and after the date first written hereof until midnight on November 30, 2019, and until November 30 from year to year thereafter until and unless either party shall have served written notice to the other at least sixty (60) calendar days prior to said November 30, 2019, or prior to any November 30 thereafter stating that it desires to negotiate modifications or to terminate this Joint Accord. **IN WITNESS WHEREOF**, the parties have caused this Joint Accord to be executed in duplicate by their respective officers, thereunto duly authorized.

NORTHWEST NATURAL GAS COMPANY OFFICE AND PROFESSIONAL EMPLOYEES INTERNATIONAL UNION, LOCAL-11, AFL-CIO By Cari L. Colton Howard D. Bell Mark A. Clemens Anthony B. Boelow aurà C. Goty Linda A. Butterfield Jon G. Huddleston Alex Cuellar Joseph S. Karney John M. Mours olleen M. O Brien Mark J. Lilly Colleen M.O'Brien Steven E. Nelson Lorelei M. Ricketts Catherine M. Reynolds Dave G. Sasaki D. Scott Williams Leri L. Russell n Steven F. Wyck C. Stewart Barry nou Kathryn G. Beyerchen Rick D. Wilson JAC Co-Chair Union Representative and JAC Co-Chair d. Lea Anne Doolittle Senior Vice President David R. Williams Michael L. Richards Vice President Executive Secretary-Treasurer Gregg S. Kantor Executive Officer resident and MardiLyn Seathoff Chief Governance Officer and Corporate Secretary

JOB TITLES BY GRADE

<u>Grade</u>	Job Title (Position Title)	<u>Grade</u>	Job Title (Position Title)
175	Construction 4 (Transmission Foreman/woman)	150	Stores 3 (Storekeeper - Delivery)
			Stores 3 (Storekeeper - Transportation)
170	Technical Services 3 (Jrny Electrician)		Weld & Fab 2 (Fabricator)
	Transmission Maintenance 2	150A	Construction 1 (Pipe Fuser)
170A	Weld & Fab 4 (Mechanic Welder)		
		145	Accounting 4
165	Construction 3 (Distribution Foreman/woman)		Computer Support 2
	Customer Field Service 4 (Industrial Tech)		Graphics 2
	Gas Storage 2 (Chief Operator)		Meter & Reg Shop 1
	General Services 4 (Sr Machinist)		Stores 2 (Storekeeper)
	System Ops 2		Weld & Fab 1 (Body Repair Tech)
	Technical Services 2 (Telecomm Tech)		
165A	Corrosion Technician	140	Automotive 1 (Auto Tech 1)
			Computer Support 1
160	Customer Field Service 3 (Commercial Tech)		Customer Field Service 1 Honored
	Field Support 3 (Field Engineering Tech)		Customer Service 3
	Leakage Inspector		Graphics 1
	Specialty Construction 2		
		135	Accounting 3
155	Automotive 3 (Auto Tech 3)		Operational Support 3
	Construction 2 (Pipe Welder Fitter)		Transportation 2 (Lube Tech Specialist)
	Field Support 2 (Field Measurement Tech)		Utility Support 3 (Field Maint Worker)
	Fire & Safety Technician		
	Gas Storage 1 (Plant Operator)	130	Customer Service 2
	General Services 3 (Machinist)		
	Graphics 3	125	Accounting 2
	Meter & Reg Shop 3		Operational Support 2
	System Ops 1		Transportation 1 (Garage Attendant)
	Transmission Maintenance 1		
	Weld & Fab 3 (Sr Fabricator)	120	General Services 1 (Delivery Driver)
155A	Customer Field Service 2 (Service Tech)		Stores 1 (Warehouse Worker)
150	Automotive 2 (Auto Tech 2)	115	Accounting 1
	Customer Service 4		Customer Service 1
	Field Support 1 (Field Data Tech)		Operational Support 1
	General Services 2 (Maintenance Tech)		Utility Support 2 (AMR Driver)
	Meter & Reg Shop 2		
	Semi & Crane	110	Currently no positions
	Specialty Construction 1		
	Stores 3 (Head Storekeeper)	105	Utility Support 1 (Motor Messenger)

WAGE SCALE (Scheduled Wage Increases)

Pay <u>Grades</u> 175	Experienced	<u>6/1/2014</u> \$40.12	<u>12/1/2015</u>	<u>12/1/2016</u>	<u>12/1/2017</u>	<u>12/1/2018</u>
175	Entry	\$38.5Z				
170	Experienced	\$37 85				
170	Entry	\$36.34				
110	2.1.1.9	φ00.01				
170A	Experienced	\$37.85				
170A	Entry	\$36.34				
170A	03	\$34.07				
170A	02	\$32.17				
170A	01	\$30.28				
165	Experienced	\$35.71				
165	Entry	\$34.28				
	,	<i>vo</i> <u>-</u> <i>o</i>				
165A	Experienced	\$35.71				
165A	Entry	\$34.28				
165A	03	\$32.14				
165A	02	\$30.35				
165A	01	\$28.57				
160	Experienced	\$33.69				
160	Entry	\$32.34				
	,	·				
155	Experienced	\$31.78				
155	Entry	\$30.51				
1660	Evperienced	<u> </u>				
155A 166A	Experienced	ቅ31.78 ድ20 51				
155A 155A		430.51 ¢20.60				
155A	03	φ20.00 ¢27.01				
1554	01	\$25.42				
100/1		ΨΖΟ. ΗΖ				
150	Experienced	\$29.98				
150	Entry	\$28.78				
150A	Experienced	\$29.98				
150A	Entry	\$28.78				
150A	03	\$26.98				
150A	02	\$25.48				
150A	01	\$23.98				
145	Experienced	\$28.28				
145	Entry	\$26.87				
140	Experienced	\$26.43				
140	Entry	\$25.11				

Pay						
<u>Grades</u>		<u>6/1/2014</u>	<u>12/1/2015</u>	<u>12/1/2016</u>	<u>12/1/2017</u>	<u>12/1/2018</u>
135	Experienced	\$24.70				
135	Entry	\$23.47				
130	Experienced	\$23.08				
130	Entry	\$21.93				
125	Experienced	\$21.37				
125	Entry	\$20.30				
120	Experienced	\$19.79				
120	Entry	\$18.80				
115	Experienced	\$18.32				
115	Entry	\$17.40				
110	Experienced	\$16.96				
110	Entry	\$16.11				
105	Experienced	\$15.70				
105	Entry	\$14.92				

Scheduled Wage Increase	-	3.00%	3.00%	3.00%	3.00%
COLA Adjuster	-	tbd	tbd	tbd	tbd

tbd = to be determined per Joint Accord, 10.3 (COLA Adjuster), range is 0% to 3%.

This table will be republished each year to include the Scheduled Wage Increase and any increase as a result of the annual COLA Adjuster.

Pay Grades that include the letter "A" refer to grades for positions with additional pay steps. Pay rates for Steps 01, 02 and 03 are listed. Step 04 is the same as Entry. Step 05 is the same as Experienced. Refer to the Positions with Additional Pay Steps JAG.

EFFECTIVE JUNE 1, 2014



Business Travel Procurement and Expense Reimbursement Policy

Index No. 80.1

. 80.1 Effective date: June 12, 2012 Page 1 of 3 Cancels version dated: May 22, 2006

Application

This Policy applies to all Company employees and anyone else traveling at the Company's expense.

Purpose

Business travel is a significant expense to NW Natural. Minimizing the costs of business travel while giving due consideration to employees' comfort and convenience requires a balanced approach, which is addressed by this Policy.

Designated Travel Agent

It is the Company's objective to utilize travel discount programs. Therefore, Azumano Travel is designated as the Company's travel agent and online reservation tool (Concur-Cliqbook) for all air travel. Airline reservations fulfilled through any other travel agency or service are not reimbursable. Car rentals and hotel reservations should also be booked through Azumano, however, employees may take advantage of other booking mechanisms to obtain conference rates and other discounts.

Employees are responsible for making their own business travel reservations and may do so by accessing the Azumano Travel online reservation tool or by calling the agent-assisted reservations desk. The online reservation tool is the preferred method for fulfilling reservations and is available through an Intranet (Hub) portal.

Policy

- 1.1 It is the policy of NW Natural that employees use the most appropriate and economical transportation and accommodations for business travel. To minimize the costs of business travel and streamline the travel reservation process, all airfare reservations are fulfilled through the Company's designated travel agent, as are hotel and car rental reservations when the Company's designated travel agent can procure the best price.
- 1.2 Employees will be reimbursed for certain expenses incurred during business travel. All business travel expenses must relate to a clearly stated business purpose. Managers, designated as business expense approvers, are responsible for the legitimacy, integrity, and accuracy of the items they approve.

Travel Guidelines

2.1 All employees who travel on business are expected to follow this Policy and the following guidelines. Employees who incur travel expenses exceeding these guidelines, without proper approval, will not be reimbursed for excess costs.

Making Travel Arrangements

- 3.1 Employees must receive their manager's pre-authorization before making reservations for business travel. A manager's pre-authorization is informal and documentation is tracked through the manager's internal process.
- 3.2 Once business travel reservations are fulfilled, the manager and employee will receive an email from Azumano Travel confirming payment. The manager will review the confirmation with the employee as appropriate, especially if any components are not in compliance with this Policy. Prior to employee's travel date, the manager will forward the email to *Accounting-Travel as formal documentation of the authorization.

Payment Methods

- 4.1 <u>Air travel</u> reservations must be fulfilled through Azumano Travel and are centrally billed to a Company credit card.
- 4.2 <u>Rental car reservations</u> fulfilled through Azumano Travel are paid with the employee's Company Purchasing Card (p-card), or for an employee who does not have a Company Purchasing Card, with a personal credit card and the employee is later reimbursed for costs.
- 4.3 <u>Hotel reservations</u> fulfilled through Azumano Travel are held by the employee's Company Purchasing Card or a personal credit card. When the employee checks out, a Company Purchasing Card (p-card) is used; for an employee who does not have a Company Purchasing Card, a personal credit card is used and the employee is later reimbursed for costs. Employees should make hotel reservations through the host organization (conference or other event) when a discount rate is offered.
- 4.4 <u>Cash advances</u> can be requested if an employee does not own a personal credit card or chooses not to use it. Cash advances are for the estimated hotel costs, meals, and other out of pocket expenses. The employee needs to reconcile actual expenses with cash advanced.

Air Travel

- 5.1 When fulfilling air travel reservations, employees should not exceed the lowest airfare listed by Azumano Travel by more than \$50. Employees are required to explain the reason for exceeding this limit during the reservation process.
- 5.2 Airline reservations should be made at least 14 days in advance to take advantage of discounted fares.
- 5.3 All reservations are for economy class. Exceptions require approval of a division officer.
- 5.4 Employees may keep any points accumulated through frequent flyer programs. However, employees are prohibited from passing on low cost flights in order to accumulate points on another airline. The use of points for business travel is not a reimbursable business expense.

5.5 If an employee does not use an airline ticket, he/she must contact Azumano Travel before the travel date to initiate credit processing. Unused paper tickets must be returned to Azumano Travel.

Rental Cars

- 6.1 Rental cars should only be used when an employee's personal car, a company car, or public transportation is not a practical alternative
- 6.2 A mid-size car is standard, unless employee requests a smaller car or circumstances warrant a larger car
- 6.3 All optional insurance offered by the car rental agent must be declined. All necessary insurance is already provided through the Company's insurance carrier

Use of Personal Vehicle

- 7.1 If use of the employee's personal vehicle is authorized in lieu of air travel or rental car, the employee will be reimbursed for actual expenses in accordance with the current mileage reimbursement rate and Policy Index 100.
- 7.2 Mileage will not be reimbursed in excess of the airfare equivalent.

Reimbursable Daily Expenses

- 8.1 Employees will be reimbursed for reasonable meal expenses while traveling. Business meals, which include customers or business guests discussing Company business, are reimbursable.
- 8.2 While attending conferences or other events where meals are included as part of the event, employees will not be reimbursed for personal meals unless approved by the employee's manager.
- 8.3 Reasonable parking fees, bridge tolls, telephone charges, public transportation fares and travel related tips are reimbursable with supporting receipts.
- 8.4 BU employees should refer to Joint Accord and Compensation for Travel Joint Accord Guideline for additional guidance and information.

Companion Travel

9.1 Business travel with a companion is allowed, but the travel costs of the companion are not reimbursable. Business travel, which includes a companion, must be fulfilled through the agent-assisted reservation desk of Azumano Travel, so companion costs can be paid for with a personal credit card.

Extended Time for Personal Travel

10.1 Additional time for personal travel may coincide with business travel. Reservations for personal travel, which coincide with business travel, may be fulfilled through Azumano Travel. Any costs beyond the costs of the business travel are not reimbursable and those days spent for personal travel will be charged to the employee's vacation/PTO allowance.



Employee Expense Accounts

G-25

Effective date: October 29, 2015 Page 1 of 5 Cancels versions dated: April 28, 2011

1 General Overview

Employees will be reimbursed for appropriate business expenses incurred while on Company assignments. To be reimbursed, the employee must adhere to the proper Company expense policies and IRS requirements.

In accordance with the <u>Expenditure Authorization Policy (I-82)</u>, all employee business expenses should be purchased using the NWN Purchasing Card (P-Card) process if possible. For employee expenses that cannot be acquired using a P-Card (tolls, mileage, etc.), or if the employee does not have a P-Card, employees should follow this Procedure and referenced forms to receive reimbursement or request an expense advance to make the needed purchase.

2 Reimbursable Employee Expenses

The following section describes the timeliness requirement of expense accounts, items to be included on expense accounts, and who should approve these requests. Required forms for completing an expense account request can be found on the Corporate Intranet, *the HUB*, under <u>General Procedures</u>, <u>G.25 Employee Expense Accounts</u>, and Expense Account Form.

1. Period of Time Requirement

Employee Expense Accounts should be submitted within 30 days of expenditures and should cover a period of no longer than one month.

2. Form of Payment By Employee

In general, the employees are reimbursed for appropriate business expenses paid with cash, personal check, or credit card.

a. Credit Cards:

Whenever possible, employees should use his/her credit card to pay for business expenditures when the employee does not have a P-Card as proof of payment must be retained and submitted for expenditures greater than \$25.

b. Cash or Personal Check:

Whenever business expenses are paid for by cash or personal check, proof of payment <u>must</u> be obtained and submitted with Expense Account Forms to support any cash expenditures <u>of \$25 or more</u>. Whenever possible, employees should obtain receipts to support cash expenditures <u>under \$25 unless impractical (e.g. cash tips, parking meters)</u>.

3. Business Meals, Entertainment and Out-of-Town Expenditures

Business meals, entertainment, and out-of-town expenditures including hotel stays are reimbursable by the Company if paid by the employee rather than by a Company P-Card.

NW Natural/1729 Moncayo/5 Receipts must be obtained for business meals, entertainment, and out-of-town expenditures including hotel stays, unless impractical, (e.g. tips). Receipts for these items must be taped on the back of the form or to a separate 8 ½ X 11 sheet and attached to the Expense Account Form. A description of the business purpose for meals and entertainment, plus names of any guests and their business relationship, must also be included.

Business travel is covered by the Business Travel and Procurement and Expense Reimbursement Policy (I-80.1). Travel expenses should not be included on the Employee's Expense Account Form unless the employee does not have a P-Card or the P-Card was not accepted.

4. Out-of-town expenditures - Per Diems (Bargaining Unit Employees only)

Bargaining Unit employees are eligible for Per Diem as provided in the Joint Accord. The per diem rate is established by the Joint Accord by considering the Government Services Administration's State of Oregon published rates. The Per Diem Form can be found on the HUB under <u>Department Sites</u>, <u>Business Services</u>, <u>Accounting</u>, <u>Forms</u>, <u>and Per Diem Request</u>.

5. Dues and Registration

Annual dues for trade associations or professional organizations, and registrations for conferences and conventions may be reimbursed on the employee's Expense Account Form. These fees may also be billed directly to NW Natural. Related invoices must be approved by the department manager. (The Department Manager's P-Card can be used for these items with approval. Receipts must be forwarded to the individual holding the P-Card.)

6. Professional Meetings

Expenditures for small group meetings (i.e. involving less than seven people) must be included on the employee's <u>Expense Account Form</u>.

Expenditures for large group meetings (i.e. involving seven or more people) may either be paid by the employee and reported on the employee's Expense Account Form or may be direct-billed to NW Natural. The billing must show the purpose of the meeting, the names of those in attendance, and <u>in all cases</u> must be approved by an officer of the Company. The preferred method is to have the meeting expense charged on a P-Card.

7. Use of Personal Automobiles on Company Business

The Company will reimburse employees for authorized personal car mileage expenses incurred on Company assignments as outlined in the <u>Company Vehicle Policy, Index No. 100</u>. The IRS mileage rates are updated annually and are to be used for reimbursement, the current mileage rates are included on the Expense Account Form.

A <u>Vehicle Mileage Log</u> is to be used for reporting business mileage. Employees who occasionally drive personal cars for business purposes may report business mileage directly on the <u>Expense Account Form</u>.

Mileage shall be reported separately for each out-of-town trip, showing destination, but mileage driven locally may be aggregated on a daily basis. Each entry for mileage will state beginning and ending odometer readings. The mileage report must be submitted with the employee's Expense Account Form. An internet map's trip mileage may be used to account for mileage

NW Natural/1729 Moncayo/6 driven for locations not included in the standard mileage chart. The standard mileage chart exists on the HUB with expected times and distances for NW Natural locations (<u>under General</u> <u>Procedures, G.25 Employee Expense Accounts, and Mileage Chart</u>).

8. Business Use of an Employee's Personal Cell Phone

The Company will reimburse employees for the business use of an employee's personal cell phone as outlined in the Cell Phone Reimbursement Form located on the HUB under <u>Workplace</u> <u>Services, Forms, and Cell Phone Reimbursement Form</u>. Reimbursement of an employee's cell phone is approved separately by the Telecommunications Department by submitting the <u>Cell</u> <u>Phone Reimbursement Form</u>. Reimbursement will then occur via the payroll process rather than the purchasing and payables process as the reimbursement is taxable. Requests for reimbursement <u>are not to be submitted</u> on the <u>Employee Expense Account Forms</u>.

9. Business Use of an Employee's Personal Internet Service

The Company will <u>not</u> reimburse employees for the business use of an employee's personal internet service as the business use cannot be substantiated. Requests for reimbursement <u>are</u> <u>not to be submitted</u> on the <u>Employee Expense Account Forms</u>. Substantiated claims can be considered for reimbursement via the payroll process as the reimbursement is taxable.

10. Safety Footwear Reimbursement

For employees engaged in activities where the absence of safety footwear presents a hazard and employees exposed to foot injuries during the course of employment, the Company reimburses employees for qualifying safety footwear as outlined in <u>Policy 67, Foot Protection</u>. Reimbursement requests should be submitted via the Safety Footwear Reimbursement Form rather than the Employee Expense Account Form.

3 Completing the Expense Account Form

1. Expense Account Approval

Expense Account Forms of the Chief Executive Officer shall be approved by the Corporate Controller. Expense Account Forms of the President, if a different person than the Chief Executive Officer, shall be approved by the Chief Executive Officer. Other Officers' Expense Account Forms shall be approved by the Chief Executive Officer or another officer designated by the Chief Executive Officer.

Expense Accounts Forms of other employees shall be submitted for approval to the manager of the department or to the executive to whom the employee reports. (Refer to <u>General Policy I-82</u> <u>Matrix of Approval Limits - Appendix A, for dollar limits of approval authority</u>.) Approval signatures carry the following responsibilities:

a. Submitting Employee – <u>assuring</u> clerical accuracy, timeliness of reporting expenses, and completeness of the form including adequate description of the business purpose and nature of the expense, plus appropriate documentation (i.e. receipts) to support items submitted.

- b. Approving Manager, Supervisor and/or Company Officer <u>confirming</u> propriety of amounts, business purposes, account distribution, clerical accuracy, timeliness and completeness of the form including adequate description and documented receipts.
- c. Accounting Department Designee <u>verifying</u> clerical accuracy, timeliness and completeness of the form including adequate description, documented receipts and proper authorization.

2. Expense Account Form Completion

The top portion of the Expense Account Form requires the employee's name, department, date (business month summarized on the form), Company code, employee number, Company location and method of reimbursement. (ACH or check and mailing address). ACH (direct deposit) is the Company's preferred and quickest method for reimbursement. Employees must sign up for Expense Account ACH directly with the Accounts Payable department. The ACH enrollment form can be found on the HUB under <u>General Procedures, G.25 Employee Expense Accounts, and ACH Request Form</u>. It is important to include all of this information on the form.

Below is a summary of the process and respective responsibilities to get the Expense Account Form completed and approved:

Employee (monthly)

- 1. Prepares expense account form as noted above and enters data for each expenditure as follows:
 - Date of expenditure.
 - Name of payee and location (city and state).
 - Total amount of expenditure (travel, lodging, meals (with tips), etc.)
 - Business purpose and reason of expenditure for <u>all</u> expenditures. (For meals include guest's names and their business relationship.)
 - a. If mileage reimbursement, submits Vehicle Mileage Log, as necessary, indicating beginning and ending odometer readings or map with mileage.
 - Receipts for all items must be taped on the back of the form or to a separate 8 ½ X 11 sheet and attached to the Expense Account Form.
 - c. Enters on the bottom of form the account distribution including the GL Accounting Number, Cost Center, Internal Order Number, and consolidated amounts from pages one and two, as necessary.
- 2. Signs Expense Account Form to indicate completeness and accuracy of the form and reimbursable expenditures and submits to respective department manager or Company officer for approval.

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Department Manager or Company Officer

Accounting Department

- Confirming accuracy of all data with receipts, reviews for appropriate business purpose, before approving Expense Account Form and forwards to Accounting Department.
- 1. Verifies accuracy of account coding, that the Employee Expense Account Policy has been followed, and the completeness of the form and receipts, including the appropriate authorized signers.
- 2. Processes for payment. If the employee selects ACH as the reimbursement method they will be notified via email when the payment has been processed.
- 3. Retains Expense Account Form and supporting documentation in accordance with established IRS and company record retention policies.

4 Expense Advance Form Completion

An expense advance may be permitted for approved out-of-town trips and for other extraordinary expenses for employees that do not have a P-Card. (Form can be found on *The HUB*, under <u>General Procedures</u>, <u>G.25 Employee Expense Accounts</u>, <u>and Expense Advance Form</u>.). Expense advances follow the same approval process as the Expense Account Form, and the actual expenditures and receipts are required to be submitted and reconciled via an Expense Account Form within 30 days of the trip. If the actual expenditures are less than the advance the difference is required to be remitted to the Company within the 30 days. If the actual expenditures are more than the advance the difference will be reimbursed via the normal Expense Account Form process.

5 Review of Procedure

In order to ensure that this Procedure continues to reflect current practices and applicable legal requirements, a regularly scheduled review will be conducted every 3 years unless changes in the law or business needs supersede this requirement.

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Gifts and Entertainment Policy

Index No. 26

Effective date: April 1, 2013 Page 1 of 4 Cancels Date: September 1, 2011

Application

This policy applies to all Company employees.

Policy

As a NW Natural employee, you are responsible for both the integrity and consequences of your actions, and you should strive to exercise the highest standards of honesty and fairness in performing any company activity.

NW Natural recognizes that it is customary for businesses occasionally to give small gifts to those with whom they do business and that such gifts and business entertainment can play an important role in strengthening working relationships among business partners. The rules set forth in this policy reflect recognition of customary business practices, including business meetings that may include a meal. A business meeting that includes a meal is not considered a gift or entertainment under this policy if the business partner participates in the business meal.

You should not give or accept gifts, favors, or entertainment that might create or appear to create improper influence. If you are in a position to award contracts or influence a decision to grant business or concessions, you must be particularly careful to avoid giving or accepting gifts, favors or entertainment that create the appearance of favoritism, improper influence or a conflict of interest.

You are prohibited from soliciting any gift, fee, discount, favor, entertainment, transportation, meal or other benefit from a third party. If any third party solicits you for any gift, fee, discount, favor, entertainment, transportation, meal or other benefit in exchange for business, you should immediately report such solicitation to the Director of Internal Audit, the Chief Compliance Officer or through the Business Integrity Hotline. (Solicitations on behalf of charitable organizations should be directed to the Corporate Contributions Committee.)

Public officials are often subject to laws and rules prohibiting receipt of gifts and entertainment. To ensure that you do not inadvertently create a situation in which the public official or you are in violation of such laws, you must never give a gift of any kind or provide a meal, entertainment, transportation or anything of value to a public official in connection with government business. It may be possible to provide de minimis business courtesies to a public official while engaged in business with them, such as coffee or beverages offered at a meeting or parking validation to attend a meeting; however, before your offer this type of de minimis gift, you should confirm with the public official that they are allowed to accept such an offer.

Gifts

A gift is anything of value. Examples include cash, gift cards or gift certificates, event tickets, drawings and raffle prizes, discounts, loans, favorable terms on purchase of any product or service, use of vacation facilities, etc. You may accept gifts from business partners, if you comply with the approval process outlined below and the overriding principles that no employee should give or receive a gift of any value when the gift:

- is of cash or cash equivalents (cash equivalents include stocks or other marketable securities)
- could create an actual or apparent conflict of interest
- could be construed as a bribe, kickback, payoff or loan;

- violates any laws or regulations; or
- could be expected to embarrass NW Natural or the other party if disclosed publicly.

The approval process for accepting gifts is outlined below:

- Gifts of gift cards or gift certificates \$25 or less in value are permitted without supervisor approval (although giving such gifts must be approved as an authorized expenditure);
- Gifts of gift cards or gift certificates exceeding \$25 in value must be approved by the employee's supervisor and the relevant Executive Officer, and this approval must be documented on the Gift Approval Form (attached as Appendix I to this Policy and described below);
- Other (non-gift card) gifts valued at \$100 or less individually and \$250 or less cumulatively from the same business partner during the calendar year are permitted without supervisor approval; and
- Gifts exceeding \$100 in value individually or exceeding \$250 in total, when combined with any other gifts received from the same business partner during the calendar year, must be approved by the employee's supervisor and relevant Executive Officer, and this approval must be documented on the Gift Approval Form (attached as Appendix I to this policy).

If a gift is a promotional item such as logo wear or items (e.g., golf hats, shirts, jackets, bags, mugs or office items etc.) customarily given by a business partner in connection with an event or promotion to employees of a number of its business partners, you may accept the gift without attempting to determine its value or obtaining any approval so long as the gift meets the other criteria specified above.

The Gift Approval Form (attached as Appendix I to this Policy), includes a description of the gift, its approximate value, and a statement of the recipient's belief that (i) the gift would not influence his or her ability to act in the best interests of NW Natural going forward, (ii) the gift could not be construed as a bribe, kickback payoff or loan; (iii) the gift does not violate any law or regulation; and (iv) a public disclosure would not cause embarrassment to NW Natural. A completed and signed Gift Approval Form will be submitted to the appropriate Executive Officer and a copy to the Chief Compliance Officer.

If you have a question about whether it is acceptable to give or receive a gift under this policy, you should direct your question to your supervisor, the Director of Internal Audit or the Chief Compliance Officer. If you are offered or receive a gift that violates this policy or that you believe is otherwise inappropriate, you should refuse it or return it if possible with an explanation to the giver of our policy and immediately report it to your supervisor, the Director of Internal Audit, the Chief Compliance Officer or through the Business Integrity Hotline . If refusing or returning the gift is not feasible (such as in the case of perishable items) or you reasonably believe to do so would offend the giver, your supervisor, after consulting with the Director of Internal Audit or the Chief Compliance Officer, may decide that the gift can be retained by the Company or donated to charity as appropriate.

Business Entertainment

Examples of business entertainment include sporting, theater or other entertainment events and also include conferences or other business functions where travel or overnight accommodations are paid for by the business partner and where the business partner is in attendance. But note, tickets to sporting or cultural events, meals or other forms of entertainment provided to NW Natural employees where the host does <u>not</u> participate in the event are not "entertainment"; they are considered "gifts", and must meet the requirements for approved gifts set forth above.

Subject to the overriding principle that no NW Natural employee should accept business entertainment if such acceptance could create an actual or apparent conflict of interest, you may accept business entertainment offered for legitimate business purposes, provided the entertainment:

- will foster goodwill and successful business relations;
- is not lavish or extravagant under the circumstances;
- is infrequent and does not reflect a pattern;
- is reasonably related to a legitimate business purpose (e.g., accompanying a business partner to a local sporting event or attending a business lunch or dinner);
- is in good taste and occurs at a business appropriate venue;
- could not be expected to embarrass NW Natural or the other party if disclosed publicly.

If you have any question as to whether participating in the event will result in an actual or perceived conflict of interest, you should consult your supervisor for guidance. You can obtain further guidance by contacting your Executive Officer, the Director of Internal Audit or the Chief Compliance Officer.

Because situations may arise where the appropriateness of receiving entertainment invitations is unclear, all business entertainment (regardless of value) must be assessed against the criteria listed above and must be approved, as described below:

- 1. For business entertainment valued at \$50 or less, cumulatively, from the same business partner during the calendar year, you are not required to notify your supervisor or complete the Business Entertainment Request Form.
- 2. For business entertainment valued between \$50 and \$250 for a single event, and between \$50 and \$500 cumulatively from the same business partner during a calendar year, you must notify your supervisor that you will be accepting a business entertainment invitation, but approval on the Business Entertainment Request Form is not required.
- 3. For business entertainment involving entertainment in excess of \$250 in value for a single event or exceeding \$500 cumulatively from the same business partner during a calendar year, you must submit a request for approval of your acceptance of the business entertainment to your supervisor using the Business Entertainment Request Form (attached as Appendix 2 to this Policy). The form requires you to identify the business partner, the invitation specifics, the benefit to NW Natural if you participate, and a description of any other entertainment that you have accepted from the business partner during the calendar year. Applying the criteria set forth above, your supervisor may approve or deny the request and/or identify any possible conflicts of interest and offer suggestions on how to manage the potential conflicts if any exist. Your supervisor must submit the request and the supervisor's recommendation with the supporting rationale based on the criteria set forth above for approval or denial to the appropriate Executive Officer, using the Business Entertainment Request Form. The Executive Officer will make the final determination to approve or deny the request and provide copies of the Request for Approval of the Business Entertainment Form reflecting such approval or denial to the Compliance Office.
- 4. If an invitation for business entertainment is received under circumstances that make it impractical to obtain prior approval in accordance with the rules set forth above and you have made a good faith effort to obtain approval, you may accept an invitation if you reasonably conclude that acceptance of the invitation meets the criteria set forth above. You must promptly report any such acceptance to the parties from whom approval was required as set out above immediately after the event or sooner, using the Business Entertainment Request Form.

Review of Policy

In order to ensure that this Policy continues to reflect current practices and applicable legal requirements, a regularly scheduled review will be conducted every five years unless changes in the law or business needs supersede this requirement.



G-24.1

Effective date: August 5, 2014 Page 1 of 7

P-Card Program Overview

The NW Natural P-Card Program is designed to assist in the management and payment of businessrelated purchases and bring benefits to the Cardholder, NW Natural, and its vendors. The P-Card is designed to streamline the procurement process from beginning to end. P-Card use enables an efficient, cost-effective method of purchasing and paying for small-dollar transactions, meals, travel and other business-related expenses. In many circumstances, reducing or eliminating the need for check requests, reimbursements, blanket orders and petty cash. The P-Card has built-in spending controls designed to prevent certain types of inappropriate purchases.

In addition to general use, designated buyers use P-Cards to procure goods or services as authorized by a standard purchase requisition. This helps eliminate unnecessary back-end processing steps and increases payment efficiency. For items not purchased against a Purchase Order (direct pays), P-Cards also help reduce the time and expenses associated with printing and mailing checks.

P-Card Policy (Policy #81)

It is the policy of NW Natural to use P-Cards as our default payment option unless otherwise required by the Company or the Purchasing Department policies or procedures. Failure to comply with the terms of the P-Card Policy or this Procedure, or any other misuse of an employee's P-Card may result in disciplinary action, up to and including termination of employment. NW Natural commits to providing the necessary resources through training and on-going support to allow its employees to maximize the benefits of this program.

Responsible Parties:

- Cardholders
- Transaction Approvers, where applicable

Acquiring a P-Card

A P-Card is a MasterCard[™] credit card issued by JP Morgan Chase and administered through the Accounting Department. The P-Card is issued by NW Natural and bears the Company logo, the Cardholder's name and identifying account number. The security code is the last three digits in the signature box on the reverse side of the card.

In order to obtain a P-Card, the applicant must complete a P-Card Request form as well as a Cardholder Agreement and receive signature approval from his/her manager. Additionally, the applicant must acknowledge their receipt and understanding of the P-Card Policy as well as this Procedure. The applicant then forwards the completed forms to the P-Card Administrator who next sends an application to JP Morgan Chase and coordinates training for the applicant. The P-Card Administrator only issues a card to the applicant after the completion of the required training.

The P-Card is a corporate charge card, which will not affect the Cardholder's personal credit rating if used within the guidelines of this Procedure, the P-Card Policy and other Company policies and procedures relating to the expenditure of company funds. Blatant disregard for these policies or any fraudulent activity perpetrated by the Cardholder may affect the Cardholder's personal credit rating and subject the Cardholder to disciplinary action up to, and including termination of employment.

Cardholders must take reasonable steps to maintain the security of the P-Cards. For example, keep the card in a secure location and carefully guard the card account number.

Training

P-Card training is mandatory for all Cardholders and Approvers. Cardholders must attend a training session before their card is issued to them. Approvers must attend a training session to go over policies and procedures before they can begin approving transactions. Trainings will be conducted by the P-Card Administrator.

Use of Card

The intent of the P-Card is to assist NW Natural in the purchase of and payment for business related goods and services. Once a company P-Card has been issued, a Cardholder should not use his/her personal credit card, or expect reimbursement for business-related goods and services. The Cardholder may use the P-Card to purchase items by telephone, in person, or over the internet. The Cardholder is responsible for determining the security of internet sites. A Cardholder is not to fax credit card numbers to anyone.

All purchases made by P-Card must be for business related purposes only. **Non-business related purchases with a P-Card are prohibited**. Further, when multiple Cardholders are attending the same event, the most senior Cardholder (as defined by position, not tenure) must use his/her card for the intended purchase.

If the P-Card is inadvertently used for a personal expense, the Cardholder is required to notify the P-Card Administrator, code the expense to the Accounts Receivable GL Account, 143022, and reimburse NW Natural for the charge.

The following purchases are **<u>not</u>** allowed on the P-Card:

- Services or construction performed on NW Natural job site or company property
- IT hardware/software (except by designated buyers, in IS or Purchasing)
- Pipeline or "stores" items (i.e. pipes, valves, meters, pipeline components, etc.)
- Charitable contributions (except as specifically designated or authorized to do so, i.e., Community Relations purchase of a table at a charitable event)
- Personal purchases
- Cash advances
- Doctor appointments / Medical treatments
- Real Estate
- Jewelry
- Airline Travel All airline travel should be arranged through Azumano Travel. See Policy 80.1 (Business Travel Procurement and Expense Reimbursement)

The above list is not exhaustive and employees should use their good judgment in using their P-Cards for business-related purchases.

Cardholder Limits

The P-Card is the preferred method of payment for any and all business and business travel related goods and services and should be used before using petty cash, direct pay, Purchase Orders or any other method of payment. Below are general guidelines for spending limits established for various groups determined by the Officers. These general guidelines are subject to the other provisions of this procedure and the P-Card policy:

General Use/Field Supervisors:

- The P-Card is to be used for single transactions of less than \$1,000.
- The monthly limit for your P-Card is \$2,500.

Field Personnel:

- The P-Card is to be used for single transactions of less than \$500.
- The monthly limit for your P-Card is \$1,500.

Executive Assistants:

- The P-Card is to be used for single transactions of less than \$1,000.
- The monthly limit for your P-Card is \$5,000.

Designated Buyers:

- The P-Card is to be used for single transactions of less than \$50,000
- The monthly limit for your P-Card is \$100,000.

Accounts Payable:

- The P-Card is to be used for single transactions of less than \$25,000
- The monthly limit for your P-Card is \$50,000.

Managers:

- The P-Card is to be used for single transactions of less than \$5,000.
- The monthly limit for your P-Card is \$25,000.

The above guidelines outline standard P-Card spending limits. Because of unique situations for each Cardholder, specific limits for individual Cardholders may be slightly different. Cardholders requesting limits in excess of the above amounts must state the reason in their P-Card Request Form and management must have the appropriate level of authority to approve the request for excess limits.

Transaction Splitting

Splitting up one transaction into multiple transactions with a single P-Card or the use of multiple P-Cards to circumvent and individual's spending limits is strictly prohibited. Similarly, a supervisor or manager should not charge their own business-related expenses to one of their direct reports' P-Cards, but instead use their own P-Card so as to not circumvent, either intentionally or unintentionally, appropriate review of the charges by the next level of review. Purchases exceeding limits as reflected on the Cardholder Agreement, whether on a monthly or individual transaction basis, will be denied at the point of sale. Credit limits are established for a complete cycle (i.e. Cardholder can spend up to \$2,500 during the month from July 21st to August 20th). Using this example, on August 21st, the Cardholder's limit would be re-established at \$2,500.

It is the Cardholder's responsibility to adhere to the purchase limits and restrictions of the P-Card and to ensure that the total transaction amount does not exceed their assigned preset spending limits. Temporary increases to P-Card limits are permitted with email approval from the Cardholder's

manager. Approval is accepted via email sent to the P-Card Administrator with the requested limit increase(s).

Note: These accountability measures are effective on January 1, 2015.

Exceptions to this policy will result in the following:

First Exception to Policy – The Cardholder will attend a meeting with their Manager, the P-Card Administrator and the Accounting Manager and their card will be suspended for one cycle.

Second Exception to Policy in 6 Months – The card will be cancelled. The Cardholder may reapply for a P-Card after a 6 month period and must attend training.

Receipts

It is the responsibility of the Cardholder to obtain an original receipt (cash register tape, paid invoice, restaurant ticket, or copy of an Internet order) as documentation for all P-Card purchases over \$25. The receipt must include:

- Purchase date
- Vendor name
- Transaction amount

Receipts for meals must include the original charge card receipt. If meals for other individuals are included, provide their names, company (for non-employees) and the business purpose for the meal in the "Transaction Notes" field of the JP Morgan Chase website, PaymentNet. If a receipt was not obtained or cannot be located a Substitute P-Card Receipt form must be filled out and sent in with your monthly statement and backup. The form is located on the HUB under Accounting Department. All receipt envelopes are due within 45 days after the cycle end date.

Monthly Account Coding Process

The P-Card bill cuts off on the 20th each month. If the 20th falls on a weekend it will cut off either on Friday or Monday, depending on which day the 20th falls on. All transactions that posted by the 20th are included within that month's bill and must be coded by the Cardholder and approved by the Cardholder's supervisor/manager. The new P-Card month begins on the 21st and monthly spend limits are replenished at that time.

As transactions are made during the cycle, the Cardholder can log on the JP Morgan Chase website: www.paymentnet.jpmorgan.com to access his/her account and review applicable charges. The Cardholder must verify accuracy of charges (or dispute if inaccurate) and input the correct account charge code and business purpose. The business purpose for each charge should be clearly stated in the "transaction notes" field including "who, what and why" the purchase was made. (Note: "Miscellaneous items" and "Business lunch" are never a sufficient description or business purpose.)

By the 21st of each month, the Cardholder must review and code all charges posted by the 20th and ensure sufficient back up is available for each charge. The Cardholder then must print the statement, systematically assemble the appropriate back up in date order, enclose in an unsealed envelope stating his/her name and month ended mm/20th/yy. The unsealed envelope should then be delivered to the approving supervisor or manager for review.

By the 25th of each month, the approving supervisor or manager must log on to the PaymentNet website and review all charges and account coding against Cardholder receipts and stated business purpose. It is the Approver's responsibility to ensure the appropriate account coding and sufficient "who, what and why" information about the business purpose is provided. The supervisor/manager must review and approve each transaction, review the Cardholders receipt pack for completeness, signs for approval and forwards the receipt packet via interoffice mail to the P-Card Administrator within 45 days after the cycle end date.

Note: The Approver is equally responsible for ensuring the Cardholder has attached all required receipts. The Approver verifies that the envelope has been signed by the cardholder indicating all applicable receipts are enclosed. Accounting will charge any transactions not approved by the 25th of the month to a default O&M account number within the Cardholder's department. Managers must clear all default accounts by the following month-end close using the standard Transfer Form on the HUB under Accounting Department.

Disputed Items & Credits

The Cardholder is responsible for contacting the vendor to resolve any disputed charges or billing errors within 30 days of the charge. If the matter is not resolved within 30 days, the Cardholder must contact the P-Card Administrator and complete the appropriate forms to be filed with JP Morgan Chase. JP Morgan Chase will not be liable if forms are not completed within 60 days of the disputed charge.

If a credit is due, vendors will issue the credit directly to the individual P-Card account for any items they have agreed to accept for return. **UNDER NO CIRCUMSTANCES SHOULD A CARDHOLDER ACCEPT CASH IN LIEU OF A CREDIT TO THE P-CARD ACCOUNT**.

The Cardholder is responsible for ensuring the appropriate credit for the reported disputed item or billing error appears on a subsequent statement.

Rejected Purchases

A vendor may reject a Cardholder's card for a number of reasons, including the following:

- Transaction amount may exceed the authorized individual transaction amount on the card.
- Transaction may result in the Cardholder exceeding their monthly credit limit.
- Transaction may involve an unauthorized vendor or vendor type.

If a Cardholder believes that his/her P-Card was erroneously declined or has reached his/her limit prior to month-end, they should contact the P-Card Administrator for additional assistance.

Lost, Stolen or misplaced Cards or Suspected Fraud

In the event of a lost or stolen P-Card, the Cardholder is required to immediately contact JP Morgan Chase toll-free at 800-270-7760 (24 hours a day, 365 days a year), then notify his/her supervisor and the P-Card Administrator.

Cardholder Status Change

If the Cardholder transfers to another department or new position, it is the responsibility of the Cardholder to notify the P-Card Administrator. Both the employee and the new manager will need to sign a new Cardholder Agreement that includes updated limits. In certain circumstances, the Cardholder may need to attend additional training.

In addition to this proactive measure, all supervisors and managers with employee Cardholders are reaccredited annually to ensure access and limits are appropriate. Additionally, the Executive Officer responsible for each division annually reviews these limits and total spend (by category) for all Cardholders.

Account Closure

The P-Card Administrator may close an account if a Cardholder (a) transfers to a new job within NWN in which a P-Card is not required, (b) separates from employment, or (c) for reasons including but not limited to those listed below:

- The P-Card is used for personal, prohibited or unauthorized purposes.
- The P-Card is used to purchase any substance, material, or service which violates NW Natural policies or applicable laws or regulations.
- The Cardholder splits a transaction to circumvent the limitations of the P-Card.
- The Cardholder uses another Cardholder's card to circumvent the purchase limit assigned to either Cardholder or the limitations of the P-Card.
- The Cardholder fails to provide receipts for transactions over \$25 within 45 days after the cycle end date.
- The Cardholder fails to provide, when requested, information about any specific purchase reasonably in question.
- The Cardholder accepts a cash refund in lieu of credit to the P-Card account.
- The Cardholder does not adhere to all of the P-Card policies and procedures.

The P-Card is to be used exclusively for business purposes and business-related expenses. The Cardholder is responsible for using the P-Card responsibly and in compliance with this and other applicable Company policies and procedures. Improper use of the P-Card may lead to disciplinary action, up to, and including prosecution and termination of employment.

The Cardholder is expressly liable for any inappropriate use of the P-Card. The Cardholder agrees and understands that the Cardholder will be obligated to reimburse the Company for any misuse of the P-Card. This reimbursement obligation is continuing and applies even if the Cardholder is no longer employed with NW Natural. The Company will pursue reimbursement by all available means, including pursuing all applicable legal remedies.

Exceptions to Policy

Note: These accountability measures go into effect on January 1, 2015.

Violations identified during audit or by any other means will result in the following three courses of action:

- First Exception to Policy The P-Card Administrator will communicate the violation and proper procedures with the offending party and appropriate approving manager
- Second Exception to Policy in 6 Months The Cardholder will attend a meeting with their manager, the P-Card Administrator and the Accounting Manager and their card will be suspended for one cycle.
- Third Exception to Policy in 6 Months The P-Card will be cancelled. Notification will be sent to the Cardholder and approving manager. The Cardholder may reapply for a new P-Card after a six month period and must attend training.

In addition to the loss of P-Card privileges as outlined above, improper use of the P-Card may lead to disciplinary action, up to, and including prosecution and termination of employment.

Inquiries or Assistance

For P-Card inquiries during business hours, contact Heather Hancock, Marie Guizzotti or Marty Cresalia:

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Review of Procedure

In order to ensure that this Procedure continues to reflect current practices and applicable legal requirements, a regularly scheduled review will be conducted every 3 years unless changes in the law or business needs supersede this requirement.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Lea Anne Doolittle

COMPENSATION AND BENEFITS EXHIBIT 1800

May 23, 2018

EXHIBIT 1800 – REPLY TESTIMONY - COMPENSATION AND BENEFITS

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1		I. INTRODUCTION AND SUMMARY
2	Q.	Are you the same Lea Anne Doolittle who provided direct testimony on
3		behalf of Northwest Natural Gas Company ("NW Natural" or "the
4		Company") in this proceeding?
5	Α.	Yes, as Exhibit NWN/700.
6	Q.	What is the purpose of your reply testimony?
7	Α.	The purpose of my testimony is to respond to the adjustments proposed by
8		Marianne Gardner and Scott Gibbens on behalf of the Public Utility Commission
9		of Oregon Staff ("Staff") and Bob Jenks and William Gehrke on behalf of the
10		Oregon Citizens' Utility Board ("CUB") related to salaries, wages, pay-at-risk, and
11		medical benefits.
12	Q.	Please summarize your testimony.
13	Α.	In my testimony, I explain that the Company's compensation practices result in
14		total compensation that is at the market median for comparable companies and
15		that none of Staff's and CUB's proposed adjustments has merit. Specifically, my
16		testimony explains that the Company's projection of increases to salaries and
17		wages for the November 2018-October 2019 test year ("Test Year") uses the
18		methodology accepted by compensation professionals and is more accurate than
19		Staff's projection produced using its model, because NW Natural's projection
20		uses compensation trend survey data, including Oregon-specific data, from the
21		relevant markets and takes into account the Company's past experience. I next
22		describe the Company's at-risk pay, which includes short- and long-term
23		incentive programs, in detail and explain how these programs benefit customers
24		and why NW Natural should be allowed to recover the full costs. I also explain

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1		that if the Public Utility Commission of Oregon ("Commission") examines the
2		goals underlying each short-term incentive program offered by the Company, it
3		will find that significant portions of these programs are tied to direct customer
4		benefits. Finally, I explain that the Company accurately projects Test Year
5		medical benefit costs using actual costs, future trend surveys, and by considering
6		past experience and Company-specific factors.
7		II. WAGES AND SALARIES
8	Q.	How did NW Natural project the escalation of wages and salaries for the
9		Test Year?
10	A.	As I explained in my direct testimony, for non-bargaining unit ("NBU") employees,
11		we routinely analyze trend data to determine the percentage by which the
12		Company's base pay should be escalated. The compensation trend surveys we
13		rely upon for escalating base pay are performed by well-regarded organizations
14		and companies such as Willis Towers Watson ("WTW") Milliman, and Mercer.
15		For bargaining unit ("BU") employees, the Company determines yearly escalation
16		through a negotiated process with the union.
17		In addition, we periodically promote both BU and NBU employees when
18		they apply for and receive a higher-level job classification with higher pay. For
19		NBU employees, we analyze all employees' compensation to determine whether
20		equity adjustments are required to keep employees at appropriate compensation
21		levels relative to one another, thereby ensuring pay equity. For BU employees,
22		we also may move employees up to a higher pay step as described in the
23		bargaining agreement. Therefore, our Test Year escalation projection accounts
24		for these considerations.

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Q. By what amounts did the Company escalate wages and salaries for the Test Year?

A. The Company's escalation for Test Year NBU wages and salaries represented a
4% increase in 2018 and a 4.25% increase in 2019—reflecting 3.25% and 3.5%
5 merit increases, respectively, and an additional 0.75% for promotions and equity
adjustments. NW Natural escalated Test Year BU wages and salaries by 3.5%
each year—reflecting the 3% negotiated increase and an additional 0.5%
increase for promotions and step adjustments.

9 Q. Does any party criticize or rebut the Company's compensation trend

- 10 studies or general methodology?
- 11 A. No, with the exception of CUB's concerns regarding officer compensation, which
- 12 I will address later, no party criticizes the studies used by the Company or
- asserts that the Company misapplied the studies or that our general approach isflawed.

15 Q. Does Staff nevertheless propose to adjust Test Year employee wages and 16 salary?

A. Yes, Staff recommends a reduction in salaries and wages of \$812,237, and
 related adjustments for payroll taxes and depreciation.¹

19 Q. What is the basis for Staff's proposed adjustment?

- 20 A. Staff applied its three-year wage and salary model (W&S Model) to escalate
- 21 wages and salaries. The model looks to a base year that is three years prior to
- the Test Year—in this case 2016—and then adjusts wages and salaries for each
- 23 subsequent year to establish the projection for the Test Year. For NBU

¹ Staff/100, Gardner/33.

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1		employees, Staff used the All Urban Consumer Price Index ("CPI") to escalate
2		2016 wage and salaries, ² and for BU employees, Staff escalated 2016 wages
3		and salaries by 3% each year, because 3% was the last contracted rate
4		increase. ³ Because Staff's projection and the Company's projection differed by
5		less than 10%, Staff advocates that the Company should recover half of the
6		difference. ⁴ Here, the Company's projection exceeded Staff's by \$1.8 million,
7		and, after halving this number and applying the Oregon allocation percentage of
8		90.3, Staff recommends an adjustment of \$812,237.5 The entire amount of
9		Staff's adjustment stems from the difference between Staff's and the Company's
10		escalation of NBU wages and salaries.
11	Q.	Do you agree with Staff's application of its W&S Model to produce the
12		recommended adjustment?
13	Α.	No, I do not. Staff has not demonstrated that the W&S Model is a superior
14		methodology to the Company's use of the well-accepted compensation
15		methodology, described above, which is a meticulous and tailored approach. But
16		even if Staff's W&S Model is used, there are several ways in which the model
17		can be applied more accurately.
18	Q.	Please explain why the Company's approach to projecting wages and

19 salaries is more accurate than the W&S Model.

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² Staff/100, Gardner/29, 32.

³ Staff/100, Gardner/32.

⁴ Staff/100, Gardner/32.

⁵ Staff/100, Gardner/33. Staff/100, Gardner/32 states that the difference between Staff's projection and the Company's was \$812,237, but it appears that this is a typographical error and that \$1.8 million accurately reflects Staff's calculations.

Α. 1 As I explained above, the compensation trend surveys used by the Company to 2 project changes to NBU wages and salaries are forward-looking, and they 3 provide information specific to wages and salaries for different categories of 4 positions, based upon the relevant hiring market. NW Natural's use of these 5 trend surveys to project compensation changes is more tailored than Staff's 6 approach of choosing a "base year" that is three years in the past and escalating 7 to the Test Year using the All Urban CPI. Staff's choice of a three-year-old base 8 year appears to be arbitrary, and the All Urban CPI is an inappropriate escalator 9 for NW Natural's wages and salaries.

Q. Why do you disagree with Staff's approach of escalating NBU wages and
 salaries using the All Urban CPI?

12 Α. I disagree with Staff's use of the All Urban CPI for several reasons. First, the All 13 Urban CPI is price data and is not applicable to wages and salaries. If Staff 14 seeks to apply a CPI, it should use the CPI-W, which the government produces 15 specifically for urban wage earners and clerical workers.⁶ Second, as Mr. 16 Moncayo explains in detail in his reply testimony,⁷ the Portland-Salem area CPI 17 (or other regional CPI) offers a much more specific and accurate indicator for NW 18 Natural, a Portland-based utility, than the All Urban CPI, in which Oregon data 19 represent only a very small percent. Third, the All Urban CPI is not specific to 20 the gas industry or other defined market from which the Company draws many 21 employees. Fourth, any CPI provides historical data that does not account for 22 future trends—unlike the compensation trend surveys used by the Company.

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⁶ See <u>https://www.bls.gov/cpi/questions-and-answers.htm#Question_6</u>.

⁷ NW Natural/1700, Moncayo/11-14.
1	Q.	Please summarize the Company's position regarding Staff's adjustment to			
2		base year salaries and wages.			
3	Α.	NW Natural stands behind its wage and salary projections and does not believe			
4		that Staff's proposed adjustment has merit.			
5		III. <u>FTEs</u>			
6	Q.	Does Staff propose an adjustment to the number of Test Year full-time			
7		equivalents (FTEs)?			
8	Α.	Yes. Staff's analysis determined that the Company's projection for FTEs in the			
9		Test Year yielded approximately the same number of customers per FTE as the			
10		Company has averaged historically, and Staff stated in testimony that it does not			
11		recommend an adjustment to Test Year FTE. ⁸ However, Staff's workpapers			
12		demonstrate that it made a \$1.65 million adjustment for 10 "unidentified			
13		positions," the purpose of which was unclear to Staff. ⁹			
14	Q.	Can you please explain the nature of the "unidentified positions"?			
15	Α.	Yes, as described in detail in Mr. Moncayo's testimony, ¹⁰ the unidentified			
16		positions Staff mentions are actually positions the Company identified that would			
17		become vacant, and thus these positions served to <i>reduce</i> costs included in the			
18		Test Year.			
19	Q.	Do you agree with Staff's proposed FTE adjustment?			
20	Α.	No, because the Company did not include the cost of these 10 FTEs in the Test			

Year, and instead removed them from the Test Year revenue requirement to 21

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⁸ Staff/100, Gardner/34. ⁹ Staff/100, Gardner/34-35.

¹⁰ NW Natural/1700, Moncayo/4-5.

1		account for these positions becoming vacant, Staff's proposed adjustment			
2		related to these FTEs is unnecessary.			
3		IV. <u>AT-RISK PAY</u>			
4	Q.	Please provide a general summary of the types of at-risk pay for which the			
5		Company seeks recovery.			
6	A.	The Company offers at-risk pay to both employees and officers as part of its			
7		effort to provide a competitive total compensation package that is necessary to			
8		attract, motivate, and retain the qualified employees needed to run a safe and			
9		reliable natural gas delivery business, with good customer service and at a cost			
10		that is reasonable. The term "at-risk pay" includes both short- and long-term			
11		incentives, each of which I will discuss in turn.			
12	Q.	Please describe the Company's short-term incentive programs.			
13	A.	For BU employees, NW Natural offers the Key Goals Program, which links			
14		employees' total compensation to the achievement of Company overall goals.			
15		The Key Goals Program has two separate components, and the Company seeks			
16		recovery only for the component related to operational goals that are within			
17		employees' control, such as customer service measures. ¹¹ For non-officer NBU			
18		employees, the Company offers the Goals Incentive Plan, which rewards			
19		employees who have demonstrated strong individual performance when the			
20		Company meets either operational or financial goals. For officers, the Company			
21		offers the Executive Annual Incentive Plan, the availability of which is contingent			
22		upon meeting predetermined financial, operational, and individual goals.			

¹¹ The Key Goals Program also has a profit sharing component, but the Company does not expect this component to be triggered in the Test Year and therefore does not seek to recover for this component.

Q. For which of these short-term incentive programs does the Company seek recovery?

A. The Company seeks recovery for all of the short-term incentive programs
described above because these programs are part of the Company's total
compensation package, which is essential to attracting and retaining qualified
employees and officers, and therefore represent reasonable and necessary
business costs.

8 As I explained in my direct testimony, the Company recognizes that the 9 Commission has not allowed recovery for portions of at-risk pay in the past. 10 Nevertheless, NW Natural requests that the Commission reexamine its past 11 practice in this case, or, alternatively, in a generic docket.

12 Q. Does Staff propose adjustments regarding the Company's short-term 13 incentive programs?

14 Yes, Staff recommends that the Commission adhere to its past practice and Α. 15 disallow 100% of officer bonuses, because such bonuses typically are based on 16 increased earnings and meeting shareholder expectations.¹² For non-officers, 17 Staff recommends disallowance of 75% of performance-based bonuses, which, 18 according to Staff, are generally focused on increased earnings and therefore benefit shareholders.¹³ Staff also recommends disallowance of 50% of non-19 20 officers' merit-based bonuses, because such bonuses reward conduct that 21 benefits shareholders and ratepayers equally.¹⁴

¹² Staff/100, Gardner/30, 37.

¹³ Staff/100. Gardner/30. 37.

¹⁴ Staff/100, Gardner/30, 37.

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1		Although Staff's testimony does not discuss the proportion of each short-
2		term incentive program that Staff disallowed to reach its total recommended
3		reduction of \$7.587 million in Test Year incentives, ¹⁵ it appears from Staff's
4		calculations that it disallowed 100% of the Executive Annual Incentive Plan and
5		50% of the non-officer short-term incentive programs (the Key Goals Program
6		and the Goals Incentive Plan).
_	-	

7 Q. Does CUB propose similar adjustments?

A. Yes, CUB also recommends that the Commission adhere to its past practice, and
 CUB recommends disallowance of 100% of officer at-risk pay and 50% of non officer at-risk pay.¹⁶

11 Q. Do you agree with the reasoning behind the proposed disallowances?

- 12 Α. No. The reasoning behind the disallowances appears to be that the Company 13 should not recover for costs associated with any portion of a pay-at-risk program 14 that benefits shareholders. More specifically, Staff and CUB seek to disallow 15 recovery for significant portions of short-term incentive programs that are based 16 on financial metrics, and therefore primarily or solely incentivize behavior that the 17 parties believe benefits shareholders. While NW Natural understands that Staff 18 and CUB seek to apply the Commission's past practice, the Company believes 19 that the reasoning underlying this practice is illogical and difficult to apply and 20 that it encourages poor compensation practices. NW Natural believes that the 21 appropriate criteria for whether these costs are recoverable is whether the
 - ¹⁵ Staff/100, Gardner/42.
 - ¹⁶ CUB/100, Jenks Gehrke/3, 6-7.

Company's pay-at-risk programs are part of a market-median total compensation
 package, and therefore are a reasonable and necessary business expense.

2 3

Q. Does at-risk pay in general benefit customers?

4 Α. Yes. Pay-at-risk helps attract and retain talented employees and officers, which 5 in turn promotes safe, efficient, and reliable service and translates into a 6 customer benefit. Staff does not dispute that incentive pay is an effective tool for 7 motivating strong employee performance.¹⁷ And CUB agrees that "[a]t-risk 8 compensation incentivizes employee behavior, which may be beneficial to utility 9 operations."¹⁸ Without high-performing, experienced, and dedicated employees, 10 the Company cannot continue to provide the excellent, safe, and reliable natural 11 gas distribution service on which its customers depend.

12 In addition, I would note that to the extent Staff's and CUB's 13 recommendations are based on the belief that it is possible to separate aspects 14 of employee performance that benefit shareholders from those that benefit 15 customers, this premise is flawed. When a customer service employee resolves 16 a customer issue efficiently, the customer benefits directly, while shareholders 17 benefit from lower costs and increased customer loyalty. When a Company 18 engineer designs a new pipeline for the greatest system benefit and efficiency, 19 the optimally designed system benefits both the customer purchasing the gas 20 and the shareholder who owns the company selling it. At-risk pay should be 21 viewed no differently than these aspects of the business, in which both

¹⁷ Staff/100, Gardner/36.

¹⁸ CUB/100, Jenks – Gehrke/4.

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customers and shareholders benefit from the efficient and competent
 management of the utility.

Q. Is it the Company's position that even the portions of pay-at-risk based on
 financial goals encourage behavior that benefits customers?

5 Α. Yes. When the Company is financially sound and offers safe and reliable 6 service, both shareholders and customers benefit. Financial goals encourage 7 employees to spend dollars wisely, work efficiently and safely, eliminate 8 redundancies, and suggest and justify capital projects that will increase efficiency 9 and return more than the cost of capital over the life of the project. Moreover, 10 both customers and shareholders benefit when a utility experiences strong 11 earnings. A utility with strong earnings will enjoy stronger credit ratings, which 12 result in lower costs of capital, and ultimately a lower revenue requirement and 13 lower rates. For these reasons disallowing recovery for any at-risk pay related to 14 financial metrics is not a logical policy.

15 Q. Does NW Natural offer at-risk pay that increases its total compensation
 above market median pay levels?

A. No. As I explained in my direct testimony, NW Natural offers pay-at-risk as part
of a total compensation package that is consistent with relevant market medians,
which is a standard practice in the industry. In other words, at-risk pay is an
integral part of the total compensation plan and is not an additional "bonus"
above the median market rate. Staff does not dispute that pay-at-risk is a
standard human resources practice and agrees that the Company is providing
appropriate levels of incentive pay, as compared to peer data, to both BU and

NBU employees.¹⁹ CUB also acknowledges that pay-at-risk is widely used in the
 gas industry.²⁰ Neither party has explained why it is appropriate to disallow a
 portion of the Company's total compensation.

Q. Staff states that the Company's decision to continue offering incentive pay
rather than raising base pay indicates the Company is better off using
incentive pay, even if some recovery is disallowed.²¹ Is this argument
correct?

8 Α. No. As discussed in my direct testimony, the Company has considered the option 9 of eliminating at-risk pay. However, this approach would require us to increase 10 base pay accordingly to remain at competitive market compensation levels. To 11 date, the Company has declined to take this route, based on the firm belief that 12 offering pay-at-risk is the best human resources practice and will allow NW 13 Natural to receive optimal performance from its employees. We also have been 14 concerned that if we raise base pay in order to remain at market levels for total 15 compensation—as we would be required to do to attract and retain a qualified 16 workforce—Staff might recommend a disallowance because our base pay would 17 be higher than that of other utilities that offer pay-at-risk. However, if the 18 Commission is unwilling to reexamine its at-risk pay policy, either in this case or 19 in a generic docket, the Company may reconsider its approach. Regardless, just 20 because the Company elected to continue with what it considers to be the best 21 practice, at the expense of Company earnings, and elected not to adopt a

- ¹⁹ Staff/100, Gardner/36.
- ²⁰ CUB/100, Jenks Gehrke/6.
- ²¹ Staff/100, Gardner/41.

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- different compensation model that it considers inconsistent with best practice. 1 2 does not mean that the Company is not harmed by Staff's policy. 3 Q. Staff asserts that, because the Commission applies the same policy of 4 disallowing a portion of at-risk pay to all regulated companies under its 5 authority, NW Natural is not at a competitive disadvantage relative to other regulated utilities in Oregon.²² Do you agree? 6 7 Α. No. As an initial matter, I note that Staff appears to be confusing the issue of 8 whether NW Natural's compensation costs are prudent and therefore recoverable 9 with the separate issue of whether disallowing recovery places the Company at a 10 competitive disadvantage. Moreover, I disagree with the underlying assumption 11 that NW Natural's only competitors for gualified labor are other utilities regulated 12 by the Commission. In reality, the Company attracts employees from a broader 13 range of employers and must compete with employers locally, in the Pacific 14 Northwest, and nationwide for highly gualified employees. I also disagree with 15 Staff's premise that application of the Commission's policy disadvantages all 16 Oregon utilities equally, because NW Natural is much smaller than several of the 17 other utilities that provide service in the state, and labor expenses make up about 18 two-thirds of our operation and maintenance costs. 19 Q. What is the philosophy behind the Commission practice that Staff and CUB 20 propose to apply in this case?
- A. As explained in Staff's testimony,²³ the reasoning behind disallowing 100% of
 officer incentive pay, 75% of employee performance-based incentive pay, and
 - ²² Staff/100, Gardner/41.

²³ Staff/100, Gardner/40.

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1		50% of employee merit-based incentive pay is to effectuate the policy of
2		disallowing recovery for the portions of incentive programs that benefit
3		shareholders while allowing recovery for the portions that benefit customers.
4		This practice is premised on the assumption that incentive programs based on
5		financial goals do not benefit customers—an assumption with which the
6		Company disagrees, for the reasons explained above.
7	Q.	Is application of flat 50%, 75%, and 100% disallowances consistent with the
8		Commission's direction that disallowances should be based on the
9		purpose for which the incentives are awarded? ²⁴
10	Α.	No. In Order No. 97-171, the Commission stated that disallowance of bonuses
11		was based "on the purpose for which the bonuses are awarded." ²⁵ Staff
12		recognizes this principle, stating "it is the metrics, goals, and targets the plan is
13		based upon that give rise to the disallowance."26 Here, however, both Staff and
14		CUB apply set percentage disallowances for particular short-term incentive
15		programs, without examining the goals underlying the program to determine what
16		portion benefits customers. This approach appears arbitrary and is contrary to
17		Staff's articulation of the reasoning underlying the Commission's past practice,
18		which seems to support recovery of the full amount of non-financial incentives,
19		because these incentives plainly provide customer benefit. Yet Staff's
20		recommended disallowances encompass portions of programs with goals that
21		are not tied to financial performance and directly benefit customers.

²⁴ Staff/100, Gardner/40-41 (discussing and quoting Commission precedent).
²⁵ Staff/100, Gardner/40 (quoting Order No. 97-171).
²⁶ Staff/100, Gardner/40.

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Q. What would a proposal consistent with the Commission's direction to
 consider the program's purpose look like?

3 As I explained above, NW Natural believes that **all** of its pay-at-risk benefits Α. 4 customers—even the portions based on financial goals—and the Company 5 seeks full recovery for all short- and long-term incentive programs. However, if 6 Staff and CUB had looked to the purpose and goals underlying each short-term 7 incentive program, they would have found that significant portions of the 8 Company's programs are tied to operational and other non-financial goals that 9 plainly provide a customer benefit. Specifically, 100% of the BU Key Goals 10 Program is based on operational goals, 50% of the NBU Goals Incentive Plan is 11 based on operational goals, and approximately 45% of the Executive Annual 12 Incentive Plan is based on operational goals and non-financial individual goals. I 13 will now describe the operational goals involved in each of these short-term 14 incentive programs, explain how the goals benefit customers, and discuss the 15 portion of each program tied to these goals.

16 Q. Please describe the four operational goals that underlie each of the

Company's short-term incentive programs and explain how customers
 benefit when the Company meets these goals.

A. Each of the Company's short-term incentive programs includes an operational
 component with the following four goals: (1) customer satisfaction, (2) company
 growth, (3) cost management, and (4) health and safety, described in more detail
 as follows:

23 24 Customer satisfaction has two components—satisfaction with the Company as a whole, and satisfaction with employee interaction. Both are measured

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by customer surveys. NW Natural employees further customer satisfaction by 1 2 providing efficient, courteous, knowledgeable service in customer interactions 3 and representing the Company positively through community involvement. 4 Customers benefit from employee behavior that increases customer 5 satisfaction. 6 Company growth measures the number of new meter sets for customers. • 7 NW Natural employees contribute to this goal by providing timely hook-ups for 8 new customers. New customers benefit when their meters are timely 9 installed, and existing customers benefit from growth because costs are 10 shared among a larger customer base. 11 Cost management involves controlling costs to serve customers. This goal is 12 measured in operation and maintenance budget dollars per customer. 13 Customers benefit when employees manage costs by working efficiently and 14 looking for ways to save time and add value, thus eliminating unnecessary 15 expenses, expanding work skills, and developing flexibility to meet changing 16 customer and Company needs. 17 The health and safety goal involves two components-damage call response • 18 time and odor call response time. Both are measured in percent of calls 19 responded to in less than one hour. Customers benefit when the Company 20 works quickly to resolve leaks and other potentially dangerous situations. 21 All of these operational goals apply to each of the short-term incentive 22 programs I will discuss below, and each goal promotes the Company's provision 23 of safe, reliable, efficient, and timely natural gas service and customer service to 24 its customers.

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Q. Please describe the Key Goals Program for BU employees and the portion tied to the operational goals described above.

3 The operational component of the Key Goals Program for BU employees, for Α. 4 which the Company seeks recovery, links BU employees' incentive 5 compensation to the achievement of the customer-focused operational goals 6 described above, and NW Natural seeks to recover 100% of the expenses 7 related to this program.²⁷ All incentives paid out under this program encourage 8 and reward behavior that benefits customers. And neither Staff nor CUB has 9 provided any logical explanation for their recommendation to disallow 50% of 10 recovery for this program, when customers benefit from the entire program.

Q. Please describe the Goals Incentive Plan for NBU, non-officer employees and the portion tied to the operational goals described above.

13 The Goals Incentive Plan for NBU, non-officer employees has an operations Α. 14 component—based on the operational goals described above—and a net income 15 component, each of which comprises 50% of the "performance factor" that 16 contributes to the total pool of incentives available for distribution among 17 employees in a particular division, on the basis of individual merit. The 18 operations component is available regardless of whether the net income goal is 19 achieved. Because the customer-focused operational goals comprise 50% of the 20 Goals Incentive Plan, the Company should be permitted to recover at least 50% 21 of this program's expenses under the Commission's reasoning, which is 22 consistent with Staff's and CUB's recommendations.

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²⁷ As I explained above, the Company does not seek to recover for the profit sharing component of the Key Goals Program, because the Company does not expect it to be triggered in the Test Year.

Q. Please describe the Executive Annual Incentive Plan and the portion tied to non-financial, operational goals.

3 Α. The Executive Annual Incentive Plan is based upon three separate components: 4 net income (50%), the operational goals described above (20%), and individual 5 goals specific to the officer (30%). Examples of individual goals include ensuring 6 smooth and timely installation of new services. For all executives other than the 7 CEO, only 15% of individual goals (4.5% of the total goals) are financial, and for 8 the CEO 25% of individual goals (7.5% of total goals) are financial. Staff and 9 CUB propose to disallow recovery of 100% of the Executive Annual Incentive 10 Plan, but their proposal is inconsistent with Commission precedent because at 11 least 45% of the program is associated with the operational goals described 12 above and with non-financial individual goals that benefit customers.

Q. If the Commission looks to the purpose underlying each short-term incentive program, how much would the adjustment proposed by Staff decrease?

A. If the Commission agrees that the Company should be permitted to recover the
full costs of short-term incentive programs, then the entire amount of Staff's
adjustment should be removed. If the Commission instead allows recovery for
100% of the Key Goals Program (instead of the 50% proposed by Staff and
CUB) and for 45% of the Executive Annual Incentive Plan (instead of the 0%
proposed by Staff and CUB) the disallowance proposed by Staff would decrease
by \$1.08 million.

23 Q. Is the Company proposing that the Commission adopt the approach of

24 looking to each program's purpose?

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A. No, as I have explained, our position is that even financial-based portions of the
short-term incentive programs benefit customers and are necessary business
expenses, and the Company continues to seek full recovery for all short-term
incentive programs. The above discussion serves to point out the inconsistency
of the Commission's past practice, which Staff and CUB seek to apply in this
case.

7 **Q**.

Q. What is Staff's position regarding capitalization of at-risk pay?

A. Staff appears to believe that capitalized pay-at-risk should be removed from Test
Year rate base as a matter of general policy but has not yet announced its
recommendation as to this case, because Staff was awaiting additional data
responses at the time it filed testimony.²⁸

12 Q. Do you agree with Staff that at-risk pay should not be capitalized?

13 No. Like other labor costs, at-risk pay associated with capital projects should Α. 14 also be capitalized, in accordance with generally accepted accounting practices. 15 As described above, NW Natural offers at-risk pay that, in combination with base 16 pay, provides employees with compensation at market median rates. Labor 17 costs are allocable to capital when employees' jobs relate to capital projects, and 18 at-risk pay should be treated the same as base pay in this regard. However, as I 19 explained in my direct testimony. Staff seeks to expand the Commission's 20 practice regarding pay-at-risk expense to capital projects. If the Commission is

21 inclined to adopt Staff's position in this case as an extension of its past practice,

²⁸ Staff/100, Gardner/42-43. NW Natural responded to each of these data requests on or before the due date.

- NW Natural requests that a separate proceeding be opened to thoroughly
 examine this issue and its consequences.
- 3

V. LONG-TERM INCENTIVES AND EMPLOYEE STOCK PURCHASE PLAN

4

Q.

Please provide a summary of the types of long-term incentives for which

- 5 the Company seeks recovery.
- 6 As part of its total compensation packages, the Company provides long-term Α. 7 incentive plans to key employees and officers, in the form of Restricted Stock 8 Units ("RSUs") and, for officers, Performance Shares. RSUs are stock units that 9 vest over time if certain retention and financial performance threshold conditions 10 are satisfied. Performance Shares are a promise of Company stock units earned 11 if NW Natural achieves certain performance goals during a three-year cycle. Officers receive 35% their long-term incentive opportunity in the form of RSUs 12 13 and 65% in the form of Performance Shares.
- 14 NW Natural included \$942,000 for non-executive RSUs, \$771,000 for
- 15 executive RSUs, and \$1.286 million for Performance Shares in the Test Year.
- 16 For the same reasons discussed above related to short-term incentive programs,
- 17 the Company seeks full recovery of these long-term incentive expenses, because
- these programs are an integral part of the total compensation package necessary
 to attract, retain, and motivate high-performing employees.

Q. Please describe the Employee Stock Purchase Plan ("ESPP") for which the
 Company seeks recovery.

- A. NW Natural included \$135,000 in the Test Year for the ESPP, which provides
- 23 employees the opportunity to purchase NW Natural stock at a 15% discount from

1		the market price. I discuss the ESPP in this section, in conjunction with the stock		
2		incentive programs, even though the ESPP is a benefit rather than an incentive.		
3	Q.	Does Staff propose an adjustment related to long-term incentive plans and		
4		the ESPP?		
5	A.	Although Staff does not specifically discuss these issues, it appears from Staff's		
6		calculations that Staff disallowed 100% of long-term incentive plan and ESPP		
7		expenses—that is, both employee RSUs and ESPP and officer RSUs and		
8		Performance Shares.		
9	Q.	Does CUB propose an adjustment related to long-term incentive plans?		
10	Α.	Yes, CUB recommends disallowance of recovery for such plans because CUB		
11		believes that shareholders are the primary beneficiaries. ²⁹ CUB does not		
12		specifically address the ESPP.		
13	Q.	What are the criteria for receiving RSUs?		
14	A.	RSUs are awarded to valuable employees who perform at the highest level and		
15		remain with the Company during the vesting period.		
16	Q.	What are the criteria for receiving Performance Shares?		
17	Α.	Performance Shares are provided based on the achievement of certain financial		
18		goals.		
19	Q.	What are the criteria for participating in the ESPP?		
20	A.	All active employees who have been employed by the Company for at least six		
21		months prior to the offering date, and whose customary employment is at least		
22		20 hours per week and five months per year, are eligible to participate in the		

²⁹ CUB/100, Jenks – Gehrke/10, 12.

ESPP. Employees choosing to subscribe for shares will receive a 15% discount
 off the offering price at the end of the 12-month subscription period.

3 Q. Do long-term incentive plans provide a benefit for customers?

A. Yes. The Company's long-term incentive plans benefit customers by helping
attract, and most importantly, retain key employees and promote excellent
management. Because the full value of RSUs and Performance Shares are
earned over time, recipients have an incentive to remain with the Company. The
result is a more experienced workforce, with a deeper knowledge base, which
provides a clear benefit to customers. Moreover, lower turnover translates into
lesser costs for hiring and training new employees.

Also, as I explained above, incentive programs based on financial metrics provide a customer benefit, because when the Company excels financially, it has good credit ratings and can borrow at reasonable prices and issue stock for a fair return. And, like short-term incentive programs, long-term incentive programs motivate and reward employees and officers who work hard and provide excellent service, thereby benefitting customers.

17 Q. Does the ESPP provide a benefit to customers?

A. Yes. Employees participating in the ESPP are motivated to work hard to maintain
the Company's good reputation and financial health, which benefit customers for
the reasons explained above. In addition, the ESPP, like other benefit programs,
helps the company to attract and retain qualified, high-performing employees
who are committed to providing safe and reliable gas services to customers.

Q. CUB asserts that there is uncertainty regarding expenses for stock-based
 incentive programs, because it is difficult to determine if an RSU will vest
 or not.³⁰ Do you agree?

4 Α. No, I do not. Long-term incentives are designed to pay out at a target amount 5 over time. If the target is not met in a particular year, it is likely to be exceeded in 6 a preceding or subsequent year, thus evening out in the longer run. In NW 7 Natural's experience, even though they are not guaranteed, RSUs have paid out 8 every year since their inception seven years ago. And if an employee leaves the 9 Company or becomes ineligible for vesting, it is often the case that the employee 10 filling the position receives an equivalent value. For this reason, the number of 11 shares issued through the RSU program does not vary significantly over time. 12 The Company's long-term incentive expenses are sufficiently definite to enable 13 accurate recovery and should not be disallowed.

Q. Does Staff explain why they recommend disallowance of 100% of non officer RSU and ESPP expenses?

A. No. It appears from Staff's calculations that they may have believed that all long term incentive plan and ESPP expenses are related to officers, when in reality,
 the Company seeks to recover \$942,000 for non-officer RSUs and \$135,000 for
 ESPP expenses.

20 Q. Has the Company been allowed to recover for its employee long-term

- 21 incentive plan and ESPP in the past?
- 22 A. Yes, in NW Natural's last rate case, Docket No. UG 221, the Company received
- recovery of 50% of employee RSUs and 100% of ESPP expenses. In the

³⁰ CUB/100, Jenks – Gehrke/11.

present case, 50% of employee RSUs translates to \$471,000 and the ESPP
 expenses are \$135,000, and, at a minimum, the Company should be allowed
 recovery of these amounts.

4

VI. <u>RESPONSE TO CUB'S COMPENSATION CONCERNS</u>

5 Q. Does CUB raise issues regarding the Company's compensation practices 6 that you have not already addressed?

7 Α. Yes. CUB raises several other concerns, some of which do not appear to be tied 8 to a particular recommended adjustment, but I will respond to each in turn. First, 9 CUB questions whether pay-at-risk is an essential element of compensation in 10 the gas industry. Second, CUB asserts that the Company should look to the 11 Portland, Oregon metropolitan area as the relevant job market, rather than to the 12 gas industry, because CUB believes that most employees hired by the Company 13 do not have prior gas industry experience. Third, CUB states that NW Natural's 14 compensation rates have been more than adequate to retain workers. Fourth, 15 CUB recommends that all officer compensation be disallowed because of its 16 concerns with the Company's methodology. And finally, CUB asserts that 17 officers do not require at-risk pay because they have a fiduciary duty to 18 shareholders.

Q. Please explain why CUB maintains that at-risk compensation is not an
 essential element of total compensation in the gas industry.³¹

- A. CUB relies on a survey of natural gas company websites that it conducted to
 determine the percentage of gas companies that advertise at-risk pay as part of
- 23

³¹ CUB/100, Jenks – Gehrke/6.

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the job posting or advertised benefits. CUB states that only 18.18% of the job

- postings mentioned at-risk compensation, and that only 24.40% of the company 1 2 websites listed at-risk compensation on the company's benefits page.³² 3 Q. Does CUB's survey of gas company websites accurately characterize 4 whether at-risk pay is an essential element of market standard 5 compensation? 6 No. Simply because at-risk pay is not commonly advertised in initial job offerings Α. 7 does not mean that it is inessential. Most specifics of employee compensation 8 are not disclosed in an initial job posting, and based on my own experience, it is 9 not at all surprising that pay-at-risk would not be mentioned in a posting. 10 Nevertheless, as CUB points out, the vast majority of energy companies put a 11 certain portion of compensation at risk,³³ and it is likely that applicants to utility 12 jobs understand that to be the case. 13 As I have discussed above, in order to effectively attract and retain 14 employees, NW Natural can either similarly offer at-risk compensation or 15 increase base compensation to rival the total compensation offered by other 16 companies. But eliminating a critical component of compensation commonly 17 offered by other entities would materially disadvantage the Company's ability to 18 hire and retain employees. 19 Q. How does CUB suggest that the Company determine best compensation 20 practices?
- A. CUB suggests that in setting wages and determining whether to offer pay-at-risk,
 the Company should look at the Portland Metropolitan Area labor market, rather

³² CUB/100, Jenks – Gehrke/6.
 ³³ CUB/100, Jenks – Gehrke/6.

1		than looking to the gas industry, because CUB believes that the majority of
2		employees NW Natural hires do not have prior experience in the energy field. ³⁴
3	Q.	How does CUB reach its conclusion that NW Natural typically hires
4		employees who do not have prior energy industry experience?
5	Α.	CUB conducted a survey of "random" examples of NW Natural employees'
6		LinkedIn profiles to determine whether the Company's employees had energy
7		industry experience before being hired by NW Natural. ³⁵
8	Q.	Does the Company consider the Portland market in its labor market
9		analysis, as CUB suggests?
10	Α.	Yes. The Company sets both base compensation and level of pay-at-risk by job
11		type with reference to detailed surveys that encompass the relevant labor
12		market. While much of this data is locally derived, including the Portland Area
13		Cross Industry Survey, some are regional where appropriate, such as the
14		Milliman Northwest Technology Survey. Notably, many of these surveys are not
15		tied to the energy industry, allowing the Company to reference the appropriate
16		labor market corresponding to the relevant job type.
17		In addition, CUB incorrectly assumes that the same labor pool is
18		appropriate for all types of jobs, when in reality, it varies by job classification. For
19		instance, the Company is more likely to look at the Portland Metropolitan Area for
20		professional positions like accountants or financial professionals, whereas the
21		labor pool may be regional for jobs that are less available locally such as
22		experienced gas utility engineers or company managers. And NW Natural may

³⁴ CUB/100, Jenks – Gehrke/5.

³⁵ CUB/100, Jenks – Gehrke/5.

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conduct a national search for highly specific jobs, such as Director of IT
 Architecture and officer positions.

3 Q. Does CUB rely upon its analysis of the labor market to assert that the

4 Company's base salaries are inaccurate or that NW Natural need not offer 5 pay-at-risk as part of its total compensation package for employees?

- A. No. CUB states that "the Company should look at the job market in the Portland
 Metropolitan Area for best compensation practices,"³⁶ but neither states nor
 suggests that a comparison with this job market would reveal that the Company's
 compensation is inaccurate or that pay-at-risk is unnecessary. I will discuss
- 10 CUB's criticisms specific to officer compensation below.

Q. Are there methodological problems with CUB's reliance on LinkedIn profiles to determine the Company's employees' job history?

A. Yes. First, LinkedIn is not a comprehensive data source, making the survey far from statistically valid. Many NW Natural employees are not on LinkedIn, and those that are may not provide all relevant information or regularly update their profiles.

17 Second, CUB's survey fails to recognize that certain jobs require prior gas 18 industry experience but others do not. For instance, gas controllers, operations 19 leaders, and senior system engineers typically must have prior gas industry 20 experience to be considered for their positions. As a result, CUB's approach of 21 looking at *all* NW Natural employees to determine the number with prior gas 22 industry experience is not valid.

³⁶ CUB/100, Jenks – Gehrke/5.

1		Third, CUB's methodology overlooks relevant prior experience that does
2		not occur at a gas company or that occurs within NW Natural. And finally, NW
3		Natural identified many instances where CUB's conclusions about a particular
4		individual's lack of prior experience were incorrect.
5	Q.	Does CUB recommend adjustments to officer compensation?
6	Α.	Yes. CUB recommends disallowances for officer compensation—both base pay
7		and, as discussed above, pay-at-risk.
8	Q.	What is the basis of CUB's recommendation regarding officer pay?
9	Α.	CUB takes issue with the executive compensation determinations of the
10		Company's independent compensation consultant, Pay Governance, which the
11		Company uses to determine appropriate market pay for NW Natural's officers.
12		Specifically, CUB recommends that recovery of executive compensation be
13		disallowed until the Company provides a comparison using "a more reasonable
14		peer group of companies, in which it actually represents a median company." ³⁷
15	Q.	What is CUB's reasoning?
16	Α.	CUB criticizes Pay Governance's reliance on utilities much larger than NW
17		Natural for comparison, and CUB contends that NW Natural should not target the
18		median compensation of the comparator companies in the sample because NW
19		Natural is not at the median of the surveyed companies in other metrics.
20	Q.	Do you agree with CUB's criticisms?
21	Α.	No. CUB's critique appears to be based on an incorrect understanding of Pay
22		Governance's approach to determining executive pay or NW Natural's use of that
23		information. The proxy peer comparisons, which Pay Governance reports for the

³⁷ CUB/100, Jenks – Gehrke/9.

1		highest paid officers, reference similar-sized gas utilities with whom NW Natural			
2		would compete for talent to fill the specific positions. Pay Governance also relies			
3		upon surveys of either general industry or the energy industry in particular, as			
4		appropriate, to determine pay for specific positions. These survey data			
5		encompass a range of company sizes within which the Company falls.			
6		Nevertheless, the median compensation results from both the peer comparisons			
7		and the survey data produce similar results for specific positions, demonstrating			
8		that, by targeting officer compensation near the median, NW Natural aligns			
9		compensation with its peers and with the relevant similarly sized survey data. In			
10		sum, NW Natural's executive compensation should not be disallowed, because it			
11		is reasonable, aligned with industry standards, and based on comparisons with			
12		similar and appropriately sized companies.			
13	Q.	CUB asserts that officers do not need at-risk pay because they have a			
14		fiduciary obligation to shareholders. ³⁸ Do you agree?			
15	Α.	No. CUB conflates officers' duties with officers' compensation. While officers			
16		have fiduciary obligations to shareholders, they must nonetheless be			
17		compensated appropriately for their labor if the Company wishes to attract and			
18		retain such individuals. Pay-at-risk is a crucial part of this compensation			
19		package. At-risk pay is not "extra," as CUB states, ³⁹ but is rather an inextricable			
20		component of a market-rate compensation package that is placed at-risk.			
21	Q.	What would be the consequence of adopting CUB's approach and refusing			

³⁸ CUB/100, Jenks – Gehrke/4.
 ³⁹ CUB/100, Jenks – Gehrke/4.

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A. Absent the at-risk portion of officers' compensation, officers would not be
 compensated at market rate, and the Company would be unable to attract or
 retain gualified individuals to run the business.

4

VII. MEDICAL BENEFITS

5 Q. Please describe the Company's approach to medical benefit costs.

6 As I explained in depth in my direct testimony, NW Natural seeks to offer Α. 7 competitive medical benefits, as part of a total compensation package, to attract 8 and retain employees, and the Company works to provide quality care for its 9 employees while controlling medical benefit costs. Even as medical benefit costs 10 have increased steeply, NW Natural has sought to keep premium increases as 11 low as possible. In most years when the Company received a significant 12 increase in premiums, it modified programs and reduced benefits to lower 13 premiums. We have also instituted a number of programs to positively affect the 14 health of our employees. After considering actual data, multiple future trend 15 reports, Company-specific factors, and past experience, NW Natural included 16 \$19.61 million of medical benefit costs in the Test Year. 17 Q. Does Staff propose adjustments related to the Company's medical benefit 18 costs? 19 Α. Yes. By applying trend analysis to NW Natural's 2014 through 2017 medical 20 benefit costs to forecast the Test Year costs, Staff concluded that NW Natural's

- 21 Test Year costs are \$541,085 too high, and Staff proposes to reduce the \$19.61
- million of medical benefit costs the Company included in the Test Year by this
 amount.⁴⁰

⁴⁰ Staff/600, Gibbens/6-7.

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Q. How did the Company forecast medical benefit costs for inclusion in the
 Test Year?

A. For the 2018 portion of the November 2018–October 2019 Test Year, the
Company used the actual increases of 3.4% for NBU and 6.5% for BU medical
benefits. For the 2019 portion of the Test Year, NW Natural looked to future
trend reports, Company-specific information, and our extensive past experience.

- 7 NW Natural consulted several trend surveys that predicted increase for
 8 2018 ranging from approximately 6-9%. Specifically, the 2018 Segal Health Plan
- 9 Cost Trend Survey predicts increases ranging from 6.9-7.8%.⁴¹ The USI
- 10 Insurance Services annual insurance carrier survey projects increases ranging
- 11 from 8.4-8.8%.⁴² The Company also consulted both the
- 12 PricewaterhouseCoopers and the WTW health care surveys, both of which
- 13 predict increases around 6%.⁴³
- 14 For 2019 BU medical benefit costs, the Company projected a 7.5%
- 15 increase, which is in the middle of the range projected by the industry surveys.

16 To project NBU medical benefit costs, we also considered the Company-17 specific report from WTW that I described in my direct testimony, which shows 18 that the Company can expect higher-than-average medical benefit costs, based 19 on the average age, gender ratio, and family size of our employees.⁴⁴ These 20 factors are relevant to determining our NBU medical benefit costs because these 21 costs are based on a coverage group of only Company employees and retirees.

⁴¹ NW Natural/1801, Doolittle/2.

⁴² NW Natural/1802, Doolittle/3.

⁴³ NW Natural/1803, Doolittle/1; NW Natural/1804, Doolittle/1-2.

⁴⁴ NW Natural/705, Doolittle/3-6.

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In contrast, our BU multi-employer coverage group encompasses several
 employers and is overall younger because it does not include retirees. Because
 our NBU coverage group is smaller, its costs also tend to be more volatile from
 year to year and tend not to adhere as closely to broader trends.

5 Based on the Company-specific considerations identified by WTW, the 6 industry trend surveys, and our past experience, the Company reasonably 7 determined that NBU medical benefit costs would increase by 11.5% in 2019. 8 This increase is similar to the increase the Company has had in some past years. 9 I note that our 3.4% actual increase for 2018 was the result of an unusually low 10 claims experience in 2017 and is not representative of the Company norm. Our 11 2018 claims experience thus far has been above normal, which supports our 12 projection that the 2019 increase in medical benefit costs will greatly exceed the 13 2018 increase.

14

Q. Please explain how Staff analyzed medical benefit expenses.

15 Α. Staff used trend analysis from the 2014 to 2017 historical timeframe and 16 weighted the forecast by total FTE for each year. From this analysis, Staff 17 determined that the Company's Test Year forecast is \$541,085 too high. To 18 determine whether the Company's Test Year forecast reasonably varied from the 19 trend. Staff reviewed other sources of information—the PricewaterhouseCooper 20 projection of a 6.5% increase and WTW's study for NW Natural, which noted that 21 the Company's program was 5% less efficient than average. Therefore, Staff 22 proposed an adjustment of \$541,085.

23 Q. Do you agree with Staff's trend analysis methodology?

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- 1 No, Staff's analysis is premised upon the assumption that premium renewals
- 2 adhere to a trend. In reality, however, prior renewals do not predict future
- 3 renewals. For example, the table below shows the percent change in renewals
- 4 for active NBU employees between 2007 and 2015.
- 5

Year	Renewal % Change
2007	13.5%
2008	20.3%
2009	4.9%
2010	4.9%
2011	5.0%
2012	11.9%
2013	(8.9%)*
2014	8.2%
2015	12.2%

 Table 1 – Percent Changes in Renewals

*Note the decrease in premium renewal in 2013 was due to the company adding a High Deductible Health Plan to the medical plan offerings. This is a much lower cost plan and resulted in a significant decrease.

- 6 During the period from 2007 to 2009, the average increase is 12.9%, but the
- 7 2010 renewal was 4.9%. As the table shows, observing the trend from the
- 8 preceding three-year period cannot accurately predict a future year's premium
- 9 renewals, because there can be significant swings in renewals from year-to-year,
- 10 even when there are not significant changes in the policy landscape—such as
- 11 the introduction of a high deductible health plan.

12 Q. Is it appropriate to rely upon the PricewaterhouseCooper projection for

- 13 increases in medical benefit rates nationwide as the only comparator to
- 14 determine whether the Company's proposed increase is reasonable?
- 15 A. No, a more accurate approach would be to consider both national and state-
- 16 specific projections and to take into account specific characteristics of the

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Company's NBU employee population. WTW's Oregon-specific survey predicts
 increases of 8.4% for Medical PPO plans (used by the majority of the Company's
 employees) and 6.9% for Medical HMO plans, which are higher than the
 PricewaterhouseCooper projection upon which Staff relies. Even if relying solely
 on national projections was appropriate, PricewaterhouseCooper's survey is just
 one of several such projections. The Company also consulted the Segal and USI
 Insurance surveys, which project increases up to 8.8%.

8 Importantly, as I explained in my direct testimony, WTW's Company-9 specific analysis indicated that NW Natural has an employee population with 10 generally higher-than-average healthcare costs.⁴⁵ Staff considered the portion of 11 WTW's analysis performed for the Company that notes NW Natural's program is 12 5% less efficient than average and concludes from this that the Company's costs 13 are 5% higher than would be expected, but Staff fails to consider the specific 14 characteristics of the Company's employee population identified by WTW-15 higher average age, lower percentage of female enrollment, and higher 16 percentage of dependent enrollment-that make it more expensive to insure. 17 Because the Company experiences higher-than-average costs, allowing the 18 Company to recover only the average amount of costs or the average increase in 19 costs would result in our employees receiving *less* than average medical 20 benefits. Based on the range of industry-wide projections and state-specific 21 projection, consideration of NW Natural-specific factors and past experience, and 22 use of actual 2018 data, the Company reasonably arrived at its projected 23 increases for the Test Year, and the Company's proposal should not be adjusted.

⁴⁵ NW Natural/700, Doolittle/20-21.

1	Q.	Does Staff agree with the Company's sharing ratio of employer and
2		employee premium costs?
3	Α.	Yes. Staff notes that it typically recommends employer/employee sharing of
4		premium costs at the industry average and that NW Natural is already aligned
5		with this average. ⁴⁶ Therefore, no change to the ratio is necessary.
6	Q.	Does this conclude your reply testimony?
_	-	

7 A. Yes.

⁴⁶ Staff/600, Gibbens/6.

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Lea Anne Doolittle

COMPENSATION AND BENEFITS EXHIBITS 1801-1804

May 23, 2018

EXHIBITS 1801-1804 – COMPENSATION AND BENEFITS

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High Rx Cost Trends Projected to Be Lower for 2018

Reversing a Multi-Year Pattern, Modest Increases in Medical Cost Trends Projected

From Washington to Wall Street and from state and local capitals to consumers, there has been strong criticism of soaring drug prices, yet there is no consensus on how to lower them. This public scrutiny may have contributed to commitments from some drug manufacturers to limit price increases. Prescription drug (Rx) benefit plan cost trends are projected to be less severe for 2018, according to the 2018 *Segal Health Plan Cost Trend Survey*, Segal Consulting's 21st annual survey of managed care organizations (MCOs), health insurers, pharmacy benefit managers (PBMs) and third-party administrators (TPAs).

Other key survey findings include:

- Medical plan trends are projected to be slightly higher than 2017 projections, a change in direction that may concern plan sponsors given that medical coverage represents the lion's share of their health care costs.
- Drug trends for actives and early retirees are expected to remain in the doubledigits, continuing to be much higher than medical trend.
- Price inflation not utilization is the leading driver of trend.
- Rx cost-management strategies and improved vendor contracting are plan sponsors' top priorities.

In fact, Rx trends are the top priority for some plan sponsors because the cost increases of pharmacy benefits now exceed the cost increases of inpatient hospital claim expenses or physician claim expenses and is the fastest-growing cost element of their health plans. In addition, once specialty Rx paid through the medical plan is added to Rx paid through PBMs, the cost of Rx is larger than inpatient, outpatient and professional services for some plans.

Health plan cost increases continue to significantly outpace general inflation and average wage increases, underscoring the need for ongoing monitoring of performance targeting cost-management efforts. Plan sponsors can use the survey results to support their 2018 rate renewal negotiations and their budget projections.

About the Survey and Trend

During the summer of 2017, Segal surveyed MCOs, health insurers, PBMs and TPAs about health plan cost trend, which is a forecast of allowed per capita *claims cost increases*. Allowed per capita claims cost is eligible billed charges (before participant cost sharing) less provider discounts. Trend takes into account various factors, including price inflation, utilization, government-mandated benefits, and new treatments, therapies and technology.

More than 100 health insurance providers participated in the survey. (Respondents are listed on page 17.) They reported 2018 trend forecasts for medical, prescription drug, dental and vision coverage. In addition, respondents reported actual allowed heath cost trends for 2016 based on their group health plan experience.

Although there is usually a high correlation between a *trend rate* and the *actual cost increase* assessed by a carrier, trend and the net annual change in plan costs are not the same. A plan sponsor's costs can be significantly different from projected claims cost trends due to such diverse factors as group demographics, changes in plan design, administrative fees, and changes in participant contributions.

Medical Plan Trends for Active and Early Retiree Coverage Projected to Increase Slightly

For 2018, all medical plan trends for actives and retirees under age 65 are projected to be less than half of a percentage point higher than the 2017 projections. Although the projected increases in trend are very small, they represent a change in direction from last year's survey when all trend projections for this category of medical coverage declined slightly (by less than 1 percentage point). There have been several years of declining trend increases, which are leveling off. As the economy picks up, and overall spending increases, we may start to see the beginning of an upward tick in the underwriting cycle for trend forecasts. Typically, there is a correlation between a healthy economy and increased utilization of services. We may be at the end of the cycle for declining trend increases.



Projected Medical Trends for Actives and Retirees Show Little Difference Among Managed Plan Types

* This data is for HDHPs that meet minimum Internal Revenue Service amounts to qualify for health savings accounts (HSAs), a plan design that is increasingly referred to as an HSA-qualified plan.

Observations While PPO plans continue to be the most prevalent plan option among most plan sponsors, HDHPs are growing in popularity.¹ HDHPs are intended to introduce more consumerism, encouraging individuals to shop for lower-cost medical services and alternative treatment options as well as provide for a way to save for future expenses on a pre-tax basis. However, according to a recent survey, there is a low rate of consumer "price shopping" for these plans, with barriers including difficulty obtaining price information and the desire not to disrupt existing physician relationships.² To meet this challenge, plans may have to make greater investments in consumer-education programs, including making tools available and providing information about quality and treatment costs. Another important issue when considering the use of HDHPs is whether they are affordable to all segments of the participant population. If the high deductible makes coverage too expensive, participants may forgo needed care.

Source: Segal Consulting, 2017

¹ According to the <u>2016 Employer Health Benefits Survey</u> conducted by the Kaiser Family Foundation and the Health Research & Educational Trust, the percentage of covered workers enrolled in HDHPs with HSA and HRA savings options grew by 8 percent points since 2014 (to 29 percent) and enrollment in PPOs fell 10 percentage points over that period (to 48 percent).

² Ateev Mehrotra, Katie M. Dean, Anna D. Dinaiko and Neeraj Sood, <u>"Americans Support Price Shopping For Health Care, But Few Actually Seek Out Price Information," Health Affairs</u>, August 2017, vol. 36, no. 8, 1392–1400.

Lower Trend Projections for Some Medicare-Eligible Retirees

In contrast to medical trend projections for actives and retirees under age 65, projected medical trends for Medicare-eligible retirees in Medicare Advantage (MA) HMOs and those covered by Medicare supplemental (Medigap) plans are 1 percentage point and 0.7 of a percentage point lower than 2017 projected trends, respectively. The exception is the very small projected increase in trend for MA PPOs: 0.1 of a percentage point.

Lower Projected Trends for Medicare-Eligible Retiree Medical Coverage



Source: Segal Consulting, 2017

Observations The number of Medicare-eligible beneficiaries enrolled in MA plans continues to steadily increase across the country (from 6.9 million in 1999 to 19.0 million in 2017). Of the 19 million current enrollees, 3.7 million are enrolled in group health plans.³ Group MA programs continue to offer attractive and stable pricing to plan sponsors. Plan sponsors may also want to revise their Medicare Supplemental plan offerings with Medicare Part D options to fit fiscal and retiree requirements. Some plan sponsors have not updated their Medicare supplemental plans or Part D plans in years.

New offerings and changes to Medicare Part D coverage create an opportunity to update and modernize these coverage options to capture plan savings without cutting overall benefit value to plan participants.

> Richard Ward, FSA, FCA, MAAA Senior Vice President, Public Sector Health Practice Leader

^a Gretchen Jacobson, Anthony Damico, Tricia Neuman and Marsha Gold, "Medicare Advantage 2017 Spotlight: Enrollment Market Update," The Henry J. Kaiser Family Foundation, June 6, 2017.

Good News, Bad News: Rx Plan Trend Projections Decrease, But Remain Higher than Medical Plan Trend Projections

The 2018 projection of prescription drug plan trend for actives and early retirees is slightly lower than what was projected for 2017. The trend for specialty drugs/biologics is projected to decline by 1 percentage point for 2018. Dampening that good news is the fact that both of those trends are, once again, projected to be in the double-digits.

In contrast, the projected trend for outpatient prescription drug coverage for Medicare-eligible retirees⁴ is more than 2 percentage points lower than the prior year projection. Yet the high trend for specialty drugs/biologics continues to put financial strains on all plan sponsors.



Prescription Drug Trends Projected to Be Less Severe*

Source: Segal Consulting, 2017

Observations In recent years, increased utilization of generic drugs replacing non-specialty drugs as more therapeutic alternatives are available has helped mitigate Rx cost increases. Formulary management, which drives greater generic utilization, has been a contributing factor. Although the rate of Rx trends is projected to be less severe, increases in Rx prices continue to be a significant concern for plan sponsors. Recent examples of soaring drug prices include dermatological drugs like Alcortin A[®], Aloquin[®] and Novacort[®], which are combination medications used to treat a variety of skin conditions, such as eczema and atopic dermatitis. The non-discounted price for Alcortin A increased from \$226 in early 2015 to more than \$9,500 today. There are strategies to control the cost of high-cost brand-name dermatological products. An aggressive strategy that has become more commonplace recently with various PBMs is to exclude high cost drugs like Alcortin A from the PBM's formulary and offer therapeutically equivalent generic alternatives.

* Outpatient prescription drug coverage for Medicare-eligible retirees includes Medicare Part D plans and Rx plans that cover retirees but under the same contract and terms as active participants.
Another example of a high-cost and highly publicized drug is Epipen[®], an allergy-reaction injector, whose wholesale price increased from \$100 for a two-pack in 2009 to \$600 in 2016. In 2017, we have seen some shift from the brand-name Epipen to Mylan's authorized generic version of Epipen and other generics available in that class.

While high-cost specialty drugs are a small portion of the total of all drugs dispensed, they represent a disproportionate — and growing — share of total drug spending. Specifically, significant increases in drug spending were due to specialty pharmaceuticals to treat rheumatoid arthritis, cancer, Hepatitis C and multiple sclerosis.⁵ The number of specialty drugs available in the market continues to increase. Specialty drugs accounted for more than one-third of total spending in 2016.⁶ By 2020, they are expected to represent almost 50 percent of all drug sales.⁷ The specialty drugs market is beginning to see increased competition from specialty generics and biosimilars,⁸ but these generics or biosimilars typically do not offer the same level of savings opportunities as generic drug versions do for non-specialty medications.

Another factor driving prescription drug trends is the increase in drug manufacturer coupon and copayment assistance programs that promote utilization of higher-cost, brand-name medications over lower-cost alternatives by lowering patients' out-of-pocket costs for those drugs. Historically, manufacturers offered coupons to patients at physicians' offices. Plan sponsors and their PBMs have attempted to stop the impact of couponing by increasing the number of prior authorizations on drugs and even excluding certain drugs from their formularies. More recently, some PBMs have designed and are now advocating new programs that capture the value of the discount coupons and copayment assistance programs for brand-name drugs to reduce the cost to plan sponsors (instead of to participants). Participants' cost could be unchanged, depending on the plan design. These arrangements are often called "variable-copay" arrangements.

There continues to be an ongoing increase in rebates, which offsets these trends. Plan sponsors should continue to focus on such cost-management strategies as modifying participant cost sharing to encourage use of lower-cost generics and preferred brand-name drugs, customizing drug formularies or moving to formularies with exclusions and putting in tighter controls on Rx prior authorization, quantity limits and step therapy.

Plan sponsors should also continue to aggressively negotiate and renegotiate their PBM contracts to help manage their Rx costs.

> Eileen Pincay, RPh Vice President, Senior Pharmacy Consultant

⁵ "Trend Drops to the Lowest Level in 4 Years," CVS Health Insights, March 15, 2017.

⁶ "2016 Drug Trend Report," Express Scripts, 2016.

² Robert Penington and Jo Ann Stubbings. "Evaluation of Specialty Drug Price Trends Using Retrospective Pharmacy Sales Transactions," Journal of Managed Care & Specialty Pharmacy (September 2016), 22(9):1010-17.

^e Biosimilars are less costly copies of drugs known as biologics, which are typically considered specialty drugs.

Dental Trends Projected Higher, but Vision Trends Projected Lower

Projected trends for dental coverage are expected to be higher for 2018 compared to 2017 projections — except for dental provider organizations, which will remain flat. The trend rates for both types of vision plans are projected to decrease for 2018.

Dental and Vision Coverage Trend Projections Expected to Remain in Single-Digits



* A schedule of allowance plan is a plan with a list of covered services with a fixed-dollar amount that represents the total obligation of the plan with respect to payment for services, but does not necessarily represent the provider's entire fee for the service.

Source: Segal Consulting, 2017

Observations Having dental coverage does not necessarily result in the use of dental services.⁹ According to the American Dental Association's Health Policy Institute, dental care utilization among working-age adults was only 35.5 percent in 2014¹⁰ compared to 83 percent for those who contacted a medical health professional.¹¹ Dental care still has a high proportion of out-of-pocket expenses, which results in low utilization. Good oral health through regular check-ups and oral hygiene can play a significant role in avoiding the need for dental work. In addition to oral health, an important benefit of dental coverage is the early detection of medical problems such as coronary disease, kidney disease and diabetes. Gum disease or periodontitis affects almost a third of diabetic patients.¹² Studies have shown significant cost savings when diabetic adults improve their oral health. Similarly, a comprehensive eye exam through vision benefits could also detect diabetes, as well as other chronic diseases such as hypertension and high cholesterol. As plan sponsors work hard to engage participants to improve their health through medical preventive visits, promotion of dental and vision checkups may be helpful.¹³

Plan sponsors should also reevaluate their dental and vision plan offerings to ensure benefits are not outdated. Technology and standards of care can change over time resulting on some benefit rules being outdated. Significant improvements in dental provider networks have been made in recent years making them a better value for plan sponsors that offer these benefits. Network discounts over non-network charges have improved as well as the size of participating dental provider networks. For example, some dental networks now provide discounts that exceed 40 percent of billed charges for common procedures. In addition, dental and vision are low-cost benefits for plan sponsors that provide noticeable value to many employees.

- * *ANALYSIS & COMMENTARY: The Dental-Medical Divide," Health Affairs, December 2016, vol. 35, no. 12, 2168-2175.
- ¹⁰ Kamyar Nasseh and Marko Vujicic, "<u>Dental Care Utilization Steady Among Working-Age Adults and Children, Up Slightly Among the Elderly</u>," American Dental Association Health Policy Institute's *Research Brief*, October 2016: 2.
- ¹¹ <u>ANALYSIS & COMMENTARY: The Dental-Medical Divide</u>," *Health Affairs*, (December 2016), vol. 35 no. 12, 2168-2175, and Blackwell, D. L. and M. A. Villarroel, "Tables of Summary Health Statistics for U.S. Adults: 2015 National Health Interview Survey." National Center for Health Statistics, (Table A-18, accessed August 29, 2017).
- ¹² Douglas B. Berkey and Frank A. Scannapieco, "Medical Considerations Relating to the Oral Health of Older Adults," Special Care in Dentistry, August 2013, Vol. 33, No. 4, 164-176.
- ¹⁹ Marjorie K. Jeffcoat, Robert L. Jeffcoat, Patricia A. Gladowski, James B. Bramson and Jerome J. Blum. "Impact of Periodontal Therapy on General Health: Evidence from Insurance Data for Five Systemic Conditions," American Journal of Preventive Medicine, August 2014, 47(2):168-74. and Dental Trade Alliance, "An Unexpected Strategy for Reducing Health Care Costs," (2016), a report based on research prepared for the Dental Trade Alliance by Uma Kelekar, Ph.D.

Health Plan Trend Rates Still Outpace Consumer Prices and Wage Increases

Health care trends continue to outpace wage increases and overall consumer price inflation. For example, the forecasted increase in trend for Rx carve-out plans is more than five times higher than the Consumer Price Index for All Urban Consumers (CPI-U). For many plan sponsors, the increase in medical plan trends can be more than three times the rate of increase in wages.



Sources: Segal Consulting, 2017 (trend rates) and Bureau of Labor Statistics CPI-U through July 31, 2017 from Consumer Price Index – July 2017 and wage increases from Table B-3. Average hourly earnings of all employees on private nonfarm payrolls, seasonally adjusted.

Observations Rising health plan costs may be a factor in dampening wage increases. However, a growing number of plan sponsors are able to manage their health plan cost increases to low single-digits, year after year, by actively managing their health plans.

Finding effective strategies to lower trend is preferable to shifting costs to participants.

Megan Kelly, CEBS Vice President, Multiemployer Health Practice Leader

Price Inflation: The Leading Driver of Trend, Especially for Rx

The leading driver of trend increases for 2018 continues to be price inflation for physician services, hospital services *and* prescription drugs. For Rx, it is nearly 9 percent.



Price Inflation Is a Much Greater Component of Projected Trends than Utilization*

* Hospital and physician trends are for open-access PPOs for actives and retirees under age 65. The components do not add up to totals because there are other components of trend not illustrated, reflecting such factors as the impact of cost shifting, technology changes and drug mix. Not all survey respondents provided a breakdown of trend by component, which may produce results that vary from the overall prescription drug plan cost survey results found on page 4.

Source: Segal Consulting, 2017

Observations Price inflation continues to be the most significant component of trend increases, most notably for hospital services and drug therapy. Using alternative value-based payment approaches, such as accountable care organizations (ACOs)¹⁴ and bundled payments for episodes of care is one way to mitigate price inflation. Under these payment alternatives, providers are reimbursed a set rate for all services involved in an episode and are accountable for the quality of care and outcomes.

In many cases, there is also an opportunity to manage where care is received and type of procedure. While patients may not be getting more procedures done, some of the price inflation is due to inappropriate use of emergency rooms and urgent-care facilities, and to unnecessary, expensive diagnostic radiology procedures, when a simple x-ray would suffice. Plan sponsors should be making sure that their plan designs properly align with the costs of care in these instances, and make efforts to ensure their participants are making smart choices in order to get the right care at the right place with the right provider.

¹⁴ ACOs are networks of providers and suppliers that agree to be jointly accountable for managing the health and cost of a defined group of participating populations across a predetermined set of health care services. Another factor influencing trends is the network-negotiated reimbursement rates paid to providers. This often varies by type of service.

Hospitals Lead Projected Average Increases in Reimbursement Allowances



* The projected average increase in reimbursement allowance for hospital/facility differs from the price inflation increase of 4.8% in the graph on page 8 because it includes new treatments, therapies and technology.

Source: Segal Consulting, 2017

Observations The projected trend for all of these services declined. Network provider organizations have done a better job at capping the annual increase in network provider fee increases in nearly all settings. However, out-of-network provider services have seen a spike in prices. Plan sponsors need to pay attention to maximizing network use and placing controls on excessive or abusive non-network provider price gouging. A growing number of plan sponsors are negotiating network provider and Rx cost inflation caps, putting a part of their health vendor fees at risk if these caps are exceeded. Plan sponsors can put pressure on HMOs, PPOs and PBMs to manage price increases and reward those organizations that can meet these new requirements. Health plan documents can be amended to prohibit waivers of cost sharing by non-network providers.

To avoid exposure from excessive out-of-network billing practices, establish a maximum allowance on reimbursement, such as 150 percent of Medicare's allowance or no more than in-network levels.

> Ed Kaplan Senior Vice President, National Health Practice Leader

Keep in Mind: Projected Trends Typically Higher than Actual Trends

To assess the accuracy of trend projections, Segal compared 2016 projected trends for medical, prescription drug benefit and dental plans to the actual average trends for 2016 (the most recent full year for which actual data is available), as reported by the survey respondents. Below is comparative data from our last four surveys for three types of coverage for actives and retirees under age 65.



Gap Closing Between Projected and Actual Trends for Open-Access PPOs/POS Plans*





For Dental PPOs, Projected and Actual Trends Have Been Relatively Close



* All medical trend results exclude Rx.

** This data reflects retail and mail-order delivery channels combined.

Source: Segal Consulting, 2017

Observations Consistent with the past five years, this year's findings support our observation that insurers tend to make conservative projections. Trend projections have been generally higher than actual experience in most years with the exception of Rx trends for 2014–2015. During that period, Hepatitis C drugs pushed actual Rx trend results beyond projections.

Some respondents provided projections that were several multiples of actual trend rates for the same time period relative to their peers. This level of conservatism skews projections towards higher trend rates.

In reviewing patterns of actual to projected trends, plan sponsors may be able to budget rates at levels 1 to 2 percentage points lower than survey forecasts if they have comprehensive utilization-management programs in place.

> Eileen Flick Senior Vice President, Director of Health Technical Services

Although *projected* Rx trends far outpace medical and dental trends, the gaps have generally been less dramatic for *actual* trends, as shown in the table below that presents data for the last 15 years.

Year	Open-Access PPOs/POS Plans	PPOs/POS Plans with Primary Care Physician Gatekeepers	HMOs	MA HMOs	Rx	DPOs
2004	10.9%	11.6%	11.5%	11.4%	13.3%	6.2%
2005	10.4%	11.1%	10.6%	8.4%	10.5%	5.0%
2006	9.6%	10.0%	10.2%	7.2%	9.5%	5.1%
2007	8.9%	9.5%	9.8%	7.0%	7.9%	5.0%
2008	9.7%	9.4%	9.7%	7.7%	7.4%	5.5%
2009	9.5%	9.7%	10.2%	4.0%	7.9%	4.7%
2010	7.6%	8.3%	8.7%	3.6%	6.4%	3.0%
2011	7.5%	7.8%	8.0%	4.5%	5.0%	3.1%
2012	7.3%	8.4%	6.7%	3.0%	5.5%	2.6%
2013	5.7%	6.7%	6.1%	3.1%	5.5%	2.8%
2014	6.5%	7.6%	6.3%	1.9%	10.7%	2.9%
2015	6.8%	6.9%	6.4%	4.2%	11.1%	3.0%
2016	7.1%	7.4%	6.3%	5.3%	8.1%	2.9%
2017	7.6%	7.5%	6.7%	4.4%	11.6%	4.1%
2018	7.7%	7.8%	6.9%	3.4%	10.3%	4.1%

Selected Medical,* Rx Carve-Out** and Dental Trends: 2004-2016 Actual and 2017 and 2018 Projected***

* Medical trends exclude prescription drug coverage.

** Prescription drug trend data for 2003-2007 only reflects retail. For 2008-2018, prescription drug retail and mail-order delivery channels are combined.

*** All trends are illustrated for actives and retirees under age 65, except for the MA HMOs. (A graph comparing 15 years of survey data - 2004 through 2016 actual trends and 2017 and 2018 projected trends - is available as a supplement to this report.)

Source: Segal Consulting, 2017

Rx Cost-Management Strategies Top List of What Plan Sponsors Are Using

Plan sponsors continue to use various cost-management strategies to grapple with ever-escalating health plan costs. We asked the survey participants to rank the cost-management strategies implemented by group health plans in 2017.

Prescription Drug Cost Management Continues to Be Plan Sponsors' Highest Priority Strategy

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2016 Top Five

Using specialty pharmacy management	Using specialty pharmacy management
Intensifying pharmacy management program	Intensifying pharmacy management program
Contracting with value-based providers*	Contracting with value-based providers
Increasing financial incentives in wellness design	Adding low-cost primary care access**
Adopting an HDHP	Increasing financial incentives in wellness design

* These include ACOs, which are defined in the footnote on page 8, and Patient-Centered Medical Homes (PCMHs), which focus an increased level of comprehensive health care resources on primary care and prevention for patients with chronic conditions.

** Strategies include telemedicine, walk-in clinics and on-site clinics.

Source: Segal Consulting, 2016 & 2017

Other cost-management strategies implemented in 2017 include:

- Adding telehealth and onsite clinics,
- Using narrow, limited or restricted provider networks,
- Providing coverage to Medicare-eligible retires through Employer Group Waiver Plans (EGWPs)¹⁵
- Introducing a defined contribution approach with or without use of a private Exchange,
- Requiring reference-based pricing for specific medical procedures, such as hip or knee replacement, and
- Following Medicare's program to reduce hospital readmissions.

¹⁶ EGWPs are custom group-sponsored plans for Medicare-eligible retirees.

Observations Plan sponsors should continue to implement multiple cost-management strategies. Tactics for managing or even lowering health plan trends include:

- · Plan designs that steer patients to the right treatment and setting,
- Narrow networks that limit the in-network providers participants may see in exchange for better discounts by those providers, and more control of patient's utilization,
- Pay-for-performance based contracting to incent vendors to produce better outcomes,
- Elimination of use of out-of-network providers with excessive pricing without evidence of superior health outcomes,
- Custom drug formularies, and
- Tighter clinical prescription drug plan rules that maximize best-value therapies and pricing without compromising patient outcomes.

Risk-mitigation strategies that avoid care by improving participants' health status or reduce the complications of chronic diseases can pay long-term dividends.

Rather than simply continue to shift costs to participants, plan sponsors will look to aggressively drive utilization to high-quality, low-cost providers. In addition, the increased tax benefits of HSA-eligible HDHPs will result in those plans becoming more prevalent.

> Chris Calvert Senior Vice President, Corporate Health Practice Leader

Where to Focus Your Cost-Management Efforts

Each plan sponsor has a unique set of goals, but all share in the common objective of managing cost increases. Segal has long advocated a three-pronged approach to the challenge of health care cost management that encompasses vendor management, plan design management and population health management.



Strategies and solutions for managing future health plan costs will vary from plan sponsor to plan sponsor. Properly diagnosing the cost drivers and plan pain points is the first step to effectively managing plan costs. Data analytics and predictive modeling can be used to help understand true drivers of costs. An in-depth review of the data will enable the identification of cost drivers, what providers and treatments produce the best value, exploration of areas of waste and what levers and incentives help change an individual's behavior to drive healthier lifestyles to reduce long-term claim trends. Data analysis can uncover plan inefficiencies and vendor contracting inefficiencies.

Through data-driven techniques, plan sponsors can continuously assess the investments needed for more efficient and effective care without simply increasing participant cost sharing. An ability to understand participant coverage needs, appropriate levels of choice, opportunities for benefit redesigns, employee affordability and service preferences will allow plan sponsors to focus on design and strategies that are most appropriate for their population. By targeting solutions and strategies that address plan design, aggressive vendor contracting, best-value providers and measurable population health improvement, plan sponsors can maintain control over providing high-value medical benefits that are well received by current and future participants.

The Survey Participants

More than 100 insurance providers participated in the 2018 Segal Health Plan Cost Trend Survey. A count of respondents by coverage category follows.

Medical Plans

27	FFS/Indemnity Plans
35	HDHPs
45	Open-Access PPOs/POS Plans
27	PPOs/POS Plans with Primary Care Physician Gatekeepers
41	HMOs

Prescription Drugs



59 Prescription Drug Carve-Out Plans

Dental Plans



 13
 Dental Schedule of Allowance Plans

 58
 Dental FFS/Indemnity Plans

DPOs

62

39

26

20

DMOs

Vision Plans



Vision Schedule of Allowance Plans

Vision Reasonable and Customary Plans

The following respondents agreed to be identified by name:

Aetna Amalgamated Life American Health Care AmeriHealth New Jersey Anthem, Inc. Benecard PBF Blue Care Network of Michigan Blue Cross Blue Shield of Alabama Blue Cross Blue Shield of Michigan Blue Cross Blue Shield of Minnesota Blue Cross Blue Shield of North Carolina Blue Shield of California BlueCross BlueShield of Tennessee **Cambia Health Solutions** Capital BlueCross Care Plus Dental Plans Cigna ConnectiCare **CVS** Health Davis Vision **Delta Dental Insurance Company** (DDIC) Delta Dental of Arizona Delta Dental of Arkansas Delta Dental of California

Delta Dental of Delaware Delta Dental of the District of Columbia Delta Dental of Idaho Delta Dental of Illinois Delta Dental of Indiana Delta Dental of Iowa Delta Dental of Massachusetts Delta Dental of Michigan Delta Dental of Nebraska Delta Dental of New Mexico Delta Dental of New York Delta Dental of North Carolina Delta Dental of Ohio Delta Dental of Pennsylvania Delta Dental of South Dakota Delta Dental of Tennessee Delta Dental of Virginia Delta Dental of West Virginia Delta Dental of Wisconsin EmblemHealth EnvisionRx Options Express Scripts, Inc. **Group Vision Service** Harvard Pilgrim Health Care

Health Alliance Medical Plans

Highmark Blue Cross Blue Shield Highmark Blue Cross Blue Shield of Delaware Highmark Blue Cross Blue Shield of West Virginia Highmark Blue Shield Horizon Blue Cross Blue Shield of New Jersey Humana Independence Blue Cross Kaiser Foundation Health Plan, Inc. Lincoln Financial Group MagnaCare Medical Mutual of Ohio Metropolitan Life Insurance Company Prime Therapeutics LLC ProAct, Inc. Starmark Sun Life Financial Tufts Health Plan United Concordia Dental UnitedHealthcare Voya Financial Wellmark BCBS of South Dakota Wellmark Blue Cross and Blue Shield

Health Net, Inc.

Questions? Contact Us.

If you have questions with health care cost-management strategies or about the 2018 Segal Health Plan Cost Trend Survey, contact your Segal consultant or one of the following Health Practice leaders:



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Segal's Health Benefits Consulting Services

Today's benefits environment demands a comprehensive approach to formulating health plan design strategies that leverage innovative approaches as well as the power of data analysis, modeling and benchmarking.

Our professionals can help your organization plan, design and strategize by providing:

- Plan Design and Analysis Are you providing high-quality, cost-effective health care to your plan
 participants? Segal's health professionals can help plan sponsors with the design and redesign
 of health benefit plans, including medical, dental, prescription drug, vision, behavioral health,
 short- and long-term disability, life, accidental death and dismemberment, and flexible benefits.
- Cost and Utilization Modeling Has your plan modeled plan sponsor expenses or calculated participant out-of-pocket cost of plan changes? Segal's consultants can help you evaluate the financial impact of plan design modifications, predict future utilization patterns and estimate changes in claims costs.
- Financial Monitoring Does your plan have the proper budgeting tools in place to ensure fund stability? Segal can assist in reviewing or developing your plan's reserve policy, analyzing the impact of proposed plan design changes on future expenses, and evaluating whether your fund is at risk for insolvency.
- Data Mining and Analysis Are you getting the information you need to make important plan design decisions? Segal can provide data-mining services — such as exploring emerging population health-risk factors that impact utilization and uncovering potential fraud and abusive provider practices — to help trustees better manage future health care expenses.
- Benchmarking Have you compared your policies and initiatives to other funds? Segal provides benchmark assessments that provide a unique and invaluable understanding of how benefit programs compare to others.



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not make any changes to your benefit plan. Plan sponsors will benefit from a clea understanding of healthcare trend projections, as a difference in healthcare trends of just 2.0% compounds to a difference of 10.4% in plan costs after just five years.¹

USI Insurance Services recently released the results of its 2017 Spring Healthcare Claim Trend Survey, which surveyed nearly 70 insurance carriers across the country on their actual and forecasted claim costs. This advisory reviews the concept of trend and shares current trends by product, along with our medical trend projections for plans that will

begin in 2018.

4.09

Fall

2014

Fall

- POS

- FPO

Spring 2015

- PPO

The most important application of these trend forecast results is to help your business project costs. As of now, the excise tax, or "Cadillac" tax, is still slated to go into effect in 2020. Healthcare cost trends remain the single-largest determining factor of whether your group's plan will hit the excise tax thresholds. Regardless of the direction healthcare reform may take, employers should continue to address aspects of the market that can be influenced within their organization. See our client advisory for five employee benefit strategies you can control.

What is healthcare trend?

The cost to provide healthcare services changes frequently. Some expenses, such as surgical costs, increase because of new, better, or more expensive medical technologies, which doctors and hospitals can access. Other expenses, such as durable medical equipment, decrease because of cheaper materials.

The annual change in healthcare cost is known as trend, which is the sum of all changes in cost throughout the healthcare industry. Healthcare trend affects employers, care providers, insurance companies, and consumers. This trend varies by geography, but the way in which it affects employers does not change.

For example, two employers in a similar geography are likely to experience very similar annual trends, even with differing occupational profiles. This occurs because healthcare trend is the change expected in claims cost before implementing any employer initiatives, such as plan design changes or health and productivity programs.

A difference in healthcare trends of just 2.0% compounds to a difference of 10.4% in plan costs after just five years.

Fall 2017

Spring 2017

Median factors are reflected above

-CDHP -- Rx

2016

— нмо

What factors can affect healthcare trend?

Each of the following factors can affect trend:

- Price inflation or deflation
- Healthcare service utilization
- Aging of the covered population Deteriorating health of the covered population
- Leveraging effect of deductibles and copays
- Variations in provider treatment patterns
- Changes in federal or state legislation
- Improvements in medical technology and drug therapies
- Consolidation of healthcare providers
- Cost shifting (from public payers, such as Medicare, to private plans)

Why is trend important and what should employers do to plan for it?

Several factors that impact trend are beyond employers' control. For this reason, it is critical for employers to do two things:

1. Examine and understand the historical and future trends in the industry, in addition to other changes that may specifically impact your organization.

While price inflation or deflation affects all employers without bias, employee aging, health status, and demographics will vary by group.

2. Develop and implement strategies to counteract the effect of healthcare cost trends. While cost shifting through plan design or monthly contributions can

be an effective short-term solution to reduce employer costs, it will not counteract long-term trends. As such, strategies that maintain a long-term view

are needed.

The purposes of a healthcare strategy are to:

- Provide benefits that your employees value and are in line with the company culture
- · Keep employees healthy and productive
- · Make long-term costs sustainable

To attain sustainable long-term costs, employers should aim to have healthcare trends that are in line with a modest index, such as the medical consumer price index (CPI). Current healthcare claim trends are well in excess of that index.

Average trends in 2017

When planning their healthcare strategy, plan sponsors should consider several key observations about healthcare trend as identified in our survey:

- Medical trends increased from our Fall 2016 survey and remain in the high single digits as of May 2017. Those trends range from 7.7% for HMO plans to 8.0% for PPO plans and 8.6% for consumer-directed health plans annually.
- As shared at the beginning of this advisory, while the difference in trends by product may seem insignificant, a difference in healthcare trends of 2.0% compounds to a difference of 10.4% in plan costs after just five years.
- In the current environment of employers' sensitivity to costs, we expect both plans with more limited networks and with more aggressive managed medical care to continue growing in popularity.
- While medical cost trends are higher than in the fall of 2016, our survey shows a moderating of prescription drug cost trends, although they remain well in excess of 10%.
- Last year, we forecasted a 2017 prescription trend at 13.9%, the actual average of which is 12.8% now. The primary reasons for the drop are that
 prescription drug managers are narrowing formularies, shifting reimbursements to a more outcomes-based setting, and negotiating deeper discounts
 amid public pressure.
- Claims trend for specialty drugs continues to run in excess of 20% annually, but it does not appear it will be higher in 2018 than in 2017.
- The dichotomy between medical and drug trends has resulted in an increased proportion of total healthcare spend on drugs. The prescription drug component of employers' plan designs continues to receive intensified scrutiny from both our employer clients and us.



Historical medical claims trends

Median factors are reflected above

Projected trends for 2018

Survey methods: In our survey, we collected probabilistic data on 2018 projected trends from carrier respondents and also gathered membership data for each product. We paired this data with our actuarial judgment and market knowledge, and weighted each response to give more credibility to the forecasts provided by those with larger populations in the given product. This allows us to project a range of cost trends for each product.

We have also provided an expectation for the national average in 2018. The range for each product category reflects the variance in carrier responses, as well as localized variances in healthcare delivery. The chart on the right represents the cost trends that will be used to set premiums for 2018.

The two most visible observations are:

- 1. Costs trends in 2018 are expected to remain relatively flat for every product, relative to 2017, except for prescription drugs.
- 2. Cost trends for medical expenses have more uncertainty than cost trends for prescription drugs.

While the rise in medical trend is not a reason to panic, it does bear monitoring economic trends as these can be indicators of future medical utilization.

Trends may also rise due to higher prices being charged in certain areas like surgical procedures, or if there is continued activity in the consolidation of healthcare providers. The continued transition of provider reimbursement models from fee-for-service (pay for volume) to value-based models (pay for value) may help balance out the additional utilization.

The variability of the carrier responses creates room for error in our best-estimate forecast, and reflects the many unknown external forces in the healthcare marketplace today.

Prescription drug trends are projected to decrease slightly in 2018 and the concern remains centered on the growth of specialty drugs. Cost containment for specialty drugs is a complicated problem that requires a thoughtful, multifaceted approach. See our related client advisory on managing specialty drug costs.

Medical claims trend forecast*

Wells Fargo Insurance 2018 Medical & Drug Trend Forecast and Variance, by Product

1.0%						13.2%
				12.0%		12.0%
2.0%						-
0%		0 104		9.5%		10.9%
	8.4%	21170	8.8%		8.6%	
.0%		7 604	7.7%	_		
	6.9%	1000	a designed and		123.40	
.0%	1		0.5%	6.9%		
	5 406	6.1%	0.070		6.1%	
.0%	3.410					
.0%						
.0%	НМО	POS	PPO	Indemnity	CDHP	Rx
				1911		
			Trend Range	 Expectation 		

*Based on probabilistic data provided by survey respondents and enrollment by carrier

Sources:

1. USI Insurance 2017 Spring Healthcare Claim Trend Survey

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pwc

Medical cost trend

United States

Behind the numbers 2018

PwC projects 2018 medical costs will grow at a slightly faster rate than 2017. Future reductions in cost trend will require more focus on price.

PwC's Health Research Institute (HRI) annually projects the growth of medical costs in the employer insurance market for the coming year and identifies the leading factors expected to impact the trend.

Heading into 2018, the healthcare industry appears to be settling into a "new normal" marked by more moderate fluctuations in a single-digit medical cost trend.

- HRI projects 2018's medical cost trend to be 6.5%—the first uptick in growth in three years.
- Price continues to be a major driver of healthcare costs.
- Businesses will have to tackle the price of services as well as the rate of utilization to reduce medical cost trend in the future.

Medical cost trend over the years

As healthcare continues to take up a larger part of the overall economy, structural changes-such as the push toward paying for value, greater emphasis on care management and increased cost sharing with consumers-are taking a stronger hold, pulling back against rapid healthcare spending growth. Still, with medical cost trend hovering I understand between 6 and 7 percent for several years, health





Future reductions in cost trend will require more focus on price

In recent years, low utilization growth-largely driven by increased cost-sharing with American consumers—has helped counteract prices that have continued to rise. However, further cost shifting to consumers is getting more difficult, so annual utilization growth could start to rise in the future. Without low utilization serving as a counterbalance, rising prices likely will put upward pressure on overall healthcare costs.

To slow healthcare spending growth moving forward, employers will consider supply-side management strategies—such as narrower provider networks and value-based purchasingthat focus on bringing price, rather than utilization, down.



Inflator: Deflator: Inflator: Inflator: Rising general High-deductibles lose Fewer branded drugs off Scrutiny pressures **Employers** minimize inflation steam patent drug prices



Inflator: **Rising general inflation** waste



Inflator: Rising general inflation impacts healthcare

An upswing in the US economy, now in its third-longest expansion in American history, is gaining strength, and higher general inflation rates will affect the labor-intensive health sector, driving up wages and medical prices.



Inflator: High-deductibles lose steam



Inflator: Movement to high-deductible health plans loses steam

After shifting healthcare costs to employees for years, employers are starting to ease off. Growth in high-deductible employer-based health plans is slowing, leaving less opportunity to stem increases in the use of healthcare services.



Inflator: Fewer branded drugs off patent

NW Natural/1803 Doglittle/4



Inflator: Fewer branded drugs come off

With fewer branded, small molecule drugs coming off patent, employers will have fewer opportunities to encourage employees to buy cost-saving generics in 2018.



Deflator: Scrutiny pressures drug prices



Deflator: Political and public scrutiny puts pressure on drug prices

Heightened political and public attention could encourage drug companies to moderate price increases. Similar scrutiny in the early 1990s resulted in a dramatic decrease in the drug price growth rate. The industry is already seeing some pharmaceutical companies take action, limiting price increases, offering cheaper alternatives and proactively addressing questions of value.



Deflator: Employers minimize waste



Deflator: Employers target right people with right treatments to minimize waste

Employers are looking to maintain access to care for their employees, but in more efficient ways, lowering costs by minimizing waste and targeting spending where it's most effective. They are doubling down on tactics such as prescription quantity limits and exploring new technologies such as artificial intelligence to match people with the best treatment.

What this means for your business

Employers

In a competitive labor market, employers are looking for new cost containment strategies beyond shifting more costs to employees. They are pursuing new contract arrangements with providers to help them tackle healthcare prices.

Actions to consider:

- Target work site health promotion programs to the right people.
- Evaluate the value of drug spending.
- · Focus more on provider arrangements to tackle price.

Healthcare providers

Healthcare providers, with opportunities to take on more risk and work with employers directly, are focusing on improving care management and optimizing their use of physician extenders and nonclinical staff to keep costs down and optimize patient care.

Actions to consider:

- · Assess skills mix.
- Look for new opportunities to manage drug costs.
- Demonstrate value to employers.
- Invest in care management.

Health insurers

Health insurers, in an effort to prove their value to employers, must work to steer patients to the most effective treatments and help providers accelerate pricing transparency efforts.

Actions to consider:

- Look for ways to automate processes.
- Consider alternative therapies.
- Explore value-based purchasing with biopharmaceutical companies.
- Take ownership of collaborating with pharmaceutical companies and providers to manage high-risk patients.
- Be providers' partner in reducing medical costs.

Pharmaceutical and life sciences

Drug companies are focusing on increasing collaboration across the industry, giving stakeholders greater insight into their pricing and the role they play in keeping patients healthy and out of high-cost delivery settings.

Principal, Health Industries, PwC,

Tel: +1 (415) 498 5218

Actions to consider:

- Re-evaluate sales and marketing needs.
- Model drug pricing policy impacts.
- Collaborate on pricing decisions upfront.
- Educate providers on personalized medicine's benefits.

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U.S. employers expect health care costs to rise by 5.5% in 2018, up from 4.6% in 2017

Willis Towers Watson survey also shows that despite uncertainty about health care legislation, employer confidence in offering health benefits has reached pre-ACA levels

August 2, 2017

ARLINGTON, VA, August 2, 2017 – Employers expect health care costs to increase by 5.5%* in 2018, up from a 4.6% increase in 2017, according to the 22nd annual Best Practices in Health Care Employer Survey by Willis Towers Watson (NASDAQ: WLTW). In the face of these continued cost pressures, including employee affordability, employers plan to step up cost management strategies over the next three years, including evaluation of emerging health care delivery solutions and improved patient navigation and health engagement.

The survey also showed that despite uncertainty about the future of health care legislation, employer confidence in offering employee health care benefits has reached its highest level since the passage of the Affordable Care Act in 2010. Ninety-two percent of employers said they are "very confident" their organization will continue to sponsor health benefits in five years.

"Cost management of health benefit programs remains the top priority for employers in 2017 and 2018," said Julie Stone, a national health care practice leader at Willis Towers Watson. "While employers made significant progress over the last few years refining their subsidy and vendor/carrier strategies, many are now looking to other aspects of their health benefit programs in order to improve health and dampen future cost increases. Over the next three years, they will seek to improve patient engagement, expand the use of analytics, and efficiently manage pharmacy costs and utilization. Yet, with rising concerns about affordability, employers are challenged to keep costs low without overburdening employees financially."

Employers are pursuing a wider array of approaches to reduce health care cost and risk – both through improved program efficiencies and members' health engagement. These areas of focus will include encouraging patients to use preferred providers for health care delivery, e.g., telemedicine, centers of excellence, and high-performance networks; emphasizing better outcomes and cost savings in high-priority clinical conditions, such as diabetes, musculoskeletal health and mental health; and selecting partners based on their ability to achieve demonstrably improved outcomes, as well as hold the line on cost.

Employers also aim to enhance employee engagement by increasing choice of benefit plans, improving decision support, and offering health wearables and mobile apps.

Other key employer priorities over the next three years include:

Encouraging employees to use preferred health care delivery options:

- Telemedicine for office visits 78% of employers currently use these consultations with another 16% planning to or considering to by 2019.
- Centers of excellence within health plans 44% of employers currently use these centers with another 33% planning to or considering to by 2019.
- High-performance networks 15% of employers currently use such networks with another 36% planning to or considering to by 2019.

Selecting carriers and vendors based on:

- Competitiveness of negotiated provider discounts: 94%
- Competitiveness of vendor's network access: 94%
- Competitiveness of vendor's total cost of care: 92%

Curbing pharmacy costs and utilization:

- Evaluate pharmacy benefit contract terms 62% of employers are currently evaluating contract terms with another 32% planning to or considering to by 2019.
- Adopt new coverage or utilization restrictions as part of specialty pharmacy strategy 60% of employers recently adopted these restrictions with another 24% planning to or considering to by 2019.
- Address specialty drug costs and utilization performance through medical benefits 44% of employers currently do this with another 38% planning to or considering to by 2019.

Elevating employee health engagement through expanded choice and a more personalized experience:

- Add choice in benefit types by offering voluntary benefits 66% of employers currently use this tactic with another 20% planning to or considering to by 2019.
- Create a virtual shopping experience at the time of enrollment 24% of employers currently do this with another 26% planning to or considering to by 2019.
- **Provide decision-support tools for health navigation** 55% of employers currently offer such tools with another 26% considering to for 2019.
- Encourage the use of mobile apps for condition management or health risk reduction 19% of employers currently provide this to their employees with another 28% planning to or considering to by 2019.
- Promote wearable devices for tracking physical activity 26% of employers currently promote these to their employees with another 18% planning to or considering to by 2019.

"Employers understand that there is no single strategy for success when it comes to health care, and it is critical to engage employees through education and communication that will create a win/win," said Catherine O'Neill, a senior health care consultant at Willis Towers Watson. "The most effective health programs will include a broad range of strategies that encompass employee and dependent participation, program design and subsidy levels, and plan efficiency. The ultimate goal is to offer a high-value plan that manages costs for both employers and employees while also improving health outcomes."

About the survey

The Annual Willis Towers Watson Best Practices in Health Care Employer Survey was completed by 678 U.S. employers between June and July 2017 and reflects respondents' 2017 health program decisions and strategies. Respondents collectively employ 11.9 million employees and operate in all major industry sectors. Results provided are based on 555 employers with at least 1,000 employees.

About Willis Towers Watson

Willis Towers Watson (NASDAQ: WLTW) is a leading global advisory, broking and solutions company that helps clients around the world turn risk into a path for growth. With roots dating to 1828, Willis Towers Watson has 40,000 employees in more than 140 territories. We design and deliver solutions that manage risk, optimize benefits, cultivate talent and expand the power of capital to protect and strengthen institutions and individuals. Our unique perspective allows us to see the critical intersections between talent, assets and ideas – the dynamic formula that drives business performance. Together, we unlock potential. Learn more at willistowerswatson.com.

Endnote

* Cost increases for 2017 and 2018 are after-plan changes; increases without plan changes are 6.0% for both 2017 and 2018. Cost trends are based on projected medical and drug claims for active employees, including both employer and employee contributions but excluding employee out-of-pocket costs.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Joe Karney

OPERATIONS AND CAPITAL PROJECTS Exhibit 1900

May 23, 2018

EXHIBIT 1900 - REPLY TESTIMONY – OPERATIONS AND CAPITAL COST PROJECTS

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i - REPLY TESTIMONY OF JOE KARNEY - Table of Contents

1		I. Introduction and Summary
2	Q.	Please state your name, business address, and present occupation.
3	Α.	My name is Joe Karney and my business address is 220 NW Second Avenue,
4		Portland, Oregon 97209. I am employed by NW Natural Gas Company ("NW
5		Natural" or "Company") as the Engineering Director.
6	Q.	Are you the same Joe Karney that previously provided Direct Testimony
7		in this docket?
8	Α.	Yes, I am.
9	Q.	What is the purpose of your testimony in this proceeding?
10	Α.	The purpose of my Reply Testimony is to present NW Natural's response to
11		the opening testimonies of Lance Kaufman of the Public Utility Commission of
12		Oregon ("Commission") Staff ("Staff"), and Bradley Mullins of the Alliance of
13		Western Energy Consumers ("AWEC"), as these witnesses present testimony
14		on the Company's major capital projects.
15	Q.	How is your testimony organized?
16	Α.	I have organized my Reply Testimony so that, for each of the major capital
17		additions proposed to be included in the Company's rate base, I (1) provide a
18		detailed description of the project; and (2) to pond Staff's and/or AWEC's
19		recommendations regarding the Company's major capital projects.
20	Q.	Please summarize the major capital projects that are included for
21		recovery in this proceeding.
22	Α.	As detailed in my initial testimony, the Company is requesting recovery of
23		capital investments in its system that include the following significant projects:

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MWVF Project. The Mid-Willamette Valley Feeder Project (MWVF) is a major
 combined system reinforcement and bare steel replacement project that
 connects Perrydale along the Central Coast Feeder to the Albany-Corvallis
 Feeder. The MWVF Project was initiated in 2005 and completed in 2013.

5 **Corvallis Loop Project.** The Corvallis Loop Project is a system reinforcement 6 project that increases service capacity and reliability to the Corvallis and 7 Philomath areas. The Corvallis Loop Project was initiated in 2011 and was 8 completed in 2013.

SE Eugene Project. The SE Eugene Project is a 2.5 mile, 12-inch diameter
high pressure pipeline, feeding the southeast Eugene distribution area from the
South Eugene gate. The SE Eugene Project is scheduled to begin construction
in spring or early summer 2018 and is expected to be completed in fall 2018.

Newport Refurbishment Project. The Newport Refurbishment Project consists of several smaller projects that together are designed to extend the life of the Newport Liquified Natural Gas ("LNG") facility for 25 to 30 years. All of the projects associated with the Newport Refurbishment Project are scheduled to be complete in fall 2018.

Mist Control Building and Control System. This project involves the design
 and construction of a new control building and replacement of obsolete plant
 control system at Mist. This project is complete.

Q. Have the parties made recommendations for adjustments regarding all of
 these projects?

A. No. No adjustments are recommended for the Newport Refurbishment Project
 or the Mist Control Building and Control System Project. However, both Staff

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1		and AWEC recommend adjustments regarding the MWVF, the Corvallis Loop,
2		and the SE Eugene Projects.
3		II. <u>MWVF Project</u>
4		A. Overview of the MWVF Project
5	Q.	Please describe the MWVF Project in more detail.
6	Α.	The MWVF Project is a project that was built in four segments, the first segment
7		of which commenced in 2005, with completion of the last phase in 2013 (<i>i.e.</i> ,
8		after the Company's last rate case). As completed, the MWVF consists of 31
9		continuous miles of 12-inch diameter, 720 psi ¹ pipeline, connecting the
10		Company's system from the Central Coast Feeder near Perrydale, in Yamhill
11		County, to a connection on the Albany-Corvallis Feeder east of Corvallis, in
12		Benton County. ²
13	Q.	Please describe the four segments referred to above.
14	Α.	The four segments are as follows:
15		1. Rickreal-to-Monmouth
16		2. South of Monmouth
17		3. Perrydale-to-Monmouth
18		4. Monmouth Reinforcement.
19		The first two segments—Rickreal-to-Monmouth and South of Monmouth—
20		were completed as part of the Company's larger efforts to remove and replace
21		bare steel throughout its entire pipeline system and will be referred to in the
22		testimony together as the "bare steel segments." These segments were

¹ The term "psi" refers to pressure per square inch.

² NW Natural/800, Karney/4.

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1 completed in 2005 and 2013, respectively, and have been judged prudent and 2 included in customer rates.³ The other two segments of the project, the 3 Perrydale-to-Monmouth and Monmouth Reinforcement segments (referred to 4 together as the "reinforcement segments") were both completed in 2012. With 5 the addition of the reinforcement segments, the MWVF provides a connectivity 6 that previously did not exist on NW Natural's system to create an integrated 7 high-pressure system. The reinforcement segments also provide NW Natural 8 with the ability to deliver gas in new ways across the system.⁴

9 Q. What costs related to the MWVF Project is the Company seeking to
 10 include in rate base in this proceeding?

A. The Company is proposing to add a total of \$12.9 million to rate base
 associated with the Perrydale-to-Monmouth and the Monmouth Reinforcement
 segments. This amount represents the total costs for the project of \$24.8
 million less depreciation and less deferred taxes associated with the asset.⁵

Q. Has the Company previously requested cost recovery related to the
 reinforcement segments of the MWVF?

A. Yes. As part of the Company's last rate case, in 2012, the Company sought to
 include the costs associated with the reinforcement segments of MWVF. The
 Commission's findings are discussed below. As mentioned above, the two

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³ The Rickreal-to-Monmouth segment was approved as part of the Company's Bare Steel Replacement Program, implemented through UM 1030. The South of Monmouth segment was approved as part of the Company's System Integrity Program implemented through UM 1406. See NW Natural Response to OPUC DR 292, attached as Exhibit 1901.

⁴ Id.

⁵ NW Natural/800, Karney/10; *see also* NW Natural Response to OPUC DR 293 (providing the final project costs by segment), attached as Exhibit 1902.

segments installed as part of the Company's bare steel replacement program
 have already been approved for cost recovery by the Commission and are
 included in rates, and there is therefore no need for the Commission to make
 additional findings regarding these segments in this proceeding. However, the
 Company has included descriptions of these segments because it is important
 to consider the MWVF Project as a whole in order to understand the full range
 of benefits and to fully understand the design of the project.

Q. What findings did the Commission previously make regarding the
 reinforcement segments of the MWVF Project in the Company's last rate
 proceeding?

11 Α. The Commission did not approve cost recovery for the reinforcement segments 12 of the MWVF Project as part of the Company's last rate case. Staff challenged the MWVF Project as potentially not being completed in time to coincide with 13 14 establishment of new rates, and also argued that the Company had not established that these segments of the project were prudent or that it was 15 16 necessary to build the reinforcement segments according to the timeline followed by the Company.⁶ Based on these challenges to the MWVF and the 17 18 record in that proceeding, the Commission determined that the Company failed to demonstrate that the costs of the project were prudent at that time.⁷ 19 20 Importantly, however, the Commission clearly stated that if the facts relevant 21 to the MWVF Project changed and the Company was able to make an

⁶ NW Natural/800, Karney/6.

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⁷ In re NW Natural Gas Company Request for General Rate Revision, UG 221, Order No. 12-437, issued on November 16, 2012, at 16.

evidence-based showing of need in its next rate case, the Commission would
 be willing to consider the depreciated costs of the project for inclusion in rates.⁸

Q. Have the facts relevant to the MWVF Project changed since the
 Company's last rate case?

A. Yes. As set forth in my initial testimony, the MWVF Project has been
consistently in service and relied on by the Company to provide benefits to NW
Natural customers since installation.⁹ The MWVF Project is serving several
important functions on the Company's system. Most critically, MWVF
addresses three important needs:

First, our modelling shows that without the MWVF, pressures in the Monmouth-Independence area would be critically low and would fail NW Natural's design criteria. This would place firm customers at risk for outages on a peak design day. In other words, if we had not completed the reinforcement segments of MWVF in 2013, we would need to do so today—or find another way to serve this area.

Second, NW Natural can now move gas from the Company's Newport LNG
 facility to Albany. This was also not possible prior to completion of the MWVF
 Project but provides the Company with an important peak day resource.

⁸ *Id*., at 18.

⁹ NW Natural/800, Karney/10.

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- *Third,* the MWVF allows gas to flow from the Central Coast Feeder through
 the MWVF into the Albany load center, thus providing a backup feeder¹⁰ to a
 load center that was previously served by a single line.
- 4
- 5

B. <u>Staff Criticisms of the MWVF Project</u>

Q. What criticisms does Staff offer regarding the Company's request to recover the costs of the reinforcement sections of the MWVF?

Α. Staff articulates three major criticisms of the Company's support for the MWVF. 8 9 First, while Staff accepts that the MWVF serves a need in the Monmouth-10 Independence areas, Staff claims that the need is guite limited and could be 11 served instead by an 8-mile 4-inch pipeline, which Staff purports would be considerably less costly than the MWVF. Second, Staff takes the position that 12 13 the MWVF is an unreliable backup for the Albany-Corvallis feeder and more 14 reliable, less expensive alternatives exists. And third, Staff takes the position that the MWVF does not actually facilitate gas flows from Newport LNG to 15 16 Albany in realistic models of Company operations.

17 Q. Do you agree with Staff's criticisms?

18 A. No. I will address them one-by-one below.

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¹⁰ For purposes of this testimony, the Company is defining the term "feeder" to mean a high pressure (greater than 60 psi) pipeline; in this context a feeder can be on either the transmission or distribution system. Please note that the term feeder may have a different definition in other contexts (e.g., the Company's Integrated Resource Plan).
1 C. <u>Response to Staff Criticisms of the MWVF Project</u>

2 1) <u>A 12-Inch Pipe Was the Appropriate Size for the Monmouth-</u> 3 <u>Independence Area</u>

Q. Please summarize the importance of the MWVF in serving the Monmouth Independence area.

A. As discussed in more detail below, NW Natural's modeling demonstrates that,
without the connectivity provided by the MWVF, customers in that area would
experience pressures that are well below design standards, and that indicate
failed service on a peak day. As a result, firm customers would be at risk of
being unable to heat their houses in the coldest weather—a result that NW
Natural would be required to remedy.

Q. Please detail Staff's position regarding the role of MWVF in serving the Monmouth-Independence area.

14 Α. Staff accepts that the Company has demonstrated a system need in the Monmouth-Independence distribution¹¹ area. However, because Staff has 15 misread the Company's Synergi model runs showing this need, Staff 16 17 underestimates the need and incorrectly concludes that this need could have 18 been addressed in a more cost-effective way using 4-inch pipe—instead of 12-19 inch pipe. In addition, Staff states that the need to reinforce Independence 20 could have been met with an 8-mile pipeline, instead of the entire 31-mile 21 MWVF.

8 - DIRECT TESTIMONY OF JOE KARNEY

¹¹ For purposes of this testimony, the Company is defining distribution system as the portion of the Company's system that is pipeline with a pressure of 60 MAOP or less and that connects a feeder to the Company's customers; *see also* Staff/700, Kaufman/9.

Q. Why do you say that Staff's position is based on a misreading of the Company's Synergi model runs?

3 Α. In my Opening Testimony, I included Figure 2, which shows the results of a 4 Synergi model run illustrating system pressures that would exist from Perrydale down to Monmouth-Independence *without the MWVF Project*.¹² Figure 2 5 6 uses color coding to show pressure in load areas on the Company's system, 7 with red indicating lower, and green indicating higher pressures.¹³ Based on 8 its view of Figure 2, Staff concludes the red portions of the figure indicate that 9 "a small area in Monmouth-Independence would experience unreliably low pressures in some locations."¹⁴ Thus, while Staff correctly interprets Figure 2 10 11 as showing that, without MWVF, the Monmouth-Independence area would 12 experience very low pressures in certain distribution areas, Staff ignores other important information shown in the model run, and therefore incorrectly 13 14 concludes that the remaining load areas have no reliability concerns.

15 Q. Please explain the relevant information shown in Figure 2.

16 A. Figure 2 is shown below:

¹² NW Natural/800, Karney/14.

¹³ Id.

¹⁴ Staff/700, Kaufman/10.

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1 Figure 2. Synergi Model of Monmouth/Independence Area without the MVWF

There are two important data sets illustrated in Figure 2. The first applies to *load pressures shown in the Company's distribution areas* (defined for these purposes as the areas where the Company's residential and commercial customers reside) in color-coded shading. The second data set is indicated by the *system pressures along the feeder pipeline,* which are not shaded, but are marked by the relevant psi.

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1 Q. Please explain the pressures in the distribution areas shown by Figure 2.

A. The map shows significant portions of Monmouth-Independence ranging
between red to oranges, which indicates pressures between zero and 15 psi.
For reference, acceptable pressures in distribution areas are between 10 and
60 psi.

6 Q. What is the significance of these levels?

7 Α. The Company evaluates pressure levels in its distribution system against its 8 design criteria for distribution, which are used to analyze project need in NW 9 Natural's Integrated Resource Plan ("IRP:). These design criteria indicate that when pressures drop to 15 psi, the Company needs to begin planning for 10 11 reinforcement, and anything below 10 psi indicates immediate risk of failure. 12 The 10 psi standard is critical because that is the lowest pressure allowable for an excess flow valve ("EFV") to function properly.¹⁵ Thus, all of the orange/red 13 14 areas in Figure 2 indicate areas where reinforcement is needed.

Q. Please explain the significance of the feeder line pressures shown in Figure 2.

A. These pressures, as shown at various intersections along the pipeline, allow
the Company to observe the decreases in psi—or pressure drop—along the
line. This information is critically important because pressures do not drop in a
linear, but rather in an exponential fashion, and any pressure decrease of 40
percent or more along a high-pressure feeder (pipeline) indicates that the
pipeline has exceeded 80% of its pipeline capacity. For this reason, under NW
Natural's design criteria for feeder used in its IRP, a pressure drop in excess of

¹⁵ See 49 CFR 192.381 (performance standards for excess flow valves).

40 percent along a high-pressure feeder indicates unacceptable conditions
 requiring reinforcement.¹⁶

3 Importantly, Figure 2 shows that without the MWVF, pressure at the 4 Perrydale Station starts at 165 psi and drops to just 85 psi by the time gas reaches Dallas,¹⁷ and drops again to 80 psi at Monmouth-Independence—a 5 6 total drop of almost 50 percent. Thus, while the distribution centers over much 7 of the Dallas and Monmouth-Independence areas are shaded in green and are therefore shown at acceptable pressures, the pressure drop along the feeders 8 9 servicing those areas indicate that they are in fact at risk of outage, and that 10 the pipeline needs to be reinforced promptly.

Q. Based on its understanding of the Company's system needs, Staff
 asserts that the reliability need identified in support of the MWVF Project
 could have been met using a shorter pipeline consisting of a smaller
 diameter pipe. Do you agree?

- A. No. The benefits of the MWVF Project could not have been provided with either
 a smaller diameter or shorter length pipeline. The shorter, 8-mile pipeline
 referred to in Staff's testimony is the Northern-most section of the MWVF and
 would only allow the Company to serve Monmouth-Independence.
- 19 Q. Why did the Company decide to use 12-inch pipe for the MWVF?
- A. NW Natural first selected 12-inch pipe for the MWVF when it was designing the
- 21

bare steel replacement segments. At that time, the Company anticipated that

¹⁷ Staff/700, Kaufman/10.

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¹⁶ A pressure drop of 40% or more indicates that a pipeline has exceeded 80 percent of its capacity according to the American Gas Association (AGA) Gas Engineering and Operations Practices (GEOP) Series, Book D-1: System Design, Revised 1990 and 2004 – Chapter 2: Gas Flow Calculations.

1 it would eventually build out the full 31-mile pipeline, and so considered the appropriate sizing for a pipeline that would connect the 10-inch Central Coast 2 3 Feeder to the 10" Albany Feeder as well as allow for a potential future Southern 4 Willamette Valley Feeder to Eugene. Given the length of the pipeline and the 5 size of the pipelines being connected, the Company selected a 12-inch pipeline 6 to minimize pressure drop and maximize potential flow volumes over the entire distance of the pipeline.¹⁸ Importantly, prior to construction the Company 7 discussed with Staff its plan to replace the bare steel segments (Rickreal-to-8 9 Monmouth and South of Monmouth) with 12-inch pipe.¹⁹ These segments and 10 other similar upsized segments were judged as prudent by the Commission.

11 It was an obvious choice to match the 12-inch pipeline for the bare steel replacement segments by using 12-inch pipe for the reinforcement segments, 12 13 in order to realize the value of the pipeline described above. MWVF is one 14 continuous pipeline, and building a 4-inch section would have significantly diminished the value of the initial 12-inch sections. As Staff has noted, 15 attaching a 4-inch pipeline to a 12-inch pipeline would be akin to attaching a 16 garden hose to a fire hose.²⁰ The entire pipeline would be limited to the flows 17 allowed by the narrowest segment. In addition, a pipeline with a consistent 18

¹⁸ *Id*.

¹⁹ Attached as Exhibit 1903 are the Company's responses to Staff data requests issue in UM 1030 in which the Company describes the MWVF segments under review, including the designation of 12-inch pipe.

²⁰ Staff makes this same analogy on regarding the connection between MWVF to Albany, thereby recognizing that it is most efficient to connect same sized pipe in order to avoid points of constriction. Staff/700, Kaufman/18.

diameter facilitates more efficient inspection for required transmission integrity
 inspections, such as inline inspection.²¹

Based on all of these factors, and given the relatively small difference in the cost to install a 12-inch as opposed to a smaller sized pipeline (which I will discuss in detail below), we determined that the 12-inch pipeline was the right approach.

7 Q. Are there any other reasons the Company selected 12-inch pipeline?

A. Yes. When we construct a pipeline, we are well aware that it will be in service
from anywhere between 50 to 70 years. Therefore, we need to keep long-term
load growth in mind, to avoid the need to replace a pipeline before the end of
its useful life. Thus, it often makes sense to consider building a larger pipeline
than is necessary to serve current load—especially when the cost differential
is relatively small, and when the component will serve as an integral part of the
system.

15 16 Q.

Can you provide any data that demonstrates the relative costs and benefits of using 12-inch pipe for the MWVF?

A. Yes. Table 1 below correlates historical installation costs provided in NW
 Natural's Response to OPUC DR 298 of different pipeline diameters with the
 associated calculated capacity of a 31-mile pipeline.²²

²⁰

²¹ See NW Natural Response to OPUC DR 170, attached as Exhibit 1904.

²² See NW Natural Response to OPUC DR 298, attached as Exhibit 1905

Nominal Pipe Size	Pipe Capacity Therm/hr (1)	Capacity % Increase from 4"	Cost per Foot (2)	Total Cost (3)	Total Cost Increase from 4"	Total Cost per Delivered Therm/hr
4	1,140		\$234	\$38,305,800		\$33,602
6	3,307	190%	\$242	\$39,615,400	3%	\$11,979
12	20,473	1696%	\$289	\$47,309,300	24%	\$2,311

Table 1 – Calculated Capacity and Cost of Pipelines by Size

2 The information in Table 1 illustrates that pipeline installation costs increase 3 incrementally as diameter increases, but the capacity increases exponentially as the diameter increases. For approximately a 24% increase in cost there is 4 5 almost a 1700% increase in capacity for installing a 12-inch pipeline instead of 6 a 4-inch pipeline. The total cost per delivered therm/hour for a 4-inch pipeline is \$33,602 while for a 12-inch pipeline it is \$2,311, less than 7% of the cost of 7 a 4" pipeline. For the MWVF, the 12-inch pipeline installed is the most cost-8 9 effective selection that can meet anticipated loads during the life of the pipeline.

Q. Has the Company modeled the impact of Staff's proposal that the
 Company substitute an 8-mile, 4-inch pipeline for the segment serving
 Monmouth and Independence?

A. Yes. In OPUC DR 163(d), Staff asked the Company to model the impact of
 using a 4-inch pipe for the Perrydale-to-Monmouth segment of the MWVF. In
 its response, the Company provided Figure A²³ below—which is also included
 in Staff's testimony.²⁴

24 Staff/700, Kaufman/12.

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Rates & Regulatory Affairs **NW NATURAL** 220 N.W. Second Avenue Portland, Oregon 97209-3991 1-503-226-4211

1

²³ Figures not previously included in my initial testimony will be designated with letters to avoid confusion.



3

4

Q. What does Figure A show?

A. Figure A indicates a number of problems resulting from the substitution of 4inch pipe. First, while risk of customer outages is improved over the "without
MWVF" Figure 2, the model run still shows distribution areas between 5 and

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15,²⁵ and a pressure drop from Perrydale to Monmouth-Independence of close
 to 40 percent.²⁶ This means that the 4-inch feeder pipeline would be near
 capacity today.

4 5

Q. What is the significance of the 70 psi inlet pressures shown in Independence?

6 Α. The 70 psi is inadequate to operate the district regulators as designed. The 7 district regulators are comprised of mechanical components that safely lower pressure from the high-pressure feeder pipelines to the 60 psi maximum 8 9 allowed operating pressure ("MAOP") distribution system. The mechanical 10 components and springs within the district regulators need a minimum pressure 11 differential of 20 psi to provide the full design flow capacity into the 60 psi 12 distribution system. Without the appropriate inlet pressure to the district regulator at Independence, firm customers would be at a risk for a loss of 13 14 service during winter conditions. With any significant customer growth, the pipeline would need to be replaced, which of course is a very expensive 15 16 proposition. Moreover, the Company also noted that, under this hypothetical 17 scenario, pressures are insufficient to allow gas to flow into the Albany-Corvallis area in useful quantities. For these reasons, installing 4-inch pipeline would 18 19 have been imprudent in the extreme.

Q. As an alternative, Staff proposes that the Company could have installed 8-mile, 6-inch pipe. Would that have been a reasonable approach?

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²⁵ As noted above, anything below 10 psi indicates immediate risk of failue.

²⁶ As noted above, a 40% pressure drop along a high-pressure pipline indicates that the pipeline has exceeded 80% of its capacity.

A. An 8-mile, 6-inch pipeline would have provided incremental increased capacity
into the Independence/Monmouth area, but would be insufficient to allow gas
to flow into the Albany-Corvallis area. This would significantly diminish the
value of the other 12-inch segments of the MWVF. With any significant
customer growth, the 6-inch pipeline would also need to be replaced at a
significant cost. For these reasons, installing a 6-inch pipeline would have been
imprudent.

Q. Please specifically address Staff's statement that the need in Monmouth Independence could have been met with an 8-mile pipeline instead of the
 31-mile MWVF

A. This statement is based on Staff's erroneous belief that the only real need for
the MWVF was to serve load in the Monmouth-Independence area. Based on
this view, Staff opines that instead of building a 31-mile pipeline (*i.e.* the entire
MWVF) to serve this need, NW Natural only needed the 8-mile Perrydale-toMonmouth segment. However, this view ignores several key facts.

First, the initial two segments of the MWVF were constructed as part of the Company's efforts to replace bare steel pipe, which was deemed unsafe. All parties supported this project, and these two segments of the MWVF have been deemed prudent and have been benefitting customers for years. Therefore, the Company never had the option to replace the overall MWVF with an 8-mile segment.

22 Second, the reinforcement segments for which the Company seeks 23 recovery today were not built solely to serve the Independence-Monmouth 24 area—although that feature does constitute one of the primary benefits of the

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pipeline. On the contrary, the two reinforcement segments were constructed
also to facilitate gas flows from Newport LNG into the Albany area, as well as
to provide backup feeder to Albany—both benefits that are discussed further
below. Therefore, Mr. Kaufman's suggestion that the Company could have
served Independence-Monmouth with an 8-mile pipe is not on point.

6

2) <u>Newport LNG Delivery Capability Provided by the MWVF Project</u>

7 Q. What is Newport LNG?

A. The Newport LNG is a peak shaving facility, located in Newport, Oregon and consists of a 1,000,000 Dth capacity storage tank, liquefaction facilities capable
of processing about 5,500 Dth/day, and vaporization capacity of up to 100,000
Dth/day. This facility was constructed by Chicago Bridge and Iron, and was commissioned in 1977.

Q. Please summarize the benefits provided by the MWVF in enabling delivery of gas from the Newport LNG to other parts of the Company's system.

A. The existence of the MWVF allows Newport LNG to flow from the Central Coast
 Feeder to the Albany load centers during vaporization in the winter. Prior to
 the MWVF, Newport LNG gas flowed exclusively to the Salem load center but
 could not get to the Corvallis-Albany area. Because Salem has other alternate
 sources of gas—in particular, stored gas from Mist—it does not need the
 Newport LNG resource; conversely, as discussed below, the Corvallis-Albany
 area clearly benefits from additional resources.

Q. What is Staff's argument regarding the additional delivery capability for Newport LNG provided by the MWVF Project?

1 Α. Staff argues that the MWVF enables delivery capability for the Newport LNG 2 only at times and under situations when this capacity is typically not needed.²⁷ 3 Staff bases this assertion on the fact that peak winter load in Salem far exceeds the Newport LNG vaporization capacity,²⁸ and opines that "[g]as does not flow 4 5 from Newport to Albany in realistic models of Company operations."29 Staff 6 therefore concludes that, because the entire Newport LNG capacity would be 7 needed to serve just Salem, there is no excess capacity that would flow to 8 Albany.

9 Q. Is Staff's understanding of the delivery capability from Newport LNG 10 correct?

11 Α. No. Staff misunderstands how NW Natural's system is configured. It is true 12 that Salem *can theoretically* absorb all of the LNG capacity from Newport. However, during cold weather, the most cost-effective approach is to serve 13 14 Salem customers using gas from Miller Station at Mist. The Salem load center is connected to supplies at Mist via the 24-inch South Mist Pipeline and the 12-15 16 inch Aurora to Brooks pipeline that connects to the Center Coast feeder. These pipeline connections supply the Salem load center during cold weather and the 17 18 Newport LNG gas is diverted to the Albany-Corvallis load center. This allows 19 the gas from Newport LNG to flow south to the Albany-Corvallis area. Figure 20 6 of my initial testimony is reproduced below and shows gas flows from the

²⁸ Id.

²⁹ Staff/700, Kaufman/9

²⁷ Staff/700, Kaufman/19.

- 1 MWVF Project on a peak day, including the ability for Newport LNG to reach
- 2 Albany-Corvallis.



3 Figure 6. Synergi Model Showing Gas Flows from MWVF on a Peak Day

4

Q. Has Staff conceded this error in its understanding of the Company's system?

A. Yes. In response to NW Natural's DR 02,³⁰ Staff acknowledged that its statement that "[g]as does not flow from Newport to Albany in realistic models of Company operations" was in error and indicated that an erratum will be filed to remove this statement.

³⁰ See Staff Response to NW Natural DR 02, attached as Exhibit 1906.

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Q. Has Staff suggested any alternative method for meeting Albany's load in lieu of using the Newport LNG capacity?

A. Yes. Staff suggests that in the event of constraints that reduce capacity on the
 Grants Pass Lateral, NW Natural could use all of the Newport LNG capacity to
 service Salem and meet Albany's load using whatever capacity does exist on
 the Grants Pass Lateral.³¹

7 Q. Is this a reasonable alternative?

8 Α. No. Staff's premise is entirely hypothetical and does not address the 9 Company's concerns regarding an outage that shuts down the Grants Pass 10 Lateral entirely—or an outage at the Albany gate station or the NW Natural 11 pipeline connecting the gate station to the load center. Both of these concerns 12 are addressed by the MWVF as discussed in more detail below. Therefore, 13 while Staff's proposal could meet a limited need in limited circumstances, it is 14 By contrast, the MWVF has changed gas flows on the not a solution. Company's system between the Salem and Albany load centers. The MWVF 15 16 Project improves deliverability of natural gas in very significant ways, benefiting 17 the current system, and allowing for future benefits. The ability to serve the 18 Albany-Corvallis area with Newport LNG is an example of the key connections provided by the MWVF Project that make the system more robust and capable 19 20 of handling expected outages or other problems.

³¹ Staff/700, Kaufman/19.

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13)The MWVF Project Provides an Appropriate Backup Feeder for2Corvallis-Albany

- Q. Please explain the importance of the MWVF in providing a backup
 feeder for the Corvallis-Albany area.
- A. Prior to the construction of the MWVF, customers in the Corvallis-Albany area
 were dependent on a single-feed system to deliver gas to their area from the
 Grants Pass Lateral. As a result, the 42,000 customers in that area were at
 risk of losing service if there were an outage or disruption (a) on the Grants
- 9 Pass Lateral; (b) at the Albany gate station; or (c) on the NW Natural pipeline
- 10 connecting the Albany gate station to the distribution area. As I explained in
- 11 my Opening Testimony, without the MWVF, Corvallis-Albany would constitute
- 12 the largest single-feed load center in NW Natural's system, and an
- unreasonable risk. Therefore, the construction of the MWVF has been critical
 to shoring up reliability in that area.

15 Q. What specific criticisms does Staff raise with respect to the MWVF Project

- as a backup feeder for Corvallis-Albany?
- A. Staff claims that, prior to the construction of the MWVF, there was no reliability
 risk in the Corvallis-Albany area that needed to be remedied. Specifically, Staff
 points out that in the past, outages on the Grants Pass lateral have been very
 rare, and therefore concludes that there was no need to construct the MWVF
 to serve that area.³²
- 22 Q. Do you agree with this argument?

16

A. No. As an initial matter, the Company was concerned not only about outages
on the Grants Pass Lateral, but also at the Albany gate station itself, as well as

³² Staff/700, Kaufman/15.

the connecting pipeline into the distribution area. And while it is true that such
outages have been rare in the past, they are far from unthinkable. Indeed,
considering all of the potential causes—including corrosion failure, natural
force damage, excavation damage or equipment failure³³ — such outages must
be anticipated. Moreover, while the probability of these outages is not
predictable, the outcome of such an event is known to the Company.

7 8

Q. What would the impact of an outage on a single feed system like the Corvallis-Albany feeder be for the Company's customers?

9 Α. In the event of an outage, all customers in the Corvallis-Albany area would lose service. In addition, the Company would be required to isolate each customer's 10 11 meter, purge all mains and services, and individually relight each customer in 12 order to safely restore service.³⁴ The process necessary for full restoration of the Corvallis-Albany load center would be anticipated to take several months.³⁵ 13 14 However, with the addition of the MWVF, Company would be able to continue to service the Albany/Corvallis load center even if an outage on the Grants 15 Pass Lateral occurs. This represents a clear reliability benefit for customers. 16

Q. Staff argues that the Company has not provided any modeling to show
 whether the MWVF would be effective in preventing outages in the
 Corvallis-Albany area in the event of an outage on the Grants Pass
 Lateral.³⁶ Could you respond?

³³ See NW Natural Response to OPUC DR 164, at 1-2, attached as Exhibit 1907.

³⁴ Id.

³⁵ Id.

³⁶ Staff/700, Kaufman/16.

1 Α. It is true that Synergi could not create a model run showing this result, because 2 that software cannot create the figures showing the pressure distribution in the 3 system when the supply of gas and the demand of gas are out of sync during 4 a large modeled outage. That said, the Company provided in its supplemental response to OPUC DR 167 a table of customers that would be impacted if there 5 was an outage on the Grants Pass lateral.³⁷ Importantly, during summer, 6 7 spring, and fall conditions, the connections to the Albany-Corvallis and Salem load centers to Mist storage gas and Newport LNG gas should prevent all 8 9 customer outages. Under simulated winter conditions approximately 2,500 10 customers in Salem and 5,000 customers in Albany will lose service. Under 11 peak conditions the number of impacted customers that will lose service grows 12 to 64,000 in Salem and 42,000 in Albany-Corvallis. Therefore, if there were an outage on the Grants Pass Lateral, the MWVF would significantly mitigate the 13 14 impact throughout the year, except under peak day conditions.

Q. Staff also points out that, in the event of an outage at the Albany gate
 station, and where the Grants Pass Lateral remains operational, the
 MWVF does not always ensure that all customers retain service.³⁸ What
 is your response?

A. Staff correctly points out that if there is an outage at the Albany gate station,
 and the Grants Pass Lateral remains operational, the MWVF will ensure that
 all customers retain service so long as temperatures are above 40 degrees.
 On the other hand, under identical circumstances, but with temperatures of 40

 ³⁷ See NW Natural response to OPUC DR 167 (Supplemental), attached as Exhibit 1908.
 ³⁸ Staff/700, Kaufman/17.

1 degrees or less, only 75 percent of customers in the Corvallis-Albany area will 2 retain service. This is because the pipe connecting the MWVF from the 3 Corvallis-Albany area is only 6 inches in diameter, which cannot sustain sufficient pressures at lower temperatures to serve 100 percent of the Albany 4 area—a fact that highlights the Company's concern about sizing high pressure 5 6 pipelines at smaller diameters. However, more to the point, NW Natural rejects 7 Staff's implication that because the MWVF addresses only 75 percent of the 8 reliability issue under certain weather conditions in Albany, it should not have 9 been constructed at all.

10Q.Staff points out that if the Company had constructed a fifth leg of the11MWVF—the Willamette Crossing—the MWVF could maintain service to12100 percent of the Corvallis-Albany area in the event of an outage at the13Albany gate station.³⁹ What is your response?

A. The overall capacity of an extended MWVF that included the Willamette
Crossing would have lessened the number of customers impacted by an
outage of the Albany Gate Station under peak conditions, but would have been
inadequate to serve all customers in the Albany-Corvallis area.

Q. Staff asserts that a similar reliability risk exists for Eugene and that the
 Company has not proposed to take any actions to reduce this risk;
 therefore, Staff argues that reducing a reliability risk for Corvallis/Albany
 is inappropriate. Do you agree with this characterization?

A. No. As an initial matter, it is important to reiterate that the reliability risks for
 Eugene are not the same as they were for Corvallis/Albany prior to

³⁹ Staff/700, Kaufman/18.

implementation of the MWVF Project. Eugene is served by three different gate
 stations and associated pipelines.⁴⁰ Therefore while Eugene is vulnerable if
 there is a complete outage of the Grants Pass Lateral, it does not have the
 other vulnerabilities that existed for the Albany area.

5 Moreover, NW Natural fundamentally rejects Staff's suggestion that if the 6 Company is not proposing reliability projects for all areas with a risk, no 7 reliability projects should be approved. While Staff correctly asserts that it is 8 impossible to be 100 percent reliable, arguing against a reliability project only 9 because the Company has failed to propose other reliability projects would 10 seem to set forth an "all or nothing approach" to reliability rather than allowing 11 the Company to strategically address the most needed projects.

Q. What alternatives does Staff suggest could have been built by the
 Company to provide reliability benefits to Corvallis-Albany in lieu of the
 MWVF Project?

A. Staff asserts that in order to achieve the benefits of the MWVF in the Albany
area, the Company could have improved maintenance at the gate station,
enhanced the gate station with redundant systems (*e.g.*, redundant
compressors), or built a second gate station in the Albany area that would be
connected to the Albany feeder.⁴¹

Q. Do you agree that these measures could have achieved the same benefits for the Albany area as the MWVF Project?

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⁴⁰ NW Natural/800, Karney/19.

⁴¹ Staff/700, Kaufman/19-21.

1 Α. No, I do not. The Company already keeps its gate stations well maintained. 2 However, this maintenance cannot sufficiently decrease the risk of failures 3 associated with outside forces, third party damages, equipment failures, or 4 disruptions to the Grants Pass Lateral that feeds gas to a gate station. Moreover, the Albany gate station is co-owned, operated, and maintained 5 6 between NW Natural and Williams Pipeline — therefore NW Natural cannot 7 entirely control the maintenance risk because it does not control all maintenance activity at this site. 8

9 Most importantly, the installation of a second gate station to the Albany area 10 would require installation of a new pipeline in order to connect the new gate 11 station—which would be a very costly proposition in and of itself. As discussed 12 in greater detail below, without consideration of this additional pipeline, Staff 13 has failed to fully consider this potential alternative.

14

D. <u>Staff's Alternatives Analysis of the MWVF Project</u>

Q. Based on its overall analysis, what alternative to the MWVF does Staff
 suggest should have been built to address the needs of NW Natural's
 customers?

A. As discussed above, Staff asserts that the system needs in the Independence Monmouth area could have been achieved through an 8-mile, 4-inch pipeline.⁴²
 However, Staff later concedes that, given the need to consider future growth,
 upsizing this 8-mile pipeline to 6 inches would also have been reasonable.
 Staff also acknowledges that to the extent that the MWVF Project included

⁴² Staff/700, Kaufman/21.

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replacement of bare steel pipeline, a longer MWVF Project (longer than 8 miles)
 would have been appropriate.⁴³ Given all of the above, Staff concludes that it
 would have been appropriate for the Company to have constructed a 31.6 mile
 6-inch pipeline—which I will refer to in my testimony as Staff's "MWVF
 Alternative".⁴⁴

In addition, Staff offers that, if the Commission believes it was appropriate
for the Company to address the reliability need at Albany-Corvallis, a
reasonable solution would have been to add a second gate station close to
Albany.

10

11

Q. Given Staff's recommended "MWVF Alternative", how does Staff approach its recommendation for cost recovery in this case?

12 Α. Staff calculates the total cost of its MWVF Alternative 31.6-mile 6-inch pipeline at an estimated \$4.6 million. Staff then uses the Company's average pipeline 13 14 costs to estimate that a comparable pipeline would cost \$40.4 million, and concludes that these two values represent the high and low range estimate of 15 16 Staff's alternative pipeline. Staff also notes that the backup gate station that it 17 recommends for Albany would cost between \$1-2 million. Staff then compares 18 the total of these two hypothetical investments with its estimate of the amounts that the Company is already recovering in rates for the bare steel replacement 19 20 segments of the MWVF (Staff estimates \$30 million) and the current value of the total MWVF (estimated at a depreciated value of \$50 million). Based on all 21 22 of these estimates, Staff finds that the cost of its MWVF Alternative is within

⁴³ Staff/700/Kaufman/21.

⁴⁴ Id.

\$3.5 million of the amount related to MWVF that is already in rates, and
therefore applies what it calls a "counterfactual" approach to get to its
conclusion that the Company is already recovering a reasonable amount, and
should receive no recovery for any of the investment in the MWVF proposed in
this case.

6

Q. Do you agree with Staff's approach?

A. No. Staff's approached is critically flawed in several respects. *First*, Staff's overall counterfactual approach is illogical and contrary to basic ratemaking principles. *Second*, Staff's "Alternative MWVF" would not address the critical needs of the Company and therefore the hypothetical costs of that resource are irrelevant. *Third*, even if Staff's hypothetical resource would meet customers' needs, Staff has drastically underestimated the associated costs.

Q. Why do you say that Staff's counterfactual approach is illogical and contrary to basic ratemaking principles?

Α. Staff's approach is illogical and violates basic ratemaking principles because it 15 16 seeks to (a) rewrite history by negating a past ratemaking decision that allowed 17 for recovery of a critically needed safety program, and (b) deny NW Natural recovery for prudent investment. In particular, Staff asks the Commission to 18 calculate a disallowance of incremental investments made by the Company in 19 20 the two reinforcement segments at issue in this case, based upon a hypothetical "MWVF Alternative" that reimagines the bare steel replacement 21 22 segments at six instead of 12-inch diameter pipeline. In so doing, Staff 23 proposes an effective "claw back" of amounts legitimately approved for a 24 necessary safety program as a "credit" to offset the costs of the reinforcement

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segments that are at issue in this proceeding. This approach is particularly
egregious given that Staff agrees with NW Natural that at least part of the
incremental investment in the MWVF is required to serve NW Natural's
customers. Thus, Staff's counterfactual proposal inappropriately seeks an endrun around a prior prudence determination and would deny the Company
compensation for the prudent investment for which recovery is sought in this
case.

8

Q. Please address your other concerns regarding Staff's MWVF Alternative.

- 9 A. As described above, Staff's alternatives are inadequate to address the very real
 infrastructure requirements that are necessary to meet its customers' needs.
 Thus, the cost to build Staff's MWVF Alternative are irrelevant to any valid
 analysis, mooting Staff's counterfactual approach.
- Q. Please explain your statement that Staff has significantly underestimated
 the costs of its alternative MWVF alternative.
- A. Even assuming that the alternatives suggested by Staff are appropriate, which
 they are not, Staff has not provided an accurate comparison. First, Staff's low end cost estimate is entirely unsupported. But more importantly, even the high end estimate that Staff attributes to NW Natural does not account for all
 relevant costs.

Q. Please explain why you say that Staff's low-end estimate is entirely unsupported.

A. According to Staff's own statements, it has mistakenly used estimates for the cost related to gathering lines, as opposed to feeder pipeline, to come up with

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1 its low-end estimate.⁴⁵ Gathering pipelines are installed between production 2 wells and gas processing facilities. They typically operate at lower pressures 3 and are located in rural areas and are only in service while the well is producing 4 gas. As a result, there are significantly fewer regulatory design and maintenance requirements for gathering pipelines. A pipeline designed and 5 6 constructed to gathering line standards would not meet the safety standards, 7 or require the same costs to construct, as a pipeline required for use in NW Natural's system. 8

Moreover, Staff's low-end estimate does not account for all of the costs of
 installing a pipeline, including design, permitting, traffic control, gas main tie-in
 hole excavation, shoring, steel plates, pavement restoration, etc.—all of which
 would have been incurred in the construction of Staff's counter-factual MWVF
 Alternative.⁴⁶

Q. Staff also argues that the costs to construct a 31-mile 6-inch pipeline is
 substantially less expensive than a 31-mile 12-inch pipeline. On what
 does Staff base this opinion?

A Staff acknowledges information that the Company provided showing the following relative costs per foot to install 4, 6, and 12-inch pipeline as \$234, \$242, and \$289, respectively. However, Staff argues that this information is inconsistent with information previously provided by NW Natural in data responses, which show that the cost of 12-inch steel pipe is \$47 per foot and \$20 for 6-inch pipe. Staff points out that NW Natural's information also provides

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⁴⁵ Staff/700, Kaufman/22.

⁴⁶ See NW Natural Response to OPUC DR 355, attached as Exhibit 1909.

that boring costs for 12-inch pipe is \$220 per foot compared to \$90 for 6-inch.
And Staff claims that, in addition, installation of 12-inch pipe requires more
trenching, backfill, welding and larger equipment. Based on all of the above,
Staff claims that its MWVF Alternative would cost \$21.7 million less than the
same pipeline built using 12-inch pipe. ⁴⁷

6

Q.

Is Staff's analysis correct?

7 Α. No. It is important to understand that there are many factors contributing to the 8 cost of an installed pipeline that are the same, regardless of the size of the pipe 9 installed. Examples of such costs are design, permitting, traffic control, site preparation, trenching, back filling, and site restoration. And while horizontal 10 11 directional drilling costs are higher for larger pipe, the primary installation 12 method is open trench installation, which is the same for both sizes of pipe. Thus, while there is an increase in the cost of larger pipe, it represents a very 13 14 small portion of the overall project costs. High-level data based on historical projects, summarized in Mr. Kaufman's testimony,⁴⁸ shows an approximate 15 20% cost increase for installing a 12-inch pipeline compared to a 6-inch 16 17 pipeline.

Q. Have you attempted to calculate the cost difference between the two reinforcement segments constructed with 12-inch pipe vs. 6-inch pipe?

A. Yes. The Company performed a "bottom up" estimate of the two system
 reinforcement segments of the MWVF. Because we cannot go back in time
 and obtain accurate numbers for a six-inch pipeline built in 2006, we created a

⁴⁷ Staff/700, Kaufman/23-24.

⁴⁸ Staff/700, Kaufman/23.

comparison using today's prices. The new estimates show that the
reinforcement segments built with 12-inch pipe would cost about 25 percent
more than the reinforcement segments built with 6-inch pipe. Table 2 below
shows those estimates, as well as the actual costs to build the reinforcement
segments.

6

Table 2

Project	2012 Actual Costs	2018 Est. for 12 inch	2018 Est. for 6 inch
Perrydale-to- Monmouth	\$14.2 million	\$25.7 million	\$20.1 million
Monmouth Reinforcement	\$10.1 million	\$18.8 million	\$14.0 million

Q. Do you have any other concerns with the cost comparisons of the alternatives suggested by Staff?

9 Α. Yes. As I stated above, adding a gate station to supply Corvallis/Albany would 10 also require the Company to construct an additional pipeline to connect the 11 gate station to the distribution area. Assuming the gate station would be 12 located near the intersection of the Grant's Pass Lateral and Highway 34 south 13 of Albany—which would be the reasonable location—the pipeline would need 14 to be at least seven miles long and 12-inches in diameter. Based on these 15 specifications, we would estimate that pipeline would cost between \$14 and \$28 million to install.⁴⁹ 16

17 Q. What do you conclude about Staff's testimony regarding the MWVF?

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⁴⁹ In addition, it is not clear that Staff's method of depreciation is accurate. Staff has attempted to combine the costs for all segments of the MWVF Project before calculating depreciation. However, because the segments were completed at different times, the depreciation calculation is not the same for all segments. Depreciation should be calculated for each individual segment.

A. Staff has applied a flawed analysis that would deprive the Company of any
recovery for investment that Staff itself deems prudent. Moreover, Staff's
criticisms of the Company's showing of the need for the MWVF are based on
fundamental misunderstandings of the Company's modeling as well as the real
needs of the system. For these reasons, Staff's testimony regarding the MWVF
is not well-supported and should be rejected by the Commission.

7 Q. Does AWEC raise any different arguments regarding the MWVF Project?

8 Α. No. AWEC's general criticisms of the MWVF Project are substantially similar 9 to those of Staff, *i.e.*, that the Company has failed to provide new evidence in support of a reliability need for the project. Specifically, AWEC argues (without 10 any support) that the MWVF will not be needed until 2025.⁵⁰ AWEC also 11 12 argues that the Company's load has not changed in the Albany-Corvallis region to justify including the MWVF Project in rates.⁵¹ These observations and 13 14 AWEC's recommendation to reduce rate base by \$20,200,000 appear to be based entirely on AWEC's review of the Commission's 2012 Order in UG 221.52 15

16

Q. What is your response to AWEC's criticisms?

A. It does not appear that AWEC's analysis relies on any of the information
 provided in this proceeding. However, as described in detail above, the
 Company has provided sufficient evidence for why it is now appropriate to
 include the costs associated with the MWVF in rate base. In response to
 AWEC's recommendation, the Company relies on its detailed response to Staff

⁵⁰ AWEC/200, Mullins/21.

⁵¹ *Id*.

⁵² Id.

set forth above. Specifically, the Company relies on the evidence presented
that supports a finding that the MWVF is providing reinforcement in the
Monmouth-Independence area; allows the Company to move Newport LNG to
Albany as an important peak day resource; and allows gas to flow from the
Central Coast Feeder through MWVF into the Albany load center serving as a
backup feeder. All of these needs met by the MWVF are important to ensure
that the Company can reliably serve its customers.

8

III. Corvallis Loop

9 Q. Please provide additional detail regarding the Corvallis Loop Project.

The Corvallis Loop Project is a transmission and high-pressure distribution 10 Α. 11 pipeline project located within the Company's Albany load center, which was 12 constructed between June 2012 and October 2013.⁵³ The Corvallis Loop Project was designed to reinforce the high pressure distribution feeder serving 13 customers in the Corvallis and Philomath area.⁵⁴ The Corvallis Loop has two 14 segments: (1) the first segment is a 12-inch diameter, 720 psi transmission line 15 16 that connects to the existing 10-inch diameter Albany-Corvallis Feeder near 17 Riverside Drive and runs south to State Highway 34; and (2) the second 18 segment is a 12-inch diameter, 400 psi transmission line that runs west along State Highway 34, crossing the Willamette River and connecting to the existing 19 distribution system serving the west side of Corvallis and Philomath.⁵⁵ A map 20

- ⁵³ NW Natural/800, Karney/23.
- ⁵⁴ Id.
- ⁵⁵ Id.

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1 of the Corvallis Loop was provided as Figure 7 in my initial testimony and is 2 reproduced below.

3





4

5 It is important to note that the Corvallis Loop allows for a service line to Oregon State University ("OSU") but that the project does not directly tie into the OSU 6 7 Energy Center. The OSU Energy Center is a co-generator facility that provides 8 heat, half of the electricity for the OSU campus, and hot water generated by heat recovery from the steam system. You will note in Figure 7 that the 9 10 Corvallis Loop ties, instead, to the pipeline serving Philomath allowing the 11 Company to better serve this area. The Company discusses the Corvallis 12 Loop's relationship to OSU in more detail below.

13 Q. Why did the Company decide to build the Corvallis Loop Project?

A. In May 2010, the Company began preliminary design of the Corvallis Loop to
 reinforce the high-pressure distribution feeder serving customers in the
 Corvallis and Philomath area.⁵⁶ The project was developed because there was

⁵⁶ See NW Natural Response to NWIGU DR 24, attached as Exhibit 1910.

insufficient firm capacity on the Company's system to meet its firm demand
 requirements in the Corvallis and Philomath areas. The project also
 represented an opportunity to meet future growth in these areas.

Q. What system conditions were being experienced prior to construction of
 the Corvallis Loop?

6 Α. Prior to construction of the Corvallis Loop, the Corvallis and Philomath area 7 system had been experiencing significant pressure drops due to steady residential, commercial and industrial load growth.⁵⁷ At the time, the Company 8 9 used a 20 percent drop as an indication that reinforcement was needed. The 10 area experienced a 20 percent drop at temperatures considerably warmer than 11 a peak day beginning at 30 degrees farenheit for Philomath and at 20 degrees 12 farenheit for Corvallis.⁵⁸ A model of the pipeline system showed a 40 percent drop—which is the threshold used by the Company today—with design day 13 14 conditions. These pressure drops left firm customers in Corvallis and Philomath at a material risk of outage, especially during cold weather events.⁵⁹ 15

16 Q. Has the Corvallis Loop been providing benefits to customers?

A. Yes. The Corvallis Loop became operational in 2013 and has been serving
 customers ever since. The project has also allowed the Company to meet the
 increased load identified before construction of the project, and also provides
 capacity to meet future customer load growth along the entire service corridor

⁵⁷ See NW Natural Response to NWIGU DR 26, attached as Exhibit 1911.

⁵⁸ NW Natural/800, Karney/25.

⁵⁹ See NW Natural Response to NWIGU DR 26, attached as Exhibit 1911; see also NW Natural/800, Karney/25.

1		from east of Albany to Philomath. ⁶⁰ Since the Corvallis loop became						
2		operational, the pipeline system in Corvallis and Philomath areas have not						
3		experienced any pressure drops that exceed the current design criteria that						
4		would place customers at risk of outages. ⁶¹						
5	Q.	What costs related to the Corvallis Loop does the Company seek to						
6		include in rate base?						
7	Α.	The total cost to complete the project was \$28.4 million. The Company is						
8		requesting to include \$23.9 million which represents the current book amount. ⁶²						
9	Q.	What criticisms does Staff raise regarding the Company's request to						
10		recover its investment in the Corvallis Loop?						
11	Α.	Staff makes five assertions regarding the Corvallis Loop Project:						
12		The Company has failed to demonstrate a current reliability need for						
13		this project;						
14		 The Corvallis Loop was built for the benefit of OSU; 						
15		• The Company failed to charge OSU for the costs of the project						
16		exceeding the OSU Energy Center line extension allowance;						
17		 The Company did not provide an alternatives analysis for this project; 						
18		and						
19		• The final project cost was \$28.4 million, which was \$15.6 million higher						
20		than the forecasted cost at the time of the Company's last rate case.						

⁶¹ *Id*.

⁶² NW Natural/800, Karney/26.

⁶⁰ NW Natural/800, Karney/25.

Q. Based on these assertions, what recommendation is Staff making with respect to the Corvallis Loop project?

A. Staff is recommending that only \$12.8 million be approved for inclusion in rate
 base, net of a proportionate amount of depreciation for a total of \$10.8 million.⁶³

5

Q. Does NW Natural agree with Staff's recommendation?

A. No. The Company addresses each of Staff's criticisms below, but in summary
 the Corvallis Loop project was necessary to reinforce the Corvallis and
 Philomath pipeline system and all of the costs (less depreciation) are
 appropriately proposed for recovery in this proceeding.

Q. What is the basis for Staff's statement that the Company has failed to
 show that the Corvallis Loop was needed for reliability purposes?

- A. Staff acknowledges that the Company has demonstrated substantial pressure
 drops on high pressure feeders in the Corvallis area during cold weather.
 However, Staff complains that the Company has not shown that these pressure
 drops result in low pressures at the customer meters (*i.e.*, the Company has
- 16 not shown that there is any impact on customer reliability).⁶⁴ Therefore, Staff
- 17 concludes that the Corvallis Loop has no effect on reliability.⁶⁵

18 Q. Do you agree with Staff's analysis?

A. No. The Company did not decide to construct the Corvallis Loop because thearea was experiencing emergency outage situations at that time. Rather, the

⁶⁵ Id.

⁶³ Staff/700, Kaufman/28, 37. Please note that the Company is requesting 84% of the original project cost because the project is 16% depreciated. Staff incorrectly states that the project is 84% depreciated (*see* Staff/700, Kaufman/37, fn. 65).

⁶⁴ Staff/700, Kaufman/28-29.

1 pressure drops on the feeder lines indicated that pressures could fall off to 2 critical levels in the event of any additional demand due either to firm customer 3 grown or design day weather conditions. And given the increased demand for 4 firm capacity in the area, the Company determined that the system needed reinforcement. Specifically, the primary driver for this reinforcement project 5 6 was to serve the firm residential, commercial, and industrial load in the Corvallis 7 and Philomath area, as well as the future long-term growth in this portion of the Company's service territory.⁶⁶ 8

9 10

Q. What is the basis for Staff's assertion that the Corvallis Loop was built to serve the OSU Energy Center and why does this matter?

- 11 Α. Prior to completion of the Corvallis Loop, OSU was an interruptible customer. 12 Staff points out that, in April of 2010, OSU requested to become a firm customer in order to provide adequate service for the planned OSU Energy Center. Staff 13 14 argues that, as long as OSU did not use gas, the system in the area was not stressed, and therefore the only reason to build the Corvallis Loop would be to 15 allow OSU to become a firm customer.⁶⁷ Staff therefore concludes that the 16 17 Company inappropriately considered the needs of OSU when deciding to build 18 the Corvallis Loop.
- 19 Q. Were the needs of OSU a driver in the Company's need analysis that 20 supported construction of the Corvallis Loop?
- 21 Α. Yes. As discussed above, the Company had identified system reinforcement needs because there was insufficient capacity on the Company's system to
- 22

⁶⁶ See NW Natural Response to NWIGU DR 26, attached as Exhibit 1911.

⁶⁷ Staff/700, Kaufman/29-32.

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meet its firm demand requirements in the Corvallis and Philomath area.68 1 During the time that the Company was considering its options for addressing 2 3 this issue, OSU also expressed a desire to become a firm customer. The 4 Company determined that the Corvallis Loop would allow the Company to meet its primary objective of reinforcement for the Philomath area while also serving 5 6 the increased demand that would result from OSU converting to a firm 7 customer. But to be clear, contrary to the assertions of Staff, while OSU's request for firm service was a consideration, it was not the primary driver for 8 9 the decision to move forward with the Corvallis Loop.

Q. Should the Company have charged OSU for a share of the construction
 costs related to the Corvallis Loop Project?

12 No. Based on its incorrect conclusion that the Corvallis Loop was built solely Α. for the benefit of OSU, Staff argues that OSU should have paid a customer 13 contribution in support of the project.⁶⁹ A customer contribution is the 14 forecasted construction costs less the customer allowance. A customer 15 allowance is the amount of investment that is economic for NW Natural to make 16 17 in serving the customer, given the customer's expected sales. Staff asserts 18 that NW Natural should have performed this calculation pursuant to its Line Extension Policy and required OSU to pay the resulting customer contribution. 19 20 However, as discussed above, OSU did not request an extension of the 21 Company's system. Instead, the Company made an independent 22 determination to reinforce its system to ensure its ability to serve firm customers

⁶⁸ NW Natural/800, Karney/24.

69 Staff/700, Kaufman/33.

in the Philomath and Corvallis areas. During the same time frame, OSU
 expressed a desire to convert to firm service and this additional growth
 supported (in part) selection of the Corvallis Loop as the best option to meet
 the need identified in this area. As a result, it would not be appropriate to treat
 the Corvallis Loop as a line extension or to require a customer contribution from
 OSU.

7 8

Q. What do you conclude about Staff's proposal that OSU bear a customer contribution for the Corvallis Loop?

9 Α. Staff's proposal would set a problematic precedent, and one that is at odds with reasonable regulatory policy. Because there were multiple drivers behind the 10 11 need for the Corvallis Loop, it would be inappropriate (and likely unsuccessful 12 in any event) to charge one single customer for the costs of the project. Such a precedent would put utilities in the untenable position of charging single 13 14 customers for potentially costly system upgrades, just because the one customer might be portrayed as the "straw that breaks the camel's back." In 15 16 any event, with respect to the Corvallis Loop, the project would have been 17 constructed even without OSU's determination to become a firm customer.

Q. Staff argues that the Company failed to comply with the Commission's directive regarding alternatives analysis. Does the Company agree?

A. No. In making this point, Staff cites to the Commission's order in the Company's
 2012 rate case—which was issued several months after the Corvallis Loop
 project broke ground. While the Company has implemented a robust
 alternatives analysis process that is now used to evaluate large capital projects,
 it is inappropriate to argue that the Company should have applied this particular

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1		process to the Corvallis Loop project after it was already underway. In any
2		event, the Company undertook a thoughtful and reasoned approach in
3		determining to build the Corvallis Loop, based on valid and tested design
4		criteria, in order to remedy a significant system need and to ensure its ability to
5		serve area customers into the future.
6	Q.	Staff suggests three possible alternatives to the Corvallis Loop that the
7		Company could have considered. Please address each alternative and
8		explain whether NW Natural agrees that they are valid.
9	Α.	Staff suggests the following three alternatives:
10		Keeping OSU as an interruptible customer;
11		• Connecting with the primary Albany feeder after it crosses the
12		Willamette instead of before; and
13		 Reducing customer incentives in stressed distribution areas.⁷⁰
14		None of these alternatives would have addressed the need identified by the
15		Company to meet customer demand in the Corvallis area.
16	Q.	Please respond to Staff's argument that the Company could have avoided
17		the need to construct in the Corvallis Loop by keeping OSU as an
18		interruptible customer.
19	Α.	As I have mentioned above, prior to OSU becoming a firm customer, the
20		system in the Corvallis and Philomath areas was already experiencing
21		unacceptable pressure drops. Figure B below, which was provided to Staff
22		through discovery,71 shows the pressure drop that existed prior to the

⁷⁰ Staff/700, Kaufman/34.

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⁷¹ See NW Natural Response to OPUC DR 351, Attachment 2, attached as Exhibit 1912.

construction of the Corvallis Loop based on firm customer loads. Given this
 fact, and the increasing customer demand, the Corvallis Loop would have been
 needed even if OSU had remained an interruptible customer.
 Figure B.



Albany to Corvallis, Corvallis to Philomath Pipeline Pressure vs Heating Degree Days

5

Q. Please explain Staff's proposal that the Company connect with the
 primary Albany feeder after it crosses the Willamette.⁷²

A. Staff claims that the Company could have shortened the length of the project
by about six miles if it had avoided crossing the Willamette River by connecting

10 to the primary Albany feeder after it crosses the Willamette.

72 Staff/700, Kaufman/35.

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Q. Please explain why the Company did not connect the pipeline with the
 primary Albany feeder after it crosses the Willamette instead of before.

3 Α. The Company did not connect pipeline with the primary Albany feeder after it 4 crosses the Willamette because the 10-inch pipeline had insufficient capacity to reinforce the Corvallis and Philomath system. The Albany feeder is a 10-5 6 inch pipeline that begins at Albany gate and connects to a 6-inch pipeline west 7 of the Willamette River. Figure B, shown above, demonstrates that the existing system was near capacity. If the new pipeline had been constructed on the 8 9 west side of the Willamette River, there would have been insufficient capacity 10 to feed the new pipeline and an additional reinforcement would have been 11 necessary, paralleling the existing 10-inch pipeline from the Albany gate to the 12 connection with the new pipeline, which would be approximately 10 miles long and would have to cross the Willamette River. By locating the Corvallis loop in 13 14 its present location, the Company was able to install one shorter overall 15 pipeline.

Q. Please respond to Staff's suggestion that the Company could have
 avoided the need to build the Corvallis Loop by reducing customer
 incentives in the Albany area.

A. The suggestion that the Company could have reduced customer incentives in
stressed distribution areas similarly ignores the identified reinforcement needs
on the Company's system. The system reinforcement was necessary based
on the firm load existing at the time. Reducing the Company's marketing efforts
in the Albany load center would not have lessened the need for the system

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reinforcement. In 2011, the Albany firm load was already causing failure at
 design standards.

Q. Were there any other alternatives that the Company could have
 considered?

A. There would have been two alternatives that could have been considered: (a)
a satellite LNG facility; and (b) additional demand side management ("DSM").
An analysis of these alternatives would be substantially similar to the
alternatives analysis performed by the Company for the SE Eugene Project
discussed below. That analysis demonstrates that the Corvallis Loop was the
best option to meet the need identified for the Corvallis and Philomath areas
for the following reasons.

12 First, a satellite LNG facility would require not only a higher initial cost but 13 would also require significant ongoing annual O&M expense. The cost 14 estimate for a satellite LNG facility contained in the SE Eugene alternatives analysis is an initial capital cost of approximately \$27.7 million, plus an annual 15 cost of \$500,000.73 Additional challenges for satellite LNG include finding a 16 17 suitable site to build a new LNG facility and securing the necessary permits. 18 Due to the higher capital installation costs, the ongoing additional O&M costs, and the risks related to siting and permitting, a satellite LNG facility is not a 19 20 better option than the Corvallis Loop Project.

21 Second, the opportunities for DSM in the Corvallis and Philomath areas 22 would not have presented a viable alternative. DSM requires the identification 23 of large firm customers that can be converted to interruptible service, or

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⁷³ See SE Eugene Alternatives analysis, attached as Exhibit 1913.

reducing load from existing residential and small commercial customers. In this
case, there were no customers of appropriate size with firm service who could
have helped forestall the need to reinforce the area. For this reason, additional
demand side management was not a viable option and a cost analysis of this
alternative is not necessary.

Q. What is Staff's argument regarding management of the Corvallis Loop 7 Project?

8 Α. Staff argues that that Company exceeded its initial estimate for this project by 9 50 percent and that this variance is an indication that NW Natural did not invest sufficient time or resources into the planning phase of the project.⁷⁴ Based on 10 11 the variance associated with this project, Staff also argues that the Company 12 did not properly control the project. Specifically, Staff argues that if the Company had more closely monitored costs, the project could have been 13 14 canceled once it became apparent that the project was not economic. Staff argues that there was no documentation of the cost over-run until all of the 15 funds had been expended and the project was only half completed.⁷⁵ 16

17 Q. Do you agree with Staff's assessment?

A. No, I do not. The cost increases experienced by the Company for this project
 were beyond the Company's control. In any event, even with the increased
 cost, the Corvallis Loop remained the best option for meeting the need the
 project addressed.

⁷⁵ Id.

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⁷⁴ Staff/700, Kaufman/35.

Q. Why did the project cost deviate from the initial cost estimate by a higher than usual amount?

A. First, it is important to note that Company's initial budget for the Corvallis Loop
Project was \$17,703,000 representing an estimated cost of \$15,939,000 with
a ten percent contingency.⁷⁶ The initial budget was not \$12.8 million as stated
by Staff.⁷⁷

7 Nevertheless, it is true that the costs for the project were higher than the initial estimate. The Company's first change order associated with this project, 8 9 which accounts for the majority of the cost increase, identifies several 10 difficulties faced by the project. The project faced several difficulties obtaining 11 permits and easement for the project, and the Company was required to modify the route and installation method in several locations to minimize impact to 12 13 environmentally sensitive areas, to avoid culturally sensitive areas, and to 14 secure easements from land owners. The increased use of horizontal 15 directional drilling and the additional pipe required for the reroutes added to the 16 costs. The costs for installation and pipe material costs were also higher than 17 initially estimated. The Company's change order addresses these issues 18 including a revised estimate to complete the work and an action plan to address each of the difficulties faced by the project.⁷⁸ 19

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⁷⁶ See NW Natural Response to OPUC DR 367 Attachment 1, attached as Exhibit 1914.

⁷⁷ Staff cites to UG 221 NWN/600, Yoshihara/4 in support of this figure. However, this appears to be a typographical error. The correct amount is contained in the Financial Authorization for this project, provided as NW Natural Response to OPUC DR 367 Attachment 1, attached as Exhibit 1914. *See also* OPUC DR 367 Attachment 2, attached as Exhibit 1915.

⁷⁸ See NW Natural Response to OPUC DR 367 Attachment 2, attached as Exhibit 1915.

Q. Is Staff correct that the Company could have controlled or somehow "managed" its way around these problems?

A. No. There is no evidence to suggest that the Company could have somehow avoided the increased costs associated with these issues. Most importantly, the Company did consider the increased costs of the project before deciding to move towards completion and even with the increase in costs, this project compared favorably to the available alternatives. There is no basis to disallow these costs simply based on the Company's initial estimate where there is no evidence that the costs rendered the project inferior to available alternatives.

Q. Based on the total costs for the Corvallis Loop Project, does the Company agree that the project became un-economic and should have been canceled?

A. No. As discussed above, even when the total costs of the Corvallis Loop
 Project are compared to other available alternatives, it represents the best
 option based on both cost and functionality. The only viable alternative to the
 Corvallis Loop Project was a satellite LNG Project that would have fewer
 benefits and higher costs to customers.

18 Q. What is your conclusion regarding the Corvallis Loop Project?

A. As detailed above, the Company has demonstrated that there was a
 reinforcement need for the Corvallis Loop Project, the Corvallis Loop Project
 compares favorably to any identified alternatives, and OSU should not have
 been required to bear the costs of the project.

Q. Does AWEC raise any different arguments regarding the Corvallis Loop Project?

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1 Α. No. AWEC's criticisms of the Corvallis Loop Project are substantially similar to 2 those of Staff. AWEC's argument is that based on the budget variance 3 associated with this project, the Commission must reach the conclusion that 4 the Corvallis Loop Project was mismanaged.⁷⁹ To reach this conclusion, AWEC appears to have reviewed only the project close out report and based 5 6 on this document alone, concludes that the entire budget variance should be 7 disallowed and removed from the Company's revenue requirement.⁸⁰ However, as detailed above, the Company experienced cost increases for the 8 9 Corvallis Loop Project that were beyond its control. The Company has also 10 shown that even if these higher costs were known at the outset of the Project, 11 the Corvallis Loop Project still compared favorably to the available alternatives. Therefore, as discussed in greater detail above in response to Staff, there is 12 simply no basis to disallow any of the costs associated with this project. 13

14

IV. <u>SE Eugene Project</u>

15 Q. Please describe the SE Eugene Project in more detail.

A. The SE Eugene Project will consist of 2.5 miles of 12-inch high pressure
 pipeline from the South Eugene Gate into the Southeast Eugene distribution
 area, generally following a route along East 30th Avenue to connect and support
 the existing distribution system.⁸¹ The new pipeline will extend west from the

⁸⁰ *Id*.

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⁷⁹ AWEC/200, Mullins/23.

⁸¹ NW Natural/800, Karney/27; *see also* NW Natural Response to NWIGU DR 22 Attachment 3, at 1, attached as Exhibit 1916.

- 1 existing South Eugene Gate and terminate at the connection to the existing 6-
- 2 inch steel distribution main near Ferry Street and East 28th Avenue.⁸²

3 Q. What was the primary driver for the SE Eugene Project?

4 Α. As discussed in my initial testimony, adequate supplies to the southeast area of Eugene has been a growing concern for many years.⁸³ Residential growth 5 6 continues to expand south, away from the Company's high-pressure supply 7 pipelines, stressing the distribution system to failure.⁸⁴ The Company's system modeling projects distribution system pressures of less than 5 psi and an 8 9 inability to reliably serve existing firm service customers in isolated areas under peak conditions.⁸⁵ This level of pressure is below the Company's criterion for 10 11 distribution system reinforcement; distribution system reinforcement is critical 12 at pressures less than 10 psi.⁸⁶

13 The results of the Company's Synergi Model for the existing Eugene 14 System during peak hour load is provided in my initial testimony as Figure 8 15 and reproduced below:

- 16 /////
- 17 /////
- 18 /////
- 19 /////

20

⁸² Id.

/////

- ⁸³ NW Natural/800, Karney/27.
- ⁸⁴ Id.

⁸⁵ NW Natural/800, Karney/27-28.

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⁸⁶ Id.



3

Q. How will the SE Eugene Project improve conditions on the Company's system?

- A. The SE Eugene Project will raise most pressures in the distribution system to
 above 25 psi during peak hour conditions, as shown in Figure 9 of my initial
 testimony and reproduced below.
- 9 /////
- 10 /////
- 11 /////
- 12 /////
- 13 /////
- 14 /////

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<complex-block>

Figure 9. Synergi Model of the Eugene System

3

4

Q. Did the Company consider alternatives to the SE Eugene Project?

A. Yes. As part of the Company's 2016 IRP, the Company analyzed alternatives
 to the SE Eugene Project including potential recall agreements (demand side
 management) and the development of a satellite LNG facility.⁸⁷

8 Q. What is the current timeline for the SE Eugene Project?

9 A. The Company has received the bid responses to its request for proposals
10 related to the SE Eugene Project, selected a winning bidder, and executed the
11 contract for the work. This Project is currently on track to be completed in
12 October 2018.

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⁸⁷ NW Natural/800, Karney30; *see also* NW Natural Response to NWIGU DR 22 Attachment 3, attached as Exhibit 1916.

1 Q. Is this current timeline consistent with the initial timeline for this project?

2 Α. Yes, this timeline is substantially consistent with the initial timeline. As stated 3 in my initial testimony, the Company expected to complete the SE Eugene 4 Project by the end of the third quarter of 2018 (*i.e.*, the end of September 2018).⁸⁸ In response to the bid responses received by the Company, NW 5 6 Natural performed a second alternatives analysis. As a result of the need to 7 perform this second alternatives analysis, the Company now expects to complete the project in October 2018. However, this projected completion date 8 9 does not differ substantially from the Company's initial estimate, was necessary to ensure the prudency of the project, and does not change the fact that the 10 11 project is expected to be used and useful prior to implementation of new rates 12 on November 1, 2018.

Q. AWEC argues that the SE Eugene Project has been delayed.⁸⁹ Do you agree?

A. No. AWEC asserts that the Company's response to NWIGU DR 22 states that
 the Project will be completed on September 30, 2018 and that this is later than
 the date modeled in the UI System Planner.⁹⁰ This statement is incorrect.
 September 30, 2018 has been the Company's target completion date for this
 project and this is the completion date included in my initial testimony.⁹¹ The
 only delay related to this project was the result of the need to perform a second
 alternatives analysis following receipt of responses to bids. As discussed

- ⁸⁹ AWEC/200, Mullins/24.
- ⁹⁰ AWEC/200, Mullins/24.
- ⁹¹ NW Natural/800, Karney/29.

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⁸⁸ NW Natural/800, Karney/29; see also AWEC/207, Mullins/3.

above, this delay will not prevent the Company from completing the project in
 time for a determination that it is used and useful prior to implementation of
 new rates on November 1, 2018.

Q. AWEC also argues that there will not be sufficient time to review the

4

5 project for inclusion in rate base in this proceeding.⁹² Do you agree? 6 Α. No. AWEC argues even if the Company is successful in completing the SE 7 Eugene Project by its September 30, 2018 date, there will not be enough time to properly review the project for inclusion in rate base in this proceeding. This 8 9 statement is not correct. The SE Eugene Project is scheduled for construction to begin prior to the hearing scheduled in this proceeding. Therefore, the 10 11 Company will be able to provide updates regarding the progress of this project 12 at the hearing and during the post-hearing briefing phase of this proceeding. NW Natural can also provide updates at other intervals as substantial progress 13 14 occurs to ensure that the Commission and all parties are provided with an 15 opportunity to review the project.

Q. AWEC states that the Company has included significantly more capital
 related to its SE Eugene Project than indicated in your initial testimony.⁹³
 What was your initial estimate for the SE Eugene Project?

93 AWEC/200, Mullins/24.

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⁹² AWEC/200, Mullins/24-25.

- A. The initial estimate for the SE Eugene Project was \$4.5 million.⁹⁴ The
 Company updated this capital estimate in response to NWIGU DR No. 22; the
 updated amount was \$4.8 million.⁹⁵
- Q. AWEC argues that the Company has actually included \$6,089,119 of
 capital related to the SE Eugene Project, and that this is significantly
 more than the estimate in your initial testimony.⁹⁶ Is this accurate?
- 7 Α. Not entirely. AWEC asked the Company to provide the monthly gross plant, 8 depreciation reserve, accumulated deferred taxes, and depreciation expenses 9 associated with the SE Eugene Project included in the Company's filed pro forma results of operations.⁹⁷ In response to this request the Company 10 produced NWIGU DR 22 Attachment 2. As the Company explained in its 11 12 response to NWIGU DR 22(e), the total in-service amount in Attachment 2 is \$6.1 million; the difference between the updated capital estimate of \$4.8 million 13 14 and the total in-service amount of \$6.1 million reflects the addition of construction overhead ("COH") and allowance for funds used during 15 construction ("AFUDC").⁹⁸ Therefore, comparing the \$4.5 million estimate from 16 17 my initial testimony to the in-service amount provided in response to NWIGU 18 DR 22 is not a true comparison because the numbers do not include the same 19 items.

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⁹⁴ NW Natural/800, Karney/23.

⁹⁵ See NW Natural Response to NWIGU DR 22(e), attached as Exhibit 1916.

⁹⁶ AWEC/200, Mullins/24.

⁹⁷ See NW Natural Response to NWIGU DR 22(e), attached as Exhibit 1916.

⁹⁸ NWIGU DR 22(e); *see also* NW Natural Response to NWIGU DR 22 Attachment 3, at 2, attached as Exhibit 1916.

1 Q. What is the current estimated cost to complete the SE Eugene Project?

A. The most up-to-date estimate for the capital costs related to the SE Eugene
Project is \$8 million. This is based on the bids actually received by the
Company in response to its request for proposals.

5

6

Q. Why have the capital costs for the SE Eugene Project increased from the Company's initial estimate?

7 Α. The capital costs have increased for several reasons. The initial \$4.5 million 8 estimate was based on pre-design planning stage estimates, and therefore 9 necessarily depended on historic pricing for similar projects. In these early estimates the full scope of construction is not fully defined and the alignment 10 11 and site conditions are not fully known. The historic projects that this estimate 12 was based on were more rural and this project has more utility conflicts and 13 paving restoration requirements. Finally, the construction market has changed 14 significantly since the early estimate was created and the bids received by the 15 Company were higher than initially anticipated because of current market conditions. Unfortunately, there is currently a very large volume of construction 16 17 work and a high demand for the contractors to fulfill this work. As a result, there are simply not enough contractors to perform all of the available work, which 18 19 allows contractors to demand higher prices.

Q. Did the Company perform a new alternatives analysis after bid responses were received?

A. Yes. When the Company received the bid responses and became aware that
 the costs of the project were going to be higher than anticipated, the Company
 determined that it was necessary to perform a second alternatives analysis to

58 – DIRECT TESTIMONY OF JOE KARNEY

ensure that the SE Eugene Project was still the appropriate project to increase
reliability for this area. For this reason, the Company re-studied the available
alternatives identified in the first study and determined that, even with the
increased costs, the SE Eugene Project remained the lowest cost alternative
to meet customer needs. A copy of the Company's alternatives analysis is
provided as Exhibit 1913.

7 Q. What is your conclusion regarding the SE Eugene Project?

A. The Company continues to request recovery for the costs associated with the
SE Eugene Project and commits to providing sufficient evidence that such
project is used and useful prior to the effective date of new rates on November
1, 2018.

- V. Conclusion
- 13 Q. Does this conclude your testimony?
- 14 A. Yes, it does.

12

59 – DIRECT TESTIMONY OF JOE KARNEY

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Joe Karney

OPERATIONS AND CAPITAL PROJECTS EXHIBITS 1901-1916

May 23, 2018

EXHIBITS 1901-1916 – OPERATIONS AND CAPITAL PROJECTS

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i – EXHIBITS OF JOE KARNEY – Table of Contents

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 292

292. Please refer to NW Natural/800, Karney/5.

a. Please provide the diameters of the Rickreall to Monmouth bare steel pipe that was replaced in 2005.

b. Please provide all analysis performed before the Rickreall to Monmouth bare steel replacement began that was used to support a 12 inch diameter.

c. Please provide the filing in which the Rickreall to Monmouth project first entered customer rates.

d. Please provide the diameters of the south of Monmouth bare steel pipe that was replaced in 2013.

e. Please provide all analysis performed before the south of Monmouth bare steel replacement began that was used to support a 12 inch diameter.

f. Please provide the filing in which the south of Monmouth project first entered customer rates.

Response:

- a. The Rickreal to Monmouth pipeline replaced a predominately 6 inch bare steel pipeline.
- b. Although the company is aware of a number of reasons for installing the pipe as sized, we are unable to locate the specific analysis performed to support the 12 inch diameter from before the installation of the pipeline in 2005.
- c. The Rickreal to Monmouth pipeline was placed into rates as part of the Bare Steel replacement program, UM 1030.
- d. The south of Monmouth pipeline replaced a predominately 6 inch bare steel pipeline.
- e. Although the company is aware of a number of reasons for installing the pipe as sized, we are unable to locate the specific analysis performed to support the 12 inch diameter from before the installation of the pipeline in 2013.
- f. The south of Monmouth pipeline was placed into rates as part of the System Integrity Program, UM 1406.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 293

293. Please refer to NW Natural/800, Karney/5. For each of the four segments identified in the figure please provide the following information:

- a. Original budget;
- b. Final cost;
- c. Project Start Sate;
- d. Project Completion Date;

Response:

Perrydale to Monmouth segment – Project 200581

- a. Original budget \$13,451,105
- b. Final costs \$14,161,979
- c. Project Start Date November 2011
- d. Project Completion Date October 2012

Rickreal to Monmouth Bare Replacement segment

a. The Rickreal to Monmouth Bare Replacement involved the installation of approximately 5 miles of 12" steel pipe to replace an existing bare main. The pipe was placed into service and rates in 2005 as part of the Bare Steel Replacement program, UM 1030.

Monmouth Reinforcement segment - Project 200580

- a. Original budget \$8,807,373
- b. Final costs \$10,056,777
- c. Project Start Date February 2012
- d. Project Completion Date October 2012

South of Monmouth Bare Replacement segment – Project 200584

a. Original budget - \$33,707,617

NW Natural/1902 Karney/2 UG 344 OPUC DR 293 NWN Response Page 2 of 2

- b. Final costs \$29,170,312
- c. Project Start Date July 2013
- d. Project Completion Date September 2014

Rates and Regulatory Affairs Facsimile: 503.721.2532



220 NW 2ND AVENUE PORTLAND. OR 97209

Karney/1

NW Natural/1903

www.nwnatural.com

April 15, 2005

Public Utility Commission of Oregon 550 Capitol Street, N.E., Suite 215 P.O. Box 2148 Salem, Oregon 97308-2148

Attn: Vikie Bailey-Goggins Administrator, Regulatory Operations Division

RE: Docket UM 1030; Staff Request No. 26-37

NW Natural submits the following responses to Staff's request for information in the above-referenced matter.

Michael Dougherty of Commission Staff had granted NW Natural an extension of time in which to respond to these requests from March 24, 2005 to April 15, 2005. As a condition of the extension, Michael had requested that data be provided through March 2005 instead of February. Unfortunately, due to conflicts with our internal month-end closing, the March data was not available for this submission. We hope to be able to provide this data by the end of the week ending April 22, 2005.

Bare Steel / Geo Hazard

26. Please provide the actual Leakage, Bare Steel, and Geo Hazard costs for October 2003 through September 2004. Please use the same format provided in the Response to Staff Data Request UM-1030, No. 1, dated March 21, 2003. For the months of July through September 2004, please provide a separate worksheet that shows the estimate and actual for each month.

<u>NW Natural Response</u>: See the electronic file **Pivot Summary Bare, Geo Haz, IMP Oct 01-Feb 05** file for cost data from October 2001 through February 2005. See also the electronic file called **Summary Bare, Geo Haz, IMP 2001-2005**, which includes Leakage, Bare Steel and Geo Hazard program estimates compared to actual expenditures for July through September 2004. Variances are primarily the result of invoice timing. A printed copy of the file **Summary Bare, Geo Haz, IMP 2001-2005** is attached.

27. Please provide the actual Leakage, Bare Steel, and Geo Hazard costs for October 2004 through February 2005. Please use the same format provided in the Response to Staff Data Request UM-1030, No. 1, dated March 21, 2003 <u>NW Natural Response:</u> See the **Pivot Summary Bare, Geo Haz, IMP Oct 01-Feb 05** file submitted in response to DR # 26. In response to Staff's verbal request to include cost data for March 2005- the requested information is not available at this time.

- 28. In the format previously provided in response to Staff Data Request No. 10, please provide:
 - a. NW Natural Bare Steel Program (Leakage, Bare Steel, Geo Hazard), actuals from October 2001 through February 2005;

<u>NW Natural Response (a)</u>: See **Summary Bare, Geo Haz, IMP 2001-2005** for actual Leakage, Bare Steel, Geo-Hazard and IMP costs from October 2001 through February 2005.

- b. Determination of Cost of Service for the period ending September 30, 2004 for Bare Steel and Geo Hazard; and
- c. Bare Steel and Geo Hazard Programs Cost of Service Summary for the period ending September 30, 2004.

<u>NW Natural Response (b and c):</u> See the electronic file **Bare Steel Geo Haz COS.** A print-out of this file is attached.

29. Please provide the number of Bare Steel and Geo Hazard Mitigation projects completed during the period of October 2003 through February 2005.

<u>NW Natural Response</u>: 801 individual work orders associated with the Bare Steel and Geo-Hazard programs were completed during the October 2003 through February 2005 time frame (See **Pivot Summary Bare, Geo Haz, IMP Oct 01-Feb 05** file provided in response to DR # 26).

30. Please provide a brief description of major Bare Steel and Geo Hazard Mitigation projects performed from the period of October 2003 through February 2005.

<u>NW Natural Response</u>: There were two major (>\$100,000) Bare Steel and no major Geo-Hazard Mitigation projects performed during the time frame from October 2003 through February 2005. The projects are briefly described as follows:

- Willamette Valley Feeder Replacement (S. of Aurora Airport)- The scope of this Bare Steel project entailed the installation of approximately 20,000 feet of 12-inch, 813 psi rated, coated and cathodically protected steel pipe to replace 8-inch bare steel pipe originally installed in the 1920's.
- Dallas Feeder Replacement-

The scope of this Bare Steel project entailed the installation of approximately 4,400 feet of 6-inch, 400 psi rated, coated and cathodically protected steel pipe to replace 4-inch bare steel pipe.

31. What controls are in place to ensure operational and maintenance projects are not charged to Bare Steel and Geo Hazard Mitigation project work requests?

<u>NW Natural Response</u>: Projects are charged to Bare Steel accounts only with the approval of responsible Area Engineers and District Engineers. Large Bare Steel Projects (>\$100,000) and all Geo Hazard Projects are included in the respective programs only with the approval of the Chief Engineer.

32. Please provide a copy of the "Summary Pivot" spreadsheet that was provided in the Response to Staff Data Request UM-1030, No. 3, dated March 21, 2003, for the October 2003 through February 2005 timeframe. Please ensure the response includes a listing of all work orders used for Geo Hazard and Bare Steel projects.

<u>NW Natural Response</u>: See **Pivot Summary Bare, Geo Haz, IMP Oct 01-Feb 05** file submitted in response to DR # 26.

33. Did NW Natural receive any federal, state, local, other type of government funding (transportation, economic development, etc.), private business funding, or any insurance settlements for any Bare Steel replacement, Leakage or Geo Hazard project? If so, how did this funding offset costs included in the 2004 PGA?

<u>NW Natural Response</u>: NW Natural did not receive any government funding (transportation, economic development etc.), private business funding, or any insurance settlements for any Bare Steel replacement, Leakage, or Geo Hazard project.

34. Please provide a copy of the latest internal audit conducted on the Bare Steel and Geo Hazard programs.

<u>NW Natural Response</u>: NW Natural has not conducted a formal, written audit of the Bare Steel and Geo Hazard programs to date. However, company personnel routinely audit every Bare Steel and Geo Hazard work order during the design process and again during the post construction process to ensure accuracy and appropriate charge numbers.

Pipeline Integrity Management (IMP)

35. Please provide a listing of all active and completed IMP work orders from October 2003 through February 2005.

<u>NW Natural Response</u>: There were 52 active and completed IMP work orders from October 2003 through February 2005 (See the **Pivot Summary Bare, Geo Haz, IMP Oct 01-Feb 05** file submitted in response to DR # 26).

36. Please provide monthly costs of IMP from October 2003 through February 2005. Please breakdown costs into the four categories of: Inline Inspection, Direct Assessment, Transmission Pipeline Systems Analysis, and Remediation / Mitigation / Repair / Replacement Costs.

<u>NW Natural Response</u>: See the **Summary Bare, Geo Haz, IMP 2001-2005** file submitted in response to DR # 26. Please note that the breakdown of IMP costs into the four categories requested by Staff includes additional costs (Transmission Pipeline Systems Analysis costs) that are not contained in the **Pivot Summary Bare, Geo Haz, IMP Oct 01-Feb 05** file.

37. Did NW Natural receive any federal, state, local, other type of government funding (transportation, economic development, etc.), private business funding, or insurance settlements for the IMP?

<u>NW Natural Response</u>: NW Natural did not receive any government funding (transportation, economic development etc.), private business funding, or any insurance settlements for any IMP project.

Please call if you have questions.

Sincerely,

NW NATURAL

Onita King, Manager Tariffs & Regulatory Compliance

cc: Michael Dougherty

Rates and Regulatory Affairs Facsimile: 503.721.2532



220 NW 2ND AVENUE PORTLAND, OR 97209 503.226.4211

Karney/5

NW Natural/1903

February 10, 2006

Public Utility Commission of Oregon 550 Capitol Street, N.E., Suite 215 P.O. Box 2148 Salem, Oregon 97308-2148

Attn: Vikie Bailey-Goggins Administrator, Regulatory Operations Division

RE: Docket UM 1030; Staff Request No. 46-60

NW Natural submits the following responses to Staff's request for information in the abovereferenced matter.

Per discussion with Michael Dougherty of OPUC Staff, the due date for NW Natural's responses to Staff Request No. 46-53 was extended to February 10, 2006; those responses are included below. Please see response dated February 3rd, 2006 for the responses to Staff Request No. 54-60.

Bare Steel / Geo Hazard

46. Please provide the actual Leakage, Bare Steel, and Geo Hazard costs for October 2004 through September 2005. Please use the same format provided in the Response to Staff Data Request UM 1030, No. 26, dated March 8, 2005. Please include estimated amounts for July through September 2005.

NW Natural Response: See the electronic file "Summary Pivot Bare, Geo Haz, IMP Oct 01 to Dec 05" for cost data from October 2004 through September 2005. See the electronic file called "Summary Recap Bare, Geo Haz, Actuals Sep 05", which includes Leakage, Bare Steel and Geo Hazard program estimates compared to actual expenditures for July through September 2005. Variances are primarily the result of invoice timing and accounting adjustments.

- 47. In the format provided in response to Staff Data Request UM 1030, No. 28, dated March 28, 2005, please provide:
 - a. NW Natural Bare Steel Program (Leakage, Bare Steel, Geo Hazard), actuals from October 2004 through September 2005;

<u>NW Natural Response (a)</u>: See the "Summary Recap Bare, Geo Haz, Actuals Sep 05" file for actual Leakage, Bare Steel, Geo-Hazard and IMP costs from October 2001 through December 2005.

- b. Determination of Cost of Service for the period ending September 30, 2005 for Bare Steel and Geo Hazard; and
- c. Bare Steel and Geo Hazard Programs Cost of Service Summary for the period ending September 30, 2005.

<u>NW Natural Response (b and c):</u> See the electronic file "Bare Steel Geo Haz COS Feb06". A print-out of this file is attached

48. Please provide the number of Bare Steel and Geo Hazard Mitigation projects completed during the period of October 2004 through September 2005.

<u>NW Natural Response</u>: 978 individual work orders associated with the Bare Steel and Geo-Hazard programs were completed during the October 2004 through September 2005 time frame (See "Summary Pivot Bare,Geo Haz, IMP Oct 01 to Dec 05" provided in response to DR # 46).

49. Please provide a brief description of major Bare Steel and Geo Hazard Mitigation projects performed from the period of October 2004 through September 2005.

<u>NW Natural Response</u>: There were three major Bare Steel and no major Geo-Hazard Mitigation projects performed during the time frame from October 2004 through September 2005. The projects are briefly described as follows:

- Willamette Valley Feeder Replacement (Highway 99-Boones Ferry Road)-The scope of this Bare Steel Project entailed the installation of approximately 11,000 feet of 12-inch, 400 psi rated, coated and cathodically protected steel pipe to replace bare steel pipe originally installed in the 1920's.
- 82nd Avenue Transmission Pipeline Replacement-The scope of this Bare Steel Project entailed the installation of approximately one mile of 12-inch, 400 psi, coated and cathodically protected steel pipe to replace bare steel pipe originally installed in 1956.
- Rickreal / Highway 99W-The scope of this Bare Steel Project entailed the installation of approximately 28,000 feet of 12-inch, 400 psi rated, coated and cathodically protected steel pipe along Highway 99W,near Monmouth, to replace bare steel pipe installed in the 1930's.
- 50. What controls are in place to ensure operational and maintenance projects are not charged to Bare Steel and Geo Hazard Mitigation project work requests?

<u>NW Natural Response-</u> Area Engineers and District Engineers receive direction from Engineering Management to ensure that only capital work orders are included in the Bare Steel and Geo-Hazard Mitigation Programs. In addition, large Bare Steel Projects and Geo-Hazard Projects are included in the respective Programs only with the approval of the Chief Engineer.

51. Please provide a copy of the "Summary Pivot" spreadsheet that was provided in the Response to Staff Data Request UM 1030, No. 32, dated March 8, 2005, for the October 2004 through September 2005 timeframe. Please ensure the response includes a listing of all work orders used for Geo Hazard, Bare Steel, and IMP projects.

<u>NW Natural Response</u>: See the "Summary Pivot Bare,Geo Haz, IMP Oct 01 to Dec 05" file submitted in response to DR # 46.

52. Did NW Natural receive any federal, state, local, other type of government funding (transportation, economic development, etc.), private business funding, or any insurance settlements for any Bare Steel replacement, Leakage or Geo Hazard project? If so, how did this funding offset costs included in the 2005 PGA?

<u>NW Natural Response</u>: NW Natural did not receive any government funding (transportation, economic development etc.), private business funding, or any insurance settlements for any Bare Steel replacement, Leakage, or Geo Hazard project.

53. Please provide a copy of the latest internal audit conducted on the Bare Steel and Geo Hazard programs.

<u>NW Natural Response</u>: NW Natural has not conducted a formal, written audit of the Bare Steel and Geo Hazard programs. However, company personnel routinely audit Bare Steel and Geo Hazard work orders during the design process and again during the post construction process to ensure the appropriateness of charge numbers.

As a result of NW Natural's auditing processes, the company recently discovered a category of work orders that were inappropriately treated the same as leakage capital work orders. Beginning in 2003, work orders for repairs due to damages to the company's underground infrastructure were treated the same as leakage capital work orders. As a result, the Leakage spreadsheet contained in the "Summary Bare, Geo Haz, IMP 2001-2005" file incorrectly contains costs associated with damage work orders. The tab entitled "Damages with Leakage Classification" provides a summary of damage work orders that were incorrectly treated the same as leakage capital work orders from March 2003 through September 2005.

The incorrect treatment of damage work orders is isolated to the Leakage category of work orders and did not affect the costs associated with Bare Steel, Geo Hazard Mitigation, or Pipeline Integrity Management work orders. NW Natural is in the process

Public Utility Commission of Oregon, UM-1030 February 10, 2006 Page 4

of implementing additional controls to ensure the ongoing accuracy and appropriateness of work orders treated as leakage capital.

Please call if you have questions.

Sincerely,

NW NATURAL

Onita R. King, Manager Tariffs & Regulatory Compliance

cc: Michael Dougherty

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 170

170. Please explain why the MWVF is 12 inches rather than a smaller diameter. Please describe the modeling that was performed to support a 12 size pipe over a smaller diameter.

Response:

Standard pressure drop and pipeline flow tools were used to determine the appropriate pipeline size for the MWVF project. The MWVF was designed to connect the Central Coast Transmission pipeline to the Albany/Corvallis load center, and a 12 inch pipeline was selected to minimize pressure drop with potential flow volumes over the entire distance of the pipeline. The first section, Rickreall to Monmouth, was constructed in 2005 with 12 inch pipe, and the Central Coast Feeder at the tie-in location of the MWVF is a 12" pipeline which allows for adequate feed into the MWVF. A pipeline with a consistent diameter facilitates more efficient inspection for required transmission integrity inspections, such as inline inspection. Finally, the incremental cost of installing larger pipe is relatively low compared to the overall construction cost of installing a new pipeline.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 298

298. Please provide average high pressure pipe construction costs under normal conditions for each common diameter between 4 inches and 12 inches and at each common maximum pressure rating.

Response:

Please see the chart below. The average cost per foot was calculated based on actual construction costs and actual installed footage (at least 1000 feet or greater) for all high pressure steel pipeline projects completed from 2011 – 2017. All high pressure steel pipelines are designed and tested for the same maximum pressure rating; therefore the MAOP does not affect the construction costs. The installation method (i.e. directional bore, open trench, etc.) and ground conditions can significantly impact construction costs. Note that for 4", 8", and 10" – the number of projects completed between 2011-2017 was significantly lower (3, 2, 3, respectively) than the number of 6" and 12" projects completed. For 10" specifically, 2 of the 3 projects were directional bores (under a highway overpass and a creek crossing) with relatively shorter lengths and higher costs due to complex construction.

Average	Cost per Foot				
4"	\$234				
6"	\$242				
8"	\$360				
10"	\$771				
12"	\$289				

UG 344 – PUC Response to NWN Data Request Page 1

Date: May 11, 2018

TO:

ZACHARY KRAVITZ NORTHWEST NATURAL GAS 220 NW SECOND AVENUE PORTLAND, OR 97209 zdk@nwnatural.com efiling@nwnatual.com LISA RACKNER McDOWELL RACKNER & GIBSON PC 419 SW 11th AVENUE, SUITE 400 PORTLAND, OR 97205 lisa@mcd-law.com

FROM: Lance Kaufman Senior Utility Economist Energy Rates, Finance and Audit Division

OREGON PUBLIC UTILITY COMMISSION Docket No. UG 344 - NWN Data Request filed April 25, 2018

Data Request No 02:

Refer to Staff/700, Kaufman 9, lines 13-14: Please explain the basis and provide any supporting documentation for Mr. Kaufman's statement that "Gas does not flow from Newport to Albany in realistic models of Company operations."

Staff Response No 02:

This statement was made in error. Staff will file an errata to remove the referenced statement.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 164

164. Please refer to NW Natural/800 Karney/18 at lines 1 and 2.

a. Please provide the date that the Albany/Corvallis area first began receiving gas service.

b. Did a single feeder gas service to Albany/Corvallis constitute an unreasonable risk when gas service began in the area?

c. If the response to part b is no, please identify the date that single feed gas service to the Albany/Corvallis area became an unreasonable risk.

d. Please describe the specific types of outages that could occur at the Albany/Corvallis gate station and provide the probability and expected duration of each type of outage.

e. Please describe the specific types of outages that could occur on the pipeline upstream of the Albany/Corvallis gate station and provide the probability and expected duration of each type of outage.

Response:

a. The Albany system initially received gas service in 1930 from a pipeline connected to the manufactured gas plant in Portland. That pipeline was converted to natural gas in 1956 after the connection with the interstate pipeline was installed at Sauvie Island. The Albany Gate Station and its associated pipeline was built in 1960, which provided a high pressure pipeline connection to the Albany/Corvallis load center, and eventually became the only feed due to the fact that the pre-existing 1930 pipeline was too small, of too low pressure to feed the system, and a bare steel pipeline eventually deteriorated to the point it was taken out of service.

b. No. When the original pipeline was installed in 1930 the Albany/Corvallis load center was small and did not present the same level of risk as supplying customers at the load center with a single feed.

c. The Company is unable to identify the exact date that the single feed became an unreasonable risk to supply the Albany/Corvallis load center. The transition from manufactured gas to natural gas in 1956 spurred significant customer growth systemwide, including in the Albany/Corvallis load center.

d. & e. All pipeline systems and facilities (such as gate stations) are subject to failures and outages due to the following causes:

NW Natural/1907 Karney/2 UG 344 OPUC DR 164 NWN Response Page 2 of 2

- Corrosion Failure
- Natural Force Damage
- Excavation Damage
- Other Outside Force Damage
- Pipe or Weld Joint Failure
- Equipment Failure
- Incorrect Operations
- Other Causes

The probability of any given cause resulting in an outage is unpredictable, and the Company is unable to provide exact probabilities for each failure mechanism on its system or the interstate pipeline system. The Company provides examples of gate station and pipeline failures in DR 165 and 166. The consequences of an outage are very high in a single feed system. Depending on the cause of failure, the outage could be as short as a few hours or extend several weeks if a section of pipeline or gate station needs to be rebuilt. Any loss of gas service to a single feed system will require the isolation of each customer's meter, the purging of all mains and services, and the individual relight of all customers to safely restore service. For a load center the size of Albany/Corvallis, it is anticipated that a full restoration would take several months.

Rates & Regulatory Affairs UG 344 2017 General Rate Revision Supplemental Data Request Response

Request No.: UG 344 OPUC DR 167

167. Please refer to NW Natural/800 Karney/18 figure 4.

a. Please also refer to lines 6 to 9. Please provide the distribution pressure results of the sendout model underlying this figure separately for a peak day, typical spring weather, typical summer weather, typical fall weather, and typical winter weather.

b. Please provide the results of the sendout model underlying this figure modified to exclude the MWVF and include the distribution pipe removed as part of the MWVF project. Please include results showing both the source of gas and the distribution gas pressures separately for a peak day, typical spring weather, typical summer weather, typical fall weather, and typical winter weather.

c. Please provide the results of the sendout model underlying this figure modified to include a pipeline outage upstream of the McMinnville-Amity Gate Station. Please include results showing both the source of gas and the distribution gas pressures separately for a peak day, typical spring weather, typical summer weather, typical fall weather, and typical winter weather.

d. Please provide the results of the sendout model underlying this figure modified to exclude the Newport LNG facility. Please include results showing both the source of gas and the distribution gas pressures separately for a peak day, typical spring weather, typical summer weather, typical fall weather, and typical winter weather.

Supplemental Response to C:

NW Natural is providing this supplemental response to part c as requested by Staff.

The Williams NWPL Grants Pass Lateral is an interstate transmission pipeline that begins with an interconnect to the NWPL Mainline near Washougal, WA and terminates at a dead end near Grants Pass, OR. This pipeline delivers natural gas to NW Natural customers in East Portland, Salem, Albany, and Eugene as well as many smaller cities. This NWPL facility also serves a number of non-NW Natural customers including Avista Energy in the Roseburg, Grants Pass area. Any loss of service along the length of this pipeline would directly affect customers to the south of the damage.

An outage upstream of the NWPL McMinnvile-Amity Gate Station would have similar impacts to the NW Natural system in the Salem and Albany areas as the DR 167 Part C previous response which assumed an outage of McMinnville-Amity gate. However, during colder weather there would be additional significant outages in the Salem area as both Salem and Turner gates would be disabled. This would make it even more difficult for Newport LNG gas to reach every portion of the Salem system. Newport LNG can

Outages at all NWPL-NW Natural Gate stations from McMinnville-Amity Gate south are estimated to have this impact:

Gate Station Name	NW Natural District	Expected Customer Outages by Weather Scenario					
	Customer Count *	Summer	Spring & Fall	Winter	Peak		
McMinnville-Amity Salem Turner	106,000 **	-	5	2,500	64,000		
Albany	42,000	-	-	5,000	42,000		
Brownsville-Halsey Coburg North Eugene South Eugene Creswell Cottage Grove	42,000	42,000	42,000	42,000	42,000		
Coos County Pipeline	1,800	1,800	1,800	1,800	1,800		
Customer Totals	191,800	43,800	43,800	51,300	149,800		
* Customer Count is Based	on Jan 2018 District Re	venue Report from (CIS				
* Includes Lincoln City Dist	rict Customers						
Note-							
Outage counts for Salem and Albany Districts may be much higher if Newport LNG is unable to vaporize immediate							
Several hours are typically required to prepare Newport LNG for vaporization.							
Outages to NWPL Customers (non-NW Natural) from McMinnville-Amity south are estimated to have this impact:

Outages of the OreMet Pipeline in Albany, this impacts a number of Albany industrial customers Outages of any customer directly fed from NWPL Outages of the Avista service territory serving Roseburg, Grants Pass, and surrounding area.

All customers behind these impacted gate stations would experience outages if the duration of the outage event exceeded approximately 30 minutes. Gas pipelines can operate on residual pressure (linepack) for a varying amount of time depending upon customer demand at the time of the event. Many thousands of natural gas customers would experience an outage under this scenario and require relights or assistance from Customer Service technicians.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 355

355. Please provide the per foot trenching and directional boring cost for each pipe size between 4" and 12" and for trenching in flat rock free loam with no obstacles or obstructions.

Response:

Pipe Size	Ріре Туре	Pipe Installation Method		
		Open Trench	Horizontal Directional Drill	
4"	MDPE, 0.391" w.t.	\$15-\$20 per foot	\$10-\$12 per foot	
6"	MDPE, 0.576 w.t.	\$15-\$20 per foot	\$17-\$25 per foot	
8"	MDPE, 0.750 w.t.	\$20-\$30 per foot	\$35-\$50 per foot	

For poly pipe the estimated per foot trenching and directional boring costs are:

For steel pipe the estimated per foot trenching and directional boring costs are:

Pipe Size	Ріре Туре	Pipe Installation Method		
		Open Trench	Horizontal Directional Drill	
4"	FBE Steel; 0.237" w.t.	\$20-\$30 per foot	\$60-\$80 per foot	
6"	FBE Steel, 0.280 w.t.	\$20-\$30 per foot	\$90-\$125 per foot	
8"	FBE Steel, 0.322 w.t.	\$20-\$30 per foot	\$140-\$180 per foot	
10"	FBE Steel, 0.365 w.t.	\$20-\$30 per foot	\$170-\$210 per foot	
12"	FBE Steel, 0.375 w.t.	\$20-\$30 per foot	\$220-\$260 per foot	

Additional Assumptions Made to Complete Estimate for Requested Costs:

• Costs reported above only include direct costs for trench excavation for pipe bury per project specifications or outside vendor horizontal directional drilling (HDD) costs;

- Work assumed to occur in open space work setting with room to side-cast trench spoils;
- Outside vendor used for HDD work:
- Trench spoils used for trench backfill (per loamy, rock free soil assumption) for all open trenching:
- Length of trench excavation or HDD installation is greater than 2,000 feet.

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 NWIGU DR 24

24. In reference to NW Natural/800, Karney/26, line 12, where Mr. Karney states "The schedule for completing the Corvallis Loop Project was delayed": Please explain why the project was delayed.

Response:

Formal analysis and planning for the Corvallis Loop began in February 2010 upon identification of the pressure drops in the Corvallis and Philomath systems would not provide reliable service to firm customers during cold weather events. Engineering design began in May 2010 with W.H. Pacific analyzing the proposed route, verifying constructability, reviewing permitting issues, and providing a preliminary cost estimate for a pipeline connection from the existing 10" Albany feeder to 6" Philomath feeder. In November 2010, W.H. Pacific was awarded a contract to create the final engineering design and obtain all easements and permits. The project was approved for construction in June 2011 with 4.7 miles of pipe planned for installation in 2011 and the remaining 5.2 miles of pipe planned for installation in 2012.

The permitting requirements for installing a utility facility in agricultural lands in Linn County required land owner acknowledgement and approval from all land owners prior to starting the permitting process in Linn County. There was one land owner who held out signing the acknowledgement document which delayed all permitting within Linn County. The delays in permitting prevented any pipe from being installed in 2011.

Additionally, the WH Pacific route evaluation did not include permitting due diligence for evaluating cultural resources requirements. The original route crossed several areas of cultural significance and prevented NW Natural from obtaining the necessary Army Corp/Department of State Lands' joint permit for the pipeline route. The pipeline route was modified and some of the construction installation methods were switched from open trench installation to Horizontal Directional Drill (HDD) to minimize impact to the areas of cultural resources. The redesign and additional permitting requirements prevented the pipeline from being fully installed in 2012. The pipeline was completed and placed into service in 2013.

Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Reguest Response

Request No.: UG 344 NWIGU DR 26

26. In reference to "UG 344 OPUC DR 200 - Attachment 2, Corvallis Reinforcement, 200363":

a. Did NW Natural prepare any cost benefit analysis supporting the construction of the Corvallis Loop prior to making the decision to construct that plant? If yes, please provide all such analyses, and any supporting memoranda and documentation.

b. To the extent not already provided, please provide copies of the project charter and the two subsequent change orders associated with the Corvallis Loop project.

c. Did NW Natural perform any subsequent cost/benefit analysis, or similar economic analyses, at the time Change Orders 1 and 2 were issued with respect to the Corvallis Loop project? If yes, please provide copies of all such analyses, including any supporting memoranda and documentation.

d. Why did the Company start the project without having the permitting, land acquisition, and design finalized?

e. Please identify each permit that was required to complete the project, along with the date the permit was issued.

f. Please describe the different permitting phases that were identified on page 10 of the referenced document.

Response:

- a. The primary driver for the installation of the Corvallis Reinforcement was to address the need for increased firm delivery capacity to service residential, commercial, and industrial firm load in the Corvallis and Philomath area, as well as future long-term growth in this portion of the service territory. Prior to the construction of this project, the pressure drops in these areas placed customers at risk of not being served during cold weather events. Additionally, at the time that the Corvallis Reinforcement was planned, NW Natural did not include in its IRP the Company's options for delivering gas to the various loads within its system (NW Natural/800, Karney/7), so a cost benefit analysis was not performed prior to constructing the pipeline.
- b. Please see UG 344 NWIGU DR 26 Attachment 1 "200363 Project Charter", UG 344 NWIGU DR 26 Attachment 2 "200363 Change Order 1 Approved", and UG 344 NWIGU DR 26 Attachment 3- "200363 Change Order 2 Final"
- c. NW Natural did not perform any subsequent cost/benefit analysis prior to approving Change Orders 1 and 2. Both Change Orders 1 and 2 were submitted

and approved during construction of the pipeline as outlined in the section titled "Reason for Change" in the change order. Approved change orders signaled support to continue installation of pipeline, which was still needed to increase the firm delivery capacity to serve existing and anticipated residential, commercial, and industrial firm loads.

- d. The start of a project includes a planning phase which is responsible for permitting, land acquisition, and final design. Most permits have a standard review period that is factored into the construction schedule, so authorization for construction can occur prior to obtaining permits and easements. Design changes can occur depending on conditions of permits and easements, but are typically minor and do not impact the schedule or scope of the project. Pages 12-15 of the attached "200363 Project Charter" contains the Project Permit Listing for Corvallis Loop, and has the anticipated permit review period.
- e. See attached document "DR 26 Corvallis Loop Permits" that contains the permit documentation.
- f. See attached UG 344 NWIGU DR 26 Attachment 4 that contains the permit documentation. The phased multi-year construction and design changes caused the need for either multiple permits from the same regulatory agency or for renewals/extensions to be needed for each phase of construction.

NW Natural/1912 Karney/1



NW Natural PROGRAM / PROJECT ALTERNATIVES NARRATIVE

Program/Project Name: SE Eugene Reinforcement Date: April 19, 2018 Preparer: Andrea Kuehnel / Engineering

The purpose of the Alternative Analysis requirement is to choose the best solution for NWN's need and to make sure we are utilizing resources in the most efficient manner.

BUSINESS NEED/JUSTIFICATION

What is the issue intended to be addressed and why is it needed?

Please note this Alternatives Analysis was submitted and approved 4/4/2017. Contractor bids and project costs exceeded the preliminary estimate by a significant amount. The evaluation of alternatives remains valid. The cost estimates (PVRR) have been updated based on the updated execution budget for the pipeline construction.

Providing adequate supplies to the southeast of Eugene, Oregon has been a growing concern for many years. Residential growth continues to expand south, away from all high pressure supply pipelines, stressing the distribution system to failure. System modeling, verified through cold weather performance checks, project distribution system pressures of less than 5 psig and—for isolated areas under peak hour conditions—an inability to reliably serve existing firm service customers. This level of pressure is below the company's criterion of distribution system reinforcement being critical at pressures less than 10 psig.

This project was originally identified as the SE Eugene Reinforcement and presented to the OPUC in the 2016 IRP. The Public Utility Commission of Oregon acknowledged NW Natural's 2016 IRP in Order No. 17-069 including the Action Item "Proceed with the SE Eugene Reinforcement project to be in service for the 2018/2019 heating season and at a preliminary estimated cost of \$4 million to \$6 million."

OBJECTIVE

Clearly define the objective.

Reinforce the supply load center for Southeast Eugene, OR with approximately 3000 incremental Therms per hour on Peak Day.

RECOMMENDED OPTION

RECOMMENDED OF TION			
Describe the option selected/recommended for approval. Explain in detail how the option measured against the decision criteria, whether it was the lowest cost option, and if there were qualitative factors considered in selecting the option. Provide all information			
necessary t	o understand the decision process that was undertaken with respect to the recommended option.		
Description	Construct approximately 2 -1/2 miles of 8" or 12" steel HP gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new HP pipeline would extend west from the existing South Eugene Gate and terminate at the connection to the existing 6" steel distribution main at Hilyard and near 30 th Street. Distribution mains would be installed in conjunction with the HP to reinforce the existing distribution system to support existing and new customers. Several pipeline routes are being examined for feasibility. The preferred route selected considers existing infrastructure, available workspace, railroad crossings, and potential traffic impacts.		
Decision Criteria	Present value of revenue requirements (PVRR) for this alternative is estimated to be \$9.5 million (in \$2018) versus \$30.3 million for a satellite LNG solution (the IRP Team provided PVRR estimates which are based on Engineering's cost estimates). This alternative is the most reliable option for addressing the existing issue and to support future short- and long-term growth/demand. Growth in Eugene tends to be south and west		

NW Natural/1913

	of the existing facilities and this route would support that future growth. This alternative also has the highest probability of successful execution by 2018-19 heating season.				
Pros	 Pipelines are the most reliable service alternative. Estimated supply benefit to current system is approximately 3000 th/hr with significant growth capacity. 				
Cons	 The preferred route will require at least one crossing of major arterial road may impact a City of Eugene public works paving project slated for 2017 construction. 				
	POTENTIAL COST				
Comital	Direct	СОН		Total	
Capital	\$7.8M - \$8.5M	\$1.2M - \$1.4M	(16%COH)	\$9M - \$9.9M	
	The second support of the second s	15.32 BOOL / MORTH 11 20 / 1 4 12 12 4		APACTED DISTRICT CONTRACTOR CONTRA TON CONTR	
0.11	Program/Project		Ongoing	Maintenance & Support	
O&M	Program/Project \$		Ongoing \$	Maintenance & Support	

ALTERNATIVE 1 Provide details of any viable alternatives for meeting the objective, other than the option above. Please provide enough detail so that the reader can understand how the alternative compares to the recommended option.				
Description	A Satellite LNG facility could be created that would alleviate the peak day pressure issues in SE Eugene.			
Pros	None identified.			
Cons	 -Higher initial cost, long-term costs, and PVRR. -Relatively high annual O&M expense. -Likely challenging to find a suitable site and secure required environmental permits. -Unknown timeline to have solution in place to support system 			
	POTE	NTIAL COST		
Capital	Direct	СОН		Total
Capital	\$23.3M	\$4.4M		\$27.7M
0.044	Program/Project		Ongoing	Maintenance & Support
O&M	\$ \$449,000/ annually			
Source/ Method of Cost Data	Community Based LNG Satellite Station report prepared by Jenmar Concepts dated 9/22/2014 – see attached cost estimate spreadsheet.			
Explain why this alternative is not recommended	Higher cost to ratepayers. Siting and permitting satellite LN	IG would likely	be more time c	onsuming.

ALTERNATIVES CONSIDERED NOT VIABLE Provide a description of any additional alternatives that were considered but rejected up front as not viable, and explain why					
	Description Why the Alternative is not viable				
Alternative 3	Demand Side Management (DSM)	Customer-specific, geographically focused defined interruptability agreements within the area of influence to delay system reinforcement is not an option, as there are no customers of appropriate size with firm service. DSM requires significant amounts of time to incent usage reduction in			

NW Natural/1913
individual customers. Additionally, a significant portion of the customer population must adopt DSM measures for a DSM project to be successful in replacing other alternatives.

FURTHER ANALYSIS NOT REQUIRED

Describe why further analysis is not required. Please explain in enough detail that others can assess whether the existing justification is sufficient.

The preferred alternative of constructing a pipeline extension will provide the most reliable and least cost gas supply for our customers and can be executed with the highest probability of success. The cost and schedules for the alternatives, although preliminary in nature, are indicative of the order of magnitude and further evaluation would be unlikely to provide information to yield a different conclusion.

PMO USE ONLY ELECTRONIC APPROVALS				
Title	Name	Date/Time Approved		
PMO Specialist				
AA Approver				

NW Nat	tural
Corvallis Loo Project #2 G-67 Financial Au June 20	p Project 00363 uthorization
h. A 1000	1 la ha
Grant Yoshingra Executive Sponsor	Date 6/6/11
Sponsor	6/15/2011
C. 24 M	Date 6/16/2011
lex Miller irector, Rates/Regulatory Compliance	Date
Szel teve Feltz reasure/Controlle	6/17/2011 Date 6/2-5/
avid Anderson enver VP, Finance and CFO	Date
regg Kantor // //	Date

CORVALLIS LOOP PROJECT - PROJECT 200363

Date Submitted: May 20, 2011	Facility: S22.01	Business Unit: Engineering
Project Sponsor: Steve Nelson		Executive Sponsor: Grant Yoshihara
Project Manager: Mark Schaefer	Desired Implement Date: June 2011	Prepared By: Mark Schaefer
Engineer: Mark Schaefer	Short Title: Corvallis Loop Project Project #: 200363	L

1. Project Title: Corvallis Loop Project

2. Project Description:

The scope of this project includes two phases. The first phase is for installation of approximately 12,700 feet of 12-inch steel natural gas pipeline tested and certified at a Maximum Allowable Operating Pressure (MAOP) of 720 psig. This pipeline will connect to the existing 10-inch Corvallis – Albany Transmission line (S22 pipeline) located on Riverside Drive in Linn County and extends south to State Highway 34. This section of pipeline will be designed to the parameters of the future Mid-Willamette Valley Pipeline in anticipation of future expansion north to the Perrydale Station (P30 pipeline) and south to Eugene. Considerations for future pressure regulation will be provided at either end of the pipeline. The second phase is for installation of approximately 39,300 feet of 12-inch steel natural gas pipeline tested and certified at a MAOP of 400 psig. This pipeline will connect to the first phase pipeline at State Highway 34 and extend west to the Campus Energy Center at Oregon State University located on SW 35th Avenue in Corvallis, Oregon.

3. Project Manager Assignment: Mark Schaefer

4. Project Objectives:

To supply additional natural gas capacity and support the increasing demand of natural gas fuel consumption at the Oregon State University Energy Center.

5. Schedule

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NW Natural construction crews and the directional drill bore contractor will mobilize in July once the pipeline easements have been acquired and the environmental permits have been received on the private land parcels between Riverside Drive and State Highway 34. Expected completion will be by October 2012.

6. Cost Constraints

- Project is estimated at \$15,939,000 with a 10% contingency (\$1,594,000) amounts to \$17,703,000 requested budget.
- Project funding is on the System Reinforcement account 116.
- The Construction Overhead rate for this project is 27%.

Other cost constraints include:

- Easement and workspace acquisitions.
- Work restriction due to environmental permitting including wetland delineation and erosion control and sedimentation plans.
- Haul off and disposal of spoils and bore fluid from directional drill activity.
- ODOT limitation of work hours and permit requirements for traffic control and restoration on State Hwy 34 and State Hwy 20.

7. Business Case

 This project will provide additional reinforcement to OSU and increase the delivery of gas capacity to the area. Although the project will provide improved service to some area customers in the short term, multiple system improvements still need to be considered for long term system reliability. These improvements include extension of the Mid-Willamette Valley Feeder pipeline from the Central Coast Feeder (P30 pipeline) at Perrydale Station to the Albany-Corvallis Feeder (S22 pipeline) and multiple distribution and transmission system improvements throughout the area.

8. Project Deliverables

- Install 12,700 feet of 12-inch steel natural gas pipeline tested and certified at a MAOP of 720 psig.
- Install 39,300 feet of 12-inch steel natural gas pipeline tested and certified at a MAOP of 400 psig.
- Rebuild the gas supply meter set at the OSU Energy Center and tie the existing service over to the new 12-inch (400 MAOP) pipeline.

 Install a new district regulator at SW 35th Avenue and Washington Way and connect the new 12-inch (400 MAOP) pipeline to the existing 6-inch (225 MAOP) S26 pipeline.

9. Communication Plan

The Communication Plan for this project is to specifically discuss the project at the Capital Projects Meetings scheduled on a bi-monthly basis. These meetings serve the function of communicating any project related management issues and addressing them in a small team environment. Key stakeholders regularly attending the meeting include Construction Supervisors, Resource Management Coordinator, Integrity Management Supervisor, Capital Project Manager, Project Engineer and Field Engineering. Outside stakeholders will be communicated with as necessary.

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Scope of Work Corvallis Loop Project P200363

2011

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- Procure 31,000 of 12" Directional Drill pipe
- Procure 21,000 of 12" Green coated pipe
- Procure all stock and non-stock materials
- Obtain approximately 21,000 L.F. of pipeline easements
- Directional drill and install 12,920 feet of 12" pipe 5 locations
- Open Excavate and install 11,700 feet of 12"pipe 3 locations

2012

- Directional drill and install 15,080 feet of 12" pipe 5 locations
- Open Excavate and install 12,300 feet of 12" pipe 5 locations
- Clean, inspect and caliper pig new 12" pipeline
- Install new bridles 3 locations
- Rebuild gas supply meter set at OSU Energy Center
- Install new district regulator at SW 35th Avenue

FINANCIAL ANALYSIS

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Project Title:	Corvallis Loop Project	Project Number:	200363
Project Manager:	Mark Schaefer	Cost Center Manager:	Steve Nelson

Funding:	System Reinforcement								
Act Type:	115 System Reinforcement Category 3 (COH 27% 5/2011)								
Total Cost:	2010 \$170,000 (actual)								
	2011 \$9,916,821								
	2012 \$7,615,878								
	TOTAL \$17,702,699								
Contingency (\$ and %)	Contingency used is 10% based on the Risk Analysis for the								
	project. Total contingency for this project is \$1,593,882.								
Project Justification:	This project will be funded by the System Reinforcement account. The project will supply additional capacity and support increasing demand of natural gas fuel consumption at the Oregon State University Energy Center. The project has been included in the Annual Capital Budget for 2011.								

PROJECT TIMELINE

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Project:		
	Corva	allis Loop
	2	00363
Project Manager:	Mark	Schaefer
Date:	5/2	0/2011
Construction Duration	15	Months
Construction Expected Start Date	6/20/2011	
Construction Expected Completion Date	9/28/2012	
Construction Timeline	Fixed	
Initiation Tasks	5/8/2010	E/2/2011
	Required Task	J/J/2011 Been
Complete Initiation Memo	Yes	PM
Complete Charter	Yes	PM
Complete Design Review	Yes	PM
Planning Tasks	3/7/2011	9/2/2011
	Required Task	Resp
Hequest Easements	Yes	Risk
Address Environmental Issues	Yes	Envir
Request Corrosion Input	Yes	PM
Complete Design	Yes	Purch
Complete Design	Yes	PM
Station Packet	Yes	PM
Pressure Test Documentation	Yes	PM
Complete Tip in Dataily	Yes	Stores
Somplete Tie-In Details	Yes	Tual Eng
Complete Troffie Control Day	Yes	Tual Eng
Bequest Pormite	Yes	FET
Notify Stakeholders Affected by Project	Yes	EC
Complete Bore Plan	Yes	PM
Traft Preliminary Procedure	Yes	Tual Eng
	Yes	Tual Eng
Executing Tasks	6/20/2011	9/28/2012
	Required Task	Resp
Te-Construction/Safety Meeting with Crew	Yes	Tual Eng
Install Construction Field Stakes	Yes	FET
Review Broliminary Dread ture 111	Yes	PM
review riteliminary Procedure with Crew	Yes	Tual Eng
Monitoring Construction Tasks	6/20/2011	9/28/2012
Aonitor Schedule	Required Task	Resp
Aonitor Budget	Yes	PM
Procedure Sign Off	Yes	PM
	Yes	Tual Eng
Closeout Tasks	11/27/2012	12/12/2012
	Required Task	Resp
Conduct Project Learning Meeting	Yes	PM
complete Final Report for Project	Yes	PM

Risk Analysis

				% Contingency
		Avg Score	3.14	10
System Impact	1 No Impacts - Adequate Feed	1 - Minimal or No Impact	1	
Contract Availability	1 Resources Available	1 - Minimal or No Impact	1	with purchasing to secure HDD contractor
Working Hours	2 Hours Restricted	1 - Minimal or No Impact	2	Coordinate construction schedule with ODOT and City of Corvallis
Resources	1 Resources Available	1 - Minimal or No Impact	1	Coordinate timeline and construction schedule with RMC and impacted work groups
Bore Method	1 Horizontal Directional Drill	2 - May Impact Project	2	Develop HDD Design plans, undertake geotechnical subsurface borings in advance and secure HDD contractor
Construction Method	1 Open Trench	2 - May Impact Project	2	Schedule Construction activities in wet areas during dry months
Weather	2 Spring/Fall	2 - May Impact Project	4	Schedule Construction activities in wet areas during dry months. Maintain pumps for groundwater for excavation.
Utility Conflicts	2 Minor Utility Conflicts	1 - Minimal or No Impact	2	Field survey and locate utilities during design and incorporate into plans
Ground Conditions	1 No Concerns	2 - May Impact Project	2	
Environmental Impact	3 Permits with Minor Conditions	2 - May Impact Project	6	Hire contract Environmental Consultant and coordinate with agencies early
Special Permits	2 Permits with Minor Conditions	1 - Minimal or No Impact	2	Hire contract Engineering Consultant and coordinate with agencies early
Standard Permits	2 Permits with Minor Conditions	1 - Minimal or No Impact	2	Schedule pre-planning meeting with ODOT and City of Corvallis
Land Acquisition	5 Multiple Easements	3 - Major Impact to Project	15	Hire contract Land Agent and meet with landowners early on in the project
Acquisition of Materials	2 Assorted Non-Stock Items	1 - Minimal or No Impact	2	Assemble list and order non-stock parts in advance
Risk	Probability	Impact	Score (Probability x Impact)	COMMENTS (Eliminate / Mitigate)
Date	:: 5	/20/2011		
Cost Center Manager	: Ste	eve Nelson		
Project Manager	· ·: Mai	k Schaefer		
Project PS Number		Vallis Loop		
Project	Cou	nullia Lean		

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G-67 PROJECT PLAN - RESPONSIBLITY MATRIX

Project	:		C	orva	llis L	.oop				7													۸.	- 10	oount	hla	
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Tasks	Task Start	Task End	Project Manager	FET	Engineering	Integrity Management	Transmission Const. Supervisors	Station Design	Resource Management	Risk & Land	Purchasing / Stores	Environmental / HazMat	Safety	Gas Supply	Gas Plants	Major Acct. Services	Electrical/ Communications	Corroslon	Municipalities	Private Eng. Firm	Other	Transmission Construction	Welders	Distribution Crew	Specialty Const. Crew (ROW)	Transmission	Maintenance Crew
			•	•	•	•	•		•	•	•	•	•	•									•	1-		┼╴╸	+
INITIATION TASKS							1				1	1		-		-+						_	-	+	—	┿━━	-
Create Project in SAP	5/8/10	5/8/10) A				1	1								-+									<u> </u>		
Create Initiation Memo	5/8/10	5/8/10	A				<u> </u>			╢──	1-	1				+					{			<u> </u>	 		
Outline Proposed Construction Dates	3/1/11	6/1/11	A	P	1					1	1-	<u> </u>	+											ļ	ļ	<u> </u>	
Preliminary Design Meeting	4/25/11	4/25/11	A	Ρ		Р	P				1	<u> </u>									-+			 	<u> </u>	ļ	
PLANNING TASKS	<u> </u>																		-+	-+					<u> </u>	┼──	
Identify Project Team	5/0/4.0		<u> </u>																	-						<u>+</u>	+-
Create Work Orders	5/8/10	10/1/10	A		<u> </u>													T								<u> </u>	+
Assemble As Builts & Historical Documentation Request Design Locates Request Survey Request Easements Draft Preliminary Design Draft Preliminary Cost Estimate Contract for Outside Services Create Design Documentation Finalize Construction Dates Create Charter or G-67 Project Plan Charter or G-67 Project Plan Charter or G-67 Project Plan Approved Complete Engineering Sketch	3/1/11 11/5/10 5/9/11 3/1/11 1/4/11 5/8/10 6/3/11 6/20/11 6/20/11 6/6/11 5/28/11 5/20/11	7/8/11 12/2/10 12/24/10 9/2/11 5/2/11 1/4/11 10/1/10 6/10/11 6/20/11 6/6/11 5/4/11 6/3/11 9/2/11	A A A A A A A A A A A A A A A A A A A	P P P	А Р Р	P P I	P		A P	P	P									P P P I		1					
Complete Traffic Control Plan	6/10/11	9/2/11			~																						+-
Request Permit	5/6/11	9/2/11			A			-+												A	$- \parallel$						T
EXECUTING TASKS															+	+		-+-	+	<u>A</u>			-+	-+			+
Bequest Construction Logates	0/00/1															\neg		+	+			+	-+	-+			+
nstall Construction Field Stakes	6/20/11	8/2/12							Α										+				-+				+
Schedule Field Recourses	6/13/11	8/2/12		A									- 1							P	+		-+				+
Hold Pre-Construction (0-11-11-11	6/20/11	9/29/12					1		A			1							+	÷			-+	-+			+
Notify Stokeholders of 5"	6/27/11	6/27/11	A	P		Р	Р		1			P	P		-+-							-+					+-
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5/23/2011

G-67 PROJECT PLAN - RESPONSIBLITY MATRIX

Project:			Co	rval	lis L	оор]													A =	Acc	ounta	ble	
PS #:	ļ			200)363																		Ρ=	Par	ticipar	ıt	
PM:		_	Pro	ject	Man	ager																	1 = 1	Inpu	t/Revie	ew.	
Tasks	Task Start	Task End	Project Manager	FET	Engineering	Integrity Management	Transmisslon Const. Supervisors	Station Design	Resource Management	Risk & Land	Purchasing / Stores	Environmental / HazMat	Safety	Gas Supply	Gas Plants	Major Acct. Services	Electrical/ Communications	Corrosion	Municipalities	Private Eng. Firm	Other	Transmission Construction	Welders	Distribution Crew	Specialty Const. Crew (ROW)	Fransmission Maintenance Crew	Gas Supply Crew
MONITORING TASKS																											Ť
Monitor Worksite Activities	6/20/11	9/29/12	P	Ρ		Р	A		Р							T						Α					+
Complete and Submit Project Change Request	6/20/11	0/20/12																									+
Monitor Schedule	6/20/11	0/20/12						$\left - \right $		 	-															L	
Monitor Budget	6/20/11	9/29/12		· · · · · ·				┝──┤	P				I									P					
Receive & Approve all Invoices	6/20/11	9/29/12	A				Δ	-																		L	
Coordinate Construction Activities with		0/20/12						+ +			<u></u>																
Stakeholders	6/20/11	9/29/12	Α				Δ																				
Finalize Tie-in Procedure	8/24/12	8/24/12	A			1	P							1								A	<u> </u>			 	<u> </u>
Tie-in Procedure Signed Off	8/31/12	8/31/12	А		1	1	1				†					+							۳		P	 	<u>μ</u>
Schedule Tie-in and Coordinate with Support																											
Crews	8/31/12	9/21/12				1	1		A																	1	
Establish Final Punch List Items & Timeline for													-													<u> </u>	
Completion	9/24/12	10/12/12	Α				А															A					
CLOSEOUT TASKS					-+		·	\vdash																			
Complete As Built Packet	9/21/12	10/12/12						\vdash		_					\rightarrow				_	_							
Audit work orders and asbuilt	9/21/12	10/12/12						r-+			$\left - \right $									- 1		A				ļ	1
Complete project document review	9/21/12	10/12/12			A			i+																		ļ	
Plat asbuilt	10/15/12	10/29/12			A			-+																			
Conduct Project Learning Meeting	12/1/12	12/1/12	A	P	<u> </u>	P	P	 																			
Complete Final Report for Project	10/29/12	12/1/12	A		-			 		-																	–
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Construction Estimate Corvallis Loop Project Project 200363

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2010 Project Actual Costs - Corvallis	
2010 Previous Charges	\$170,000
Total 2010 Project Actual Costs w/ COH	\$170,000

2011 Project Estimated Costs - Corvallis	
Equipment/Material Total	\$5,000,800
Labor Total	\$1,279,500
Contract Total	\$1,292,000
Total	\$7 572 300
Construction Overhead (27% for System Reinforcement)	\$2 044 521
Total Cost	\$9 616 821
Contingency (10%)	\$300.000
Total 2011 Project Cost w/ COH	\$9,916,821

2012 Project Estimated Costs - Corvallis	
Equipment/Material Total	\$1 898 450
Labor Total	\$1 471 500
Contract Total	\$1,608,000
Total	\$4,977,950
Construction Overhead (27% for System Reinforcement)	\$1,344,047
Total Cost	\$6 321 997
Contingency (10%)	\$1 293 882
Total 2012 Project Cost w/ COH	\$7,615,878

Total Project Contingency	\$1,593,882
Total Project Cost w/ COH 2010-2012	
	ψ17,702,039

NW Natural – Corvallis Loop

Project Permit Listing

WHPacific File No. 209.035901

PERMIT / REPORT	JURISDICTION	CONTACT	Anticipated Review Period	NOTES / COMMENTS
Wetland Delineation	Oregon Division of State lands (DSL)	Linn County Resource Coordinator, Gloria Kiryuta 503-986-5226 Jevra Brown (503-986-5297) File number is WD 2011-0188 .	Up to 120 days	5/31/11 - Wetland delineation was submitted on 5/26/11 6/1/11 - The report has been assigned to Jevra Brown (503-986-5297) for review. The file number is WD 2011- 0188
Joint permit Application (JPA)	DSL & Oregon Corps of Engineers (COE)	Northwestern Division – Portland Linn County, Shelly Hanson @ Eugene Office 541-465-6878	30 days completeness – 120 day review period (includes 30 day public notice)	5/31/11 – JPA has been prepared and we are awaiting Owners signatures to submit. Mike Hayward to confirm ability to submit under nationwide status.
Land Use Application (TBD)	City of Corvallis	Brian Latta, Associate Planner 541-766-6908 ext 5020 <u>Brian.latta@ci.corvallis.or.us</u>	Up to 120 days	5/31/11 - Recent updates now require City permitting – City Staff is determining application process
Land Use Compatibility Statement (LUCS)	City of Corvallis	Brian Latta, Associate Planner 541-766-6908 ext 5020 Brian.latta@ci.corvallis.or.us	30 days after application completeness (typically 30 days)	5/31/11 – Submitted to City and in review (see comments above)

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Permit Application for Franchise Utilities to Occupy or Perform Operations Within Public ROW	City of Corvallis	Mark Bauer 541-766-6729 ext 5079 <u>Mark.bauer@ci.corvallis.or.us</u>	Within 30 days of submittal	5/31/11 - To be submitted 6 months prior to construction
Excavation & Grading/Erosion Prevention & Sediment Control Permit Application	City of Corvallis	Development Services Division 541-766-6929	TBD	5/31/11 – Currently submitted to Development Services but City is not clear on why it is needed – awaiting verification from Mark Bauer
DEQ 1200C Permit (Intergovernmental Agreement with DEQ)	City of Corvallis (City has authority to issue permit)	Michael O'Connor, Erosion Control Specialist 541-752-7522 ext 5109 <u>Mike.oconnor@ci.corvallis.or.u</u> <u>S</u>	Within 2 weeks after evidence of DEQ 1200C	6/1/11 – Talked with Michael – all OK, send in final DEQ permit and the City will also issue permit. Permit good for 180 days and then extended with each inspection for an additional 180 days.
Conditional Use permit – Rural Resource Zoning District	Linn County	Deborah Pinkerton, Sr. Planner 541-967-3816 ext 2367 dpinkerton@co.linn.or.us	Up to 120 days	5/31/11 – Awaiting Owners signatures for submittal
Conditional Use Permit – Willamette River Greenway Review	Linn County	Deborah Pinkerton, Sr. Planner 541-967-3816 ext 2367 dpinkerton@co.linn.or.us	Up to 120 days	5/31/11 – Awaiting Owners signatures for submittal
Land Use Compatibility Statement (LUCS)	Linn County	Deborah Pinkerton, Sr. Planner 541-967-3816 ext 2367 dpinkerton@co.linn.or.us	30 days after application completeness	5/31/11 – Awaiting Owners signatures for submittal

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			(typically 30 days)	
Application for ROW Encroachment	Linn County	inn County Linn County Roads Department Katy McGowan, ROW Specialist 541-967-3919		5/31/11 - One page application form – 3 sets of drawings (follow directions on form)
DEQ 1200C Permit	Oregon State Department of Environmental Quality	Kathy Jacobson Eugene Office 541-687-7326	Up to 120 days	5/31/11 – Requires land Use Compatibility Statements from City of Corvallis and Linn County - Requires Owners signatures and land use applications to be submitted
Easement for Willamette River Crossing	Division of State Lands	Mr. Cy Young, Property Manager 503-986-5245 Jim Grimes 503986-5233	TBD	5/31/11 – Contact made with Jim Grimes at DSL 503-986-5233 and it was determined that an easement will be required
Easement for Mary's River Crossing	Division of State Lands	Mr. Cy Young, Property Manager 503-986-5245	TBD	5/31/11 – Easement not required per Jim Grimes – "State ownership is undetermined"
ODOT Right of Way Permitting & Traffic Control Plans	State of Oregon	Ken lamb 541-757-4182 <u>Kenneth.e.lamb@odot.state.or</u> .us	Up to 30 days	5/31/11 – Ken Lamb on vacation – call into him to determine ROW permitting process 6/6/11 – Left another message
Oregon State Historic Preservation Office (SHPO) Clearance / Permitting	State of Oregon	Dr. Dennis Griffin, State Archeologist 503-986-0674 Dennis.griffin@state.or.us	TBD	5/31/11 - Mike Hayward to research SHPO requirements

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Railroad Crossing Permits (2)	Portland & Western Railroad Willamette & Pacific Railroad Document Custody c/o Kuenzi & Co., LLC 650 Hawthorne Ave. SE, #100 Salem, OR (&#)! Marsha Dunn 503-779-1043 <u>mdunn@kuenzicpas.com</u> Dennis Hannas, Field Engineer 503-508-7440</td><td>30 – 60 days</td><td>5/31/11 – Railroads' representatives contacted and forms obtained</td></tr></tbody></table>		

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PROJECT CHANGE ORDER

Project Name	Project Number
Corvallis Loop	200363-01
Change Order No.	Change Request No
1	
Project Manager	Date
Brian Konrad	4-11-2013

Description of Change

- Budgetary lift to complete the construction of Corvallis Loop
- Original estimate from G-67 financial approval \$ 17.7 million
- Revision to the G-67 financial approval for an additional \$9 million for a total of \$ 26.7 million

Reason for Change

- Original budget is at 93% and the construction progress is at 44%.
- Project has had difficulties obtaining land acquisition and permits
- Complex route selection to avoid environmental impacts
- The project is located in a culturally rich area and consumed time and budget
- Multi agency permitting process
- The geology of the area consists of gravel beds over clays. This composition has created design changes, unsuccessful HDD bores, contamination of domestic water wells and changes in contractor cost.
- NWN committed to additional HDD bores to secure the land acquisitions
- The project will require a high risk bore across the Willamette and Marys Rivers.

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PROJECT CHANGE ORDER

Net Change Summary:

(1) Increase costs of design and permitting.	\$ 1.2
(2) Increase costs of land acquisitions.	\$ 0.8
(3) Increase in installation costs.	\$ 5.2
(4) Increase in HDD pipe footage & installation price.	\$ 0.3
(5) Increase in pipe material quantities and cost.	\$ 0.6
(6) Increase in projects overheads	\$ 1.0
Total in millions	\$ 9.1

Change Details: Recovery Plan

NWN crews will construct the remaining 5.8 miles

Obtain concurrence from SHPO before moving forward

Obtain all land owner agreements before we award any contracts

Modify all designs and construction practices to mitigate environmental risk

NWN will manage the contracts with the HDD contractors

NWN will employ third party observation on the high risk HDD bores to minimize risk.



PROJECT CHANGE ORDER

Impact Detail		
Budget Impacts		
	Original Budget	\$17,702,698.97
	Change (+ or -)	+ \$ 9,048,930.78
С	Adjusted Budget	\$ 26,751,629.75
	Details: See attachme	ents;
Schedule Impact	Expected completion November 2013. One	was end of October 2012 and now is the first of year adjustment.
Scope Impacts		
Resource Impacts	Project team has met feel that constructing response to core bus	with the Construction Managers and they do not this project this year will negatively impact the iness needs.
Quality Impact		
Other Impacts	The desired outcome reinforcement in the (is still to increase system reliability and Corvallis/ Philomath service territories.

Signatures:

Executive Sponsor

Project Sponsor

4/125/13

Date

4/25/13

Date

Project Manager

Date

Net Change

Net Change 0.7 miles of 12" Pipeline				
ltem	Cost/Unit	Qty	Unit	Cost
Design and Permitting (1)(6)(7)			LS	\$1,202,729.00
Workspace & Easements (2)(6)(7)			LS	\$770,623.00
NWN Labor			hrs	-\$449,727.60
Pipeline Contractor (3)(7)			LS	\$5,572,781.00
Contract HDD Bore Services (4)(6)(7)	\$39.13		ft	\$316,512.00
X-ray (NDT) (3)(6)(7)	\$557.19	313	days	\$625,875.67
Caliper Pig			ea	\$0.00
Drill Pipe (4)(6)(7)	\$2.43	14377	ft	\$788,572.97
FBE Pipe	\$2.53	-7458	ft	-\$209,988.24
Pipe Materials (5)			LS	\$497,771.00
NWN Equipment & Material			LS	-\$1,002,136.00
Total				\$8,113,012.80
Construction Overhead				\$1,568,762.83
Total				\$9,682,775.63
Contingency				\$633,844.85
Total Project Cost w/ OH		_		\$9,048,930.78

Install Cost/ft

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Excludes Design, Permitting, Workspace & Easements Includes Actual Pipe installed only

Net Change 0.7 miles of 12" Pipeline

Net Change Summary:

- (1) Increase costs of design and permitting.
- (2) Increase costs of land acquistion.
- (3) Increase in installation costs.
- (4) Increase in HDD pipe footage & material and installation price.
- (5) Increase in pipe material quantities and cost.
- (6) Increase length of project by 0.7 miles.
- (7) Increase in project duration

\$103.58

Total (Actual & Projections)								
	Total (Actual + Projected) Total Install 10.5 miles of 12" Pipeline							
Item #	ltem	Cost/Unit	Qty	Unit	Cost			
1, 2	Design and Permitting	\$2,289,729.00	1	LS	\$2,589,729.00			
3	Workspace & Easements	\$795,623.00	1	LS	\$970,623.00			
33-58	NWN Labor		1	hrs	\$2,223,117.20			
-	Pipeline Contractor	\$5,572,781.00	1	LS	\$5,572,781.00			
46	Contract HDD Bore Services	\$139.13	22400	ft	\$3,116,512.00			
21	X-ray (NDT)	\$1,857.19	393	days	\$729,875.67			
59	Caliper Pig	\$100,000.00	1	ea	\$100,000.00			
29	Drill Pipe	\$49.61	45377	ft	\$2,251,152.97			
30	FBE Pipe	\$35.28	13542	ft	\$477,761.76			
32	Pipe Materials	\$833,271.00	1	LS	\$833,271.00			
4-28, 66	NWN Equipment & Material	\$1,884,204.00	1	LS	\$1,968,439.00			
	Total				\$20,833,262.60			
	Construction Overhead				\$4,958,330.28			
	Total				\$25,188,342.88			
	Contingency		-		\$960,036.87			
	Total Project Cost w/ OH				\$26,751,629.75			
Install Cost/ft \$418.31 Excludes Design, Permitting, Workspace & Easements Includes Actual Pipe installed only								
Total Length of Pipeline = 10.5 Miles								

Financial Cost Analysis:

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* Revised total estimated project costs. Includes actual costs to date and estimated costs for remaining installation.

Phase 1, 3A & 3B (Projections)								
	Projected to finish	•	•	•				
	Install 3.5 miles of 12" Pipeline (Phase 1)							
	Install 2.3 miles of 12" Pipeline (Pl	nases 3A & 3B)						
item #	ltem	Cost/Unit	Qty	Unit	Cost			
1, 2	Design & Permitting (2)(4)(5)(6)	\$752,425.00	1	LS	\$752,425.00			
3	Workspace & Easements (3)(5)	\$444,000.00	1	LS	\$444,000.00			
33-58	NWN Labor (1) (7)	\$84.33	19640	hrs	\$1,656,241.20			
-	Pipeline Contractor	\$0.00	1	LS	\$0.00			
46	Contract HDD Bore Services (5)(6)(8)	\$139.13	22400	ft	\$3,116,512.00			
21	X-ray (NDT) (7)	\$1,857.19	123	days	\$228,434.37			
59	Caliper Pig	\$100,000.00	1	ea	\$100,000.00			
29	Drill Pipe (5) (9)	\$49.61	-3650	ft	-\$181,076.50			
30	FBE Pipe (9)	\$35.28	-5170	ft	-\$182,397.60			
32	Pipe Materials	\$20,000.00	1	LS	\$20,000.00			
4-28, 66	NWN Equipment & Material (1)	\$1,520,972.00	1	LS	\$1,605,207.00			
	Total				\$7,559,345.47			
	Construction Overhead (27%)				\$2,041,023.28			
	Total				\$9,600,368.75			
	Contingency (10%)				\$960,036.88			
	Total Decised Octavel Oll							
	I otal Project Cost W/ OH				\$10,560,405.63			

Excludes Design, Permitting, Workspace & Easements Includes Actual Pipe installed only

\$363.40

Total Length of Pipeline = 5.8 Miles

Recovery Plan:

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- (1) NW Natural to construct project due to high risk of installation through farmland and environmentally sensitive areas.
- (2) Permitting process still incomplete. Working with SHPO to obtain completeness.
- (3) Acquistion process still incomplete due to design changes. Working with land owners to secure final easements and workspaces.
- (4) Gathering additional geotechnical data and revising HDD Bore plans.
- (5) Modified design to avoid and mitigate environmentally sensitive areas.
- (6) Contract with consultant to oversee HDD field installations.
- (7) Decrease inspection costs by self performing installation.
- (8) NW Natural to directly contract with HDD bore contractors.
- (9) Credit pipe charges to project for extra pipe ordered but not installed.

	Phase 2 &	3C (A	(ctual)	·
Actual to date (as of March 21,	, 2013)	•	-	
Installed 3.7 miles of 12" Pipel	ine (Phase 2)			
item	Cost/Unit	Qtv	Unit	Cost
Design and Permitting (2) (3)	\$1,837,304.00	1	LS	\$1,837,304.00
Workspace & Easements (3)	\$526,623.00	1	LS	\$526,623.00
NWN Labor (4) (6)			hrs	\$566,876.00
*Pipeline Contractor (1) (2) (5)	\$5,572,781.00	1	LS	\$5,572,781.00
**Contract HDD Bore Services	\$0.00	0	ft	\$0.00
X-ray (NDT) (6)	\$1,857.19	270	days	\$501,441.30
Caliper Pig	\$0.00	0	ea	\$0.00
Drill Pipe (3) (7)	\$49.61	49027	ft	\$2,432,229.47
FBE Pipe (7)	\$35.28	18712	ft	\$660,159.36
Pipe Materials (8)	\$813,271.00	1	LS	\$813,271.00
NWN Equipment & Material	\$363,232.00	1	LS	\$363,232.00
Total				\$13,273,917.13
*Construction Overhead (22% A	ctual)			\$2,917,307.00
Totai				\$16,191,224.13
* Includes \$475,000 yet to be rec	ceived			
** HDD Services included in Pipe	eline Contractor costs	Ī		
Total Project Cost w/ OH				\$16,191,224.13

Install Cost/ft

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\$476.16

Excludes Design, Permitting, Workspace & Easements Includes Actual Pipe installed only

Total Length of Pipeline = 4.7 Miles

Engagement Discoveries:

- (1) Outsource construction labor
- (2) Permitting delays due to land owner negotations and agency

completeness process

(3) Higher cost of land acquistion with public and private land owners

that exceeded estimated values.

- (4) Construction installation process modified to avoid environmental sensitive areas
- (5) Undiscovered geological conditions caused schedule delays and change orders
- (6) Inspection costs increased due to outsourcing
- (7) Cost of pipe increase
- (8) Increase in pipe material spend due to design changes

G67 Charter - June 2011 (Estimate)

Original Estimate (2011) Install 9.8 miles of 12" Pipeline

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5.00							
49.80							
7.45							
17.25							
31.72							
).00							
98.97							

Install Cost/ft

Excludes Design, Permitting, Workspace & Easements

\$314.74

Total Length of Pipeline = 9.8 Miles

Base Assumptions:

- (1) Project to be constructed by NW Natural Crews
- (2) Farmland and City property to be low cost of acquistion
- (3) Open excavation through farmland with low environmental impacts
- (4) Minimize installation by HDD bore method with moderate to low risk installations.
- (5) Construction to be completed in one season

NW Natural/1915 Karney/9 Construction Estimate Summary - Feb 2013 Corvallis Loop Project 200363

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2010-2012 Project Actual Costs		
2010 Actual Charges		\$169,311
2011 Actual Charges		\$4,285,769
2012 Actual Charges		\$10,569,034
Total 2010-2012 Project Actual Costs w/ OH		\$15,024,114
2013 Project Estimated Costs		
Actual Charges (as of Feb 25, 2013)		294 881 00
Projected Costs - Phase 3C (City to OSU)	φ	1 016 000 00
Projected Costs - Extra Pipe to be Transferred	\$	(475,000.00)
Phase 1 (Riverside Drive to Hwy 34)		
Design/Management Total	\$	339 975 00
Equipment/Material Total	\$	1.021.317.50
Bore Labor Total	<u> </u>	744 892 00
Trench Labor Total	\$	77.300.00
Contract Support Total	\$	60.480.00
Contract Total	\$	1.255.100.00
Total	1\$	3 499 064 50
Construction Overhead (27%)	Ś	944.747.42
Total Cost	1\$	4 443 811 92
Contingency (10%)	<u> </u>	444,381,19
Total Cost w/ OH - Phase 1	\$	4,888,193.11
Phase 3A (Huny 24 (Huny 20 Pumper)		
Design/Management Total	e	240.075.00
Fauinment/Material Total	\$	249,975.00
Bore Labor Total		136.036.00
Trench Labor Total	φ	
Contract Support Total	<u> </u>	46 080 00
Contract Total	\$	246 600 00
Total		1 578 361 75
Construction Overhead (27%)	<u> </u>	426 157 67
Total Cost		2 004 510 42
Contingency (10%)	<u> </u>	2,004,019.42
Total Cost w/ OH - Phase 3A	\$	2,200,431.94
Phase 3P (Willomette & Mende Biyer)		······································
Design/Management Total		400 475 00
Equipment/Material Total		162,475.00
Bore Labor Total		366,909.00
Trench Labor Total	Q	415,555.00
Contract Support Total		-
Contract Total		40,080.00
Total		2 710 020 00
Construction Overhead (27%)		2,119,020.00
Total Cost		2 452 455 40
Contingency (10%)		3,403,105.40
Total Cost w/ OH - Phase 3P		345,315.54
2013 Total Cost w/ OH	<u> </u>	3,/98,470.94
	\\$	11,727,516.41
Total Project Cost w/ OH 2010-2013		\$26,751,630

NW Natural/1916 Karney/1

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 NWIGU DR 22

22. In reference to NW Natural/800, Karney/3, lines 15-17, where Mr. Karney states "The SE Eugene Project is scheduled to begin construction in spring or early summer 2018, and is expected to be completed in fall of 2018."

a. Has NW Natural begun construction on the SE Eugene Project? If no, please state when construction is expected to begin.

b. Please provide NW Natural's best estimate of the expected in service date for the SE Eugene Project, based on all information known at this time.

c. Please provide the project charter and any associated change orders that have been submitted or approved with respect to the SE Eugene Project.

d. Please provide the latest capital estimates associated with the SE Eugene Project.

e. Please identify the monthly gross plant, depreciation reserve, accumulated deferred taxes and depreciation expenses associated with the SE Eugene Project included in the filed pro forma results of operations.

f. Did NW Natural prepare a cost/benefit analysis, or other similar economic analysis, when making the decision to construct the SE Eugene Project? If yes, please provide all such economic analyses, including any memoranda or documentation supporting the analyses.

Response:

- a. Construction has not begun. Expected construction start date is June 2018.
- b. Expected in service date for the SE Eugene project is September 30, 2018.
- c. Please see UG 344 NWIGU DR 22 Attachment 1- 201675 SE Eugene Project Charter. There are no change orders associated with the project as of March 2018.
- d. The current capital estimate is \$4.8 million. The capital estimate will be updated upon receipt of contractor bids in April 2018. Cost estimate is expected to be on the upper end of the range estimated on the project charter.
- e. Please see attached spreadsheet UG 344 NWIGU DR 22 Attachment 2. The total in-service amount in the attachment for this project is \$6.1M. The difference between the \$4.8M described above and \$6.1M in the spreadsheet is due to COH/AFUDC.

NW Natural/1916 Karney/2

f. See the attached UG 344 NWIGU DR 22 Attachment 3, the approved 201675 SE Eugene Alternatives Narrative FINAL.




PROJECT NAME			SAP NO.	TIER
SE Eugene Reinforcement		201675	4	
PROJECT MANAGER	PROJECT SPONSOR	EXECUTIVE SPONSOR	DATE SUBN	IITTED
Andrea Kuehnel	Joe Karney	Grant Yoshihara	May 10, 2017	

PROJECT DESCRIPTION

Construct approximately 2-1/2 miles of 12" steel HP gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new HP pipeline would extend west from the existing South Eugene Gate and terminate at the connection to the existing 6" steel distribution main at Hilyard Avenue and near 30th Street. Distribution mains would be installed in conjunction with the HP to reinforce the existing distribution system to support existing and new customers. Several pipeline routes are being examined for feasibility. The preferred route selected considers existing infrastructure, available workspace, railroad crossings, and potential traffic impacts.

Gate station modifications may be necessary to serve the new pipeline, and may require that NWN takes over regulation from Williams pipeline. Evaluation of the gate station will be completed during the planning phase.

PROJECT PLATS	PROJECT LOCATION
Start 2-238-007 to End 2-237-011	Eugene Resource Center, City of Eugene, Lane County, OR

OBJECTIVES / BUSINESS CASE

The objective of the project is to reinforce the supply load center for Southeast Eugene, OR with approximately 3000 incremental Therms per hour on Peak Day. Providing adequate supplies to the southeast of Eugene, Oregon has been a growing concern for many years. Residential growth continues to expand south, away from existing high pressure supply pipelines, stressing the distribution system to failure. System modeling, verified through cold weather performance checks, project distribution system pressures of less than 5 psig and—for isolated areas under peak hour conditions—an inability to reliably serve existing firm service customers. This level of pressure is below the company's criterion of distribution system reinforcement being critical at pressures less than 10 psig. The Public Utility Commission of Oregon acknowledged NW Natural's 2016 IRP in Order No. 17-059, including the Action Item "Proceed with the SE Eugene Reinforcement project to be in service for the 2018/2019 heating season and at a preliminary estimated cost of \$4 million to \$6 million."

SCOPE

Construct approximately 2-1/2 miles of 8" or 12" steel HP gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new HP pipeline would extend west from the existing South Eugene Gate and terminate at the connection to the existing 6" steel distribution main at Hilyard and near 30th Street. Distribution mains would be installed in conjunction with the HP to reinforce the existing distribution system to support existing and new customers. Several pipeline routes are being examined for feasibility. The preferred route selected considers existing infrastructure, available workspace, railroad crossings, and potential traffic impacts.

OUT OF SCOPE



CONSTRUCTION PROJECT CHARTER

DELIVERABLES

Construct pipeline with capacity to deliver minimum 3,000 incremental Therms per hour to distribution system. District Regulator and associated distribution main to connect new HP main to existing DB system. Evaluate Gate Station for modifications to serve new main.

KEY TEAM MEMBERS						
Name	Department	Role	% Utilized			
Andrea Kuehnel	Engineering	Engineer/PM	20%			
Brian Konrad	Engineering	PM/Construction Manager	20%			
Scott Lundgren	Engineering	Station Design	10%			
Mike Smith	Engineering	FET	10%			

SCHEDULE						
PLANNING/DESIGN: Proposed Dates						
PIn Start Date (quarter/year)	Q2 2017	PIn End Date (quarter/year)	Q1 2018			
EXECUTION: Proposed Dates						
Exe Start Date (quarter/year)	Q2 2018	Exe End Date (quarter/year)	Q4 2018			

MAJOR PHASES/MILESTONES						
Phase	Estimated Start Date	Estimated End Date				
Planning	5/8/17	6/30/2018				
Execution/Construction	7/1/2018	12/30/2018				

PROJECT COSTS							
	Actual Requested Planning Cost						
	Current Fis	cal Year	Future Fiscal Year(s)				
Pre-Approved Design Work	\$ 2,405		N/A	Actuals spent from \$25k			
Additional Requested Planning Cost	\$432,500		\$204,500	Capital (no COH/AFUDC)			
	Es	timated Exe	ecution Cost (+/-100%)				
	Current Fis	cal Year	Future Fiscal Year(s)				
Est. Execution Cost	\$0		\$3M - \$4.5M	Capital (include contingency)			
		Estimated T	Total Cost (+/-100%)				
	Current Fis	cal Year	Future Fiscal Year(s)				
Total Estimated Cost w/ Contingency	\$434,905		\$3.2M - \$4.7M	Capital (<u>includes contingency</u> , no COH/AFUDC)			
Total Estimated Cost w/ COH & AFUDC	\$517,500		\$4M - \$6M	Capital (includes contingency & COH/AFUDC)			
		PROECT CO	OST INFORMATION				
Funding/Applicant		115/Syster	n Reinforcement				
COH Rate		19%					
Notes (Cost Constraints	s)	Gate station modifications not included in estimated execution total cost					
On-Going O&M Increases Projected							





CONSTRUCTION PROJECT CHARTER

Budget Assumptions	Design will avoid or limit impacts to Critical Habitat. Design will avoid or limit areas with potential Cultural Resources impacts. Joint Permit Application can be obtained for Amazon Creek crossing.
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RISK / DEPENDENCIES / RELATED PROJECTS				
CONSTRAINTS				
ASSUMPTIONS				
RISK	See attached Risk Analysis			
DEPENDENCIES				
RELATED PROJECTS				

CUSTOMER GROUP / STAKEHOLDERS				
NW Natu	ral Stakeholders	Comments		
Х	Contract Services			
Х	Corrosion			
	Distribution Crew			
Х	Elect/Communications	Review Telecom needs		
Х	Environmental/Haz Mat			
Х	Resource Management			
Х	Gas Supply			
	Gasco/Mist/LNG Plants			
	Major Acct. Services			
Х	Integrity Management			
Х	Purchasing / Stores			
Х	Resource Center Engineer			
Х	Risk and Land			
Х	Safety			
Х	Specialty Const Crew (ROW)			
Х	Station Design			
Х	Surveying			
Х	Transmission Const Crew			
Х	Transmission Maint Crew			
Х	Welders			
External Stakeholders		Comments		
Х	City			
Х	County			
Х	State	DSL/DEQ		
Х	Engineering Firm			
Х	Property Owners			
	Other			

ATTACHMENTS:

Tier Assessment Budget Summary SAP Budget to Actuals LTD Report Risk Analysis



CONSTRUCTION PROJECT CHARTER

PMO USE ONLY ELECTRONIC APPROVALS					
Title	Name	Date/Time Approved			
Executive Sponsor(s)					
Project Sponsor(s)	Yoshihara, Grant; Karney, Joe;	5/8/2017 5:11PM			
Project Manager	Kuehnel, Andrea F.	5/8/2017 4:20 PM			
PMO Director	Wilson, Shante	5/11/2017 3:34PM			
PRB Group					
Executive Committee	Anderson, David; sp_webservices; sp_webservices; Doolittle, Lea Anne; Yoshihara, Grant;	5/12/2017 8:41AM			
CFO Approval					
Other Signator(s)		5/8/2017 5:11PM			

NW Natural/1916 Karney/7

	08/2018	09/2018	10/2018	11/2018	12/2018	01/2019	02/2019	03/2019	04/2019	05/2019	06/2019	07/2019	08/2019	09/2019	10/2019
Gross Plant	\$ 6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127 \$	6,103,127
Depreciation Reserve	\$ 7,592 \$	15,184 \$	15,184 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953 \$	9,953
Accumulated Depreciation	\$ 7,592 \$	22,776 \$	37,960 \$	47,913 \$	57,867 \$	67,820 \$	77,773 \$	87,726 \$	97,679 \$	107,632 \$	117,586 \$	127,539 \$	137,492 \$	147,445 \$	157,398
Accumulated Deferred Taxes - Prorated	\$ (13,058) \$	(13,058) \$	(13,058) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799) \$	(57,799)

NW Natural/1916 UG 34/ Karney/8 NW Natural PROGRAM / PROJECT ALTERNATIVES NARRATIVE

Program/Project Name: SE Eugene Reinforcement Date: April 4, 2017 Preparer: Andrea Kuehnel / Engineering

BUSINESS NEED/JUSTIFICATION

What is the issue intended to be addressed and why is it needed?

Providing adequate supplies to the southeast of Eugene, Oregon has been a growing concern for many years. Residential growth continues to expand south, away from all high pressure supply pipelines, stressing the distribution system to failure. System modeling, verified through cold weather performance checks, project distribution system pressures of less than 5 psig and—for isolated areas under peak hour conditions—an inability to reliably serve existing firm service customers. This level of pressure is below the company's criterion of distribution system reinforcement being critical at pressures less than 10 psig.

This project was originally identified as the SE Eugene Reinforcement and presented to the OPUC in the 2016 IRP. The Public Utility Commission of Oregon acknowledged NW Natural's 2016 IRP in Order No. 17-069 including the Action Item "Proceed with the SE Eugene Reinforcement project to be in service for the 2018/2019 heating season and at a preliminary estimated cost of \$4 million to \$6 million."

OBJECTIVE

Reinforce the supply load center for Southeast Eugene, OR with approximately 3000 incremental therms per hour on Peak Day.

Describe the option se whether it was the lowe necessary te	RECOMMENDED OF TION elected/recommended for approval. Explain in detail how the option measured against the decision criteria, st cost option, and if there were qualitative factors considered in selecting the option. Provide all information o understand the decision process that was undertaken with respect to the recommended option.
Description	Construct approximately 2 -1/2 miles of 8" or 12" steel HP gas piping, a district regulator and distribution mains to connect and support the existing distribution system. The new HP pipeline would extend west from the existing South Eugene Gate and terminate at the connection to the existing 6" steel distribution main at Hilyard and near 30 th Street. Distribution mains would be installed in conjunction with the HP to reinforce the existing distribution system to support existing and new customers. Several pipeline routes are being examined for feasibility. The preferred route selected considers existing infrastructure, available workspace, railroad crossings, and potential traffic impacts.
Decision Criteria	Present value of revenue requirements (PVRR) for this alternative is estimated to be \$10.0 million (in \$2015) versus \$47.1 million for a satellite LNG solution (the IRP Team provided PVRR estimates which are based on Engineering's cost estimates). This alternative is the most reliable option for addressing the existing issue and to support future short- and long-term growth/demand. Growth in Eugene tends to be south and west of the existing facilities and this route would support that future growth. This alternative also has the highest probability of successful execution by 2018-19 heating season.
Pros	 Pipelines are the most reliable service alternative. Estimated supply benefit to current system is approximately 3000 th/hr with significant growth capacity.
Cons	 The preferred route will require at least one crossing of major arterial road May impact a City of Eugene public works paving project slated for 2017 construction.

NW Natural/1916 Karnev/9

	POTE	NTIAL COST		x	
Conitol	Direct	СОН		Total	
Capital	\$ 3.5M - \$5M	\$0.5M - \$1M (1	9%COH)	\$ 4 - \$6 M	
0.844	Program/Project	4	Ongoing Maintenance & Support		
U&IVI	\$		\$		
Source/ Method of Cost Data	Engineering provided pre-design cost estimate based on historic cost per mile construction costs.				

ALTERNATIVE 1			
Description	A Satellite LNG facility could be created that would alleviate the peak day pressure issues in SE Eugene.		
Pros	None identified.		
Cons	 -Higher initial cost, long-term costs, and PVRR. -Relatively high annual O&M expense. -Likely challenging to find a suitable site and secure required environmental permits. -Unknown timeline to have solution in place to support system. 		
POTENTIAL COST			

Conitol	Direct	C	ЭН	Total	
Capital	\$23.3M \$4.4M			\$27.7M	
	Program/Project		Ongoing	Ongoing Maintenance & Support	
O&M	\$		\$449,000/ annu	ally	
Source/ Method of Cost Data	Community Based LNG Satellite Station report 9/22/2014 – see attached cost estimate spread		prepared by Je sheet.	enmar Concepts dated	
Explain why this alternative is not recommended	Higher cost to ratepayers. Siting and permitting satellite LN	IG would likely	be more time c	onsuming.	

ALTERNATIVES CONSIDERED NOT VIABLE			
Provide a descri	btion of any additional alternatives that were considere Description	Why the Alternative is not viable	
Alternative 3	Demand Side Management (DSM)	Customer-specific, geographically focused defined interruptability agreements within the area of influence to delay system reinforcement is not an option, as there are no customers of appropriate size with firm service. DSM requires significant amounts of time to incent usage reduction in individual customers. Additionally, a significant portion of the customer population must adopt DSM measures for a DSM project to be successful in replacing other alternatives	

FURTHER ANALYSIS NOT REQUIRED Describe why further analysis is not required. Please explain in enough detail that others can assess whether the existing justification is sufficient. The preferred alternative of constructing a pipeline extension will provide the most reliable and least cost gas supply for our customers and can be executed with the highest probability of success. The cost and schedules for the alternatives, although preliminary in nature, are indicative of the order of magnitude and further evaluation would be unlikely to provide information to yield a different conclusion.

NW Natural/1916 Karney/10

	COMMITTEE APPROVAL	
	REQUIRES FURTHER ANALYSIS BELOW, AS DESCRIBED BELOW	□ NOT APPROVED AT THIS TIME
Comments/Recommenda	ations:	

ternatives A	Analysis Team	Represent	ative	Date	
Task: Rates Manager Approv	val. Started at: 4/17/2017 1:06 PM. e	nded at: 4/17/2017 4:04 PM			
User	Assigned Time	Completed Time	Outcome	Comments	
Thompson, Mark R.	4/17/2017 1:06 PM	4/17/2017 4:04 PM	Approve	(Thompson, Mark R.) LazyApproval by Mark. Thompson@nwnatural.com Approve	
				From: WorkflowApproval@SP2WEB1PD.gasco.com [mailto:WorkflowApproval@SP2WEB1PD.gasco.com] Sent: Monday, April 17, 2017 1:06 PM To: Thompson: Mark R. Subject: AA Manager: Alternatives Review: SE Eugene Reinforcement [#CCCHVNVGL#]	
				Workflow Notification	
				Project Name: SE Eugene Reinforcement Project Description: Reinforce supply of distribution system in SE Eugene, Oregon by constructing 2.5 mile high pressure distribution pipeline. Project Requestor: Wilson, Shante	
				AA Review Team Consensus: Approve	
				Place rank "Annrau" or "Not Annrau" to complete the raview process	
				поваютору периото от тох периото то сопциото воссаю.	
				LazyApproval enabled. Reply with a valid outcome on a line by itself at the top of the return email.	
Task: PMO Specialist Notific User	ation. Started at: 4/11/2017 9:23 AM Assigned Time	I, ended at: 4/17/2017 1:06 PM Completed Time	Outcome	Comments	
Wilson, Shante	4/11/2017 9.23 AM	4/17/2017 1:06 PM	Approve	(Wilson, Shanto)	
Workflow Messages					
Time	Event	Message			Outcome
4/11/2017 9:23 AM	Workflow Comment	Setting	Workflow State	us to Alternative Analysis Review	
4/11/2017 9:23 AM	Workflow Comment	Set Stat	us to AA Revi	DW	
4/11/2017 9:23 AM	Workflow Comment	Send Er	mail Notificatio	n to AA Review Team	
4/17/2017 1:06 PM	Task Completed	(Wilson	Shante)		Approve
4/17/2017 1 06 PM	Workflow Comment	Setting	Workflow State	us to Alternative Analysis Review	
4/17/2017 4:04 PM	Task Completed	(Thomp	son, Mark R.)	LazyApproval by Mark. Thompson@nwnatural.com Approve	Approve
		From: V Sept. M	orkflowAppro	val@SP2WEB1PD.gasco.com [mailto.WorkflowApproval@SP2WEB1PD.gasco.com] 7, 2017 1.06 PM	
		To: Tho Subject	mpson, Mark I AA Manager	Altorna	
4/17/2017 4:04 PM	Workflow Comment	To: Tho Subject Change	Mark I AA Manager State to Attac	Alterna hment Processing	
4/17/2017 4:04 PM 4/17/2017 4:04 PM	Workflow Comment Workflow Comment	To: Tho Subject Change Setting	Mark I AA Manager State to Attac Workflow State	Alterna hment Processing us to Alternative Analysis Review	
4/17/2017 4:04 PM 4/17/2017 4:04 PM 4/17/2017 4:15 PM	Workflow Comment Workflow Comment Workflow Comment	To: Tho Subject Change Setting Altachm	mpson, Mark I AA Manager State to Attac Workflow State ent Processin	Norma himma Processing us to Alternative Analysis Review Q Workliow Complete	

/default.aspx ing | Integrity Hotine 1-866-546-3696 | Report Issues **BEFORE THE**

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Kyle Walker

RATE ADJUSTMENT MECHANISMS Exhibit 2000

May 23, 2018

EXHIBIT 2000 - REPLY TESTIMONY – RATE ADJUSTMENT MECHANISMS

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i – REPLY TESTIMONY OF KYLE WALKER – Table of Contents

1		I. INTRODUCTION AND SUMMARY
2	Q.	Are you the same Kyle Walker who filed direct testimony on behalf of NW
3		Natural (the Company) in this docket?
4	Α.	Yes, I presented NW Natural/900, Walker.
5	Q.	What is the purpose of your reply testimony?
6	Α.	The purpose of my testimony is to respond to the opening testimony of
7		Commission Staff ("Staff") and the Citizens Utility Board of Oregon (CUB) relating
8		to the Company's proposed Decoupling modifications.
9	Q.	Please summarize the Company's Decoupling Proposals.
10	Α.	In my opening testimony, the Company proposed three substantive modifications
11		to the Decoupling mechanism:
12		1. Fully decouple all customers in decoupled rate classes, by using the
13		WARM and Decoupling mechanisms;
14		2. Include large commercial firm sales customers in Decoupling; and
15		3. Create four separate groups, or customer classes, subject to Decoupling.
16	Q.	Please summarize your Reply Testimony.
17	Α.	In my testimony, I:
18		Explain how further integrating WARM and Decoupling to provide full
19		decoupling for all rate schedule 2 (residential) and 3 (small commercial)
20		customers is not a novel concept and clarify how it does not change the
21		outcome or incentives of the mechanisms;

1 -REPLY TESTIMONY OF KYLE WALKER

1		Provide several examples of weather variations getting deferred for rate
2		making purposes;
3		Provide support showing the positive customer impact of the Company's
4		proposal and how customer behavior has changed with regards to WARM
5		opt-outs;
6		Explain why it is appropriate to include large firm sales commercial
7		customers in our service territory in the mechanism;
8		Explain that large commercial energy efficiency programs are heavily
9		influenced by NW Natural; and
10		Explain why decoupling all new customers in decoupled rate classes is
11		prudent, rather than only decoupling new customers expected in the Test
12		Year.
13		II. MODIFICATIONS TO DECOUPLING
14		A. Full decoupling for all decoupled rate classes
15	Q.	Please explain NW Natural's proposal to move to full decoupling for all
16		customers in decoupled rate classes while simultaneously maintaining the
17		WARM Program.
18	Α.	As described in my opening testimony, NW Natural's WARM program removes
19		the link between weather variation and revenues, and Decoupling (during the
20		WARM season) removes the link between non-weather (i.e., conservation)
21		variations and revenues. All residential and small commercial customers are
22		"fully decoupled" for weather and non-weather variations from mid-May through

2 -REPLY TESTIMONY OF KYLE WALKER

1		November. However, in the months where the WARM Program is active
2		(December through mid-May), customers participating in WARM are fully
3		decoupled, whereas those who have opted out of the real time bill adjustment
4		that WARM provides for weather variations are not being decoupled from
5		weather variations at all. NW Natural's proposal addresses this gap in
6		decoupling by modifying its Decoupling mechanism so that it only weather-
7		normalizes for customers that participate in the WARM program. By no longer
8		weather-normalizing customers who have opted out of WARM, those customers
9		will also be fully decoupled for the entire year. This proposal brings NW Natural's
10		decoupling mechanisms in line with those administered by Avista and Cascade,
11		both of which have full decoupling for their customers. We believe our proposal
12		is even more advantageous for customers as compared to the other LDCs
13		because we can offer the optionality of the WARM program that provides monthly
14		bill adjustments during the winter heating season.
15	Q.	Did Staff interpret the Company's Decoupling proposal correctly?
16	A.	No, NW Natural believes Staff misinterpreted our proposal. Staff suggests we
17		are modifying the WARM mechanism to decouple WARM opt-out customers. ¹
18		While NW Natural's proposal has a similar effect, it is not a proposal to change
19		the WARM program, rather, it is a change to the Decoupling mechanism.

3 - REPLY TESTIMONY OF KYLE WALKER

¹ See UG 344 Staff/700 at Kaufman/66 lines 14-16; Exhibit NW Natural/2001, Walker is Staff's response to data request No. 12, dated May 11, 2018.

1	Q.	Please explain Staff's position regarding the Company's proposal to create
2		full decoupling.
3	A.	Staff argues that NW Natural is ignoring the customer preferences of the eight
4		percent of our customers that have opted out of the WARM program by
5		decoupling them from weather variation. Staff further states that extending
6		weather decoupling to cover opt-out customers will not have a tangible benefit to
7		customers.
8	Q.	Do you agree with Staff's arguments?
9	A.	No. I believe that customers likely opt-out of WARM for reasons other than
10		weather decoupling (i.e., to avoid the real-time bill adjustments and WARM
11		related true-ups). In addition, decoupling aligns risk with that of the Company, so
12		a reduction of risk is beneficial to both the Company and customers alike.
13	Q.	Why do you believe customers opt-out of WARM?
14	A.	Customers seemed to be opting out of WARM prior to the 2016-17 WARM
15		season due to the June true-up bills.
16	Q.	What changed in the 2016-17 WARM season?
17	A.	Per Order No. 16-223, from the UM 1750 WARM investigation, the Company
18		started deferring weather related variance costs that were outside the monthly
19		caps and floors associated with the WARM program and spreading those costs
20		to all customers in rate schedules 2 residential and 3 commercial, coincident with
21		the annual PGA adjustments. This modification to the WARM program
22		eliminated the June bill "true-up," which applied a credit or surcharge on

4 – REPLY TESTIMONY OF KYLE WALKER

1		customer bills related to weather variance. These true-ups could be large (either
2		as a surcharge or credit) if weather was unusually warm or cold in the previous
3		winter. By eliminating the June bill true-up, credits or surcharges are now
4		deferred until the next year's bill changes with the purchased gas adjustment on
5		November 1 of each year. The UM 1750 WARM investigation was created due
6		to customer complaints regarding these June true-up bills, and the changes
7		adopted in Order No. 16-223 were in response to these complaints, and as a
8		result of the UM 1750 investigation. As noted in that investigation: "The True-ups
9		came as a surprise to some customers, which led to the increased complaints." ²
10	Q.	What behavior changes have you noticed in WARM opt-out customers
11		since Order No. 16-223?
12	A.	The Company has experienced a slowdown in customers choosing to shift from
13		opt-in to opt-out. Recall that WARM defaults to opt-in, unless the customer
14		specifically requests to opt-out of the mechanism. Therefore, it is reasonable to
15		assume that the shift in the number of customers choosing to opt-out were
16		largely due to surcharges hitting customer bills during the June true-up. The
17		chart below shows the total opt-out percent for all eligible WARM customers
18		since Order No. 16-223.
19		///
20		///
21		///

² UM 1750/JOINT/100, Kaufman-Thompson-Jenks/8

5 – REPLY TESTIMONY OF KYLE WALKER



Q. Does the Company's proposal include a June true-up, or the potential for a one-time large surcharge bill?

A. No. The Company's Decoupling proposal is very similar to the deferral created in
Order No. 16-223 that defers weather related usage.

6 Q. Please explain why NW Natural's modification to Decoupling will benefit

7 customers.

1

- 8 A. The Company believes that the proposed Decoupling mechanism is a benefit to
- 9 customers because it fully decouples opt out customers from weather variance.
- 10 In other words, the mechanism will further reduce risk, or volatility, to overall
- 11 customer bills. Additionally, the Company's proposal maintains customers'
- 12 choice to not participate in the WARM program.
- 13 The key difference between the proposed Decoupling mechanism and
- 14 WARM is the timing when opt out and WARM customers experience the risk
- 15 reduction. WARM customers receive real-time billing, or experience the risk

6 – REPLY TESTIMONY OF KYLE WALKER

1		reduction in their monthly bill, whereas, the Decoupling mechanism defers costs
2		and/or revenues (risk) to the next year. From a pure time value of money
3		perspective, the two mechanisms are similar because the Decoupling deferral
4		accrues interest in the customer's favor when usage is above the weather
5		normalized baseline (driven by cold weather) and the Company's favor when
6		usage is below the baseline (driven by warmer weather).
7	Q.	Does the Company's proposal prevent WARM from being a meaningful
8		customer choice program?
9	A.	No. Customer bills will still be significantly different if they opt out of WARM. The
10		deferral aspect of the Company's Decoupling proposal will have minimal impact
11		to all customers, as opt outs represent only 8 percent of all WARM eligible
12		customers.
13	Q.	Please summarize CUB's criticisms of NW Natural's proposal to modify
14		Decoupling.
15	A.	CUB has four main criticisms of NW Natural's proposal. First, CUB argues that
16		NW Natural should not combine Decoupling and WARM because CUB believes
17		that the two mechanisms serve different purposes. Second, CUB claims that NW
18		Natural is attempting to shift weather-related revenue risk onto customers. Third,
19		CUB argues that NW Natural's proposal raises fairness concerns because the
20		weather adjustment for customers who opt out of WARM would be placed on the
21		bills of all customers. Fourth, CUB questions the legality of NW Natural's
22		proposal as possibly being impermissible retroactive ratemaking.

7 - REPLY TESTIMONY OF KYLE WALKER

1 Q. Do you agree with CUB's criticisms? No. I will address each one below. 2 Α. Is NW Natural proposing a novel concept by further integrating two rate 3 Q. adjustment mechanisms with two different purposes? 4 5 Α. No. The current proposal is consistent with the current structure of the WARM 6 and Decoupling mechanisms. 7 Q. The two mechanisms have two main purposes: 1) reduce bill variance caused by weather; and 2) create a disincentive for the Company to 8 9 increase customer usage, therefore aligning the Company and energy 10 efficiency. Do the current WARM and Decoupling mechanisms capture weather related usage variance? 11 12 Α. Yes. The sole purpose of the WARM mechanism is to capture the effects of 13 weather on customer bills for the months of December through mid-May. For the months of June through October, the current Decoupling mechanism is fully 14 decoupled for all customers in decoupled rate schedules, meaning that any 15 weather variance is captured within the Decoupling mechanism and has been 16 since 2005³. For the months of November and May, the beginning month and 17 18 ending month of the WARM period, the WARM therms calculated serve as the weather adjustment to address the phase-in and phase-out of the WARM period. 19 20 In addition, with the weather adjustment based on the WARM therms calculated

 $^{\rm 3}$ The change from 100% weather normalized was modified in UG 163.

8 – REPLY TESTIMONY OF KYLE WALKER

in November and May, it effectively captures the WARM opt-out weather
 variation in the Decoupling mechanism.

Q. Does NW Natural's proposal affect the disincentive for the Company to
 increase customer usage, therefore aligning the Company and energy
 efficiency?

- A. No. The Company feels strongly about supporting energy efficiency efforts and
 believes our proposal will continue this support. The behavior of the Company
 has been consistent in this regard over the years, including creating and
 maintaining strong relationships with The Energy Trust to support energy
- 10 efficiency programs through the public purpose charge and Industrial Demand
- 11 Side Management (DSM) programs.
- 12 Q. Do other utilities in Oregon include usage variances associated with
- 13 weather and energy efficiency in their Decoupling mechanisms?
- A. Yes. Avista and Cascade have Decoupling mechanisms that capture usage
 variance caused by weather and energy efficiency efforts.
- 16 Q. Would NW Natural be willing to move to a full decoupling program, similar
- 17 to Avista and Cascade?
- 18 A. Yes. If the Parties would rather NW Natural pursue a full decoupling program
- using only one mechanism, the Company would be willing to move off ourproposal.
- Q. Please describe CUB's position regarding shifting weather-related risk to
 customers.

9 – REPLY TESTIMONY OF KYLE WALKER

A. CUB states that NW Natural is modifying the Decoupling mechanism because of
the Company's concern that it will lose revenue associated with weather variation
for the eight percent of NW Natural customers who opt out of WARM.⁴ CUB
believes that NW Natural is attempting to shift the weather-related risk from the
Company to its customers.

6

Q.

How do you respond to CUB's position?

7 Α. I disagree with that assertion. CUB's testimony only tells half the story. By fully decoupling customers who have opted out of WARM, the Company is not 8 9 attempting to capture revenues that would otherwise be lost under the current 10 Decoupling mechanism. Instead, the proposal will stabilize revenues and bills year-to-year for the Company and its customers, respectively. It is true that in 11 12 warmer than normal winters, the proposed Decoupling mechanism will increase 13 collections in the decoupling deferral so that the Company will not under-collect its fixed costs. CUB fails to mention that in colder than normal winters, the 14 15 proposed Decoupling mechanism will credit the decoupling deferral so that the Company will not over-collect its fixed costs. Over time, we expect that weather 16 17 variation from year-to-year will balance out and the Company will not over or 18 under collect from customers. As such, the proposal is not about recovering lost revenues or shifting risk to customers. Rather, it will reduce the volatility of 19 20 Company revenues and customer bills.

⁴ CUB/100, Jenks-Gehrke/23.

10 – REPLY TESTIMONY OF KYLE WALKER

- Q. You state that the proposed changes to Decoupling would stabilize
 revenues. Can you please describe how the accounting would work to
 stabilize revenues related to weather usage?
- Yes. In a scenario where the month is warmer than normal, NW Natural would 4 Α. 5 recognize Decoupling revenue to bring the Company's earnings to a normalized 6 level. In a colder than normal month, NW Natural would recognize an expense to 7 bring the Company's earnings to a normalized level. The above revenue 8 (scenario that is warmer than normal) and expense (scenario that is colder than 9 normal) is accounted for in the calendar month where the weather is experienced 10 and is considered Decoupling revenue and expense. These Decoupling revenues and expenses are also deferred for collection from or credits back to 11 12 customers when the Company actually accrues the earnings. During the 13 collection or credit period, when customers receive bills which include the Decoupling deferrals, an associated expense or revenue offsets the amount 14 included in customer bills to neutralize the revenue or expense received in bills. 15 effectively creating no earnings in the year following the actual weather 16 experienced caused by the Decoupling mechanism⁵. Therefore, the accounting 17 18 for Decoupling simply normalizes earnings and does not increase the Company's 19 profit above the revenue requirement. 20 Q. Is CUB correct that NW Natural's Decoupling proposal is unfair to WARM 21 customers?

11 - REPLY TESTIMONY OF KYLE WALKER

⁵ The following year can also be viewed as the amortization period.

1	Α.	No. The proposed Decoupling mechanism would be fair to all customers. The
2		Company fully recognizes that for some periods, opt-in WARM customers may
3		pay somewhat more due to weather variation caused by WARM opt-outs.
4		However, just as likely as paying more, WARM opt-in customers can receive bill
5		credits caused by weather variation from WARM opt-outs. Therefore, WARM
6		opt-in customers, as well as all customers, are expected to be neutral, with any
7		surcharges in some months being offset by credits in others.
8		In the below table, the Company has imputed the weather impact of all
9		opt-out customers since the 2013-14 WARM season. As you can see, the total
10		impacts are small, even with record warm years in 2015 and 2016 and an
11		extreme cold year in 2017. Due to these extreme weather events, the data in the

analysis includes what we believe are the bookends, or outliers, of warmer and
colder weather than normal. On average, over the five year period, customer

14 impacts are very small, 0.1%. These opt-out weather impacts are proposed to

15 be amortized to all residential customers, regardless if they are included or not

17 ///

16

18 ///

///

19

12 – REPLY TESTIMONY OF KYLE WALKER

included in the WARM program.

		Reside	ntial WARM (Opt Out Cu	ustomer W	eather Impac	t		
							Α	verage I Bill Im	Monthly pact†
Warm Year	A	WARM Adjustment	Opt-Out Bills Issued	Wea	ather	Per Therm Increment		\$	%
2014	\$	(584,494.48)	49,111	7.2%	colder	\$ (0.00165)	\$	(0.08)	-0.1%
2015	\$	1,596,613.82	48,397	-19.8%	warmer	\$ 0.00451	\$	0.23	0.4%
2016	\$	1,479,948.29	49,725	-17.3%	warmer	\$ 0.00418	\$	0.21	0.4%
2017	\$(1,222,352.53)	49,904	14.2%	colder	\$ (0.00345)	\$	(0.17)	-0.3%
2018*	\$	157,713.12	48,487	-1.8%	warmer	\$ 0.00045	\$	0.02	0.0%
Average	\$	285,485.64		-3.4%	warmer	\$ 0.00081	\$	0.04	0.1%
* = estima	* = estimated WARM period ending amounts.								
† = Custon	ner	bill impact as	sumes 50 ave	rage ther	ms per moi	nth			

Q. CUB asserts that NW Natural's proposal could constitute retroactive
 ratemaking, and CUB is uncertain whether the Commission has the legal
 authority to defer revenue related to weather variation. How do you
 respond?

5 Α. NW Natural stated in its initial filing that it would defer the decoupling adjustment for weather variation to be amortized coincident with next year's purchased gas 6 7 adjustment. Implicit in this proposal was an understanding that NW Natural would request deferral authorization for this accounting treatment. With respect 8 9 to CUB's assertion that the Commission may lack the legal authority to defer such revenues, the Company is not aware of any Commission precedent 10 prohibiting such treatment but, if necessary, will address this guestion in legal 11 12 briefing. However, history shows that the Commission has approved deferrals of revenues related weather variances. 13

13 – REPLY TESTIMONY OF KYLE WALKER

1	Q.	Can you provide examples of when the Commission has allowed utilities to
2		defer weather related revenues?

- A. Yes. NW Natural currently defers usage variance associated with weather and
 energy efficiency efforts in Decoupling, and specifically weather variance in the
- 5 WARM program. Decoupling has included a deferral of energy efficiency efforts
- 6 since 2003⁶, and, both weather and energy efficiency efforts since 2005⁷.
- 7 WARM has included a deferral of weather variance associated with WARM
- 8 adjustments outside the defined caps and floors of the program since 2016⁸.
- 9 Q. Do other utilities in Oregon defer weather and energy efficiency efforts?
- A. Yes. Avista and Cascade have deferral mechanisms where both weather and
 energy efficiency efforts are deferred.
- 12 B. Large commercial customers should be included in Decoupling
- 13 Q. Staff opposes NW Natural's proposal to include large commercial firm
- 14 sales customers in Decoupling due to economic sensitivity and shifting
- 15 economic risk from the Company to customers. Please explain your
- 16 response.
- 17 A. Staff was making points about all large customers (commercial and industrial) in
- 18 general, not specifically commercial customers that the Company is proposing to
- 19 include in our Decoupling mechanism⁹. I discuss each issue below.

⁶ UM 143

⁸ UM 1750

14 – REPLY TESTIMONY OF KYLE WALKER

⁷ UG 163, Advice Filing No. 05-9A

⁹ Staff Data Response No. 13. See Exhibit NW Natural/2002, Walker

1 Q. Do you believe NW Natural's commercial firm sales customers are

2 generally sensitive to economic cycles?

A. No. The majority of NW Natural's large commercial customers have low natural
gas use impact to economic cycles. The table below displays all 32 commercial
firm sales customers by segment, volume used in the previous 12 months (as of
March 2018), and the segment's economic risk. Economic risk can be defined by
a customer's natural gas use sensitivity to economic business cycles
summarized into three categories, by segment: Low Risk, Medium Risk, and

9 High Risk.

32 Commercial Firm S	ales Custon	ners
Segment Name	Volumes	Economic Risk
Education	9,215,463	Low Risk
Governement	4,953,894	Low Risk
Lodging	3,570,890	High Risk
Healthcare	3,241,058	Low Risk
Entertainment	3,057,494	High Risk
Office and Wholesale	2,394,185	Medium Risk
Laundry	2,123,332	Medium Risk
Wholesale Nurseries	1,670,172	High Risk
Retail	1,558,167	Medium Risk
Natural Gas Vehicles	1,492,497	Low Risk
Restaurant	1,265,872	High Risk
Grocery	1,036,901	Medium Risk
Residential Apartments	652,686	Low Risk
Residential Multi-family	456,670	Low Risk
Food Producing Farms	300,956	Medium Risk
Lighting Manufacturing	240,271	High Risk
Food Processing	156,312	Medium Risk
Electronics Manufacturing	124,758	High Risk
Pulp and Paper	84,803	High Risk
Chemical Manufacturing	76,392	High Risk
Asphalt, ready mix, sand/gravel	41,875	High Risk
Dry Out	2,352	High Risk

15 – REPLY TESTIMONY OF KYLE WALKER





1	Q.	Is it possible that in certain economic cycles, large commercial customers
2		could use a different amount of volume compared to the calculated
3		baseline included in NW Natural/905, Walker?
4	A.	Yes. Economic cycles go up and down. It is reasonable that economic cycles
5		could cause usage to be above or below the baseline, although, only a subset of
6		customers would likely alter their usage significantly as shown in the above
7		economic risk charts. I would expect economic booms and busts to occur over
8		time and that they would offset over a period of time.
9	Q.	Would decoupling large commercial customers shift substantial economic
10		risk away from shareholders and towards customers?
11	A.	No. The risk would be shared equally as Decoupling would mitigate commercial
12		customers' otherwise higher costs when economic cycles are in boom and the
13		Company would mitigate lower revenues during economic cycles in bust. I feel
14		the risk is shared due to an equal chance of economic booms and busts.
	16 –RE	EPLY TESTIMONY OF KYLE WALKER

Rates & Re

- Q. Staff is proposing a different load forecast for certain classes. Is that
 relevant to this discussion?
- Yes. For Decoupled rate schedules, the forecasted use per customer is not as 3 Α. 4 crucial because Decoupling will ensure that customers only pay for the revenue 5 requirement allocated to their service. However, for non-Decoupled schedules, 6 the use per customer forecast is very important because our revenue 7 requirement may not be collected, or over collected, if customer usage is not 8 forecasted accurately. This may occur because a significant amount of our 9 revenue requirement is collected via a variable rate. Staff's forecast for 10 commercial customers is significantly different from the Company's. We are concerned that if large commercial customers are not included in Decoupling, as 11
- 12 proposed, we may significantly under-recover our cost of service. See NW
- 13 Natural/1500, McVay for more information.

14 Q. Please explain Staff's position relating to the impact on Demand Side

15 Management if large commercial customers are added to Decoupling.

- 16 A Staff believes NW Natural has little ability to "interfere" with Demand Side
- 17 Management customers (i.e., large customers) due to the program being
- 18 managed by The Energy Trust. Staff argues that this means they should not be
- 19 decoupled.
- 20 Q. Do you agree with Staff's position?
- A. No. NW Natural often has discussions with large commercial customers
- regarding energy efficiency and works with the customer and The Energy Trust

17 – REPLY TESTIMONY OF KYLE WALKER

to ultimately implement energy efficiency efforts. Thus Decoupling serves the
 same purpose as for residential customers.

Q. You state that NW Natural works often with large commercial customers. Is
 this consistent with small and large customers alike?

- 5 A. Yes. NW Natural works with customers of all sizes under both the public
- 6 purpose and Industrial Demand Side Management programs. We rely on our
- 7 relationship and alignment with The Energy Trust to discuss energy efficiency
- 8 programs and projects, as well as impacts to customer rates. Specific to large
- 9 customers, they often reach out to NW Natural to discuss energy efficiency
- 10 programs and opportunities. NW Natural's relationships and discussions on
- large commercial programs with The Energy Trust are consistent with programs
 targeting small customers and large customers alike.
- 13 Q. Staff suggests a mechanism to recover lost margin for large commercial

14 customers due to energy efficiency as an alternative to Decoupling¹⁰. Does

15 NW Natural support such a mechanism?

- A. NW Natural believes Decoupling is a better mechanism that would capture the
 variability in usage caused by energy efficiency efforts and weather. However,
- 18 depending on the design and the administration of the program, the Company
- 19 may be willing to support such a mechanism.
- 20 ///
- 21 ///

¹⁰ See Staff/700, Kaufman/70

18 – REPLY TESTIMONY OF KYLE WALKER

1		C. Decoupling should apply to customers forecasted through the Test Year
2	Q.	Staff proposes to decouple only the customers forecasted in base rates, do
3		you agree?
4	A.	No.
5	Q.	What is NW Natural's issue with Staff's proposal to include only customers
6		through the Test Year into the Decoupling mechanism?
7	A.	The Company believes decoupling all customers continues to fully align energy
8		efficiency efforts and NW Natural. Without aligning customers and the Company
9		on energy efficiency, the Company goes directly against its own low carbon
10		goals.
11	Q.	What is the best way to align energy efficiency and the Company?
12	A.	The best way to align energy efficiency and the Company is to decouple
13		customer use from Company revenues.
14	Q.	Does this conclude your reply testimony?

15 A. Yes.

19 – REPLY TESTIMONY OF KYLE WALKER

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Kyle Walker

RATE ADJUSTMENT MECHANISMS EXHIBITS 2001-2002

May 23, 2018

EXHIBITS 2001-2002 – RATE ADJUSTMENT MECHANISMS

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i - EXHIBITS OF KYLE WALKER - Table of Contents

UG 344 – PUC Response to NWN Data Request Page 1

Date: May 11, 2018

TO: ZACHARY KRAVITZ NORTHWEST NATURAL GAS 220 NW SECOND AVENUE PORTLAND, OR 97209 zdk@nwnatural.com efiling@nwnatual.com

LISA RACKNER McDOWELL RACKNER & GIBSON PC 419 SW 11th AVENUE, SUITE 400 PORTLAND, OR 97205 lisa@mcd-law.com

FROM: Lance Kaufman Senior Utility Economist Energy Rates, Finance and Audit Division

OREGON PUBLIC UTILITY COMMISSION Docket No. UG 344 - NWN Data Request filed April 25, 2018

Data Request No 12:

Refer to Kaufman/66, lines 14-18. Please provide data or information relied on to support the claim that NW Natural proposes to change the WARM mechanism rather than the decoupling mechanism.

Staff Response No 12:

The referenced testimony does not contain the referenced claim.

UG 344 – PUC Response to NWN Data Request Page 1

Date: May 11, 2018

TO:

ZACHARY KRAVITZ NORTHWEST NATURAL GAS 220 NW SECOND AVENUE PORTLAND, OR 97209 zdk@nwnatural.com efiling@nwnatual.com LISA RACKNER McDOWELL RACKNER & GIBSON PC 419 SW 11th AVENUE, SUITE 400 PORTLAND, OR 97205 <u>lisa@mcd-law.com</u>

FROM: Lance Kaufman Senior Utility Economist Energy Rates, Finance and Audit Division

OREGON PUBLIC UTILITY COMMISSION Docket No. UG 344 - NWN Data Request filed April 25, 2018

Data Request No 13:

Refer to Kaufman/68, lines 13-15. Please provide the data or information relied to support the claim that large customers are more sensitive to economic conditions than smaller customers.

- a) Does Staff's statement refer to both large commercial and industrial customers?
- b) Does Staff believe there is a difference in sensitivity to economic conditions for large commercial and large industrial customers?

Staff Response No 13:

Staff relied on previous experience forecasting energy use of utility customers. Staff's claim is also supported by the Natural Gas Supply Association. See Attachment 1 page 2.

- a) Staff's statement statement referred to large customers in general.
- b) Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Kimberly Heiting

CUSTOMER COMMUNICATIONS & ADVERTISING Exhibit 2100

May 23, 2018

EXHIBIT 2100 - REPLY TESTIMONY – CUSTOMER COMMUNICATIONS & ADVERTISING

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i – REPLY TESTIMONY OF KIMBERLY HEITING– Table of Contents

1		I. INTRODUCTION AND SUMMARY
2	Q.	Are you the same Kimberly Heiting who filed direct testimony in this
3		proceeding on behalf of Northwest Natural Gas Company ("NW Natural" or
4		"the Company")?
5	Α.	Yes, I presented NW Natural/1000, Heiting.
6	Q.	What is the purpose of your Reply Testimony in this proceeding?
7	A.	The purpose of my Reply Testimony is to present NW Natural's response to the
8		opening testimony of Rose Anderson of the Public Utility Commission of Oregon,
9		and Bob Jenks and William Gehrke of the Oregon Citizens' Utility Board.
10		Specifically, I will respond to their testimony relating to NW Natural's request to
11		recover \$1,696,500 of advertising expenses in the Test Year.
12	Q.	Please summarize your testimony?
13	A.	In my testimony, I:
14		Respond to Staff's proposed disallowance from recovery of advertising
15		expenses related to NW Natural's "Less We Can" program;
16		Explain why Staff's proposed disallowances that were calculated from the
17		Base Year expense, rather than Test Year expense, are improper and
18		exacerbate the impact of the disallowance when it is applied to the Test
19		Year;
20		Respond to CUB's assertions that television advertising is not an effective
21		communications tool and that the Less We Can campaign has not
22		provided value to customers.

1 – REPLY TESTIMONY OF KIMBERLY HEITING
2		A. The Less We Can Program.
3	Q.	Please explain why NW Natural's Less We Can program is recoverable as
4		Category A expense.
5	A.	As previously described in my opening testimony, it is clear from customer
6		research and the local and state effort to further carbon reduction policies that
7		climate change is of paramount concern to our customers and the communities
8		we serve. It is also paramount to NW Natural. In response to the climate change
9		imperative, NW Natural developed a voluntary carbon savings goal of 30 percent
10		by 2035, based on a 2015 baseline associated with our customers' use of natural
11		gas. To communicate this effort and educate our customers on how the
12		Company and its customers can reduce emissions, the Company developed the
13		Less We Can initiative.
14	Q.	Please describe Staff's position regarding the recoverability of expenses
15		related to the Company's Less We Can program.
16	A.	Staff believes that 40% of the Company's Less We Can program is correctly
17		attributable to Category A expense. Staff believes that the remaining portion of
18		the Less We Can expenses are corporate imaging or promotional in nature, of
19		which Staff proposes to allow 21% of the Company's initial request as Category
20		C expense. Staff takes particular issue with the Company's portrayal of
21		Renewable Natural Gas (RNG) and Power-to-Gas in its Less We Can
22		advertisements. Staff argues that we should not be able to recover for the

II.

1

ADVERTISING EXPENSES

2 – REPLY TESTIMONY OF KIMBERLY HEITING

- expenses associated with this communication because NW Natural does not
 currently provide the product.
- 3 Q. Do you agree with Staff's adjustment?
- 4 A. No, I do not. This communications expense has appropriately been categorized
- 5 as Utility Information Advertising, which is recoverable Category A expense.¹
- 6 Please see NW Natural/2101, Heiting which maps the two defined areas
- 7 specified by OAR 860-026-0022 of content within Category A Communications to
- 8 the associated relevant content for the campaign's introductory TV spot and the
- 9 videos that were produced for the Less We Can website.

10 Q. Please explain what Renewable Natural Gas (RNG) and Power-to-Gas refer

- 11 **to.**
- 12 A. Renewable Natural Gas refers to gas that can be put on our pipeline to serve
- 13 customers, but which comes from non-fossil fuel sources, such as biomass.
- 14 Power-to-Gas refers to gas (either hydrogen, or methane created from
- 15 methanated hydrogen) that can be produced from using excess renewable
- 16 electric generation to split hydrogen from water. Both of these technologies
- 17 represent ways to serve our customers with renewable, non-fossil fuel based
- 18 energy, using our existing system.

19 Q. How are topics like Renewable Natural Gas (RNG) and Power- to- Gas
 20 relevant Category A communications?

¹ NW Natural/1000, Heiting 7-8.

3 – REPLY TESTIMONY OF KIMBERLY HEITING

1	A.	As referenced in my initial testimony, it is clear from customer research, and city
2		and state efforts to further carbon reduction policies that climate change is of
3		paramount concern to our customers and the communities we serve. Given this
4		context and the Company's own environmental values, NW Natural has been
5		actively pursuing renewable natural gas and power-to-gas technology. The
6		potential from innovations that displace conventional natural gas and dramatically
7		lower emissions, such as renewable natural gas and power-to-gas technology,
8		are topics that fall under two Category A Communications categories:
9		 "Energy Efficiency and Conservation;" and
10		• "Utility Information: Generation/transmission methods; and, environmental
11		considerations and other contemporary items of customer interest.
12		Renewable natural gas provides an 80% or better carbon reduction
13		opportunity over conventional natural gas, and power to gas from surplus or
14		otherwise curtailed renewable energy has a carbon footprint as low as wind and
15		solar power. These are innovations that are technically viable today – and
16		technologies that the Company is actively pursuing in a variety of ways. Please
17		refer to NW Natural's response and attachments to UG 344 OPUC DR 374,
18		which has been attached as NW Natural/2102, Heiting.
19		NW Natural is planning for RNG from waste streams and power to gas to
20		be an important part of our future supply mix, and as such, have included them
21		as resources in our most recent Integrated Resource Plan. Given that, NW
22		Natural believes mentioning these innovations and how they fit into lowering the

4 – REPLY TESTIMONY OF KIMBERLY HEITING

1		carbon intensity of the natural gas system over time is appropriate - as just one
2		aspect of a broader educational effort that focuses on the emissions profile of the
3		natural gas system as well as energy efficiency and conservation actions
4		customers can take today. The Less We Can outreach initiative is an important
5		part of educating customers about the utility and its services, by describing the
6		direction that the utility is heading, and the tangible steps we are taking to get
7		there.
8		B. Staff's Methodology Used to Calculate Adjustment.
9	Q.	Please provide the amounts that the Company included for advertising
10		costs in its initial rate case filing.
11	A.	The Company's Test Year advertising expense was set at \$1,885,000 on a
12		system basis, or \$1,696,500 on an Oregon-allocated basis. For a reference
13		point, it is typical to describe advertising costs on a dollar-per-customer basis,
14		and NW Natural's proposed amount equals \$2.53 per customer. ²
15	Q.	Was there a difference between the Company's Base Year (2017) amount
16		for Category A spending, and the amount proposed in its Test Year?
17	A.	Yes. The Company's system Base Year advertising expense (from 2017) was
18		\$2,134,000. The Test Year amount of \$1,885,000 was less than the Base Year
19		primarily due to differences in the initial cost to develop the Less We Can
20		program that addresses conservation and environmental issues facing the
21		Company and its customers.

 2 \$1,696,500 OR allocated Test Year expense/669,659 customers = \$2.53.

5 – REPLY TESTIMONY OF KIMBERLY HEITING

1		In the Base Year, the Company spent approximately \$1 million on the
2		program, which included up-front costs of program development and creative
3		production (<i>i.e</i> . production of program website and web videos), which were
4		absorbed by the Company.
5		For the Test Year, the allocation of spend on this element of Category A
6		communications (specifically messages addressing conservation, energy
7		efficiency and topics of environmental interest to customers such as emission
8		reduction opportunities) is expected to be \$500,000 on a system basis, as
9		outlined in the Company's Test Year forecast materials. See included exhibit
10		NW Natural/2103, Heiting/1, lines 12 and 13. In other words, the Company
11		incurred a significant amount of one-time costs related to the Less We Can
12		customer outreach, and is not seeking recovery for those amounts.
13	Q.	What is the amount of Staff's proposed adjustment to revenue requirement
14		for this issue?
15	A.	Staff Witness Anderson proposed a disallowance of \$449,275 of the Company's
16		advertising expense. ³ However, Staff's Revenue Requirements Witness Gardner
17		identified Staff's adjustment to advertising expense as \$412,000. ⁴ It appears that
18		this lower amount in Staff Witness Gardner's testimony reflects an Oregon-
19		allocated amount for this issue, while Staff Witness Anderson's testimony and
20		exhibits were not state-allocated.

³ Staff/400, Anderson/12.

⁴ Staff/100, Gardner/3.

6 – REPLY TESTIMONY OF KIMBERLY HEITING

1	Q.	Please explain the basis for, and impact of Staff's adjustment.
2	A.	Using the Base Year spending information, as opposed to Test Year information,
3		Staff applied an adjustment methodology that produced an adjustment of
4		\$449,275 on a system basis. An adjustment of that amount applied to the Test
5		Year, however, would result in an allowed Oregon-allocated Category A amount
6		of only \$1,292,148. With 669,661 test year customers, the amount of Category A
7		expense on a per customer basis would be only \$1.93.
8		Although NW Natural disagrees with Staff' adjustment methodology for
9		other reasons, if Staff had applied its methodology to Test Year amounts (the
10		amount the Company is actually seeking to recover), the Staff adjustment would
11		have been only \$195,000 (<i>i.e.</i> it would have been lower, because the costs
12		associated with the Less We Can campaign that Staff sought to disallow was
13		less in the Test Year than it was in the Base Year).
14		Exhibit NW Natural/2104, Heiting shows: 1) a recalculation of the Staff
15		adjustment generated from the Base Year information, 2) the results that would
16		occur if Staff's methodology were applied to Test Year amounts, and 3) what the
17		result would be if Staff's adjustment, calculated from the Base Year, were simply
18		applied to the Test Year.
19	Q.	Did Staff provide information about the expected impact of their
20		adjustment?
21		Yes. Staff's testimony indicates that their expectation was that their adjustment
22		would result in a per-customer cost of \$2.63, which they indicate was in line with

7 – REPLY TESTIMONY OF KIMBERLY HEITING

their intent to provide NW Natural an amount comparable to the other Oregon
utilities. However, as described above, the Staff adjustment would result in a
recoverable amount of only \$1.93 per customer, which is far below the range
Staff deemed would be reasonable.

Q. Do you agree with Staff's methodology used to make an adjustment to the
 Company's advertising expense?

- A. No. NW Natural believes that all of its proposed Category A expenses should be
 recoverable. Additionally, for the reasons above, Staff's adjustment should not
 have been determined with respect to Base Year amounts in any event. NW
 Natural notes that the error is understandable as it may not have been clear from
 our opening testimony that the Company was not seeking as much recovery for
 advertising expense as was spent in the Base Year.
- 13 Q. Above, you describe that Staff's proposal would mean that NW Natural's
- 14 allowed spending would be out of line with the other utilities. Under Staff's
- 15 proposal, how would NW Natural's allowed expenses compare to the per
- 16 customer allowances of other utilities operating in NW Natural's service
- 17 area?
- 18 A. PGE and PacifiCorp's per customer allowances are \$2.48 and \$2.78,
- 19 respectively. The outcome of Staff's proposed disallowance would be in conflict
- 20 with Staff's recognition that NW Natural should be allowed rate recovery for
- 21 communications generally in line with PGE and PacifiCorp on a per customer
- basis. NW Natural agrees with Staff's position regarding the comparability of per

8 - REPLY TESTIMONY OF KIMBERLY HEITING

- 1 customer advertising expense between utilities, and NW Natural's initial request
- 2 for \$2.53 per customer achieves this goal.

3 Q. If Staff had used the Company's Test Year expense levels to calculate its

- 4 adjustment, what would the result be?
- 5 A. If Staff used the Company's Test Year expense levels, Staff would base its
- 6 disallowance on the \$500,000 that the Company included for environmental-
- 7 related advertising. Applying Staff's methodology, this would result in an ultimate
- 8 disallowance of \$195,000. For reference, this is equivalent to \$2.27 per
- 9 customer, still far below our peer utilities.⁵

10 C. Response to CUB's Criticisms of NW Natural's Advertising Expense

- Q. Please summarize CUB's proposed adjustment to NW Natural's advertising
 expense.
- A. CUB proposes to disallow \$843,500 of the Company's advertising expense. This
 would result in a per customer allowance of \$1.27.⁶

15 Q. Please explain CUB's position regarding television advertising.

16 A. CUB believes that television advertising is not an effective form of advertising in

17 light of consumers' ability to use DVR to fast forward through programs and the

- 18 fragmented nature of consumers' media viewing.⁷ CUB does not recommend a
- 19 specific disallowance based on NW Natural's use of television advertising, but it

9 – REPLY TESTIMONY OF KIMBERLY HEITING

⁵ (\$1,696,500 OR allocated Test Year expense – \$195,000 Staff adjustment)/ 669,659 customers = \$2.24 per customer.

⁶ (\$1,696,500 OR allocated Test Year expense – \$843,500 adjustment)/ 669,659 customers = \$1.27 per customer.

⁷ CUB/100, Jenks-Gehrke/15-16.

is part of the basis for CUB's proposed disallowance of \$843,500 from the
 Company's requested advertising expense.

3 Q. Is television an important media channel to reach customers despite

4 **DVRs?**

5 Α. Yes. Every year from 2012 through 2017, NW Natural customers have rated 6 television the highest among media channels for how important the source is to 7 receive news and information. (See NW Natural/2105, Heiting). As stated in initial testimony, third-party research also reveals television is the dominant 8 media channel for news and information.⁸ With those facts in mind, the majority 9 of the NW Natural TV media purchases occur during local news programming. 10 Further supporting TV as a dominant media channel, 68 percent of all 11 12 internet users cite live TV as the most popular method of watching TV programming overall⁹ and the Nielson Company states that consumers with 13 DVRs who watch a recorded program are now fast-forwarding less through 14 commercials¹⁰. 15 Is television an allowed communication channel under Oregon 16 Q.

17 Administrative Rule (OAR) 860-026-0022?

10 - REPLY TESTIMONY OF KIMBERLY HEITING

⁸ <u>http://www.pewresearch.org/fact-tank/2017/10/04/key-trends-in-social-and-digital-news-media/</u>

⁹ <u>https://www.emarketer.com/Article/Live-TV-Still-Leads-Streaming-Services-Among-All-US-Ethnic-GroupsSave-One/1016321</u>

¹⁰ <u>http://www.indiewire.com/2016/09/dvr-sales-growing-millennials-on-demand-streaming-commercials-1201723492/</u>

1	Α.	Yes. Among other broad-based media channels identified in OAR 860-026-0022
2		(1) (a), television is listed as an allowed means of delivering communications to
3		inform, influence, and/or educate customers.
4	Q.	Is television an effective media for advertising recall?
5	Α.	Yes. In a recent media study, attentiveness is the highest while watching
6		television—ahead of smartphones, computers and tablets. ¹¹ This finding was
7		confirmed by Forbes, where TV messages are recalled at a higher rate – as high
8		as 60% ¹² - over other media.
9	Q.	CUB disputes NW Natural's assertion that its service territory is
10		geographically broad. Does NW Natural incur additional costs by serving
11		two designated market areas (DMAs)?
12	A.	Yes. NW Natural serves customers in two DMAs – Portland and Eugene.
13		Satellite areas such as Coos Bay Oregon are also purchased separately. To
14		reach customers in the Eugene DMA, NW Natural must divert 11 percent of an
15		already modest annual media budget. This results in a reduction in media spend
16		to effectively reach customers in the Portland DMA – an area that ranks 22 in the
17		nation in terms of media costs, ¹³ making Portland among the more expensive
18		media markets to operate in. This fact further reinforces the challenge the gross
19		retail revenue allowable creates for NW Natural in effectively reaching our

¹¹ <u>https://www.marketingcharts.com/television-68800</u>

11 - REPLY TESTIMONY OF KIMBERLY HEITING

¹² <u>https://www.forbes.com/sites/baininsights/2017/02/07/to-keep-a-consumer-brand-top-of-mind-consider- old-school-advertising/#490c8c2467cd</u>

¹³ <u>http://www.nielsen.com/content/dam/corporate/us/en/public%20factsheets/tv/2017-18%20TV%20DMA%20Ranks.pdf</u>

1		customers. Because NW Natural serves the same Portland DMA as our electric
2		utility counterparts, I believe that our funding levels should be in line.
3	Q.	Please explain CUB's position regarding Google Trends Index.
4	A.	CUB believes that Google Trends Index for the Less We Can website
5		demonstrates that the Company's Less We Can initiative has not been effective.
6	Q.	Does the Company agree with this assertion?
7	A.	No. The Google Trends Index measures search terms over a period of time from
8		a national search perspective. NW Natural serves only select areas in Oregon
9		and SW Washington states. Thus, using national search results to measure the
10		effectiveness of an advertising campaign that was designed to only reach NW
11		Natural's service area is an inaccurate method. The relevant method to
12		measure effectiveness is to review exact website traffic results through Google
13		Analytics.
14	Q.	What is Google Analytics?
15	Α.	Google Analytics is the most widely adopted and top-rated tool to measure
16		website utilization, including total visits, unique visitors, and page views. ¹⁴
17	Q.	Was the Less We Can media purchase effective in driving traffic to the Less
18		We Can website?
19	Α.	Yes. A Google Analytics report measured individual visits to the Less We Can
20		website during the timeframe the TV and digital media purchases were in effect.
21		As the graph below shows, during that timeframe, unique visits to the Less We

¹⁴ <u>https://www.trustradius.com/web-analytics</u>

12 – REPLY TESTIMONY OF KIMBERLY HEITING

Can website spiked to over 8,000 visits. From the time the media purchase
 began to when it ended, nearly 33,000 unique visits were recorded in total.
 Outside of the campaign window - when TV and digital media had stopped traffic fell significantly.



5 6

Google Analytics data demonstrates the significant impact TV and digital media
support have on driving results, and their effectiveness in communicating to
customers.

10 The Less We Can initiative is a long-term program that will be supported 11 through various media channels for years to come. It is expected that when the 12 media campaign resumes in 2018, similar traffic patterns will emerge. 13 Additionally, it is reasonable to expect traffic to each of the interior-page

- Additionally, it is reasonable to expect traffic to each of the intenor-page
- 14 educational videos will increase as well, as planned digital media over time will
- 15 drive traffic to each of the video landing pages.

13 - REPLY TESTIMONY OF KIMBERLY HEITING

- 1 Q. Does this conclude your testimony?
- 2 A. Yes

14 – REPLY TESTIMONY OF KIMBERLY HEITING

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Kimberly Heiting

CUSTOMER COMMUNICATIONS EXHIBITS 2101-2105

May 23, 2018

EXHIBITS 2101 - 2105 – CUSTOMER COMMUNICATIONS & ADVERTISING

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i - EXHIBITS OF KIMBERLY HEITING - Table of Contents

The chart below maps two defined areas specified by OAR 860-026-0022 of content within Category A Communications to the associated relevant content for the campaign's introductory TV spot and the videos that were produced for the Less We Can website.

Categories of Advertising Content	Energy Efficiency or Conservation	Utility Information
Content Definitions	Advertising that does not relate to a Commission approved program.	Advertising that increases customer understanding of utility systems, generation/transmission methods, environmental considerations and other contemporary items of customer interest [carbon emissions, climate change]
Less We Can Introductory TV Spot	 a. Can a Natural Gas company be serious when it says it wants us to use less gas? b. Can we expand our economy and use less? c. Yes. By conserving, offsetting and innovating. d. Join the effort at LessWeCan.com 	 e. Can we raise our families and lower emissions? f. Can we heat our homes and fight climate change? g. Together we are reducing emissions today while we create a better tomorrow. h. Join the effort at LessWeCan.com
Equipment Innovation Video	"We're working with organizations like the Gas Technology Institute and the Northwest Energy Efficiency Alliance to encourage innovation in products for things like Zero Net Energy Homes, Solar Thermal heating systems and other cutting edge energy technologies."	
Conservation Tariff Video	"Decoupling removes the financial incentive to sell more gas, allowing us to mean it when we say we want everyone to use less."	"We were among the first utilities in America to decouple the cost of maintaining our pipelines from the natural gas inside them."
Conserve Video	"And our customers have already cut theirs in half by upgrading to high efficiency equipment and through simple things like low flow shower heads, better insulation and window coverings to control temperature."	"Using less energy is the easiest way to reduce carbon emissions."
Upgrade Video	"Maintenance is a fact of life. It's also a prime opportunity to become more energy efficient through upgrades to things like on-demand water heaters, high-	

Categories of Advertising Content Content Definitions	efficiency furnaces and gas fireplaces. Best of all incentives and rebates can help make every dollar you spend greener."Energy Efficiency or ConservationAdvertising that does not relate to	Utility Information Advertising that increases customer
	a Commission approved program.	understanding of utility systems, generation/transmission methods, environmental considerations and other contemporary items of customer interest [carbon emissions, climate change]
Offset Video	"The program's mantra, "Use Less, Offset the Rest," makes clear that offsets are a valuable tool to help lower emissions."	"Our Smart Energy program offers customers a voluntary opportunity to offset some or all of the CO ₂ produced by their natural gas use."
Transportation Video		"Transportation is the largest contributor to emissions. Today, compressed natural gas vehicles offer a viable path to address carbon emissions and air quality issues from heavy-duty vehicles, producing 90% less air pollution than even the cleanest diesel engines."
RNG Video		"Renewable Natural Gas is produced from organic materials like wood and food waste, agricultural waste and, well, human waste. When these materials decompose they produce methane which can be converted to Renewable Natural Gas, sustainably reducing emissions and closing the loop on waste."
Power to Gas Video		"Power to Gas is a cutting-edge process that captures surplus wind and solar energy and converts it to hydrogen or renewable natural gas through electrolysis. That means this renewable energy can be stored and then blended in into our existing pipeline system."

NW Natural[®] Rates & Regulatory Affairs UG 344 2017 General Rate Revision Data Request Response

Request No.: UG 344 OPUC DR 374

374. See NW Natural/1000, Heiting/Page 9. Please provide a narrative description of "The efforts NW Natural and others are taking to support renewable natural gas development and technology advancements that can help lower emissions." Specifically, how is NW Natural contributing to these efforts?

Response:

Renewable Natural Gas

NW Natural has been working with the City of Portland's Bureau of Environmental services to facilitate interconnection of Renewable Natural Gas (RNG) from waste methane at the Columbia Boulevard Wastewater Treatment Plant. This support includes the development of an interconnection agreement, RNG natural gas quality specification requirements, engineering design and development of billing and accounting procedures to accommodate RNG. Additionally, the City of Portland has initiated Schedule H compression service to fuel the City's vehicle fleet with natural gas and RNG. We are also in preliminary discussions with other potential producers of RNG seeking to interconnect with the Company's distribution system.

In addition, NW Natural has conducted initial analysis of the overall potential for RNG supply in its service territory. This work has included communications with a wide variety of potential RNG producers to understand their existing systems and onsite technological needs necessary to produce pipeline-quality gas. As a result, we have been contacted by several smaller wastewater treatment plants, such as Hood River and Coos Bay, and have helped them think through some of the initial questions around RNG production.

NW Natural identified the lacking detail in existing estimates of RNG availability in the state of Oregon. Consequently, the Company was the original drafter of a proposed bill, which became SB 334, to identify the technical potential of RNG in Oregon and to identify the barriers to developing this new energy supply for the state. NW Natural worked with the Oregon Department of Energy on improving the bill and was key in driving legislative support for the bill. SB 334 was passed by the Oregon Legislature in 2017. NW Natural has worked closely with a variety of stakeholders during this process, including other gas utilities in Oregon, to understand how the political, regulatory, and market barriers facing greater RNG development could be addressed.

UG 344 OPUC DR 374 NWN Response Page 2 of 3

Additionally, we are members of the Renewable Natural Gas Coalition and participate in relevant industry meetings held annually such as the American Gas Association's Sustainable Growth Committee (part of our overall AGA membership) to stay up-to-date on renewable natural gas policy development and advancements nationwide.

In 2017, we helped to sponsor an RNG conference at our corporate headquarters in partnership with Energy Vision that brought together policymakers and RNG developers to discuss barriers and challenges for RNG development. The agenda and list of speakers for that workshop is attached as UG 344 OPUC DR 374 Attachment 1.

We are members of the Gas Technology Institute's (GTI) Utilization Technology Development group. Among a number of technologies and energy efficient end-use applications, this organization is looking at ways to enhance conditioning and cleaning of RNG to make it pipeline ready. NW Natural supported these initiatives through the Research and Development budget.

Through our GTI partnership we were one of the funders of another RNG technology, Woody Biomass Gasification. Through our R&D budget we contributed to the GTI woody biomass design study (also funded by PG&E, SoCal and SMUD) in late 2016. This study is still underway and we get quarterly reports.

In the last year NW Natural has also completed detailed macroeconomic analysis of the benefits to the Oregon economy of "buying local" when it comes to natural gas supply (given that RNG can be sourced within the state of Oregon) in terms of employment and economic activity (see Confidential UG 344 OPUC DR 374 Attachment 2) and the cost of renewable natural gas in terms of tons of carbon dioxide equivalent saved relative to other emissions reductions activities NW Natural can undertake to reduce the carbon footprint of its product (see UG 344 OPUC DR 374 Attachment 3).

Additionally, NW Natural's voluntary, self-funded carbon offset program "Smart Energy" has been available to customers to reduce their carbon footprint with renewable sourced methane offsets for the last decade. This experience has allowed NW Natural to gain experience in sourcing biogas projects that will be useful in evaluating potential RNG projects. Smart Energy is described in Confidential UG 344 OPUC DR 374 Attachment 4.

Through all of these activities, NW Natural has gained the information necessary to make thorough initial estimates of potential RNG sources and the cost at which they can be procured for its customers. This information is being put to use to analyze different RNG options for cost-effectiveness relative to other resource options in a detailed fashion for the first time in the Company's upcoming 2018 IRP. The information presented on these RNG options for evaluation in the 2018 IRP are included as UG 344 OPUC DR 374 Attachment 5.

UG 344 OPUC DR 374 NWN Response Page 3 of 3

Power to Gas

Power to Gas is a process that takes excess renewable energy - wind, solar or hydro and through electrolysis converts it to hydrogen or renewable natural gas through methanation. That renewable energy can then be distributed through our existing pipeline infrastructure.

We have partnered with Oregon State University (OSU) to support a team of engineering graduate students to assess the critical considerations of siting a Power to Gas facility in the Northwest. We remain engaged with the OSU team and provided guidance on their submittal in the Hydrogen Education Foundation's Student Design Contest. The OSU team's Power to Gas submittal is included as UG 344 OPUC DR 374 Attachment 6.

We have also funded a grant to the National Fuel Cell Research Center at the University of California Irvine, a leader in Power to Gas technology development, to support research and analysis that evaluates the technical potential for Power to Gas installations in our service territory. We expect these findings to be delivered later in 2018.

NW Natural has dedicated staff time to understanding technology and economic characteristics of all major RNG production pathways, including through Power to Gas. NW Natural funded Flink Energy to author a white paper exploring the opportunity for Power to Gas. This paper is attached as UG 344 OPUC DR 374 Attachment 7.

NW Natural/2102 Heiting/4 UG 344 OPUC DR 374 Attachment 1

Page 1 of 4

NW Natural[®]

THE POWER OF ORGANIC WASTE: RENEWABLE NATURAL GAS (RNG) FOR OREGON

A WORKSHOP BY ENERGY VISION & NW NATURAL

SEPTEMBER 6, 2017, 8:30 A.M. - 3:00 P.M. NW Natural, 220 NW 2nd Ave, Portland, Oregon

AGENDA

8:30AM - 8:40AM

WORKSHOP INTRODUCTION: MOVING TOWARD A LOW-CARBON FUTURE IN OREGON

Joanna D. Underwood, Founder & Board Chair, Energy Vision

8:40AM - 9:00AM

WELCOME ADDRESSES

David Anderson, President & CEO, NW Natural

Mike Jordan, Director, Portland Bureau of Environmental Services

9:00AM - 10:20AM

PANEL 1 - TURNING ORGANIC WASTE INTO BIOGAS: WASTEWATER, FOOD WASTE & AG/ LANDFILL CASE STUDIES

The Biomass Resource Potential in Oregon - Dan Avery, Senior Policy Analyst, Oregon DOE

From Raw Biogas to Pipeline Quality RNG - Tim Logan, Senior Scientist, Landau Associates, Inc. From Fuel to Flame - Paul Suto, P.E., Supervising Engineer, Portland Bureau of Environmental Services

From Food Waste to Low-Carbon Fuel - Sean Moen, General Manager, ReFuel Energy Partners

10:20AM - 10:35AM COFFEE AND NETWORKING

10:35AM - 12:05PM

PANEL 2: MAKING ULTRA-LOW-CARBON RNG AVAILABLE FOR END USE APPLICATIONS

Integrating RNG into Pipeline Infrastructure - Bill Edmonds, Director of Sustainability, NW Natural

Delivering RNG to Customer Markets Tyler Henn, General Manager, Clean Energy Renewables

Near-Zero Emission Natural Gas Engines - Kevin Cook, Pacific Regional Manager, Cummins Westport

Natural Gas for Transportation Tim D'Alessandro, Rogue Valley Transportation District

12:05PM - 1:30PM

LUNCH AND NETWORKING – "POWER TO GAS" PRESENTATION, JACK BROUWER, PH.D, UNIVERSITY OF CALIFORNIA, IRVINE ENGINEERING

1:30PM - 2:45PM

PANEL 3: THE ROLE OF ECONOMICS, POLICY AND REGULATION IN RNG'S FUTURE (SHORT PRESENTATIONS + Q&A)

Jana Gastellum, Program Director - Climate, Oregon Environmental Council

Marcus Gillette, Director of Public & Gov't Affairs, RNG Coalition

Peter Weisberg, Senior Investment Manager, The Climate Trust

Mary MacPherson, VP, Water Management Sector, Equilibrium Capital

2:45PM - 3:00PM

FINAL QUESTIONS AND CLOSING REMARKS

PARTNER



Air Liquide







COMMUNITY PARTNERS











SPEAKER BIOGRAPHIES

JOANNA D. UNDERWOOD is the Founder and Chair of Energy Vision, a national environmental research group whose mission is to identify and promote strategies necessary for a sustainable energy and transportation future. Ms. Underwood has been a leading figure in the environmental movement for more than four decades, where here research an advocacy have been instrumental in shaping city, state and federal policy around land-use, agriculture, toxic chemicals and energy/transportation. She is a graduate of Bryn Mawr College and The Sorbonne.

DAVID H. ANDERSON is the president and CEO of NW Natural, a role he has held since last August. In his previous 13 years with the company he was Chief Operating Officer and before that its Chief Financial Officer. David came to Portland after a long career working in the financial world of utilities in Texas, where he also graduated in Accounting from Texas Tech University.

Here in Portland, David has been very active in the community, serving on the Portland State University Foundation, Oregon Business Council, Portland Business Alliance, Greater Portland, Inc., Oregon Department of Education Business Advisory Team and Lines for Life. He also serves on the board of directors of the American Gas Association and is the co-chair of the AGA's Carbon Policy Task Force.

MICHAEL J. JORDAN became Director of the Portland Bureau of Environmental Services in June 2015. Before joining Environmental Services, Mr. Jordan served as Oregon state government's chief operating officer. As COO, he was responsible for leadership and oversight of the day-to-day operations of the state and the Department of Administrative Services. From 2003 to 2011, Mr. Jordan served as Metro's chief operating officer where he was responsible for a workforce of 1,600 and the integrated management of public services and economic development assets that benefit the Portland tri-county region through Metro's regional governance. His previous public roles include service as a Clackamas County commissioner, a seat to which he was appointed and subsequently elected. Jordan honed his public administration expertise as the city administrator for Canby, where for more than 10 years he was responsible for managing all aspects of city operations.

Before entering public service, Mr. Jordan worked for 11 years at Pacific Power and Light managing retail water distribution systems and construction project management for electricity transmission delivery systems across three states. Mr. Jordan attended the graduate program for public administration at Lewis and Clark College, holds a BS from Portland State University, and attended the University of Oregon on a baseball scholarship. **DAN AVERY** is a Senior Renewable Energy Policy Analyst at the Oregon Department of Energy who works with public and private interests to help advance renewable energy opportunities and their supporting policy. Dan has worked on energy and natural resource issues in the Pacific Northwest for over 25 years and has worked in federal, state and private industry. He has worked in regulatory, conservation and public planning arenas. Dan holds a MBA in Sustainable Business and Renewable Energy from Marylhurst University and a BS in Marine Biology from Texas A&M. He believes that renewable, clean and affordable energy opportunities are critical components of a sustainable world.

TIM LOGAN manages solid waste services projects in Landau Associates' Portland office. He has 16 years of experience as a project manager and technical contributor assisting landfill owners and operators address a wide range of issues pertaining to air quality, landfill gas (LFG) operations and maintenance (O&M), and landfill operations. Tim has worked at over 60 active and closed landfills thorough the US and at sites in Israel, Panama and Brazil. Tim is a graduate of the Pennsylvania State University with a degree in Environmental Resource Management and serves as the VP for the Beaver (Oregon) Chapter of SWANA.

PAUL SUTO is a Supervising Engineer with the Bureau of Environmental Services. He manages the Wastewater Engineering design section, which is responsible for capital project delivery for BES' two wastewater treatment plants, and 99 pump stations. Paul is overseeing Portland's biogas to Renewable Natural Gas (RNG) project, providing guidance and leading efforts with partnerships and other opportunities. Paul has been with BES for almost 9 years. Prior to working at BES, he worked for a utility (East Bay Municipal Utility District) working on resource recovery and energy projects. He also has experience as a consulting engineer for planning and design of water and wastewater facilities. He has a B.S. and M.S. in Civil Engineering from UC Berkeley.

SEAN MOEN has over a decade of experience in the energy, transportation, & fleet fueling industry. Sean joined ReFuel Energy Partners in 2015 after many years with a local petroleum distributor in Sacramento, CA. As the General Manager for ReFuel Energy, Sean is responsible for all facets of the natural gas business - from site maintenance to station growth and long-term strategic planning. In addition, Sean is accountable for quality controlling and communicating with our RNG (renewable natural gas) production partners; one of which operates North America's first direct food waste to transportation fuel anaerobic digestion production facility. Sean is actively engaged in several projects to bring RNG to market and has recently opened ReFuel's 2nd natural gas fuel station in San Jose, California.

SPEAKER BIOGRAPHIES - continued

BILL EDMONDS is the Director of Environmental Management & Sustainability at NW Natural. In his current position he oversees a team that takes up current environmental compliance challenges and manages customer programs that touch the environment. He's recently taken on the challenge of helping the company develop new, innovative efforts to reduce overall greenhouse gases emissions.

Prior to working at NW Natural, Bill has been in the electric sector, worked as an environmental consultant and served as a staff member at the California Public Utilities Commission. Bill currently serves as a member of the Board for the Community Cycling Center. He is a past board member of the Oregon Environmental Council, Earth Advantage and The Climate Trust. Bill has a degree in Political Science from Williams College and a Masters in Public Policy from UC Berkeley.

TYLER HENN serves as Vice President and General Manager of Clean Energy's subsidiary, Clean Energy Renewables. In this role Tyler is responsible for the operations, marketing and distribution of Clean Energy's Redeem™ brand of renewable natural gas. Prior to this role Tyler served as the Vice President of Finance and Commodities for Clean Energy Renewables where he provided financial oversight and worked on financing transactions to support the growth of Redeem. Tyler began his career working for Deloitte and Touche, LLP. He received his B.A. in Accounting from the University of La Verne.

KEVIN COOK is the Pacific Regional Manager for Cummins Westport. Kevin joined Cummins in 2010 as an engineer in their Columbus, IN headquarters. He moved to Los Angeles in 2012 to join Cummins Westport as a Technical Support Manager and Account Manager for California transit agencies. In 2016, Kevin moved into his role as the Pacific Regional Manager, covering California, Oregon, and Washington, and is currently based in Seattle. Kevin holds a BS in Aerospace Engineering from the University of Michigan and a MBA and MS in Marketing from the Indiana University Kelley School of Business.

TIM D'ALESSANDRO is the Operations & Fleet Maintenance Manager at Rogue Valley Transportation District in Medford, Oregon. His duties include direct oversight of transit operations, fleet maintenance and facility maintenance. He is also charged with assisting in the oversight of the para-transit operation (Valley Lift) and the non emergent medical transportation program (Translink).

Rogue Valley Transportation District began using CNG in their transit buses in 1994. As an early adopter of CNG Technology, RVTD's transition was not without its struggles. There were no schools and this technology was very young. As a result, most of what was learned was by trial and error. RVTD now has a highly skilled Team of technicians that can maintain both CNG vehicles and CNG fueling facilities. 75% of RVTD's transit fleet runs on CNG.

Tim has worked for the RVTD for 34 years. Over that period of time he has held the positions of Coach Operator, Dispatcher, Transportation Supervisor, Transportation Mgr, Fleet Maintenance Mgr and current position of Operations and Fleet Maintenance Manager.

Tim has worked with the Rogue Valley Clean Cities Coalition for several years and has been a Board member for 4 years. He is a newly elected City Councilman for the City of Medford and sat on the Medford Planning Commission for 2 years.

JACK BROUWER is Professor of Mechanical and Aerospace Engineering at the University of California, Irvine and Associate Director of the National Fuel Cell Research Center. At the Center he conducts research, education, simulation and outreach programs focused on high-efficiency, environmentally preferred energy conversion and power generation technology advancement, with fuel cell and gas turbine systems as the principal targets.

Current research projects address ultra-high efficiency and ultra-low emissions high temperature fuel cell systems, integrated hybrid fuel cell gas turbine systems, renewable power intermittency and integration, battery electric and plug-in hybrid electric vehicle evaluation and infrastructure development, advanced fuel cell and gas turbine dynamic operations, hydrogen and electricity infrastructure development, and power electronics and energy conversion devices for the smart grid. He holds a PhD. in mechanical engineering from the Massachusetts Institute of Technology, as well as bachelor's and master's degrees in mechanical engineering from UCI.

JANA GASTELLUM is Climate Program Director at the Oregon Environmental Council (OEC) where she leads state and regional work to build a low-carbon and equitable economy. Her recent work has focused on implementing programs to advance clean fuels, energy efficiency and limiting and pricing climate pollution. Jana previously served on the United Nations Foundation/Energy Future Coalition climate team where she focused on clean energy development and the nexus between energy security, climate change and poverty alleviation. She also helped launch the 25x'25 renewable energy alliance and built capacity within the agricultural and forestry communities around the role these sectors can play in a low-carbon economy. She received a B.S. and M.S. in Earth Systems from Stanford University.

SPEAKER BIOGRAPHIES – continued

MARCUS GILLETTE is Director of Public & Gov't Affairs at the Coalition for Renewable Natural Gas. In this role he has advocated for biogas and RNG through educating decision-makers in Washington DC and the Atlantic region on the benefits and deployment opportunities for RNG in North America, while helping the industry develop partnerships with relevant stakeholders and organizations. Mr. Gillette holds a B.A. in Economics & Business from Westmont College and an MBA from American University's Kogod School of Business. He is a native Oregonian, born and raised in the Willamette Valley, and recently relocated with his family back to Oregon.

PETER WEISBERG is Senior Portfolio Manager at The Climate Trust. Peter began working in carbon markets in 2006, first at EcoSecurities and then joining The Climate Trust in 2007 and founding Climate Trust Capital in 2016. He has invested more than \$10 million into projects that generate environmental credits. During his time at The Trust, Peter's work has focused on biogas, grassland conservation, nutrient management and forestry projects. Peter holds a B.A. from Claremont McKenna College. MARY MACPHERSON is Vice President of the Water Management Sector at Equilibrium Capital, working on due diligence and underwriting for the Wastewater Opportunity Fund (WOF). Mary brings over 10 years of experience in investment banking, financial advisory, public policy and consulting services to federal, state, and local governments. Mary's expertise includes complex financing structures including multi-year, multi-billion dollar capital plans.

Prior to joining Equilibrium in 2015, Mary worked as a consultant assisting the treasury group at the Bonneville Power Administration, and completed a fellowship program at Stanford. She spent eight years as a public finance investment banker with Seattle-Northwest Securities, structuring and executing over 100 bond transactions with a total par value exceeding \$3 billion. Mary holds a master's degree from Stanford Graduate School of Business and a bachelor's degree from Vassar College. Mary chairs the Research Board for the City Club of Portland, a nonprofit and non-partisan civic affairs organization.

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NW Natural/2102 UG 344 OPUC DR 374 Attachment 4 Page 6 of 7

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NW Natural/2102 Heiting/22 UG 344 OPUC DR 374 Attachment 3 Page 1 of 1

CARBON GOAL POTENTIAL COSTS

2035 Estimated Carbon Goal Emissions Savings and Costs



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RENEWABLE NATURAL GAS (RNG)





- NW Natural will evaluate four different RNG scenarios in 2018 IRP
- Buying RNG on the market is likely more expensive than producing it ourselves and/or negotiating long-term contracts
- Statewide RNG technical potential analyses currently underway in Oregon and Washington; to be finalized by end of 2018
- NW Natural considering how to bring lower cost RNG to customers in the future

NW Natural/2102 UG 344 OPUC DR 374 Attachment 5 Page 3 of 20

Renewable Natural Gas (RNG)



RNG is *pipeline-quality gas* derived by cleaning up the biogases emitted as organic material chemically breaks down. Material such as:

- Food waste
- Wastewater treatment plants
- Landfills
- Dairy and other manures
- Mill and forest residues

Photo source Portland Tribune

Prepared for IRP Working Group - Not to be used for investment purposes.



- RNG reduces CO₂ emissions, whether used directly in appliances or in vehicles
 - NW Natural assumes some future cost of carbon in all resource planning scenarios
- RNG production turns costly waste products into revenue generators for cities and businesses
- Local RNG resources produce direct economic benefits
- On-system RNG potentially reduces
 infrastructure requirements

Eugene-Springfield Water Pollution Control Facility Photo source City of Eugene



Prepared for IRP Working Group - Not to be used for investment purposes.



RNG: Carbon Reduction Benefits





Current RNG market:

- Must compete with market-altering transportation credits
 - Too expensive to buy RNG today on the open market for our customers
- Expect significant growth in number of RNG projects in U.S. throughout 2018
- ODOE technical potential and report to legislature: Fall 2018
- NWN considering how to secure lower-cost RNG for customers





UG 344 OPUC DR 374 Attachment 5 Page 8 of 20

RNG as a Resource

RNG on NWN system:

- City of Portland Columbia Boulevard Wastewater Treatment Plant → in process
- Four other projects (wastewater treatment plants/food waste facilities) → likely in 2018/2019



Columbia Boulevard Wastewater Treatment Plant Photo source Eli Duke, via Flickr via NextCity

RNG as a Resource

- This region has a wide array of potential RNG resources
- For the 2018 IRP, we will model four that represent possible near-term potential resources:
 - 1. Purchase RNG on market today
 - 2. Sign contract now for delivery of RNG in years 2023-2033
 - 3. Utility-owned equipment to capture and process RNG
 - 4. Utility-owned equipment to capture and process RNG with near-term monetization of transportation fuel credits

We assume for all projects:

- 100,000 Dth annual RNG production in all scenarios
- Transportation fuel credits for RNG decrease after 2022

RNG as a Resource

	Scenario	Source of biogas	Ratepayers invest in	Estimate d Cost/Dth ¹	Capital expenses	Annual operating expenses	On- system resource benefits	Estimated Percent CO ₂ reduction compared to conventional gas	Estimated Cost (\$) per metric ton of CO ₂ avoided
1	Buy RNG on market today	Landfill		\$30.25				41%	\$889.71
2	Enter into contract for RNG for 2023- 2033	Dairy		\$14.00			х	452%	\$34.14
3	Develop RNG plant	Wastewater	Cleanup, compression, interconnect	\$12.65	\$8 million	\$600,000	х	75%	\$186.45
4	Develop RNG plant and monetize transportation fuel credits in years 1-5	Wastewater	Cleanup, compression, interconnect	\$8.10	\$8 million	\$600,000	х	75%	\$130.65

¹ Cost/Dth in Scenarios 1 and 2 derived from market knowledge; Scenarios 3 and 4 through cost-of-service modeling

Prepared for IRP Working Group - Not to be used for investment purposes.

RNG as a Resource-Scenario One

- Scenario One: Purchase of RNG
 on market
 - Portion of landfill output
 - Have to compete against lucrative transportation offtake market
 - Working with RNG marketers to understand market dynamics



Roosevelt Regional Landfill Photo source Klickitat PUD

RNG as a Resource-Scenario Two

- Scenario Two: Sign contract for RNG to be delivered in years 2023-2033
 - Of interest to project developers because transportation credit market in later years is very uncertain
 - Project is located at a dairy that can earn higher carbonbased program credits



Photo source Chronicle.co.zw

RNG as a Resource-Scenario Three

- Scenario Three: Investment at wastewater treatment plant
 - Reflective of regional capital and operating costs
 - Assume no monetization of transportation fuel credits
 - Assume existing wastewater treatment plant with digesters already in place
 - Assumed capital investment includes:
 - Gas conditioning
 - Gas compression
 - Pipeline extension
 - Interconnection equipment (monitoring, metering, etc.)



Fats, Oils, and Greases (FOG) tanks at Gresham Wastewater Treatment Plant Photo source NW Natural

RNG as a Resource-Scenario Four

- Scenario Four: Investment at wastewater treatment plant
 - Reflective of regional capital and operating costs
 - NWN customers take delivery of physical gas upon facility completion
 - Environmental attributes sold into transportation markets first five years; all environmental attributes kept for NWN customers starting in year six
 - Assume existing wastewater treatment plant with digesters already in place
 - Assumed capital investment includes:
 - Gas conditioning
 - Gas compression
 - Pipeline extension
 - Interconnection equipment (monitoring, metering,

Prepared for the working Group - Not to be used for investment purposes.



Anaerobic Digester Eggs at Newtown Creek Photo source NYC.gov



POWER-TO-GAS (P2G)

UG 344 OPUC DR 374 Attachment 5 Page 15 of 20

Why is Seasonal Energy Storage Important?

- Pacific Northwest energy needs are seasonal and concentrated in the winter
- Hydropower generation is seasonal and concentrated in the spring
- Solar generation is seasonal and concentrated in the summer
- Wind generation is less seasonal, but generally quite variable in the winter

Key Takeaway:

At high levels of renewable penetration there will be a large mismatch in timing between electricity generation and electricity demand. Seasonal energy storage will be very beneficial.

What Seasonal Energy Storage Technologies Exist?

Let's not forget our current energy needs are met largely through storage:

Hydroelectric storage

Reservoirs

Natural gas

- Underground storage
- LNG

Petroleum (Gas and Diesel)

Tanks

Electricity Storage:

Batteries are not the only option, and are not a very good option for seasonal energy storage





Viable Seasonal Renewable Storage Solution



Key factors that impact the costeffectiveness of power-to-gas:

- 1. Capacity factor
 - Capacity factor is directly related to the amount of excess renewable electricity generation available
- 2. Cost of electrolyzer
 - How much will technology improve and costs decline over time
- 3. Whether methanization is included
 - Producing methane with hydrogen adds to the cost of the final product
- 4. Cost of storing hydrogen or methane
 - Storing the product for later use is critical for energy needs



P2G Key Takeaways

- As renewable electricity generation penetration increases, we expect an increasing amount of excess electricity generation
 - This excess generation will be highly seasonal in the Pacific Northwest
- Power-to-Gas (or P2G) turns excess electricity generation into carbonfree hydrogen gas or methane (synthetic natural gas) that can be used as seasonal energy strorage
- P2G is a way to decarbonize the direct use of natural gas load
- P2G economics are highly dependent upon the amount of excess electricity generation available to purchase at low prices
 - P2G economics will improve through time as more excess electricity generation is available and electrolysis technologies improve (by becoming more efficient or cheaper)
- NW Natural will include P2G as a gas supply option in the 2018 IRP

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Hydrogen for Heat Utilizing Hydrogen for Long-Term Energy Storage in Northern Climates.

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2 EXECUTIVE SUMMARY

Oregon's Renewable Portfolio Standard (RPS) requires that by the year 2040, at least 50% of the electricity consumed in the state be generated from renewable sources. This high level of renewable generation poses a challenge for grid management as curtailment has already been an issue with today's relatively low level of renewable generation (6% in 2016). New renewable power plants are expected to come online to meet the RPS, which is expected to exacerbate curtailment issues. In Oregon, curtailment occurs in the spring when hydro-electric generation is plentiful due to snowmelt. However, Oregon's peak energy demand is seasons later in the winter, when heating loads are high. A long-term energy storage technology is necessary to utilize the curtailed energy.

NW Natural supported this work to investigate how power-to-gas technology could alleviate Oregon's curtailment issues. The technology is executed by an electrolyzer, which uses electricity to split water into oxygen and hydrogen gases, the latter of which can be stored stably in large quantities for long durations.

The proposed system design uses the Proton On-Site M100 electrolyzer module to produce hydrogen gas from renewably-generated electricity, in lieu of curtailment. The module package includes a compressor, which will pressurize the hydrogen for injection into NW Natural's natural gas pipeline. Hydrogen production in the spring will coincide with the months that the state's largest natural gas utility, NW Natural, increases inventory in the Mist Site, an underground natural gas storage facility. The blended natural gas will flow into storage until it is needed seasons later. Our analysis found that from the 304 hours of curtailment in 2017, 2,850 kg of hydrogen could have been produced, resulting in a concentration by vol. of 75 ppm hydrogen in a 453,100,000 m³ reservoir filled with natural gas at standard temperature and pressure.

Herein, we worked with NW Natural to identify four possible sites for the project and created a decision matrix to rate each. The most suitable site, per our criteria, is Miller Station in Clatskanie, OR.

Our environmental analysis of the system shows there is no significant negative impact on the environment. Hydrogen sulfide is a toxic by-product of sulfate-reducing bacteria, but its occurrence is minimal at low hydrogen concentrations. Using only curtailment hours, the indirect greenhouse gas effect of hydrogen that is leaked at a rate of 4.5% is equivalent to the effect of 0.74385 metric tons of CO₂. However, the carbon dioxide reduction from burning this much hydrogen instead of fossil natural gas is 39 metric tons. Oregon does not currently offer incentives for carbon dioxide emission reduction, but following California's structure results in a carbon reduction incentive of \$41.42 per metric ton of carbon dioxide.

An economic analysis of the system shows that to meet NW Natural's rate of return for this project, the price for the hydrogen produced would need to be \$121.81/kg. This would result in a payback period of 9.75 years. A projected model for the year 2027, which accounts for a decrease in equipment costs, an increase in carbon credit, and an increase in utilization to year-round, could set the price of hydrogen as low as \$2.83/kg.

All the equipment in the design meets code and safety standards set by various regulating organizations. Hydrogen embrittlement could be an issue if the pipeline does not meet the standards set by AMSE B31.12. However, NW Natural's upgraded pipelines fall within standards that indicate it should not be affected by low concentrations of hydrogen. Explosion risk is not increased when blending natural gas with up to 10% hydrogen. The low concentration of hydrogen in the natural gas should not change leak detection procedures.

There are currently no policies or standards that specifically address hydrogen-blended natural gas. However, using the Wobbe Index, concentrations of up to 35% by volume of hydrogen would have no effect on current natural gas appliances. Up to 8.7% by volume of hydrogen gas is allowed according to the energy content limits set by the Oregon Public Utility Commission.

We recommend that a hydrogen power-to-gas system be placed at Miller Station in Clatskanie, OR to facilitate a large-scale long-term energy storage solution for Oregon. To make the project economically possible, we propose that enrollment in a premium price per therm program should be offered to customers. We also recommend NW Natural install hydrogen sulfide monitoring and treatment equipment at their Mist Site, and that further investigation on hydrogen embrittlement be done by the research community.

3 INTRODUCTION

Regulatory bodies around the world, encouraged by public opinion, are trending toward mandating the use of carbon-free energy within their districts. This trend, which is clear on the west coast of the US, is driven by concerns regarding climate change and global warming. The State of Oregon, for example, has set a Renewable Portfolio Standard (RPS) that requires at least 50% of the electricity consumed in the state be generated from renewable sources by the year 2040. Even more strict, the city of Portland (the largest metro area in Oregon and home to 640,000 people) has committed to using 100% renewable *energy* by 2050 [1],[2]. These constraints show the importance that the state, and its citizens, place on moving away from carbon-emitting energy sources.

Currently, 6% of the electricity generated within Oregon's borders is derived from renewable sources, defined federally as "solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, and *new* hydroelectric" [3],[4],[5]. *Old* hydroelectric facilities (those built before 1995) account for over 60% of Oregon's electricity generation, and as such are not considered renewable [1]. Therefore, in order to meet the RPS regulations, utility-led renewable energy projects are under construction around the state.

Integrating renewable energy sources that often exhibit inherently variable output has been difficult since Oregon's largest energy generators (hydro facilities) are seasonally variable themselves. Snowmelt during spring causes rivers in the state to run high, which increases hydroelectric production. However, spring in Oregon is relatively temperate and does not require a large heating or air-conditioning load. This combination of low power demand and high production leads to production-demand mismatch and electrical generation curtailment. Even at the current low level of 6% renewable penetration, curtailment has been an issue for the state.



Figure 1: BPA Curtailed Energy, 2017

In 2017, the Bonneville Power Administration (BPA) curtailed 139,000 MWh of renewable energy between the months of March and July, Figure 1 [6]. This represents enough energy to power 155,000 homes for one month [7]. An increase in renewable generation of up to 50% (RPS requirement) is expected to exacerbate curtailment issues significantly.

Winters in Oregon, contrary to the spring, require large heating loads (natural gas usage is eight times higher in the winter than summer) and see relatively low levels of hydroelectric generation. This production-demand mismatch is usually made up for by using natural gas (NG) for heating. However, fossil-derived natural gas will not be an acceptable energy source for the city of Portland under the new regulations. This presents a problem for the future

scenario in which the renewable generation fleet cannot supply enough power to heat homes in Portland. To mitigate this issue, Oregon needs a long-term energy storage solution to shift available renewable energy from the spring to the colder winter months.

Several energy storage technologies are available, including compressed air energy storage, pumped hydro, power-to-gas hydrogen and power-to-gas methane. Figure 2 shows a comparison of different storage methods and their capabilities [8]. In California, solar energy that exceeds the power demand during the day is stored in batteries to use later in the evening when the sun goes down and residential electricity demand is highest. Batteries are great for short-term utility shifts, but are not practical for utility shifts longer than a few hours due to their self-discharging rates [9]. Although batteries could satisfy the short-term intraday storage needs for Oregon, and other northern climates, this solution is not practical for long-term storage for seasonal shifting needed in the region [10].

A technology that shows promise for long-term energy storage is power-to-gas, which converts renewably-generated electricity into chemical energy that is stable and can be stored for long durations. Power-to-gas technology uses electricity to split water molecules into hydrogen gas and oxygen gas, after which, the hydrogen gas can be stored for later use [11]. Pumped hydro is the only other energy storage



Figure 2: Storage Technologies and Power / Energy Characteristics

technology that is capable of storing large amounts of energy for long durations. However, it requires large amounts of water and land, resources that are themselves hard to come by. This is not feasible in Oregon.

This report will document the design of a power-to-gas system used to seasonally shift energy from times of high renewable generation and low demand (spring in Oregon) to times of high heating load and low generation (winter in Oregon). This case study is suitable for northern climates and provides a contrast to the California battery-driven daily shifting model.

4 SYSTEM DESIGN

This section details the design efforts undertaken by the team, including: preliminary research, system selection, components of the selected design, and system operation and maintenance.

4.1 PRELIMINARY RESEARCH AND SYSTEM SELECTION

The first step of our design process was gathering information on power-to-gas technology and familiarizing ourselves with hydrogen production via electrolysis. A literature review revealed that several European nations are currently injecting hydrogen, produced through electrolysis, into their natural gas networks [12],[13]. These projects are utilizing hydrogen at up to 10% in their natural gas systems, indicating that hydrogen injection for long-term energy storage is feasible [12]. The Netherlands is currently investigating the feasibility of storing hydrogen-enriched natural gas underground [12]. However, to the best of our knowledge, no one has stored hydrogen-enriched natural gas underground for long-term energy storage.

With this information, we spoke to NW Natural and discussed their distribution network system. We learned about their system's components and constraints, and how power-to-gas technology might fit in with their current operations. It was determined that a pilot-scale project (~ 0.5 MW_{electric}) would be beneficial for multiple reasons: 1) to prove out the technology on their grid and identify any issues for grid-level adoption, 2) to allow policy-makers and regional energy developers to get "hands-on" proof of the technology to spur support.

With a size in mind, the next step was to research commercially available electrolyzers. An electrolyzer is a device that performs electrolysis, which is the process of splitting water molecules into hydrogen and oxygen gas using electricity. There are three electrolysis technologies available: alkaline, proton exchange membrane (PEM), and solid oxide [14]. Of the three, alkaline electrolysis and PEM electrolysis are commercially available. Although alkaline electrolysis is less expensive and has higher nominal efficiency (70% compared to 63% of PEM electrolysis), the quick ramp-up time of PEM electrolyzers makes them more suitable for responding to fluctuations in stochastic renewable energy generation, which is what an electrolyzer operating in the Pacific Northwest would likely respond to [15].

After conducting a national technology survey, three commercially available electrolyzers were identified: the ITM Power HGas1000, the Proton On-Site M Series, and the Hydrogenics HySTAT60. Effort was made to establish contact with each of these companies. Proton On-Site was the most responsive, and their M100 satisfied the pilot-scale project's size requirement of 0.55 MW. It also has a quick ramp-up rate (<5 min from off state and <10 sec from minimum to full load). The HGas1000 runs at almost double that electrical consumption rate and the next smallest unit from ITM Power only consumes ~360 kW. The Hydrogenics HySTAT60 is the largest unit that Hydrogenics offers and only consumes ~300 kW. For these reasons, we decided to select the Proton On-Site M100.

4.2 SYSTEM OVERVIEW AND O&M

The three main components of the system are the electrolyzer module, the compressor, and the underground natural gas storage facility. The electrolyzer module, which houses the electrolyzer stacks, will take water and renewably-generated electricity and produce hydrogen gas. The hydrogen will move into a compressor and then be injected into the natural gas pipeline. The natural gas will flow toward the underground natural gas storage facility and will be injected at the reservoir wellheads. There, the hydrogen-enriched natural gas will stay for months until winter, when heating loads are higher. When demand for natural gas increases in the colder months, NW Natural will withdraw the stored gas and place it on its feeder pipelines, delivering hydrogen-blended natural gas to consumers in large cities like Portland.



Figure 3: System Overview

4.3 ELECTROLYZER MODULE

Electricity enters the M100 electrolyzer module through the motor control center, which distributes power to all electronic components. Water undergoes a reverse osmosis/deionizing process in the site facility before entering the module at the O_2 & Cooling Management skid. It is stored in the water tank above the H₂ Production skid, and pumped through the system for cooling. During hydrogen production, the water enters the electrolyzer cell stacks in the H₂ Production skid and is split into oxygen and hydrogen. The oxygen is diverted back to the O₂ & Cooling Management skid and vented out of the container. The hydrogen moves to the H₂ Gas Management skid where it is separated from the water that leaves the cell stacks with it, and where flow, temperature, and pressure are managed. For additional purification, the hydrogen moves through the H₂ Dryer before exiting the electrolyzer module. Having a minimal amount of water vapor is important in injecting hydrogen into the natural gas pipeline. With the presence of water, ice-like natural gas hydrates can form, creating blockages in the natural gas grid [16]. The hydrogen produced leaves the module at 3000 kPa, and will travel to the compressor in tubing that adheres to ASME B31.12 [17],[18].

Table 1: M100 Specifications

Electrolyte	Proton Exchange Membrane
Hydrogen Production	225 kg/24h
Delivery Pressure	3000 kPa
Hydrogen Purity	> 99.9% Water Vapor < 500 ppm, N2 < 2 ppm, O2 < 1 ppm, All others undetectable
Hydrogen Purity with Optional High Purity Dryer	ISO 14687-1:1999 Type 1 Grade C / ISO 14687- 2:2012 Type 1 grade D > 99.9995% Water Vapor < 2 ppm, N2 < 2 ppm, O2 < 1 ppm, All others undetectable
Power Consumption at Cell Stacks	0.51 MW
Power Consumption at System	0.55 MW
Power Consumed per Mass H ₂ Produced	59 kWh/kg
Electrical Specification	Typical Installation: 10 kV and 20 kV, 3-phase + neutral, 50 Hz/60 Hz
Start-Up Time (from Off State)	<5 min
Turndown Range	10 to 100% (Input Power Mode); 0 to 100% (H2 Demand Mode)
Ramp-Up Time (Minimum to Full Load)	<10 sec
Ramp Rate (% of Full-Scale)	\geq 15% per sec (Power Input Mode)
Water Consumption Rate	93 L/h
Maximum Inlet Flowrate	187 L/h
Water Temperature	5 °C to 40 °C
Input Water Quality	ISO 3696 Grade 2 Deionized Water required, < 1 micro Siemen/cm (> 1 MegOhm-cm) ISO 3696 Grade 1 Deionized Water recommended, < 0.1 micro Siemen/cm (> 10 MegOhm-cm)
Mass of Water Circulation Skid	5163 kg
Mass of H ₂ Gas Management Skid	909 kg
Mass of Power Conversion Assembly	6500 kg
Mass of motor control center (MCC)	909 kg
Mass of Controls	300 kg
Dimensions of Water Circulation Skid (W x D x H)	7197 mm x 820 mm x 2563 mm
Dimensions of H ₂ Gas Management Skid (W x D x H)	3317 mm x 575 mm x 2083 mm
Dimensions of Power Conversion Assembly (W x D x H)	6200 mm x 1200 mm x 2850 mm
Dimensions of MCC (W x D x H)	2032 mm x 549 mm x 2210 mm
Dimensions of Controls (W x D x H)	1550 mm x 382 mm x 2190 mm
Storage/Transport Temperature	5 °C to 60 °C
Ambient Temperature Range	10 °C to 40 °C

The electrolyzer package from Proton On-Site includes a reverse osmosis/deionizing (RODI) unit to supply the lab-grade water the system needs [17]. The RODI unit occupies a footprint space approximately 1.2 m x 2.4 m [19]. Assuming the RODI unit is 25% efficient, it requires 372 L/h of water input when the

electrolyzer is running at full power. Excluding the RODI unit and the compressor, the entire electrolyzer module is housed in a 12.2 m x 2.4 m container to be placed outdoors [20]. Additional specifications of the electrolyzer module can be found on Table 1 [21],[17].



Figure 4: Key Features of the M100

Figure 4 highlights some of the key features of the M100 [17]. The heat exchanger and the water circulation pump work together to regulate the temperature of the system. The cell stack is the actual electrolyzer that will produce hydrogen gas. The hydrogen and oxygen phase separators limits the water that is delivered with the hydrogen and oxygen from the cell stack. The hydrogen gas management system controls the quality of the hydrogen as it leaves the module. The combustible gas detector monitors hydrogen gas levels in the module container and alerts operators if there is a leak.

4.3.1 Electrolyzer O&M

The operation of the M100 is designed to be fully automated with remote monitoring and control [17]. The controls unit is included in the package, is located inside the container, and will be monitored by the same staff that monitors the selected NW Natural site. Yearly maintenance is required and maintenance kits for the electrolyzer and RODI unit are available for purchase. Purchasing a kit of spare parts is recommended every two years. An annual preventative maintenance service is also recommended, which includes parts, labor, and is performed by a Proton On-Site trained and certified field service engineer [22].

4.4 COMPRESSOR

The M100 is capable of electrochemical compression of up to 3000 kPa, greatly reducing the required compression power. If additional compression is needed, Proton On-Site offers a hydrogen-rated compressor to compliment the electrolyzer module. A hydrogen compressor for a system this size is expected to be slightly smaller than 2.57 m x 3.47 m, which is the footprint of a compressor sized for the larger M400 model. Its input requirement is 480 VAC, 3-phase. It's assumed to have enough power to compress hydrogen from 3000 kPa to 3620 kPa, to inject into a 3450 kPa NG pipeline. To estimate the compressor's power consumption, we calculated the specific work (w) required for isentropic compression, assuming steady-state operation, hydrogen is an ideal gas, and that changes in kinetic and potential energy can be neglected. We chose isentropic compression to give the most conservative estimate. This calculation

is a relationship between the ratio of specific heats of hydrogen ($k = c_p/c_v$), gas constant of hydrogen (R), inlet temperature of the hydrogen (T), inlet pressure (P₁), and exit pressure (P₂).

$$w = \frac{kRT}{k-1} \left[\frac{P_2^{k-1/k}}{P_1} - 1 \right]$$

Using hydrogen's ratio of specific heats k = 1.4 (from the Engineering Equation Solver) [23]), R = 4.124 kJ/(kg * K), $P_1 = 3000 kPa$, $P_2 = 3620 kPa$, and assuming the initial temperature of hydrogen to be T = 20 °C, the work required to compress the hydrogen is 233.3 kJ/kg [24]. Using the M100's production rate of 9.375 kg/h, the compression would require a power consumption of 0.6076 kW during operation [17].

The compressor will connect to the NW Natural pipeline network using tubing that meets ASME B31.12 standards. For injection, a check valve will be utilized to allow higher-pressure hydrogen to enter the lower-pressure pipeline, but prevent natural gas from back flowing from the pipeline into the compressor.

4.4.1 Compressor O&M

Since the compressor is included in the package from Proton On-Site, it is assumed the compressor is controlled by the same control unit inside the electrolyzer module, making it fully-automated and remotely monitored and controlled as well. We also assume maintenance will be included in the annual maintenance program.

4.5 UNDERGROUND NATURAL GAS STORAGE FACILITY

The underground storage facility for this project is the Mist Site in Mist, OR, which is controlled by NW Natural. The Mist Site has several depleted natural gas reservoirs with a working capacity of 453,100,000 m³ [25]. Figure 5 shows the wind and solar power plants in Oregon and the location of the Mist Site, which is 60 miles northwest of Portland [25],[4]. Currently, the reservoirs are used as intermediate energy storage facilities for the state. Oregon's natural gas consumption increases by 8-fold in the winter versus the summer, and the interstate pipeline cannot currently support this winter capacity. To mitigate this, NW Natural buys natural gas in the spring and summer months and stores it in the depleted reservoirs. This gas is then pulled out during the winter and is used for heating. Figure 6 shows that these months of gas buying for the Mist Site coincide with BPA's months of curtailment in 2017 [25],[6],[26]. This indicates that there is capacity to store hydrogen generated by springtime overgeneration of renewable electricity.



Figure 5: Natural Gas Underground Storage, Solar Power Plants, and Wind Power Plants in Oregon



Figure 6: BPA Curtailment and Total Mist Site Inventory Coincidence, 2017

4.5.1 Underground Natural Gas Storage Facility O&M

Operation and maintenance of the Mist Site will not be altered by the production and addition of hydrogen from a system of this size, and NW Natural can continue with their usual procedures.

4.6 Hypothetical Hydrogen Production from 2017 Curtailment

The smallest amount of energy BPA's oversupply management protocol (OMP) requested for any hour of curtailment in 2017 was 1 MWh. With the system sized at 0.55 MW, it could run at full power for



every hour of curtailment. This system, along with its compressor, would be able to use 0.12% of the total curtailment. Figure 7 shows a range of potential system sizes and the percent of curtailment they would have been able to use in 2017. While the proposed system could only utilize a small amount of the curtailment, this demonstration-sized system is primarily intended as a proof of concept. If successful, a larger system will be necessary to utilize the large amount of curtailed electricity expected in future energy mixes.

If all 304 hours of curtailment were utilized, the M100 would produce 2,850 kg annually. Assuming the underground storage facility was filled with NG at 20 °C and 101.325 kPa, this addition of

Figure 7: Cumulative Percent of Curtailment Utilized by System Size

hydrogen would result in a volume percentage of 75 ppm, or 0.0075%.

5 SITING

This section details the siting requirements for the project and their weighting. The proposed sites are listed, information for each location is summarized, and site preparation costs are explained. A decision matrix used to determine the final site is found at the end of this section.

5.1 REQUIREMENTS

After discussion with NW Natural and Proton On-Site, six key criteria were identified. The general requirements for the project site are: 1) access to electricity, 2) access to water, 3) ample indoor space available for the water filtration system and compression unit, 4) ability to transport the generated hydrogen to the depleted reservoirs for storage, 5) minimal preparation costs, and 6) public access so that policy makers and energy developers can get a "hands-on" appreciation of the system. These will be briefly discussed in turn.

5.1.1 Electricity Requirement

The site needs to be able to provide enough power for the electrolyzer and the compressor simultaneously at each unit's required voltage. The M100's power requirements are 0.55MW with a voltage between 10 kV and 20 kV, 3-phase power, at 50 Hz/60 Hz [17]. The compressor will require 3-phase 480VAC, and the power requirement will depend on the compression needed for injection at the different potential sites [19].

5.1.2 Water Requirement

The electrolyzer module requires highly filtered water for operation (ISO 3696 Grade 1 or Grade 2). This water is provided via a reverse osmosis deionization (RODI) module sold as part of the M100 package. The electrolyzer consumes 93 L/h of filtered water from the RODI unit during operation [17]. Assuming the RODI is 25% efficient, it will require 372 L/h from the project site during operation.

5.1.3 Space Requirement

The site needs to have enough space for the container that houses the electrolyzer unit, compressor, and additional water well, if needed. The M100 is housed in a container with a 12.2 m x 2.4 m footprint [17]. The compressor will occupy a little less than 2.57 m x 3.47 m [19]. If a well is needed on the site, a pump system sized at about 1 m x 1 m will suffice [27]. If there isn't enough space on the existing chosen site, NW Natural may need to purchase land adjacent to the site.

5.1.4 Ability to Transport Hydrogen to Mist

The project site must be in a location where the natural gas in the pipeline is flowing toward the Mist Site for storage during these months. The ability to store the produced hydrogen in the Mist reservoirs is a key component of the energy storage plan.

5.1.5 Minimizing Preparation Costs

Minimizing site preparation cost is important for any project, and we have included it in the siting requirements. Since different sites have their own preparation requirements (like water well installation and power line upgrades), and costs could vary widely, this site requirement ranks the sites based on the cost of preparing the sites for the project.

5.1.6 Convenient Access

The site needs to be within a reasonable drive from NW Natural's headquarters in downtown Portland to allow for public access, so visitors can see the technology in action and have the opportunity to learn more about hydrogen power-to-gas and energy storage. This can help in adopting hydrogen power-to-gas as part of the solution to move toward renewable energy for the future. Since mileage between each of the sites to the headquarters involves different driving scenarios, like driving through cities in traffic and winding through mountain roads, drive time is considered a better measure than actual mileage for this site requirement. We required the drive time to be less than an hour and a half from NW Natural's headquarters.

5.2 **REQUIREMENT WEIGHTING**

We evaluated each site on a scale from 0 to 5, with four choices, 5 being the best choice for the requirement and 0 meaning the requirement cannot be fulfilled. One hundred points were distributed between the requirements according to how important they were to site the project. Access to electricity, access to water, and having enough space for the system were all weighted at 20 points each. If any of these three requirements are missing, hydrogen production would not be possible. Requiring that the NG is able to flow toward the Mist Site has a weighting of 15 points. Although it is an important part of the system design, it was weighted less than the previous requirements because hydrogen production can commence to make use of curtailed energy regardless of which way the natural gas is flowing. However, if the hydrogen-enriched natural gas does not flow toward the Mist Site, it cannot be seasonally stored, which is the intended application of the system. Minimizing site preparation cost was also given 15 points. Lastly, public accessibility was given a weighting of 10 points. The system's success does not depend on how accessible the project site is from NW Natural's headquarters, but it is an important aspect of this project and is included in the siting. After many conversations with the local utilities at each proposed site, information was gathered about each location. Table 2 summarizes this information.

5.3 PROPOSED SITES

After conversation with NW Natural, four possible project sites were identified in their network: Molalla Gate in Canby, OR; Deer Island Gate in Rainier, OR; Miller Station in Clatskanie, OR; and an undeveloped site in Newberg, OR. Aerial shots of each location, from Google Maps, can be seen in Figure 8 through Figure 11.



Figure 8: Satellite View of Molalla Gate



Figure 10: Satellite View of Newberg Site



Figure 9: Satellite View of Deer Island Gate



Figure 11: Satellite View of Miller Station

5.4 EXPLANATION OF SITE PREPARATION COSTS

5.4.1 Cost for Well Installation

Of the four sites, only Miller Station has water service, which is provided by well #95426. Molalla Gate and the Newberg Site are in areas where water access is obtained by drilling and installing a well pump system. Wells #99824 and #112591 from Gingerich Farms, and well #99820 from Highland Meadows Nursery near the Molalla site, average a well depth of 98.1 m. A local drilling contractor in the area concluded that a well depth of only 42.7 m would be required for a system requiring much less water throughput than the neighboring farmlands do, and this depth was used to determine the cost per length of drilling service [28]. Although the contractor provided us with the depth information, we were unable to obtain a quote. Wells #60734, #87153, and #118265 in the residential area near the Newberg site average a well depth of 43.6 m. We also could not obtain a quote from local drilling contractors in the Newberg area. The Deer Island site is not near a well to compare water table depth with, but we assume the depth depth required is the same as the Newberg site for calculating the cost of a well installation. For the cost of the drilling service, we took a high estimate of \$50/0.3 m and added in the cost of a mid-range pump system of \$11,750 [29]. The cost for installing a well on site is \$18,750 for Molalla Gate, \$18,900 for both the Newberg site and Deer Island Gate, and \$0 for Miller Station.

Table 2: Information Found for Siting

	Proposed Site					
Requirement	Molalla Gate	Deer Island Gate	Newburg Site	Miller Station		
10 kV or 20 kV, capacity increase of 0.62 MW	Since this site is outside of the city limits, and outside of Canby Utility's service area, Portland General Electric is the power service provider [30]. PGE confirmed power service to the site, but would not provide the details of the service available [31]. The closest transmission line is ~5 km away [4].	Columbia River People's Utility District provides power service within the city limits of Rainier, OR. Although this site is outside of the city limits, one of the provider's lines runs along the highway on which it is located. 12.47 kV service is available, and to meet the capacity needed, lines from two feeders a few miles away need to be tied together and brought to the area. This upgrade would need a few dozen new poles to bring the line over. A system impact study, over the course of a few months, would need to be done to determine if the required power service could be provided by the existing scheme. If possible, the cost of bringing power to the site could decrease significantly [32]. The closest transmission line is ~8 km away [4].	Portland General Electric services the area this site is in. There is currently no power service at the site [31]. The closest transmission line is ~6.5 km away [4].	West Oregon Electric Co-op provides power service to this site. Upgrades are needed to meet the requirements of the electrolyzer module [33]. The closest transmission line is ~9.5 km away [4].		
>372 L/h water availability	Since this site is outside of the city limits, a water well needs to be installed on the site [30]. Neighboring farms have high- yielding wells, much higher than needed for this project [34]–[36]. A well installation will yield enough water for the electrolyzer.	Since this site is outside of the city limits, a water well needs to be installed on the site [37]. Expected yield in the area is unknown.	Since this site is outside of the city limits, a water well needs to be installed on the site. Wells in the area have enough yield to satisfy the requirement [38]–[40].	There is a well on site, well ID#95426. According to the most recent well log, it yields 6800 L/h [41]. This is more than enough to satisfy the requirement.		
40'x8' footprint, plus space for additional components is available	Space is limited due to area classification zones , but a satellite view of the site shows there may be room for an electrolyzer unit [19][42]. It would be difficult to find space within the site for a compressor and a well. Expansion of the site may be difficult since it is surrounded on three sides by farmland, and is bordered by a road on its fourth side.	Space is very limited within the existing fence due to recent improvements that include a new odorant tank and pig launchers [19]. There does not seem to be any space available for the container, compressor, and well [43]. The Columbia Land Trust owns the surrounding land, and it may be difficult to buy land for this project since their work is primarily land preservation.	There is enough space on site for all components [44]. However, NW Natural does not own the land, and it is unclear if they still own the natural gas line on the property [19].	Space is limited inside the station due to recent and planned improvement projects, but land outside the perimeter may be available from one of the land owners adjacent to the station [19], [45].		
---	--	---	--	---		
Pipeline flows toward Mist, OR in the spring	Molalla Gate is a primary receipt/delivery point for Mist storage [11]. Storage in the Mist facilities occurs in the spring and summer months, so flow through this site will go toward the underground reservoirs in Mist, OR [19].	Deer Island Gate is a primary receipt/delivery point for Mist storage [11]. Storage in the Mist facilities occurs in the spring and summer months, so flow through this site will go toward the underground reservoirs in Mist, OR [19].	The Newberg site is at the end of a 4970 kPa pipeline that feeds a 2070 kPa system that distributes gas to serve Newberg, OR [19]. This flow is away from the direction of the Mist reservoirs, and further investigation is needed to conclude whether the hydrogen produced at this site can be delivered to Mist [19].	Miller Station is the station adjacent to the Mist storage facilities. Natural gas that is injected or withdrawn from the reservoirs can pass through this station [19].		
Within 1.5h drive from NW Natural headquarters	1h 10min Drive	55min Drive	1h 5min Drive	1h 25min Drive		
Preparation Costs	\$592,230	\$933,630	\$763,005	\$1,086,981		

5.4.2 Cost for Power Service

Portland General Electric (PGE) provides power service to the area that Molalla Gate and the Newberg site are in. PGE confirmed that Molalla Gate has power service, but we were unable to obtain details about the voltage and capacity for the site from PGE. We were also unable to obtain an estimate on installing power service to the Newberg site from PGE. West Oregon Electric Co-Op currently provides power service to the Miller Station. We were able to speak with an engineer who explained a possible solution to obtaining the required power service, and who also insisted that an engineering study on their system would be required to analyze the solution's feasibility. We were unable to obtain a quote for this service upgrade to the station. Columbia River People's Utility District controls the power line that runs along the highway right in front of the Deer Island Gate. They were able to confirm that the site currently does not have power service, but installing 3-phase service with 12.47 kV is possible. The field engineer we spoke to said a system impact study would need to be done over months to determine if their current system can provide the capacity needed. Without that study, he provided a rough estimate of \$910,000 for a solution to provide the capacity needed by tying lines from two feeders 8 km away and bringing in powerlines, requiring a few dozen new powerline poles, to the site. Since this is the only estimate we obtained, we used \$113,750/km, along with each site's approximate distance from the nearest transmission line, to estimate the cost of providing the required power service to each of the sites. The approximate distances to the nearest transmission line are 5 km for Molalla Gate, 8 km for Deer Island Gate, 6.5 km for the Newberg site, and 9.5 km for Miller Station [4]. Using these distances, the estimated cost of access to electricity is \$568,750 for Molalla Gate, \$910,000 for Deer Island Gate, \$739,375 for the Newberg site, and \$1,080,625 for Miller Station.

5.4.3 Cost for Compressor Building

Since the compressor provided by Proton On-Site is sized for each module in the M Series, it would be the same regardless of where the system is located. It would require a compressor building of the same size at each site, and therefore incur the same cost. Using the compressor power consumption estimation stated previously in section 4.4 and an estimate of \$2295.80/kW cost for compressor buildings, and taking the highest value among the sites, we get \$4730 for a building to house a compressor [46].

5.4.4 Cost of land

If there is not enough footprint space for the electrolyzer module, compressor, and well, acquiring a quarter-acre of land would be enough for the system and additional components. Based on the average land value of Oregon in 2015, this would add an additional cost of \$1625.75 for undeveloped land acquisition [47].

5.5 SITING RESULTS

The results from the decision matrix in Table 3 show that Miller Station will be the most suitable site for the project.

Table 3: Decision Matrix

Customer Requirements/General Requirements	Engineering Requirement	Scale	Weight	Proposed Site				
				Molalla	Deer Island	Newberg	Miller	
Access to electricity for	10kv or 20kv, greater than	5 - Power lines available, voltage and capacity met	20	3	1	1	3	
electrolyzer	consumption rate	3 - Power lines available, upgrades or transformer needed to satisfy requirement						
		1 - No power transmission, need to install lines						
		0 - Voltage and capacity cannot be met						
Access to water	>372L/hr of water	5 - Water meets quantity and quality requirements	20	1	1	1	5	
		3 - Water access is available, but upgrades are needed to satisfy requirement						
		1 - No water access, needs new infrastructure						
		0 - Cannot make water accessible, need tank and driver						
Space for the system is available	40'x8' footprint, and space	5 - There is enough space	20	1	1	5	3	
	is available	3 - There is not enough space on site, but it is likely land can be acquired						
		1 - There is not enough space on site, but it may be difficult to acquire land						
		0 - There is not enough space on site, and land cannot be acquired						
Can store hydrogen in reservoirs from site	Pipeline flows toward Mist	5 - Pipeline flows toward Mist in the spring, or toward Mist most of the time	15	5	5	0	5	
		3 - Pipeline flows both ways, but evenly or unpredictably						
		1 - Pipeline flows both ways, but mostly away from Mist						
		0 - Pipeline only flows away from Mist						
Accessible from NW Natural	Within 1 hour and 30	5 - Within a half hour drive from NW Natural headquarters	10	1	3	1	1	
neauquarters	Natural headquarters in	3 - 0.5-1 hour drive from NW Natural headquarters						
	Portland, OR	1 - 1-1.5 hour drive from NW Natural headquarters						
		0 - Over 1.5 hour drive from NW Natural headquarters						
Minimize Preparation Costs	Rank sites in order of	5 - Incurs least amount of preparation costs	15	3	5	1	0	
	preparation costs	3 - Incurs second to least amount of preparation costs						
		1 - Incurs second to most amount of preparation costs						
		0 - Incurs most amount of preparation						
			Totals:	230	240	165	305	

6 ENVIRONMENTAL ANALYSIS

2017 was the second warmest year on record with global temperatures at 0.9° C above the 1951-1980 mean [48]. This is partly due to carbon dioxide (CO₂), a heat trapping greenhouse gas whose current level of 407.62 ppm as of December 16th 2017 is at the highest concentration levels in 650,000 years [49]. Much of this rise can be attributed to human factors such as the burning of hydrocarbons to produce electricity and heat.

Environmental concerns are regulated federally by the Environmental Protection Agency (EPA). Oregon also has several specific regulatory agencies, namely the Oregon Department of Environmental Quality (DEQ), Oregon Department of Fish and Wildlife (ODFW), and the Oregon Health Authority (OHA) [50]. Special consideration was given to the standards upheld by these agencies when examining the environmental impact of the proposed system.

Our proposed design will eliminate some of these CO_2 emissions by replacing a portion of the hydrocarbons in natural gas with clean burning hydrogen. That is not to say there will not be any negative environmental impacts, though the benefits far outweigh the costs. Other concerns include water usage, the potential for a hydrogen sulfide by-product, and indirect greenhouse gas effects.

6.1 WATER USAGE

Water is a vital component to the continuation of life on earth and so may be treated as a precious resource, the allocation of which is limited. To analyze the impact of adding a new water consuming process to the current Clatskanie water grid we looked at the amount of water the electrolyzer will use, the source of that water, historical water restrictions, and affected wildlife.

The system uses 372 liters of water per hour at maximum production [52]. Using only the 304 curtailed electricity hours reported in 2017 yields 113,088 liters of water per year. To put this into perspective we used the concept of virtual water, which looks at the entire life cycle of a product and the amount of water necessary to create, process, and distribute it [54][55][55]. A plain cheeseburger requires 2,714 liters of water to produce [56]. Therefore, it can be said that the electrolyzer uses roughly 42 cheeseburgers worth of water every year.

Miller Station receives water via a well which may have an indirect effect on the city of Clatskanie's water supply, particularly during drought conditions. Wells can disrupt groundwater flows and introduce contaminants into adjacent water supplies [57]. Since the well is already in place it is assumed to be in compliance with the clean water act, ensuring the risk of contamination to be minimal [58]. The location is not an area typically associated with drought, though historically there have been drought conditions as recently as 2002 [59]. Special care will be taken to monitor water use during times of scarcity.

Because the well may disrupt groundwater flows, we considered the ODFW list of endangered and threatened wildlife which contains several species that may be affected by water use in the area [60]. The Coho salmon is considered endangered in Oregon and has a critical habitat area that includes West Creek and Roaring Creek, where the city of Clatskanie harvests drinking water [61][62]. Other endangered species migrate through the adjacent Columbia River gorge and may be affected by excessive water use.

The low water use of the electrolyzer is expected to have a minimal environmental impact on current water resources. During droughts it may be necessary to minimize or stall use of the equipment in favor of conservation. The impact on fish and wildlife will be monitored though adverse effects are not expected. Excessive water use may influence water levels in the city of Clatskanie's reservoirs, though this effect will be minimal.

6.2 HYDROGEN SULFIDE

Hydrogen sulfide is a toxic and corrosive compound. It may be formed when hydrogen is stored in depleted mines due to the presence of sulfate-reducing bacteria, as covered in section 8.5 Hydrogen Sulfide [63]. The environmental impact is mainly attributed to health concerns due to this toxicity.

Health concerns arise because "[h]ydrogen sulfide is both an irritant and a chemical asphyxiant with effects on both oxygen utilization and the central nervous system" [64]. Exposure can include symptoms ranging from mild irritation of eyes, lungs, and throat, to coma and death. Symptoms may appear at concentrations as little as 2 ppm and instant death will occur at 1000-2000 ppm [65].

The United Nations global warming potential (GWP) index, a list of pollutants recognized for their effect on climate change, does not list hydrogen sulfide as a contributor to global warming. It does appear on the EPA's original list of pollutants, but was later redacted and moved under accidental release provisions [66][67]. This provision is handled by the Chemical Emergency Preparedness and Prevention Office (CEPPO) and requires an emergency plan for the accidental release of hydrogen sulfide [68]. This plan is already in place as it is required for all currently operating natural gas mines.

Many states have additional regulations regarding the amount of hydrogen sulfide that can be found in the ambient air. Restricted concentrations are extremely low, largely related to the strong odor, described as rotten eggs. California, for example, restricts hydrogen sulfide to 30 ppb [69]. The Oregon DEQ does presently have this restriction, though it is working with the OHA to update the existing 24 hour toxic screening levels to include hydrogen sulfide at 98,000 ng/m³ (68.7 ppb) [70] ,[71].

At low hydrogen concentrations our design is not expected to raise hydrogen sulfide levels. However, the scalability of the project may be affected so it is imperative that the system be monitored and daily quality checks be continued to ensure safe levels are maintained.

6.3 INDIRECT GREENHOUSE GAS EFFECT

Hydrogen is not included on the EPA's list of toxic or priority pollutants suggesting it is not classified directly as a pollutant [72]. Studies would argue hydrogen may have a secondary, indirect effect on climate change. This is mainly due to the interaction of hydrogen with hydroxyl radicals (OH) in the Earth's atmosphere to produce water vapor, inhibiting the natural process of decomposing greenhouse gases [73],[74]. While this may counteract potential CO₂ reductions, it is an unofficial environmental impact and will not affect the potential carbon tax reduction.

The Global Warming Potential (GWP) is an EPA standard to compare the impact of various substances on climate change. Specifically, "it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO₂)" [75]. The GWP of carbon dioxide is 1 by definition, while the GWP of methane is 28 [76]. The estimated indirect value of hydrogen is assigned a GWP value of 5.8 for a 100 year period, associated only to the amount leaked into the atmosphere [73].

Hydrogen will leak through materials at a higher rate than natural gas due to its smaller size. Studies have found that at concentrations of 10% hydrogen leaked three times faster than methane through steel with the age of the pipe having no effect [77]. Other studies minimize this loss for low concentrations [78].

The average leak rate of natural gas in the United States is estimated at 1.5% of production [79]. Using this statistic as a reference, the leak rate of hydrogen is estimated to be 4.5% of the hydrogen produced. This statistic is somewhat skewed due to the use of cast iron piping, which has a much higher leak rate than the steel piping used by NW Natural. We expect the actual leakage to be lower, but will use this as a conservative baseline.

Multiplying the GWP by the amount of gas leaked yields the equivalent amount of CO_2 emissions [80]. The system is expected to create 2,850 kg of hydrogen using only 2017 curtailed hours. With an expected leak rate of 4.5% this will amount to 128.25 kg of hydrogen leaked annually [79]. At a GWP of 5.8 this equates to an equivalent 0.74385 metric tons of CO_2 each year. The maximum annual yield of the electrolyzer is 82,125 kg of hydrogen. This is a CO_2 equivalent of 3.7 metric tons.

The average CO_2 emissions per capita in the United States is 16.5 metric tons [80]. Our system is only 22.5% of the typical American's annual carbon footprint if operated at maximum capacity all year. It is also negligible (<0.5%) when compared to the amount of carbon dioxide being reduced from the atmosphere as a portion of the natural gas is replaced by hydrogen.

6.4 CARBON DIOXIDE REDUCTION

Gaseous hydrogen is a clean energy carrier that can have zero to near-zero harmful emissions when burned [82],[83]. As a portion of the natural gas is replaced by hydrogen, the amount of CO_2 produced from the burning process will be reduced.

Substance	Molecular Formula	% of Mixture
Property and the second second	Formula	Mixiure
Methane	CH ₄	93.59
Ethane	C ₂ H ₆	3.75
Propane	C ₃ H ₈	0.92
Isobutane	C4H10	0.11
Butane	C4H10	0.15
Isopentane	C5H12	0.02
Pentane	C5H12	0.02
Hexanes	C ₆ H ₁₄ +	0.01
Carbon Dioxide	C02	0.25

Table 4: NW Natural's Gas Composition % by Volume

To determine how much CO_2 is emitted by natural gas during combustion, we used the average chemical gas composition from the NW natural website as shown in Table 4 [84]. T-Butyl Mercaptan, Methyl Ethyl Sulfide, and Hydrogen Sulfide were omitted due to negligible contributions to CO_2 emissions. Also excluded are Nitrogen and Oxygen which do not form CO_2 .

As each compound is burned it combines with oxygen in the air, forming CO_2 and H_2O . The chemical balance equation for each process reveals that the molar amount of CO_2 produced from the combustion of each hydrocarbon is directly proportional to the molar amount of carbon contained in each hydrocarbon fuel. For example, the process for propane indicates that:

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

Propane's three carbon atoms form three CO_2 is true for every compound in this analysis. The amount of CO_2 formed per cubic meter of

molecules. This is true for every compound in this analysis. The amount of CO_2 formed per cubic meter of natural gas is then determined by using the equation:

Total $CO_2 = \Sigma$ (Density * Volume Percent ÷ Molecular Weight * CO_2 Conversion Rate

The resulting values for each compound are shown in Table 5. When referring to CO_2 reduction, a value in terms of mass is more common. Multiplying the total result of 4.5E-2 kmol/m³ by the molecular weight of CO_2 gives a total mass of 1.97 kg CO_2 formed per m³ of natural gas burned.

Compound	Density* (kg/m³)	HHV	Percent by Volume	Molecular Weight (kg/kmol)	CO ₂ Conversion Rate	CO2 Formed (kmol/m ³)		
Methane	0.6786	55530	0.9359	16.0425	1	3.959E-2		
Ethane	1.28	51900	0.0375	30.069	2	3.193E-3		
Propane	1.895	50330	0.0092	44.0956	3	1.186E-3		
Isobutane	2.528	49080	0.0011	58.1222	4	1.914E-4		
Butane	2.528	49150	0.0015	58.1222	4	2.610E-4		
Isopentane	2.99	48570	0.0002	72.1488	5	4.144E-5		
Pentane	2.99	48632	0.0002	72.1488	5	4.144E-5		
Other Hexanes	3.582	48310	0.0001	86.1754	6	2.494E-5		
Carbon Dioxide	1.868		.0025	44.0095	1	1.061E-4		
Total:						4.463E-2		
*Thermodynamic properties retrieved from EES database at standard conditions (1 atm of pressure and 20°C)								

Table 5: Calculation of Total CO2 formed per cubic meter of Natural Gas

We used the higher heating value (HHV) of each gas to determine how much natural gas the hydrogen would replace. HHVs are used to characterized the energy content of fuels and measures the "amount of heat released during the combustion of one gram of fuel to produce CO_2 and H_2O " [84].

The HHV of hydrogen is 141 MJ/kg [85]. For the HHV of natural gas, we used a calculated heating value of 39 MJ/m³ which can be found in 9.3 Gas Quality Standards. Dividing by the density of our mixture yields a final HHV of 37,511 kJ/kg for the natural gas.

The typical efficiency of home furnaces is 80% in standard DOE certified appliances [86]. This requires that an efficiency be applied to account for heat loss during capture.

$$Total CO_2\left(\frac{kg}{kJ}\right) = CO_2 formed \div (HHV * Efficiency)$$

The result of this calculation was then multiplied by the HHV of hydrogen to determine the amount of CO_2 emissions reduced per kilogram of hydrogen added. The results are shown in Table 6, alongside comparative calculations for coal to simulate heating with electricity produced from coal fired plants. The calculations for coal used the same process as for natural gas with bituminous coal having 137 carbons and anthracite coal having 240 carbons [87].

Substance	CO ₂ Formed	HHV (kJ/kg)	Efficiency	HHV w/ efficiency	Total CO ₂ (kg/kJ)	CO2 Reduction (kgco2/ kgh2)
Natural Gas	2.92 (kg/m ³)	37511.83	0.80	30009.46	9.74E-05	13.815
Bituminous Coal	3.12 (kgco2/kgcoal)	38000	0.30	11400	27.4E-05	38.812
Anthracite Coal	3.43 (kg _{CO2} /kg _{coal})	38000	0.30	11400	30.0E-05	42.632

Table 6. Carbon Dioxide Reduction per Kilogram of Hydrogen Produced

While the inclusion of coal is not relevant to the proposed system, it does put the potential carbon footprint reduction into perspective. If all electric furnaces currently running on coal-generated electricity were converted to hydrogen-natural gas blended furnaces, there is a potential reduction of nearly 43 times the CO_2 emissions per kilogram of hydrogen produced.

For our system, using only 2017 curtailed hours, 2850 kg of hydrogen will be produced each year. This leads to a CO_2 reduction of 39,372 kg or 39 metric tons (43 US tons) annually. If operated at full capacity all year there is a potential for 82,125 kg of hydrogen. This equates to 763 metric tons (841 US tons) of CO_2 emissions eliminated each year.

6.4.1 CO₂ Reduction Incentive

In 2007 the Oregon legislature passed House Bill 3543 which outlines greenhouse gas emission reductions to be met by a series of targeted goals. Reduction goals are set by the Oregon Global Warming Commission (OGWP) and plans are to reduce CO_2 emissions to 10% below 1990 levels by 2020 and 75% by 2050 [88]. Oregon does not expect to meet goals set for 2020 [89][90].

One method being proposed to motivate CO_2 reductions is a "carbon cap-and-trade". Senate bill 557 is currently in the review stage and outlines a new plan, including new emission reduction goals and a penalty system aimed at forcing industries to lower emissions. The bill will change reduction goals to 20% by 2025, 45% by 2035, and 75% by 2050 [91],[92].

Carbon cap-and-trade works via an allowance system where each allowance is equal to one metric ton of CO_2 or equivalent GHG. The allowances are allocated to electric utility and natural gas companies each year, with additional allowances available for purchase. The amount allocated each year will reduce over

time, while the price will rise. This creates a "cap" on the amount of GHG's emitted each year while the penalty makes it more economical for companies to remain in compliance by buying allowances [91].

No official pricing structure for the allowance system has been set, so we looked at California's cap and trade pricing structure as a model. California currently has three price tiers for administrative allowances set at \$50.69, \$57.04, and \$63.37 per metric ton with a trade market minimum price floor of \$13.57 and a historical high of \$22.45 [93]. This yields an average price of \$41.42 per metric ton in 2017. These prices increase annually by 5% plus inflation [94].

Assuming Oregon follows this trend and inflation remains steady at the current rate of 2.2% the expected price per allowance shown Figure 12 is a reasonable forecast.



Figure 12. Expected Allowance Price per Metric Ton

This forecast may be affected by the inclusion of Portland which accounts for 15.6% of the population of Oregon [95]. Portland is the first U.S. city to create a climate action plan with the goal of 40% CO_2 reduction by 2030 and 80% reduction by 2050 [96]. Both the city and county have been pushing to adopt carbon pricing and have stated that even "[i]f the state does not adopt a carbon price, the City will consider local adoption of a carbon pricing mechanism" [97]. This could lead to a higher pricing structure and increases the likelihood of CO_2 emissions costs becoming reality.

7 ECONOMIC ANALYSIS

This section examines the economic viability of the system by using a net present value model, a sensitivity analysis, payback period, and proposes a premium price per therm for hydrogen-enriched natural gas.

7.1 NET PRESENT VALUE MODEL

The net present value model considers the present worth of costs and present worth of benefits associated with a project. The annual costs and benefits from each year of the project, usually lasting the duration of the service life of the equipment for which a capital expense is included, are discounted to today's dollar value, or present worth.

Net Present Value = Present Worth of Benefits - Present Worth of Costs

The net present value shows a relationship between the rate of return and the discount rate. A NPV greater than zero shows the project will yield a rate of return greater than the discount rate used in the calculation. This indicates that a project would exceed the required return and would be a good investment. A NPV less than zero shows the project would not meet the required rate of return. When NPV is equal to zero, the rate of return and the discount rate are equal, and the required rate of return is met exactly. Since NW Natural adheres to a rate of return limited by the Oregon Public Utility Commission, the desired outcome for the NPV model, using their set rate of return as the discount rate, is a value of \$0.

For this system design, the elements that make up the net present value include capital expenses, operation and maintenance (O&M), revenue, and salvage value. As shown in Figure 13, the initial capital expense and the annual O&M expenses make up the costs associated with the project, and the annual revenue and salvage value at the end of the project's life make up the benefits.



Figure 13: Cash Flow Diagram

The capital expenses are expenses paid for in today's dollars and include costs of the components, installation costs, and site preparation costs. Since these costs are incurred at year zero of the project, they do not need to be discounted as they are measured in year zero dollars.

The major components that have an initial cost in this project are the electrolyzer module and the compression unit. The natural gas grid and the storage facility are already in place, and any costs associated with their construction are sunk costs and cannot be considered for present and future value calculations.

The installation costs include that of the compressor and the electrolyzer module, the latter divided into four parts: container installation, transformer outdoor upgrade, installation supervision, and operator training.

Site preparation costs are also divided into costs associated with the electrolyzer module and the compressor. The preparation costs for the electrolyzer module include expenses to bring water and power to the site and land acquisition for the system, if needed. The preparation cost for the compressor includes a building to house the compressor in.

Operation and maintenance costs for the electrolyzer are an annual expenditure, except the cost of spare parts, which occur every two years. To obtain the present value of the O&M costs, all the O&M costs need to be in their annual form, added together, and multiplied by the factor that determines present worth based on annuity. The O&M costs are electricity, water, spares, annual maintenance kit, reverse osmosis/deionizer (RODI) maintenance kit, cost of an operator to apply maintenance kits, and an annual preventative maintenance performed by a technician. The cost of electricity includes the electrical consumption of both the electrolyzer unit and the compression unit.

Present Worth of
$$0\&M = Annual \ 0\&M * \left(\frac{P}{A}, \%, N\right)$$

 $\left(\frac{P}{A}, \%, N\right) = \frac{(1+i)^N - 1}{i(1+i)^N}$, where $i = rate$ of return and $N = total$ years of annuity

The biennial spares need to be taken to their present value, then transformed into their annual equivalent before adding in with the rest of the O&M costs.

Annual Equivalent of Spares = Present Worth of Spares *
$$\left(\frac{A}{P}, \%, N\right)$$

 $\left(\frac{i(1+i)^N}{2}\right) = \frac{i(1+i)^N}{2}$ where $i = rate of return and N = total years of annual control of the second seco$

$$\left(\frac{A}{P}, \%, N\right) = \frac{i(1+i)^N}{(1+i)^N - 1}$$
, where $i = rate$ of return and $N = total$ years of annual cost

Present Worth of Spares

$$= Cost of Spares * [\left(\frac{P}{F}, \%, 2\right) + \left(\frac{P}{F}, \%, 4\right) + \left(\frac{P}{F}, \%, 6\right) + \left(\frac{P}{F}, \%, 8\right) + \left(\frac{P}{F}, \%, 10\right) \\ + \left(\frac{P}{F}, \%, 12\right) + \left(\frac{P}{F}, \%, 14\right) + \left(\frac{P}{F}, \%, 16\right) + \left(\frac{P}{F}, \%, 18\right)] \\ \left(\frac{P}{F}, \%, N\right) = (1 + i)^{-N}, where i = rate of return and N = each year spares are bought$$

The revenue is calculated annually, and is dependent on the amount of hydrogen produced, as well as its selling price. The annual revenue also needs to be multiplied by the same factor as above that transforms the annuity into a present value. We also factor in the carbon offset of the hydrogen produced. This concept and calculation is discussed in the Environmental Analysis section. We get the price of hydrogen by taking its energy content, multiplying it by the ratio of energy units to one US therm, and multiplying that by NW Natural's price per therm of natural gas.

Present Worth of Revenue = Revenue *
$$\left(\frac{P}{A}, \%, N\right)$$

Revenue = Price of Hydrogen * Total Hydrogen Produced + Total Hydrogen Produced
* Carbon Offset

Salvage value is a single future value that needs to be discounted back to present value for the net present value model.

Present Worth of Salvage Value = Future Salvage Value *
$$\left(\frac{P}{F}, \%, N\right)$$

 $\left(\frac{P}{F}, \%, N\right) = (1 + i)^{-N}$, where $i = rate$ of return and $N = service$ life

7.1.1 Explanation of Calculated Values Used

This project will be owned and operated by NW Natural, whose rate of return is controlled by the Oregon Public Utility Commission (OPUC) [98]. NW Natural provided us with this rate, which comes from a capital structure of 50% equity and 50% long-term debt, and it is the discount rate used in the model [11]. The rate consumers pay for natural gas is also controlled by the OPUC, and the rate per therm used in the calculation comes from NW Natural's rate schedule for residential customers [99],[100].

There are a few preparation costs accounted for in the calculation. NW Natural has a well on the chosen Miller Station site and does not need to install a new source of water for the system; the water preparation cost is \$0. The preparation of power service is a cost associated with upgrading the current power service to supply the electrolyzer system. This cost is based upon the estimate given for the Deer Island Gate in Rainier, OR and incremented as a cost per kilometer to the nearest transmission lines. The preparation of footprint includes the cost of purchasing a quarter-acre piece of land adjacent to the Miller Station and the construction of a building for a hydrogen-rated compressor. These preparation costs are discussed in detail in the section 5.4.

Fixed CostsConfidential[20]ElectrolyzerConfidential[20]CompressorConfidential[20]Installation of CompressorConfidential[20]Container InstallConfidential[20]Transformer Outdoor UpgradeConfidential[20]Installation SupervisionConfidential[20]Operator TrainingConfidential[20]Preparation of Water\$0[41]Preparation of Power\$1,080,625Calculated, [32]Preparation of Footprint\$3,180Calculated, [46], [47] Operator Otsts Confidential[20]Cost of SparesConfidential[20]Electricity Rate\$0.38/kg H2Calculated, [101][102]Carbon Offset\$0.38/kg H2Calculated, see section 6.4.1Water Rate\$0.001453/L[103]Annual Maintenance KitConfidential[20]RODI Maintenance KitConfidential[20]Operator\$7,600Calculated, [19]Price per therm\$0.8385[100]Price per therm\$0.8385[100]Price per therm\$0.55 MW[17]Consumption Rate of Compressor1 kWCalculated, see section 4.4Water Consumption Rate $372 L/h$ [17]		Value	Source
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Water Consumption Rate 372 L/h [17]	Consumption Rate of Compressor	1 kW	Calculated, see section 4.4
	Water Consumption Rate	372 L/h	[17]
Running Time 304 hours [6]	Running Time	304 hours	[6]
Hydrogen Production Rate 225 kg/24h [17]	Hydrogen Production Rate	225 kg/24h	[17]
Energy Content of Hydrogen 142,081.38 kJ/kg [104]	Energy Content of Hydrogen	142,081.38 kJ/kg	[104]
Volumetric Energy Density of 12079 kJ/m ³ [104]	Volumetric Energy Density of Hydrogen	12079 kJ/m ³	[104]
Volumetric Energy Density 0.0075% H239057.91 kJ/m3Calculated, see section 9.3	Volumetric Energy Density 0.0075% H ₂	39057.91 kJ/m ³	Calculated, see section 9.3
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Energy Content to therms 105,505 kJ/therm [83]	Energy Content to therms	105,505 kJ/therm	[83]
Rate of Return 8.1% [11]	Rate of Return	8.1%	[11]

Table 7: Values Used in NPV Calculation

The calculated operation costs are the electricity rate, operator cost, and consumption rate of the compressor. The HEF's Hydrogen Design Contest Rules page provides a base electricity rate to use in our calculations, and a premium of \$0.02 was added to ensure renewably generated electricity from West Oregon Electric Co-op is used to power the system. Proton On-Site asserts the operation and maintenance cost is expected to be 1.5% of the capital cost of the electrolyzer module. Since current operation and

maintenance costs exceed that percentage, we assumed it to be 2.5% instead, taking the difference between current costs and 2.5% of the capital cost to be the operator cost. The calculation for the compressor consumption can be found in the Siting section.

There are two calculated revenues: the carbon offset of hydrogen and the value of hydrogen according to natural gas's price per heating value. More detail, including the calculation of the carbon offset, can be found in the Environmental Analysis section.

The unit was assumed to have no salvage value at the end of its service life.

7.2 RESULTS OF NPV CALCULATION

Four cases were studied to determine NPV. Case 1 and case 2 use the curtailment hours of 2017 as the only operating hours while case 3 and case 4 run continuously for six months, from the beginning of February to the end of July. The electricity cost for case 1 and case 2 are assumed to be \$0/kWh. In BPA's Oversupply Management Protocol, its procedure to request curtailment, several actions are taken first to avoid the need to displace non-hydro generation. The first of the listed actions includes selling power at zero cost [105]. Case 1 and case 2 take advantage of this free electricity while simultaneously providing grid stability and storing clean, carbon free energy. Case 3 and case 4 also assume the energy used during 2017's curtailed hours cost \$0/kWh, and the rest of the electricity is paid for at \$0.1258/kWh. Case 1 and case 3 are calculated with the price of hydrogen set at the price of natural gas for an equivalent amount of energy. If we sold the hydrogen at this price, the price of delivered natural gas would not increase for consumers. The hydrogen is valued at \$1.129/kg for case 1 and 3 using the following calculation:

Hydrogen Value
$$\left[\frac{\$}{kg}\right] = \frac{Energy Content of 1 kg Hydrogen \frac{kJ}{kg}}{kJ to Therm Conversion Factor} * NG Price per Therm$$

Using this value, the NPV stays negative for case 1 and case 3. When hydrogen energy is valued at the same price as natural gas, the rate of return for the project is lower than NW Natural's desired rate. To allow the NPV to reach a value of approximately \$0, the price of hydrogen was increased for case 2 and case 4, Table 8. Keeping the NPV approximately \$0 ensures NW Natural does not exceed its allotted rate of return. When the price for hydrogen was increased, NW Natural's rate of return was achieved, but the price per therm of the blended gas goes up as well.

Case	Hours Running [h]	Electricity Rate [\$/kWh]	H2 Price [\$/kg]	NPV [\$]
1	304	0	1.129	-3,351,785
2	304	0	121.81	0
3	4,380	0.1258	1.129	-3,086,644
4	4,380	0.1258	8.84	0

Table 8: NPV Calculation Results

7.3 SENSITIVITY ANALYSIS

Analyzing the economic viability of this project using the curtailment hours of 2017 provides a base case from which we can evaluate how the economics are affected by changing factors. The sensitivity analysis is more relevant in investigating the future economics of the proposed system. Figure 14 shows the NPV's sensitivity to increasing and decreasing inputs by +/- 15%. Each line follows the change in the NPV as the input that represents that line is altered individually. The case used for the sensitivity analysis

is case 2, and all values, other than the input being tested for sensitivity, are held constant in the calculation. The most dramatic changes in NPV occur when the running time and the capital expenses are altered. In the future, if running time can be increased and capital expenses decreased, a NPV of \$0 can be achieved with hydrogen selling at a lower price.



Figure 14: Sensitivity Analysis of the Net Present Value

7.4 PAYBACK PERIOD

The simple payback period for this project is the capital expense divided by the expected revenue. The payback period for case 2 and case 4 are approximately the same. The capital expenses are the same, and although the O&M and the revenue are different, the price of hydrogen is adjusted to keep the rate of return the same between the two cases.

Table 9:	Payback	Period	for	Case	2 and	Case 4
----------	---------	--------	-----	------	-------	--------

Case	Payback Period				
2	9.75 years				
4	9.75 years				

7.5 PREMIUM PRICE PER THERM

Many energy providers fund their renewable energy projects by offering a premium add-on for customers interested in supporting them. NW Natural currently offers a carbon off-setting program called "Smart Energy" in which customers may enroll. This program funds projects that prevent greenhouse gas emissions, and NW Natural does not profit from any contribution made toward them. Two premium options are available: the Average Option charges residential customers \$5.50/month, and the Climate Neutral Option charges just over 10 cents for every therm of gas used [106]. Using this model as a way to fund investment in hydrogen production, we can control the value of hydrogen and adjust it to get the NPV to equal \$0. The price of hydrogen will apply toward the energy content it contributes to a therm of hydrogen-enriched natural gas. The rest of the therm that is supplied by natural gas will cost customers the normally scheduled rate. Once this new price per therm of blended natural gas is determined, the current rate for natural gas will be subtracted to determine the premium add-on customers may subscribe to in a voluntary-

style program like "Smart Energy". To calculate the premium price per therm, we assume the hydrogen and natural gas are at 20 °C and 101.325 kPa.

Using the volumetric energy density of the hydrogen-enriched natural gas (at a specific percentage), we can determine how many cubic meters of gas are needed to supply a therm of energy.

Energy Content of a Therm Volumetric Energy Density of Blended Gas = Volume of Blended Gas

The volume of hydrogen is obtained by multiplying the volume of the blended gas by the percent by volume admixture. The mass of hydrogen is found from multiplying volume and density. This mass and the price of hydrogen needed to achieve a NPV of \$0 will determine the cost of the hydrogen portion of a therm.

Cost of Hydrogen Portion of a Therm = Mass of Hydrogen * Price of Hydrogen

Using the energy content of a therm and the amount of energy hydrogen contributes toward a therm, we can find the portion of the energy that natural gas contributes.

 $Energy\ from\ Hydrogen = Mass\ of\ Hydrogen * Energy\ Content\ of\ Hydrogen$

 $\frac{Energy\ Content\ of\ a\ Therm-Energy\ from\ Hydrogen}{Energy\ Content\ of\ a\ Therm}=Natural\ Gas\ Portion$

Pricing this portion at the normally scheduled rate and adding it to the cost of the hydrogen portion of a therm will get us the new price per therm with the premium included.

Price of Blended Therm = Natural Gas Portion * Price per Therm + Cost of Hydrogen Portion of a Therm

The premium add-on can be found by subtracting the base rate from the new price per therm. A NPV of \$0 is achievable with case 2 and case 4, and their resulting premium price is found in Table 10.

Case	Percent Hydrogen	Price of Hydrogen Needed to Achieve NPV = \$0	Premium
2	0.0075%	~\$121.81/kg	\$0.20/therm
4	0.1082%	~\$8.84/kg	\$0.18/therm

Table 10: Premium Add-On Calculation Results

7.6 PROJECTION

The commercially available electrolyzer is a fairly new technology, and like other technologies that lack maturity and availability, is expensive and may seem uneconomical. The real value may not be realized for some years when multiple factors converge in the technology's favor. One of these factors is the capital cost associated with a power-to-gas system. If the price for electrolyzer modules follows the same trend as that for solar panels, we may see a price decrease of approximately 4.4% each year [107]. Another factor that may change in the favor of power-to-gas via electrolyzer is an increasing carbon credit. If NW Natural can save money by decarbonizing the gas they provide, the price of hydrogen would decrease in response, and a premium may not be needed. Lastly, utilization of power-to-gas technology could increase in the future. With Oregon's movement toward a 50% renewable portfolio standard by 2040, more solar and wind

power plants are expected to connect to the electrical grid. An increase in variable energy generation could mean more unpredictable activity and oversupply for the power balancing authority. The quick response time of an electrolyzer could prove useful in consuming extra electricity that would otherwise be curtailed. It may even serve as the primary grid-balancing technology and be kept running throughout the year. To illustrate the effect these combined factors have on a hydrogen power-to-gas system, we created a projected NPV model for the year 2027, and the results are shown on table 5.

The projected NPV model assumes NW Natural's rate of return is the same as it is today, the cost of electricity is 0/kWh, and a cost for power-to-gas hydrogen can be found by making the NPV = 0. The capital equipment costs are discounted 4.4% each year until 2027 for the calculation, and the carbon credit is increased to 0.76/kg of hydrogen. To model the increase in utilization, we assumed the electrolyzer is running at full power throughout the year. Table 11 shows the results of the projected NPV model. Even with the changing factors, the price of hydrogen will still be more expensive than natural gas in 2027. However, it is a lot less expensive than the price hydrogen would have to sell for today. This decreasing trend indicates that the price for hydrogen may eventually be the same, or less than, the price we pay for natural gas.

Table 11: 2027 Projected NPV of System

Hydrogen Admixture	Running Hours	Price of Hydrogen	Premium
0.2164%	8760	~\$2.83/kg	\$0.08/therm

7.7 DISCUSSION OF ECONOMIC RESULTS

In case 2, where the only operational hours are those from curtailment, the price of the energy from hydrogen is 100x the price of the same amount of energy from natural gas. Although this project is economically infeasible, it can be made possible by offering a premium price per therm of hydrogen. New technologies in their early stages of maturity are often expensive, but considering the beneficial externalities of the project, we may find greater overall societal value than just a purely financial analysis might suggest. This project would prove out the technology and offer insight to using it on a larger scale in the future, inform policy-makers on emerging technologies that may influence their decision-making regarding a renewable future, and educate the public on power-to-gas technology and how energy providers like NW Natural are making progress toward the renewable future they want to see. It is evident that ceratin consumers are willing to pay a premium price for energy derived from renewable sources, and a project like this could follow a similar funding structure to programs like NW Natural's "Smart Energy". Realizing the energy climate is changing, we conducted a sensitivity analysis to see how this project would look in the future. We expect the technology to decrease in price and the utilization to increase, and the model with these changes shows that the price of hydrogen decreases, approaching the price we are currently paying for natural gas.

8 SAFETY ANALYSIS & CODES AND STANDARDS

As with any good design, safety is a top priority. Codes and standards are meant to limit risks through a set of rules and guidelines. We took great care to ensure our design meets or exceeds all relevant safety codes and standards as set by various regulating agencies.

NW Natural is an interstate natural gas distributor providing service to Oregon and Washington. This classification puts their operations under federal jurisdiction, which is regulated by the Federal Energy Regulatory Commission (FERC), in collaboration with the U.S. Department of Transportation (DOT) [108]. This is monitored and enforced by DOT's Pipeline and Hazardous Material Safety Administration (PHMSA) with consideration to the Oregon Public Utility Commission (OPUC) [109].

Many of the safety codes come directly from the National Fire Protection Association (NFPA) which seeks to minimize fire risks as they pertain to equipment, distribution pipelines, and storage of hydrogen. Most of these codes are already being met by the existing equipment and safety standards in place for the natural gas distribution currently in operation. For our purposes, a focus was made on where these codes differ.

To meet these codes, some organizations have devised standards for the transportation, storage, and use of hydrogen and natural gas. Namely, the American Society of Mechanical Engineers (ASME) and the American Petroleum Institute (API) [110], [111], [112]. Standards that specifically address a hydrogennatural gas blend do not currently exist, an issue addressed in section 10 1-Pager for Policy Makers.

8.1 EQUIPMENT

Our design includes an electrolyzer, a compressor, and piping that is subject to NFPA codes as gaseous hydrogen is a flammable substance [113]. The relevant NFPA codes are found in section 2, "Hydrogen Technologies" which covers materials, maintenance, and storage of hydrogen related equipment [114].

The electrolyzer involves the handling of hydrogen, ventilation of oxygen, and piping to transport the produced hydrogen to an injection site. According to Proton On-Site, the electrolyzer has been built to meet, "all international safety standards", which suggests NFPA codes have been met by the manufacturer in terms of materials used and built-in safety features [115].

We opted for an outdoor container to house the electrolyzer which will have built-in ventilation, remote monitoring, and protection from freezing temperatures and potentially damaging elemental conditions. We will purchase additional land to allow for placement away from potential ignition sources, combustible materials, air conditioners, and compressors. This will meet relevant NFPA 2 codes [114].

The electrolyzer will be connected to the natural gas pipeline via a steel pipe. To prevent embrittlement related issues, it will be built to ASME B31.12 standards for "Hydrogen Piping and Pipelines" by using a low tensile strength steel rated for hydrogen transport. This will prevent hydrogen related fatigue cracking.

Oxygen created through the electrolysis process will be removed from the system via ventilation equipment on the top of the electrolyzer compartment. Oxygen itself is not flammable, however it may act as an accelerant causing fires to burn hotter and spread faster. Concentrations above 23.5% are considered oxygen rich, with an increased risk of fire ignition and are restricted by NFPA code 2.13 [114][116]. Oxygen monitoring systems will be installed, though this risk is minimized by an outdoor ventilation system.

Regular maintenance is included with Proton On-Site's care package. This will include preventative care and replacement of parts should issues arise [115]. Should an alarm be activated, the issue will be addressed immediately by certified technicians. This will ensure code compliance and satisfy safety concerns as it pertains to the hydrogen generation equipment.

8.2 PIPELINE INTEGRITY

Blending hydrogen into the existing natural gas pipeline brings up the issue of hydrogen embrittlement, a process in which hydrogen permeates metal, causing a loss of ductility and making the material more brittle and prone to fracture [117][118]. Hydrogen embrittlement is theorized to be caused by smaller hydrogen atoms penetrating microcracks in materials, causing deformation on a molecular scale [119]. This can lead to an increase in fatigue related stress cracking of the pipes.

Hydrogen enriched natural gas, at low blends, is treated similarly to compressed natural gas (CNG) in terms of fire safety regulations, with a few exceptions. Pipeline material restrictions, such as the disallowance of cast iron piping, limit what materials are safe for hydrogen transport. According to NFPA code 2 7.1.15.1, all hydrogen piping must meet the standards set by ASME B31.12 as well as relevant International Fuel Gas Codes (IFGC) [114]. The fuel gas codes require all piping materials to be 300 series steel or other approved materials [120].

NW Natural has an updated pipeline infrastructure using only, "polyethylene pipes and cathodically protected and coated steel pipes" [121]. Polyethylene has a tendency to absorb hydrogen without the same embrittlement problems as steel and so for our purposes, only the effect on steel will be considered [76], [122]. NW Natural's steel is rated to meet all minimum federal safety standards and does not exceed pipe grade X52 [123]. This is a low tensile strength steel which is less susceptible to embrittlement-related cracking and fatigue [124][125][126][127].

For natural gas fueled vehicles, a study was done on the effect of hydrogen compressed natural gas (HCNG) on steel fuel tanks. They found that for steels with a tensile strength below 950 MPa, all hydrogen blends were considered compatible [128]. According to API standards for seamless line pipe, the maximum tensile strength of X52 grade steel will be 760 MPa [129]. This suggests the effects of embrittlement may be minimal, but a full review will be required and additional testing is highly recommended.

The DOT Code of Federal Regulations §192.475 allows for a potentially corrosive gas to be transported if its effects are thoroughly investigated and steps are taken to minimize risks [130]. This is in contrast with the OPUC which completely disallows the addition of impurities that may cause corrosion in natural gas piping [131]. Whether the addition of hydrogen causes excessive corrosion due to embrittlement will need to be evaluated to ensure compliance.

There have been many studies done on the feasibility of hydrogen transportation through the existing natural gas infrastructure. This includes five projects operating in Europe which have successfully integrated hydrogen into the natural gas grid [12]. Many studies have been done which show varying conclusions about the increased corrosion risk associated with hydrogen embrittlement [132][126]. The grade of steel piping used by NW Natural is expected to minimize hydrogen embrittlement related risks.

8.3 EXPLOSION RISK

The risk of explosion can be broken into three categories; the likelihood of an ignition event, the severity of the explosion, and the frequency of explosion. The likelihood of an explosion refers to how likely the gas is to ignite should a leak or rupture occur. The severity of the explosion looks at the intensity of the blast in terms of temperature, blast radius, and the potential for damage. The frequency of the explosion refers to whether the addition of hydrogen will increase the likelihood of an explosion.

The likelihood of an ignition event is dependent upon the auto-ignition temperature of the involved gases. Hydrogen has an ignition temperature of 500°C while methane (natural gas) has an ignition temperature of 580°C [134]. This may increase the probability of ignition should a leak in the pipeline occur. However, studies estimate that at low concentrations of hydrogen, below 10%, the increase in ignition probability is only marginally greater than with natural gas alone [77][135][136][137]. This suggests the increase in the likelihood of an ignition event is negligible for this project.

How severe an explosion will be is dependent on a number of factors and will vary based on the surrounding conditions. Hydrogen has a greater flame speed and will burn more intensely than methane, though it will not burn for as long [138][139]. Hydrogen is also lighter and will dissipate more quickly than methane in the open air. In the event of an explosion we would expect a more severe explosion in terms of pressure and heat release if in a confined space, though likely no change would be apparent should the event occur in a ventilated area.

Most explosions occur due to rupture, usually caused by accidental puncture of the pipeline. There is nothing to suggest that the addition of hydrogen to the gas blend will increase the likelihood of a ruptureinduced explosion. However, hydrogen amplifies cracking by embrittlement in compromised pipes, possibly leading to an increase in leaks. If these leaks are left untreated it may increase the likelihood of an explosion, though preventative measures will minimize this risk.

At low concentrations, we expect the effects of hydrogen to be minimal to the risk of explosion for all three categories. NW natural already has plans in place to prevent accidental ruptures including a free service to have utility lines marked to avoid potential accidents [140]. This should be sufficient and a large change in explosion risks is not expected.

8.4 UNDERGROUND STORAGE

The underground storage of natural gas is a federally regulated process monitored by the DOT [130]. NW Natural has been operating the proposed storage site in Mist, OR since 1981. They have already received site certification from the Energy Facility Siting Council, proving compliance with all relevant codes and regulations [140]. An additional amendment may be required if the change to gas composition is considered substantial as well as to allow the electrolyzer to be placed at Miller Station.

An assessment of the cap rock at the mine to ensure an adequate seal against leakage would be beneficial. Hydrogen loss due to leakage either through the cap rock, or at the injection site is possible, though generally, when a site is determined to be adequate for natural gas storage it is assumed that leakage will be minimal [12]. Chemical reactions may also lead to hydrogen loss, particularly involving sulfate-reducing bacteria.

8.5 HYDROGEN SULFIDE

Due to the presence of sulfate-reducing bacteria in hydrocarbon reservoirs, the injection of hydrogen into natural gas mines may increase levels of hydrogen sulfide [62]. The toxicity of hydrogen sulfide, as covered in section 6.2, make it a particularly dangerous health and safety concern. It can also cause damage to the pipeline with its corrosivity and so preventative care is necessary

Hydrogen sulfide is regulated on both the federal and state level, with OPUC code 860-023-0025 having the most conservative restriction of, "no more than .25 of one grain of hydrogen sulfide in each 100 cubic feet" (4 ppm) [131]. It is vital that any excess hydrogen sulfide is removed to ensure pipeline integrity.

Hydrogen sulfide is also a naturally-occurring compound in gas mines and so methods for its removal are available. This is referred to as "gas sweetening" and most commonly done with an amine treatment where the sulfur is absorbed, often for further treatment and resale [141],[142]. NW natural does not currently have this equipment in place and so preventative care will be key to addressing this issue.

Beyond pipeline concerns, hydrogen sulfide may cause complications when it comes to underground storage. It can settle in porous materials, effectively cutting off sections of the mine and possibly leading to ground destabilization [143]. There are too many variables to quantify what percentage of hydrogen and operating conditions will minimize this risk[77]. A full soil analysis will be necessary to determine whether sulfur, a key element in the hydrogen sulfide production process, is present in the mine.

For the single system proposed here, the low hydrogen blend will likely be insufficient to cause any major concern [12]. In terms of scalability, preventative measures must be made to limit the amount of hydrogen sulfide produced. Some studies show the effect can be minimized at low pressures and temperatures [144][124]. One study suggests an expected increase of only 0.5 ppm if temperatures are kept below 130°C [145]. Further research and testing is required if the project is to be scaled to higher hydrogen concentrations.

8.6 LEAK DETECTION

DOT code §192.706 requires that a leakage survey be performed annually [130]. Some equipment can be recalibrated to detect hydrogen and some will be unaffected by the hydrogen blend. Flame ionization detection (FID) devices are typically used for pipeline inspections and cannot detect hydrogen. It is generally considered acceptable for hydrogen concentrations below 5% as the majority of the leaked gas will be hydrocarbons that are detectable by FIDs [77]. For our design this is not expected to be an issue, but for higher concentrations, semiconductor technologies are better suited for hydrogen detection [77].

8.7 EFFECT ON OTHER INDUSTRIES

8.7.1 Natural gas vehicles

Natural gas vehicles are gaining in popularity with an estimated 150,000 operating in the US and 15.2 million worldwide [146]. Hydrogen blended natural gas can cause issues with fuels tanks which may be

made of materials unable to withstand hydrogen embrittlement related cracking. Some studies indicate this concern may be limited and depends on the class of fuel tank being examined [128].

NFPA 52 "Vehicular Natural Gas Fuel Systems Code" restricts hydrogen content to 2% by volume for use by CNG vehicles [114]. This could require additional equipment to eliminate the excess, or require additional natural gas to be blended in, for which NW Natural may be liable. However, it may be safe to implement higher hydrogen concentrations were these codes to change.

Hydrogen-blended compressed natural gas (HCNG) fuel is being investigated as a potential solution to some of the pitfalls of natural gas vehicles. The improved laminar flame speed of hydrogen provides an improvement to combustion properties, increased engine efficiency, and decreased CO₂ emissions [147][148][149][150]. While high concentrations of hydrogen require engine modification, lower concentrations "from 0% to 20% by volume" may be run without engine retuning" [151].

For this project to be implemented with higher hydrogen concentrations, some changes to the existing natural gas vehicles will need to be made. The current certification of fuel tanks will need to be re-examined to consider the effect of higher hydrogen concentrations on embrittlement. Otherwise, fueling stations will need to be supplied with unblended natural gas.

8.7.2 Natural Gas Turbine Power Plants

Natural gas power plants use turbines with specific ratings for allowable hydrogen content; as low as 0.5% hydrogen by volume [77]. Combustion instabilities and higher combustion temperatures make hydrogen-rich natural gas blends unsuitable for turbine technologies not specifically designed for hydrogen blends [152][153][134]. For our design, the hydrogen concentration is too low to cause issues, however it does affect the scalability of the project.

It may be possible to modify existing turbines to be compatible with higher hydrogen blends. As a case study we investigated the River Road Generating plant in Vancouver, Washington which uses a GE 7FA combustion turbine not rated to support hydrogen [154]. Modification equipment does exist for this model to allow for higher hydrogen blends, up to 5% by volume [77][155].

It is highly recommended that a full review of the current equipment being used at all natural gas power plants in NW Natural's service area be conducted to ensure they can support a higher hydrogen concentration should the project expand.

8.8 FAILURE MODE

A failure mode effects analysis (FMEA) is a, "step-by-step approach for identifying all possible failures in a design" [156]. It is used to analyze the ways in which a design might fail and the consequence to that failure. For our purposes, a focus was made on the hydrogen-producing equipment and how the inclusion of hydrogen to the natural gas blend may create additional problems for the existing natural gas distribution network, as shown in Table 12.

Process	Failure	Effect	L	Р	Cause	F	Control	D	Action
	Owner hal	Elevated Oxygen levels	1	1	Equipment failure	2	Alarm, ventilation	10	Automatic shut-off of electrolyzer, evacuate immediate area until dissipated, inspection and repair.
Electrolysis Hydrog leak	Oxygen leak	Fire	8	9	Equipment failure and presence of ignition source	1	Alarm, ventilation, fire suppression	10	Immediate evacuation, notify fire department, emergency shutdown of all equipment on site.
	Hydrogen	Hydrogen detected	7	1	Equipment failure, crack or rupture	1	Alarm, outside placement	10	Automatic shut-off of equipment, emergency shut-off of adjacent equipment, evacuate area, inspection and repair.
	leak	Explosion	10	10	Presence of ignition source	1	Separate container with on-board safety equipment	10	Immediate evacuation and emergency shutdown of all station equipment, emergency shut down of pipeline.
Pipeline	Cracking pipe	Leaking	4	1	Embrittlement	4	Quality steel, leak detection equipment	8	Shut down section of pipeline, remove and replace cracking pipe, inspect adjacent pipes. Same policy as for natural gas
	Rupture	Outdoor/ Indoor / Leak/ Explosion	9	9	Embrittlement, corrosion, human error, puncture	1	Leak detection equipment, routine inspection, public education	8	Same policy as for natural gas.
Mine Storage	Hydrogen Sulfide	Corrosion, toxicity	6	7	Microbes	2		9	Monitoring equipment, tested daily, flush affected pipeline with steam.

Table 12. Failure Mode Effects Analysis

L = Severity of effect on life whether by injury or loss of life P = Severity of effect on property F = Likelihood of failure

D = Likelihood of prevention methods to avert failure

9 POLICY & REGULATORY ANALYSIS

Natural gas in NW Natural's service territory is primarily used by residential customers in furnaces, for heating purposes. This requires company policy to ensure end-user safety and quality is maintained and to ensure that customers receive a consistent quality of natural gas that is compatible with their appliances.

Pricing, end-use appliance compatibility, and gas quality are regulated in Oregon by the OPUC. Pricing structure regulation has historical significance meant to protect consumers and maintain the integrity of natural gas supplies. The compatibility of appliances can be determined through Wobbe index calculations while gas quality is a company set energy content range. These factors will determine the amount of hydrogen that can be blended in to the existing natural gas infrastructure.

9.1 **REGULATION**

In Oregon, the OPUC is the main regulating agency responsible for setting distribution standards between natural gas suppliers and end-users. Gas companies are required to regularly report on the heating value and properties of the natural gas being delivered to customers.

The natural gas policy act of 1978 regulates the sale and distribution of natural gas [157]. No changes may be made to the pricing or gas quality without commission approval and public notification. Meant to protect consumers from monopolies and gas shortages, the natural gas act sets price ceilings and regulates how natural gas prices are determined. [158]

The natural gas composition is required by OPUC 860-023-0045, "Service Standards", to be maintained so, "the established heating value, the chemical composition, and specific gravity shall be such as to attain satisfactory combustion in the customer's appliances", as well as that, "[w]hen supplemental or substitute gas is distributed by a utility, the gas quality shall be such that the usage performance will be satisfactory, regardless of the heating value of the gas" [159]. This suggests that there are two components to examine when determining whether a new gas blend will meet current policies. One that looks at compatibility of the appliances and one that looks at performance in regard to the amount of heat generated.

9.2 WOBBE INDEX

The Wobbe index is used to determine whether an alternative fuel is interchangeable with the current fuel-gas blend for end-user appliances [160]. A gas composition with a similar Wobbe index number (\pm 4%) is considered to be a compatible replacement [161].

For our gas composition, we used the percentage of each compound found in NW Naturals mixture and applied the following equation:

Wobbe Index = HHV
$$\div \sqrt{Specifc Gravity}$$

The calculation for each compound in NW Natural's mixture is shown in Table 13. HHV's are at standard conditions, 20° C and 1 atm of pressure [163].

Compound:	HHV (kJ/m^3)	Specific	Wobbe Index	% of mixture	Wobbe Index
800.00	28 14	Gravity	(kJ/m^3)	by volume	for % (kJ/m ³)
Methane	37682.66	0.5537	50641.232	0.9359	47395.130
Ethane	66432	1.0378	65210.945	0.0375	2445.410
Propane	95375.35	1.5219	77311.319	0.0092	711.264
Isobutane	124074.24	2.01	87515.221	0.0011	96.267
Butane	124251.2	2.0061	87725.187	0.0015	131.588
Isopentane	145224.3	2.48	92217.523	0.0002	18.444
Pentane	145409.68	2.487	92205.203	0.0002	18.441
Other Hexanes	173046.42	2.973	100361.043	0.0001	10.036
Total					50826.579

For a Wobbe index of 50,827 kJ/m³ a plus or minus 4% interchangeability range yields compatibility from 48,794 kJ/m³ to 52,860 kJ/m³. Hydrogen by the same calculation has a Wobbe index of 45,036 kJ/m³. We used the following formula to determine the percentage of hydrogen blended into NW Naturals current natural gas blend that would remain within this range.

New Wobbe Index = $(\% H_2 added) * (H_2 Wobbe \#) + (1 - (\% H_2 added)) * (NG Wobbe \#)$

By this method a 35% hydrogen blend, having a Wobbe index of 48,800 kJ/m³ is the highest concentration allowed. This hydrogen concentration is far above the scope of this project and so we do not foresee having any compatibility issues.

It should be noted that the Wobbe index is best examined using a historical average, rather than a snapshot of the current gas composition. This number is more of a general guideline to get an idea of what percentage of hydrogen may be allowed now. The number will need to be reevaluated as the gas composition fluctuates.

9.3 GAS QUALITY STANDARDS

The energy content of a gas blend determines how much of the gas must be combusted to produce a desired effect. This ensures consumers receive a product with the same heating capabilities to which they are accustomed.

NW Natural policy states that "[t]he quality of Natural Gas or Biomethane procured and delivered by the Company or by Customers under Schedule T shall conform to standard purity requirements of the Commission; shall have an energy content between 985 and 1115 Btu per standard cubic foot; and shall permit satisfactory operation of appliances" [163]. The purity requirements were examined in detail in section 8.5 of this report. The satisfactory operation of appliances was covered with the Wobbe index interchangeability.

Compound	Energy	% of	Energy
	Content	mixture by	Content for
	(kJ/m^3)	volume	% (kJ/m ³)
Methane	37706.01	0.9359	35289.05
Ethane	66432.62	0.0375	2491.22
Propane	95271.01	0.0092	876.49
Isobutane	124966.35	0.0011	137.46
Butane	125525.23	0.0015	188.29
Isopentane	149072.86	0.0002	29.81
Pentane	149370.93	0.0002	29.87
Other	177199.60	0.0001	17.72
Hexanes			
Total			39059.93

Table 14: Energy Content of Natural Gas

The energy content is a standard policy set by the company and is used to calculate how much to change the customer pricing structure based on the quality of the delivered product. It is possible to change this value, however, it is easier to stay within this range as any changes would require commission approval and a regulation process.

The energy content of NW Natural's gas composition is 39,060 kJ/m³. This was calculated by taking the energy of each compound multiplied by the percentage of that compound found in NW Natural's mixture, as shown in Table 14.

Hydrogen has a much smaller energy content of 12,079 kJ/m³ [164]. To stay within the current company policy for energy content, we applied the following formula:

Mixture energy content = $(\%H_2)(H_2 energy content) + (1 - \%H_2)(NG energy content)$

At 8.7% hydrogen concentration, the energy content of the hydrogen-natural gas blend will be 36,713 kJ/m³. This will require no altering of the current billing policy while providing end users with the same quality of gas to which they are accustomed.

We do not expect to reach this concentration with the current project. In terms of scalability, the energy content is set by NW natural and may be changed as necessary. At this point, other factors limit the amount of hydrogen that can be blended into the current natural gas admixture such as the effect on natural gas vehicles and power plants. What these calculations prove is that a higher hydrogen concentration in the blend is possible should other limiting factors be eliminated or otherwise mitigated.

10 1-PAGER FOR POLICY MAKERS

Project Overview

Our design seeks to lower CO_2 emissions associated with natural gas, while providing a storage solution for energy created from renewable sources during peak supply. This provides a viable pathway for increasing our renewable energy portfolio while providing a positive impact on climate change.

The design works by utilizing curtailed energy to generate hydrogen via electrolysis. The produced hydrogen will be injected directly into the natural gas infrastructure where it will be stored in depleted hydrocarbon mines for seasonal use. We evaluated a 0.55 MW system to serve as proof of concept, with intentions to scale up the system in the future.

Background

- Electrolyzers use electricity to separate water molecules into hydrogen and oxygen gas. The oxygen is released into the air, leaving hydrogen which is a clean energy carrier that produces near-zero harmful emissions when burned.
- Oregon is working to reduce harmful CO₂ emissions to 10% below 1990 levels by 2020 and 75% below 1990 levels by 2050. We are already behind on meeting these goals and alternative CO₂ reducing pathways are desperately needed.
- During the spring of 2017, 139,000 MWh of renewable energy was curtailed. That is clean, renewable energy wasted due to load restrictions of the power grid. This amount does not include the energy sold to other states and is expected to continue increasing as renewable energy production is increased.
- Oregon plans to increase the amount of electricity produced from renewable sources to 50% by 2040. This will further increase the amount of clean electricity being curtailed in months where hydro-power, wind-power, and solar-power overproduce.

Research Findings

Our research finds that a hydrogen-enriched natural gas blend is both possible and beneficial, reducing CO_2 emissions by 9.3 metric tons for every metric ton of hydrogen blended into natural gas. In 2017 the system could have used 0.12% of Oregon's curtailed energy to produce 2850 kg of hydrogen. This would have displaced 39 metric tons of CO_2 .

Using the Wobbe Index, we found a concentration of up to 35% hydrogen would have no effect on current natural gas appliances. Hydrogen concentrations of up to 8.7% will remain within energy content limits set by the Oregon Public Utility Commission.

The biggest inhibiting factors to hydrogen-blended natural gas are:

- Lack of incentives for the reduction of CO₂, a known contributor to climate change.
- Natural gas fueled vehicles are restricted to 2% hydrogen by volume due to fuel tank classifications.
- Natural gas power plants may be restricted to as little as 0.5% hydrogen by volume.
- Hydrogen permeates materials causing deformation and fatigue cracking, otherwise known as hydrogen embrittlement.

Policy Recommendations

- Incentives to improve the economic viability of green expenditures, such as carbon cap-and-trade programs.
- A re-evaluation of current ratings for natural gas vehicles and power plants to determine if higher hydrogen concentrations may be allowed.
- A standard to specifically address hydrogen-blended natural gas to ensure pipeline integrity and limit hydrogen embrittlement related issues.
- A recognition of power-to-gas as a viable energy storage resource in policymaking and renewable energy policy development.

11 CONCLUSION

Even with low renewable energy penetration in Oregon, there is already an issue with the curtailment of renewably-generated electricity. To meet the increasing Renewable Portfolio Standard, growth in the number of renewable power plants is expected in the state. Without large-scale long-term storage solutions, the amount of curtailment could increase as the number of renewable power plants increases.

A storage solution for Oregon has been presented: use power-to-gas technology to produce hydrogen gas for seasonal storage. The proposed system uses an electrolyzer to take advantage of excess renewable energy and produce hydrogen gas, which can then be blended with natural gas using the existing natural gas infrastructure owned by NW Natural. The spring months of curtailment coincide with the months that NW Natural increases its inventory in its Mist Site, an underground natural gas storage facility, and the blended gas will flow into the reservoirs for seasonal storage. In the winter, when heating loads are higher, the gas will be withdrawn and distributed to customers per NW Natural's regular operations.

Out of four possible sites, Miller Station in Clatskanie, OR is the most suitable location for the project, based on siting criteria established from communications with NW Natural and Proton On-Site. There are no significant negative environmental impacts of the system, and carbon dioxide emission is reduced by using the hydrogen produced as a fuel in place of fossil natural gas.

Although the project is currently economically infeasible, it can be made possible by offering a premium price to consumers who wish to support renewable projects. The real value of the project is in the positive externalities that arise from its implementation: proving out technology that could help usher Oregon into the renewable future it envisions, educating policy makers on new technology that needs to be considered in decision-making to comply with renewable energy standards, and educating the public on power-to-gas technology and how renewable energy fits into their lives.

Codes and safety standards for the design are met, and the system does not increase safety risks associated with the natural gas system it will join. There are currently no policies or standards that specifically address hydrogen-blended natural gas. However, hydrogen admixture up to certain percentages can still comply with the Wobbe Index and energy content limits for natural gas set by the Oregon Public Utility Commission.

We recommend the implementation of the proposed system to take advantage of the curtailment Oregon currently faces, and to explore the scalability of the system to mitigate the increased amount of curtailment likely to be seen in the future.

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Power to Gas Opportunities for Greening the Natural Gas System



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Overleaf photo: Glomfjord, Norway 135 MW electrolyzer plant. 1953-1991. Courtesy Nel Hydrogen.



Executive Summary

Power to gas (PtG) is a means of using electricity and water as primary feedstocks to produce hydrogen or methane fuels capable of reducing the carbon footprint of delivered gas. If the power is sourced from renewable resources such as excess wind or solar energy, the resulting gas is also carbon neutral. This offers the potential to produce carbon neutral fuels when renewable resources are in good supply, leverage existing natural gas infrastructure for long-term and large-scale storage, and to use those fuels in existing power plants to provide carbon neutral power when renewable resources are in short supply.

European policies recognize the vitally important need for long-term storage of renewable energy in the natural gas infrastructure. These policies have fostered dozens of demonstration projects that are increasingly becoming full-scale commercial applications. In the US, PtG is not generally recognized as energy storage at all, and is sometimes specifically excluded in electric system storage mandates. Not only are unsupportive policies an impediment to PtG storage applications, competing electric energy storage media—such as batteries and pumped hydro storage—are prohibitively expensive for long-term bulk energy storage, and are hundreds of times more expensive than PtG storage in these applications.

The technology for disassociating water into hydrogen and oxygen with electricity was discovered more than two hundred years ago, with utility scale electrolyzers in operation since at least as far back as 1953 (see cover photo). Despite the long history of the technology, it continues to develop due to renewed interest spurred by the rise in renewable resources that can create vast surpluses of electricity that need to be stored in large quantities over long periods of time.

The commercially-produced hydrogen available today is primarily derived from natural gas and is not carbon neutral. Hydrogen produced by PtG technologies is not cost competitive with fossil-derived hydrogen or natural gas based on the energy value alone. The relatively high cost of natural gas in Europe, along with firm commitments to meeting carbon emission reduction goals, contributes to the greater level of interest in PtG there, while progress in the US has lagged significantly. Despite its higher cost in the US, PtG gas brings a host of other values that may make up for the cost difference and continued reductions in the cost of PtG technology will help make it increasingly more cost competitive.

Hydrogen can be used directly in place of natural gas in many applications. Quantities of hydrogen can be mixed directly with natural gas in pipeline systems. There are important differences between hydrogen and natural gas that limit the fractional amount of hydrogen that can be injected into gas pipelines without requiring other changes (e.g., end user burner modifications). Through methanation, hydrogen combines with carbon dioxide to make methane, the primary constituent of natural gas. The resulting methane is freely interchangeable with natural gas. The Audi Car Company has been producing carbon neutral methane in a 6 MW plant in Germany since 2013 to fuel its compressed natural gas vehicles from a carbon neutral source.

While the importance of PtG to the success of renewable energy is broadly recognized and encouraged in Europe, the general lack of recognition among policy makers, renewable advocates, and regulators in the US remains a serious impediment. There are some



incentives for creating low carbon transportation fuels, but few other incentives. While the energy value of the produced gas is its primary value proposition, there are other valuable aspects of PtG that include strengthening the floor for wholesale electric market prices; providing fully dispatchable load capable of supplying grid balancing services ("ancillary services") to power grids, offering long-term storage of renewable energy; and reducing the carbon footprint of the nation's energy systems. An important challenge for PtG is gaining the policy support necessary to enable the monetization of these important aspects of the technology.

Development of PtG in North America can benefit from the rapid rise of PtG in Europe, where economies of scale and investments in research and development are causing improvements and cost reductions in the technology.

Producing carbon neutral fuels from PtG can result in multiple benefits for the gas system, the electric power system, and the environment. Among the potential benefits are:

- 1. Providing a viable approach to reaching carbon emission reduction goals.
- 2. Leveraging existing natural gas infrastructure for providing seasonal storage and distribution of renewable energy.
- 3. Reducing exposure to fuel price risk from volatile fossil-derived natural gas prices that may become subject to future carbon taxes or caps.
- 4. Expanding the market and reach of renewable power sources beyond the electric power grid to reduce carbon emissions from other energy sectors.
- 5. Potentially increasing disaster resilience by providing fuels from locally sourced renewable generation, without relying on interstate pipelines or roads.
- 6. Providing an economically feasible technology for bulk storage of renewable energy on a seasonal basis.
- 7. Adding flexible load to help manage both the variability and occasional large surpluses of renewable generation that occur on the electric power system, potentially putting otherwise unusable power to good use.

It is likely that PtG has a bright future in achieving these benefits. A combination of policies and historically low natural gas prices are inhibiting its development in the US today, but as the pressure to reduce carbon emissions increases, and the cost of the technology improves with scale, there will be increasing opportunities for cost-effective PtG applications in the US.

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Power to Gas Opportunities for Greening the Natural Gas System

by Ken Dragoon, Flink Energy Consulting

"Power-to-gas" (PtG) is the creation of gaseous fuels from electric power. It is likely to be an indispensible component of low-carbon power systems and is available commercially at an industrial scale. As the cost of electric power from renewable resources drops, the prospect of using such carbon-neutral energy to create carbon-neutral fuels capable of displacing today's dependence on fossil fuels is a tantalizing prospect for eliminating greenhouse gas emissions. This paper summarizes principal aspects of the state of this technology and its importance in reducing greenhouse gas emissions, with a focus on incorporating carbon-neutral gas into the existing natural gas grid.

The natural gas system supplies nearly 30% of all primary energy consumed in the US for heating, manufacturing, transportation, and increasingly to fuel electric power generation in a symbiotic relationship with renewable energy to meet electrical demand. Modern natural gas power plants are far more capable of adjusting to the sometimes rapid changes in output from renewable resources than many other conventional resources. Natural gas and renewable resources combined to significantly reduce carbon emissions associated with generating electric power, a trend that is expected to continue.

According to the Environmental Protection Agency (EPA), greenhouse gas emissions per unit of energy delivered from the electric power industry dropped 16% between 1990 and 2015, due to increased renewable and natural-gas-fueled generation replacing coal power. Electric power derived from natural gas resources increased from 11% of total generation to 32% in that period, and electricity from wind and solar increased from 0.1% to 5%¹.

Progress toward reducing greenhouse gas emissions is expected to continue. Although commitments to carbon emission targets at the federal level have faltered somewhat, commitments from states, local governments, and US industry are accelerating. Examples of the progress include:

- California's 2017 legislature debated setting 100% renewable sourced electric power by 2045.
- The City of Portland and Multnomah County have adopted a 100% renewable target for all city energy uses by 2050.
- Apple Computer contracted for 100% renewable energy to power its Prineville, Oregon server farm.

¹ Inventory of Greenhouse Gas Emissions 1990-2015, Environmental Protection Agency, 2017, page 3-16.



• The State of Oregon established the Oregon Global Warming Commission and is actively considering legislation to cap greenhouse gas emissions.

There is no reason to believe these efforts will abate, and it is no coincidence that NW Natural has adopted its own Low Carbon Pathway to reduce carbon emissions from its natural gas system 30% by 2035. Providing gas to customers with products derived from lowcarbon PtG technologies could have an important role to play in meeting NW Natural's emission reduction goals in 2035 and beyond.



Figure 1 Carbon emissions from electricity production declining from their peak in 2007 despite relatively constant production levels. Source: EPA Inventory of US Greenhouse Gas Emissions and Sinks, Figure ES-8.

Hydrogen: the PtG Foundation

Hydrogen is the most abundant element in the universe, and along with oxygen, constitutes water. In its pure gaseous form, hydrogen burns readily in air, but unlike natural gas, its main combustion product is water rather than carbon dioxide. If by some quirk of natural history the primary constituent of natural gas produced from the ground were hydrogen, using natural gas in place of petroleum and coal would virtually eliminate carbon dioxide emissions in the energy sector.

The primary constituent of natural gas is methane, but this was not always true of the gas delivered to homes and businesses. Prior to the advent of natural gas, many cities relied on "manufactured gas" that contained a mixture of 30-50% hydrogen². Even today, Hawaii's Oahu gas grid contains a significant percentage of hydrogen. In June 2017, Nel Hydrogen and H2V signed a framework agreement to provide up to 700 MW of hydrogen electrolysis

² Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues, Melaina, Antonia, Penev, NREL 2013.



facilities to inject hydrogen directly into the French natural gas grid³. Hydrogen has an established history and promising future as a substitute for natural gas, and the production of hydrogen from renewable power sources is the basis for PtG pathways to reducing carbon emissions.

Producing hydrogen from electric power and water is the first step in any PtG application. The produced hydrogen can be used directly, in place of natural gas, or as a feedstock for producing other fuels such as methane—the primary constituent of natural gas.

Producing Hydrogen Through Water Electrolysis

Hydrogen can be produced by breaking water into its constituent parts through a process called electrolysis. Splitting water into hydrogen and oxygen with electricity was discovered a few weeks after the discovery of the battery more than 200 years ago. The advent of low-cost electricity from solar and wind raises the possibility of creating hydrogen from low-

carbon resources. Today, commercially available hydrogen is primarily derived from processing natural gas and has a significant carbon footprint. Realizing the carbon benefit of substituting hydrogen for natural gas necessitates a low-carbon source of "green" hydrogen.

At its simplest, electrolysis is accomplished by introducing an electric current through water. As the current flows, water splits into hydrogen that forms around one of the electrodes, and oxygen that appears around the other. The process results in three important products: hydrogen, oxygen, and heat. Making use of all three products may be key to realizing the greatest value from electrolysis applications.



Figure 2: Basic electrolysis consists of passing direct current through water.

Modern electrolysis has come a long way, and continues to improve in both efficiency and cost. There are three categories of electrolyzers today, each with its own characteristics and potentials: Alkaline, Proton Exchange Membrane (PEM), and Solid Oxide Electrolysis (SOE).

Alkaline Electrolysis

Alkaline electrolysis is the oldest of the three electrolysis technologies, and the closest to the simple configuration depicted in Figure 2. Alkaline electrolyzers are the least expensive, most time-tested, and currently more efficient than the other commercial electrolysis technologies. Alkaline electrolyzers introduce an alkaline chemical catalyst, usually caustic

³ Personal conversation with Nel Hydrogen CEO Jon André Løkken. See also: <u>Ny Nel-kontrakt kan være starten på fransk milliardeventyr</u>, E24.no, June 13, 2017.



potassium hydroxide⁴, into the water to improve the efficiency of the process.

While technology maturity, commercial scale, cost, and efficiency are important advantages to the technology, alkaline electrolysis has certain limitations compared with the newer PEM technology, including:

- longer startup times (>10 minutes)⁵,
- sensitivity to rapid changes in input power levels,
- lower power densities that lead to relatively larger space requirements,
- produced gas at relatively low (1-15 bar) pressure⁶.

Fast startup and ability to ramp quickly are positive attributes for units responding to potentially variable power from renewable resources. Most hydrogen applications require compressed gas, necessitating a compression stage that reduces efficiency and can involve additional maintenance costs.

Most of the large scale applications of electrolysis today are of the alkaline electrolyzer type. The cover photo on this report is of a 135 MW alkaline electrolyzer in Norway that was in service from 1953 to 1991. Its purpose was to use excess hydro power to produce hydrogen that was used in the production of ammonia-

based fertilizer.

Proton Exchange Membrane (PEM) Electrolysis

Another technology that is gaining in importance is PEM electrolysis, based on special polymer materials that can pass protons. The membrane separates the produced oxygen and hydrogen, allowing higher pressures to develop without dangerous mixing of hydrogen and oxygen within the cell. Importantly, this technology is virtually identical to PEM fuel cells that produce electricity from hydrogen and oxygen—the basic process shown in **Figure 3** is virtually reversible. Fuel cells are the power source for most hydrogen fueled vehicles, and the association with fuel cells makes PEM a target of research and development efforts.



Figure 3: Basic PEM electrolysis cell. The membrane separation allows higher pressures to be developed within the cell without mixing hydrogen and oxygen within the cell.

⁴ Oregon startup company Hydrostar claims a proprietary nontoxic catalyst in their electrolysis technology.

⁵ At least one manufacturer contends that fast start alkaline units are possible if established as a design criterion.

⁶ Compressors can increase the pressure of the produced gas, and research is ongoing to develop alkaline electrolyzers that can produce higher pressure gas.



PEM technology has been commercialized in recent years and has several advantages over alkaline electrolyzers:

- higher power densities that have lower space requirements,
- relatively rapid startup times (<10 minutes),
- rapid response capability (sub-minute) to changes in input power levels,
- higher pressure (~30 bar) hydrogen production capability,
- potential for further development to reach higher efficiencies.

PEM electrolyzers are becoming more common, principally due to their smaller size and ability to rapidly respond to changes in output level. For example, ITM Power supplied the 500 kW electrolyzer to absorb wind and tidal generation from Eday Island resources in the Orkney Islands. The gas is compressed and transported by truck and ferry to Kirkwall, where a fuel cell converts the hydrogen back to electricity. It was the largest commercial scale PEM electrolyzer built at the time it was ordered. The manufacturer has since taken orders for 3 and 10 MW electrolyzers, and has announced plans for designing 100 MW scale devices⁷.

Solid Oxide Electrolysis (SOE)

Still in the research and development phase, solid oxide electrolysis (SOE) may play a vital role in a low carbon energy economy. Both Alkaline and PEM electrolysis obtains the energy needed to split water molecules from electric power. SOE relies on a combination of electric

energy and heat. There are important advantages to heat as the primary energy source because heat is generally less expensive to create and store than electric power. We already see supersurpluses of electric power from solar and wind that tend to be difficult to utilize and expensive to store. If that energy could be stored temporarily as heat, to be used at a more constant rate to create hydrogen, it could be a very inexpensive way to store and make use of renewable energy that might otherwise simply be curtailed.

 $CO+H_2 \bigcirc CO \\ H_2 \\ CO_2 \\ CO_2 \\ H_2 \\ CO_2 \\$

Figure 4: Solid Oxide Electrolysis. Water, potentially mixed with carbon monoxide, is introduced as high temperature (700-1,000 C) steam.

Another potential advantage of SOE is

the ability to produce either hydrogen gas or a mixture of hydrogen and carbon monoxide with the addition of a carbon dioxide feedstock. The mixed gas can, in turn, be used to synthesize methane or other hydrocarbon transportation fuels. There is much optimism that SOE will proceed to commercialization in the next dozen years or so.

⁷ 100 MW Electrolyzer Plant Designs to be Launched at Hannover, ITM-Power, 12 December, 2016.



Renewable Resources and PtG

Fully relying on solar and wind electric power to reduce carbon emissions has some significant challenges due to the variable nature of those resources. Two of the most prominent challenges are how to meet electrical demand when wind and sun are not available in sufficient quantities, and how to make economic use of the super-surpluses of power when sun and wind can supply far more power than the concurrent demand. Boom and bust cycles of renewable resource production are inevitable and must be addressed if they are to be the primary means of eliminating carbon emissions. PtG presents perhaps the only economic solution.

Power plants are often assigned a type of figure of merit called "capacity factor," which is the ratio of average output of an electric power plant (typically over a year) divided by its maximum output capability. A power plant that runs all the time at maximum output would have a capacity factor of 100%. Plants used solely to meet system peak demands may have a capacity factor of just 5-15%. Wind projects typically have capacity factors in the 25-45% range, and photovoltaic solar projects in the 15-30% range.

The capacity factor of wind and solar becomes important to systems meeting all their power requirements with such resources. Meeting the average demand necessitates 3-5 times as many megawatts of installed renewable capacity. For example, meeting a 100 MW average demand with a 20% capacity factor solar resource would require at least 500 MW of installed solar power. The peak demand of the 100 MW average load might normally be around 160 MW. As a result, there will inevitably be times when the resource is not generating enough to meet load, and other times when the production will be several times the actual demand. Systems meeting most or all their power demand with wind and solar need some means of storing the excesses and using at least some portion of them to meet the shortfalls.

To some extent, these boom and bust cycles already exist in systems with significant fractions of wind and solar power supplies. When solar and wind fall off, other resources such as hydro- and gas-fueled power plants are called on to increase their output. Under maximum renewable resource output, other resources are minimized to make best use of the available resource, and this may require exporting power to other regions. Once markets are saturated, wind and solar resources may be curtailed (i.e. turned off).

Curtailments are already occurring in significant quantities in the Northwest on the Bonneville Power Administration transmission system and in California. Curtailments typically occur in the spring when hydro, wind, and solar output can be high, and while demand for power is moderate—especially at mid-day with California solar resources, and at night in the Northwest with wind and hydro output. Such events, and lesser ones that drive wholesale power prices to very low levels (e.g. below the cost of natural gas on an energy basis), provides a potential low-cost fuel source for PtG projects. In turn, developing PtG electrical demand can play an important role in reducing the frequency and intensity of such events, effectively bolstering a floor on wholesale electrical prices, while putting the otherwise-curtailed energy to productive use.





Figure 5: Energy curtailments in Germany. Adapted from: *Power-to-Gas in a Decarbonized European Energy System Based on Renewable Resources*, DNV GL for European Power to Gas, .

In 2017, California renewable curtailments will total about 350,000 MWh⁸, representing roughly \$10 million⁹ of wholesale energy. The Bonneville Power Administration reported just under 140,000 MWh¹⁰ of resource curtailments in 2017. All things being equal, these numbers can be expected to increase as the percentage of power coming from wind and solar increase. Figure 5 shows very rapid the rise of unusable energy with renewable resource development in Germany.

Making power grids work with large fractions of wind and solar will require some means of storing these "super-supplies" of power, and potentially returning that power back to the grid at other times when renewables are less available. Although this need to combine energy storage with renewable resources is widely recognized, the importance of PtG in that role is far less well-known.

⁸ Per the October 22, 2017 <u>California ISO Wind and Solar Curtailment Report</u>, year-to-date curtailments were 346,520 MWh.

⁹ This is based on assuming an average wholesale electric power price near \$30/MWh. The literal value of this energy at the time it was generated was zero or less.

¹⁰ Source: Bonneville Power Administration website, <u>Oversupply Management Protocol</u> <u>Retrospective Reports, 2017</u>.



Power System Energy Storage and PtG

Unlike other fuels, electric power is produced and consumed at virtually the same moment. If there is a large enough mismatch between supply and demand¹¹, the power grid can become unstable and cause widespread outages. Power system operators typically accommodate this difficult situation through vigilant monitoring and adjusting of power output levels to match demand within tolerable levels. The introduction of variable and less controllable wind and solar contributes to this difficult balancing act.

Regulators, utilities, and power system operators are responding to the increased difficulty brought by wind and solar by looking for more flexible resources—such as power plants, loads, and storage facilities that can be controlled and rapidly respond to changing power balance conditions. Several states have mandated minimum electric energy storage requirements, including California, Massachusetts, New York, and Oregon. These requirements have largely been met, or are proposed to be met, by advanced battery technologies or pumped hydro energy storage.

Pointedly not considered is the ability to use surplus electricity to produce power plant fuels—such as hydrogen, methane, and ammonia—that can be used to recover power at a later date. In other words, PtG is an important electric energy storage option that is largely left out of the conversation. For example, the Northwest Power and Conservation Council's November, 2017 "White Paper on the Value of Energy Storage to the Future Power System" contains a compendium of energy storage technologies that does not include PtG energy storage.

Another example is the Oregon Public Utilities Commission Order 17-118 in docket UM 1751, which identifies qualifying energy storage technologies as those consistent with Sandia Laboratories' *DOE/EPRI Electricity Storage Handbook in Collaboration with NRECA* (2015)¹². That document contains the following language (p. xxv):

"The Handbook includes discussion of stationary energy storage systems that use batteries, flywheels, compressed air energy storage (CAES), and pumped hydropower and <u>excludes thermal, hydrogen, and other forms of energy storage that could also</u> <u>support the grid</u>..." [emphasis added]

While, in Europe, PtG is considered a vital step toward meeting renewable energy and carbon emission reduction goals, it is not commonly accepted as an energy storage technology in the US. This suggests a greater advocacy role for PtG manufacturers and other interested stakeholders in forming energy storage policy.

¹¹ This discussion distinguishes between consumption and demand. Consumption is taken to be the rate at which power is consumed by a load, while demand is the amount that would be consumed if power were delivered under rated conditions of voltage, frequency, power factor, etc. Deviations in these standard conditions are evidence that supply and demand are mismatched, though consumption will match supply irrespective of the conditions. ¹² There is an ambiguity in the Commission order as to which version (2016 or 2015) of the handbook it was referring. The 2016 language is somewhat broader, but affirms that hydrogen remained excluded from coverage within the text.



Why it Matters

According to the Northwest Power and Conservation Council, the region receives about 13,000 average megawatts power from fossil resources. It would take about 40,000 MW of wind generation to supplant that generation. As discussed above, when the wind comes up, the region would be hard pressed to find a place to put all that wind generation, and without additional system loads much of it would be curtailed. Another issue is how to generate the



Figure 6: Capital cost comparison of energy storage technologies with PtG. Note that a logarithmic scale was used to make the PtG cost visible on the chart.

13,000 MW over a period of several weeks when the wind could be missing altogether. The two most commonly heard answers are batteries and pumped hydro storage.

Batteries

There are a number of battery technologies available today, and improvements in cost and performance are continuing at a rapid pace. However, the cost of battery storage is largely proportional to the quantity of energy stored. If the Northwest need is 13,000 MW for a period of four weeks, the amount of energy storage required

would be 8.7 billion kWh¹³. A design goal for lowering battery costs is currently around \$100 per kilowatt-hour (kWh) of energy storage by 2020¹⁴. Assuming that goal is achieved, meeting the energy storage requirements would cost \$870 billion. For comparison, this figure is roughly fifty times the current capital investment in wind and solar resources in the region.

Pumped Hydro Storage

Energy can be stored by using electric pumps to move water from a lower source to a higher elevation, and later allow the water to fall back through hydro generators to recover the electric energy. Such storage facilities are called pumped hydro storage and have long been used primarily to meet peak electric demand needs. The amount of energy that can be stored depends on the physical availability of the upper and lower bodies of water, and the

¹³ This is 13,000 MWH X 1,000 kWh/MWh X 4 weeks X 168 hours/week = 8.736 billion kWh.

¹⁴ This figure is illustrative only, and generally taken to be the cost of batteries absent balance of plant and interconnection costs. However, some analysts are optimistic that the cost of batteries alone could reach \$80/kWh by 2030 or earlier, so \$100/kWh is used as generally indicative of plant costs as battery technology improves.



elevation difference between them. Costs can be very location specific, but the *DOE/EPRI Electricity Storage Handbook in Collaboration with* NRECA (2015) examined the costs of four hypothetical pumped storage units¹⁵. In terms of cost per kWh of storage, they ranged from about \$500/kWh to just over \$700/kWh, which is five or more times the battery costs derived above.

PtG Electric Grid Energy Storage

An alternative to storing electric energy in batteries or pumped hydro would be to use electrolyzers to produce carbon neutral fuels that can be used directly by natural gas customers or can be burned in existing electric power plants. Assuming that the power plants are on average 35% efficient in converting fuels to electric energy, and that electrolyzers are about 70% efficient in converting electric energy to gas, producing would require 35 billion kWh of electric power input. If that gas were produced over a seven month period, it would require about 7,000 MW of electrolyzer capability. Commercial utility scale electrolyzers cost about \$500/kW of capability¹⁶, resulting in a total capital cost of \$3.5 billion—less than one percent of the cost of battery storage. Economies of scale would likely reduce that figure significantly if this scale development were actually pursued.

There are no currently conceived improvements in other storage technologies that can compete with PtG for addressing the renewable energy integration challenge at the highest levels of renewable deployment. In addition to providing the needed non-fossil back up for renewable generation, PtG offers power systems a potentially fully flexible and controllable load for system balancing, and an additional demand for power that is increasingly in excess supply. It offers the potential for not only increasing the usability of renewable energy, but also producing fuels for reducing carbon emissions in other energy sectors. PtG is likely an inescapable component of a truly low-carbon energy future.

PtG Pathways

Hydrogen can be biologically or chemically combined with carbon dioxide to form methane. Methane has potential advantages over hydrogen as a fuel. Foremost is that natural gas is principally composed of methane and can be used freely in place of natural gas for consumption, storage, and transportation. If the carbon dioxide is taken from the atmosphere, the process remains carbon neutral. In addition to methane and other carbon

¹⁵ Values derived from Figure 25, p. 37, by multiplying project capacities by the graphed costs per kW and dividing by the energy storage capability (megawatts of capacity times hours of storage).

¹⁶ Various electrolyzer costs are quoted, depending on electrolyzer type, delivery pressure, and assumptions about economies of scale. Typical values fall in the \$500-\$1,000/kW range, for megawatt-scale 70% efficient machines. See for example *Power-to-Gas: The Case for Hydrogen White Paper*, California Hydrogen Business Council, October 8, 2015. Nel Hydrogen recently announced a 100 MW electrolyzer proposal for 450 million Norwegian Kroner, or \$550/kW.



fuels, hydrogen can be chemically combined with nitrogen (predominant component of air) to form ammonia that can be used either as a fuel or for fertilizer, as was the purpose of the 135 MW Glomfjord electrolyzer in Norway pictured on the title page of this report.

As a result there are multiple pathways for PtG applications, depending upon whether hydrogen or some other substance is the ultimate product, whether the process involves purely chemical or biological processes, and what the processed substance is used for. Producing carbon neutral fuels for supplementing the electric grid is not necessarily the highest and best use of PtG potentialities, especially in the near-term. Therefore, it is worth considering some of the many PtG pathways, as illustrated in Figure 7.





Electrolysis

Beginning with the electrolysis process, there are three general decisions to make:

- selection of electrolyzer technology type,
- source of electric power,
- disposition of the produced hydrogen (and potentially heat and oxygen byproducts).

Each of these decisions entails multiple options that are considered in greater detail below.

Electrolyzer Technology Options

As previously discussed, there are three general electrolyzer technologies, two of which are commercially available today: Alkaline and PEM. In general, megawatt-scale applications will tend toward alkaline electrolyzers that are commercially available on that scale. Applications in which fast reaction is a priority, or physical space is limiting, tend toward PEM devices. There may be cases to be made for combinations of PEM and alkaline in applications where



some variability is expected. Another potential would be to pair alkaline technology with smaller scale battery storage to absorb fast fluctuations.

Electric Power Source

Electric power can be acquired through wholesale arrangements over the high voltage transmission grid, directly from utilities over the lower voltage electric distribution grid at the retail level, or directly from an on-site power source. Each of these has its own benefits and challenges.

Wholesale Market

Negative market prices driven by super-supplies of renewable energy are only accessed through the wholesale electric markets. If a PtG facility is owned or operated by an electric utility, it could receive the benefit of access to those prices; however, accessing wholesale market prices is possible for non-utility entities. In Oregon, participation of loads in the wholesale markets is provided through Direct Access legislation. The Oregon Public Utility Commission certifies energy service suppliers¹⁷ that utilities work with for providing non-retail power service. An advantage of working with active wholesale market participants is the possibility for electrolyzers to provide other power grid services, such as rapid response and system balancing. These are potentially beneficial value streams that are typically unavailable to retail electric utility customers and may not be available through all energy service suppliers.

Retail Market

Large consumers of electric power can sometimes negotiate special deals with utilities for non-standard service. It may be possible to arrange directly with a utility for a discounted energy rate in exchange for providing flexible and interruptible load. Standard rates, even relying solely on off-peak discounted power, are likely prohibitively expensive. As renewable resources increase in importance, it is becoming more clear that utilities need to reflect unusually low wholesale prices at the retail level to promote using energy that might otherwise be curtailed as unusable. At this time, there are no state mandates for requiring tariffs that would accomplish this important function.

On-Site Generation

Co-locating electrolyzers and renewable resources has some potential advantages. Electrically connecting a renewable power source to an electrolyzer load avoids significant costs normally faced by renewable projects. These potentially include substations, high voltage transformers, purchasing transmission rights, transmission and distribution system interconnections studies, and potential capital improvements that might be required by those systems. Renewable resources are increasingly finding little ability to purchase firm transmission rights (typically required by utilities purchasing renewable energy) at any price. Demonstrating the ability of electrolyzer plants to foster new renewable resource

¹⁷ A list of Oregon State certified energy service suppliers is available on the <u>Oregon Public</u> <u>Utility Commission website</u>. As of this writing, the list includes 3Phases Renewables, Avangrid Renewables, Calpine Energy Solutions, Constellation NewEnergy, EDF Energy Services, and Shell Energy North America.



development without acquiring additional electric transmission rights could open the floodgates to new renewable development that would not otherwise occur.

Disposition of Produced Hydrogen

There are a myriad of potential hydrogen markets, including residential and commercial space and water heating, transportation, and manufacturing. Produced hydrogen can be intermixed with the natural gas system as pure hydrogen, or converted to methane which is completely interchangeable with natural gas. After its manufacture in the electrolyzer, the produced hydrogen has five potential dispositions:

1. The high pressure natural gas transmission pipeline system;

- 2. lower pressure distribution pipeline system;
- 3. on-site storage for later transportation or consumption;
- 4. further processing into methane;
- 5. direct delivery to consumptive uses.

Each of these is discussed in more detail below.

High Pressure Pipeline Injection

Hydrogen can be injected directly into high or low pressure natural gas pipeline infrastructure. Permissible, or technically acceptable, concentration levels depend on the system into which it is introduced. Volumes of gas in the high pressure system are great enough to be able to accept relatively high levels of production while maintaining acceptably low overall concentrations of hydrogen. This comes at the cost of higher energy and capital requirements to pressurize gas to the higher levels. The maximum acceptable concentration of hydrogen blended into the nation's natural gas system—without causing issues relating to safety, leakage, or consumption of the fuel—is reportedly in the range of 5-15%¹⁸.

Lower Pressure Distribution Pipeline Injection

Injecting hydrogen directly into the lower pressure distribution pipeline system is less costly and more efficient than high pressure injection, but the lower volumes involved limit the scale of the injections without introducing high concentrations of hydrogen in the system. Most natural gas systems can accept concentrations of hydrogen up to a few percent without significantly affecting the transportation or use of the product. Levels as high as 20-25% may be acceptable in some systems. If NW Natural matched 10% of its annual sales with PtG hydrogen, it would represent over 500 MW of electrolyzer load, consuming the equivalent of

¹⁸ At "…less than 5%–15% hydrogen by volume, this strategy of storing and delivering renewable energy to markets appears to be viable without significantly increasing risks associated with utilization of the gas blend in end-use devices (such as household appliances), overall public safety, or the durability and integrity of the existing natural gas pipeline network." *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues*, M. W. Melaina, O. Antonia, and M. Penev, National Renewable Energy Laboratory March 2013.



about half the output of Oregon's current wind fleet¹⁹.

Confining the injections to an isolated part of the gas grid may allow up to 100% hydrogen, depending on the customers on that segment of the system; however, it may require some engineering adjustments to gas-consuming equipment.

Hydrogen Storage

There are some applications in which hydrogen is produced and stored on-site for later transportation. Although hydrogen can be stored as a compressed gas or cryogenic liquid, compressed gas is the more common approach. Storage can be a desirable option in applications remote from natural gas systems or where the hydrogen is produced for its own special characteristics. The latter usually involves providing hydrogen to fuel cells.

Fuel cells convert hydrogen and oxygen (from the air normally) into electric power. Although fuel cells are more expensive than combustion engines for producing electric power, they are far more efficient. Often the most valuable use of hydrogen is in fuel cell hydrogen vehicles that are increasingly appearing at commercial levels in the US and abroad. Although battery electric vehicles appear to be outstripping fuel cell hydrogen vehicles, there is likely a long-term space for hydrogen vehicles on longer range, continuous operation transportation such as buses, trains, and ships.

The cost of compression and physical storage facilities must be taken into consideration. A 2005 analysis found a wide range of compressed hydrogen storage costs. The values shown in **Figure 8** translate to a range of about \$6.3/kWh to \$71/kWh²⁰ (\$185-\$2,100 per therm) of storage capacity.

¹⁹ Based on assuming NW Natural 2016 Annual Report sales of just over one billion therms, 70% efficiency electrolyzer technology, and Oregon wind fleet of about 3,000 MW. At today's electrolyzer costs, this represents a capital investment of between \$250 and \$500 million.

 $^{^{20}}$ Expressed in the same year currency used in the original study, assuming \$1.18 per euro, and 33.3 kWh/kg hydrogen density (lower heating value).

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Figure 8: Capital costs quoted for compressed hydrogen storage facilities, based on a 2005 analysis. Energy units are based on lower heating value of hydrogen. Adapted from *Systems Analyses Power to Gas: Deliverable 1*, DNV KEMA, June 20 2013, Figure 23, p. 69.

Methanation

Converting hydrogen to methane makes it completely interchangeable with natural gas. Although methane releases carbon dioxide to the atmosphere when it is burned, if the source of carbon for the methanation process is scavenged from the atmosphere, the process remains carbon neutral. A source of carbon is an integral component of methanation. It can come from bio-digesters or be taken as carbon dioxide directly from biomass stack emissions. An experimental joint National Renewable Energy Laboratory (NREL), SoCalGas facility combines hydrogen with micro-organisms in a bio-reactor to produce methane²¹. The needed carbon dioxide can potentially be scavenged directly from the atmosphere itself²².

The benefit of having a completely interchangeable form of gas comes at the expense of an additional process step with its own capital and energy costs. Nevertheless, the chemical process for combining hydrogen and carbon dioxide to form methane is known as the Sabatier process, and was developed more than a century ago. That technology is well developed and widely available, and could be employed to convert excess renewable energy to a fuel that could potentially make today's natural gas system entirely carbon neutral²³.

Direct Delivery

On-site production and consumption of hydrogen is another possibility, likely involving at

²¹ See: https://www.nrel.gov/news/features/2017/undersea-microbes-provide-path-toenergy-storage.html

²² See, for example, "In Switzerland, a giant new machine is sucking carbon directly from the air," E&E News, June 1, 2017.

²³ There are also greenhouse gas implications relating to leaks of methane into the atmosphere from the natural gas system that would need to be separately addressed.



www.flinkenergy.com

least a small amount of on-site storage. Examples of this may be an on-site bio-digester for producing methane and hydrogen vehicle fueling stations. Nel Hydrogen manufacturers both electrolyzers and modular hydrogen fueling stations.

Power Generation

Electric power generation relying on PtG products can be supplied through the natural gas pipeline system, as is currently done, or rely on hydrogen stored for their use. From an environmental perspective, it hardly matters whether the carbon-neutral fuel produced is consumed directly by the power generators themselves or simply somewhere in the pipeline grid. Nevertheless, it is also possible to supply the power plants with pure hydrogen, potentially created and stored at the plant site.

Cost and Value Considerations

While the value proposition for PtG as seasonal renewable energy storage is orders of magnitude better than battery and pumped storage alternatives, the economic case for PtG hydrogen as a fuel is generally less clear. The cost calculation depends strongly on the cost of the electric power consumed and the electrolyzer utilization factor.²⁴ Low power prices tend to be available in the market over far fewer hours than higher cost power. The advantage of purchasing power at low-cost is offset by spreading project capital costs over fewer kilograms of produced gas. This relationship is illustrated in Figure 9 for an hypothesized electrolyzer cost. For example, the cost of produced hydrogen from zero cost power available on 20% of all hours (UF=20%) is approximately the same (~\$2/kg) as purchasing \$22/MWh power if available 50% of the time (UF=50%).

In addition to the cost of power and utilization rate, variables include the continuing decline in the cost and penetration of renewable resources, and economies of scale to be expected from the accelerating deployment of commercial electrolyzer technologies. Commercial PtG deployments are increasing around the world, especially in Europe. The most recent cost quote for large scale electrolyzers comes from the deal between Nel Hydrogen and C2V to provide 100 MW scale electrolyzers for \$550 per kilowatt of electrolyzer capability (see reference in footnote 16).

²⁴ Utilization factor is analogous to capacity factor, representing the average usage rate divided by the maximum possible usage. For example, if an electrolyzer could produce 10 tons of hydrogen in a year at full output, but only produces one ton, its utilization factor is 10%.

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Figure 9: Tradeoff between produced hydrogen costs, average cost of power, and utilization factor.

The value of the produced gas is also an important variable to be considered along with any applicable subsidies available. For example, Oregon and California award credits for low carbon transport fuel substitutes that have a significant value today. Each credit represents a metric ton of avoided carbon dioxide emissions avoided. Recent prices have been around \$50 per credit²⁵, that translates to about \$0.54/kg (\$0.47/therm) of hydrogen produced if used in standard vehicles, or \$1.00/kg (\$0.88/therm) in fuel cell vehicles.²⁶

Electrolyzer flexibility may also be leveraged by providing balancing services to the electric grid—i.e. responding to changing power system balance by adjusting consumption on a subhourly (usually 5-15 minute) basis. Oxygen and heat byproducts may also be monetized. The various values may be combined to offset a significant percentage of electrolyzer costs, and substantially reduce the cost per therm of hydrogen.

²⁵ Price quoted based on recent personal communications with Oregon DEQ staff. Oregon DEQ issues monthly Clean Fuels Program Transfer Reports containing recent month trading prices.

²⁶ Oregon and California transportation fuel credits take account of the comparative efficiency of the fuel use through an "energy economy ratio" that is assigned to different transportation technologies. Fuel cell vehicles are more energy efficient than conventional internal combustion vehicles and would receive a higher credit. It should be noted that Oregon Dept. of Environmental Quality has not adopted an energy economy ratio for fuel cell vehicles at this time—the estimate is solely that of the author.



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Water Use

The first step in any PtG process involves producing hydrogen from water and electric power. The amount of water consumed in the process becomes an obvious question. It turns out that the amount of water required is surprisingly modest. Each gallon of water can produce .48 therms of hydrogen²⁷, about a third of the average Oregon household's natural gas use. Put another way, if a household's gas needs were met by PtG, the extra water consumed would be about 1% (3 out of 300 gallons per day). It takes about 71.4 gallons of water to produce a megawatt-hour of hydrogen energy, about one tenth the water consumption of coal plants to produce an equivalent amount of energy.²⁸

Resiliency

The Northwest is subject to extremely destructive Cascadia Subduction Zone earthquakes which may disrupt resupply of natural gas and transportation fuels for weeks or months. Without indigenous supplies of transportation and heating fuels, the state's energy security is especially vulnerable. The ability to use locally available resources (e.g. water, wind, and sun) to produce transportation fuel may be a vitally important key to improving the state's response to such events, bringing value far in excess of today's market price of fossil-based hydrogen or natural gas.

Price Volatility Risk Management

Hydrogen or methane derived from PtG processes are likely to be higher cost than their fossil-derived counterparts at today's historically low natural gas prices. There are several factors potentially mitigating the price disadvantage. The cost of PtG gas is expected to continue to drop due to increased economies of scale in manufacture, while wholesale electric prices continue to see downward pressure due to growing penetration of renewables. Large scale development of dispatchable PtG electrical loads potential provides an important cap on volatile gas prices, and strengthens a floor for wholesale electric prices. See Figure 10 for natural gas price volatility over the past ten years. Adding to that uncertainty is the growing possibility of carbon emission costs being explicitly levied on the production or sale of fossil fuels. Gas produced through PtG can be seen as a hedge against natural gas price risk, just as renewable electric power does for power consumers.

 $^{^{27}}$ A gallon of water has a mass of 3.78 kg, made up of 3.36 kg of oxygen and just .42 kg of hydrogen. One kilogram of hydrogen contains 33.3 kWh of electric energy (lower heating value), so there are (.42 kg X 33.3 kWh/kg) 14 kWh, or 0.48 therms of energy, in each gallon of water.

²⁸ Source: <u>Union of Concerned Scientists (UCS) web page</u> cites 480-1,100 gallons of water consumption per MWh of coal production (100-317 gallons for once-through units). UCS conclusions based on *Operational water consumption and withdrawal factors for electricity generating technologies: a review of existing literature*; Macknick, Newmark, et al; Environ. Res. Lett. 7 (2012) 045802.





Figure 10: Historical spot market natural gas price volatility. Source: Energy Information Administration.

PtG Applications

Low gas prices in the US have hampered development of PtG projects, likely due to the historically low price of natural gas. In contrast, there are dozens of projects in Europe where natural gas is more expensive. Although most of the European installations are relatively small scale demonstration projects, utility scale developments are also being pursued. A sampling of PtG applications are offered below.

US

There are two important US projects going on today, both associated with SoCalGas, the NREL, and Dr. Jack Brouwer at the University of California, Irvine.

Advanced Power & Energy Program, University of California, Irvine

In concert with SoCalGas and research support of the NREL, UCI's Advanced Power & Energy Program is conducting research into PtG with its 60 kW PEM electrolyzer. Hydrogen from the electrolyzer is mixed with natural gas from the campus gas system and injected back into the campus system at a pressure of 400 psi (28 bar). Research goals of the facility include:

- Advance the dynamic operation of DC electrolysis.
- Advance hydrogen natural gas mixing concepts.
- Investigate pipeline hydrogen storage capabilities.
- Demonstrate efficient hydrogen production and injection into an existing natural gas pipeline—a U.S. first.
- Develop integrated PtG system concepts.
- Analyze the cost effectiveness of massive PtG energy storage.



The UC Irvine PtG system continues to operate and contribute to researching PtG technologies.

SoCalGas/NREL Bio-Methanation Project

West of Denver on the NREL campus is an experimental hydrogen methanation bio-reactor that combines hydrogen with microbes that produce methane. The microbes produce methane as they metabolize under favorable environmental conditions. The facility is roughly scaled in the 100-200 kW scale, designed to handle 2.5-5 kg per hour of

hydrogen.²⁹ Hydrogen is produced by an electrolyzer and fed to a bio-



reactor kept at 150° F (66° C) and 250 psig (18 bar). The microbes are a naturally occurring species known as *Methanothermobacter thermautotrophicus*.

Europe

Development in Europe is substantially beyond what is occurring in the US, partly due to the higher natural gas prices there, and partly due to the continent's commitment to reducing greenhouse gas emissions and the rapid development of renewable energy for that purpose. Figure 5 showed Germany's experience with increased curtailments, or conversely, the increasing need for controllable demand to absorb low-value renewable energy. Converting renewable electricity to carbon neutral fuel is recognized as a vital component to meeting European objectives. The European Commission's 2016 "Clean Energy for all Europeans" directives revised its definition of energy storage to include PtG³⁰. Figure 12 maps the database of European PtG facilities taken from the European Power-to-Gas Platform. A few of those projects are described in brief detail below.



²⁹ Source: <u>Novel Power-to-Gas Tech Begins Testing in the US</u>, Feherenbacher, GTM, October 16, 2017.

³⁰ See ITM Power December 1, 2016 announcement <u>New EU Directives to Drive the</u> <u>Adoption of Power-to-Gas Energy Storage.</u>

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Figure 12: European PtG projects. Existing projects in green, planned in yellow, and completed demonstrations in red. Adapted from <u>European Power to Gas Platform</u>.

Frankfurt am Main gas distribution network

Thüga Group's power-to-gas demonstration plant was the first project to inject hydrogen generated by electrolysis into a gas distribution network when it was commissioned in 2014. The 325 kW PEM ITM-Power electrolyzer converts power to hydrogen at a 77% efficiency rate according to Thüga Executive Board Chair Michael Reichel.³¹

Audi e-gas Plant, Werlte

The Audi Car Company began operating a 6 MW power-to-methane facility near Werlte, Germany in 2013. Power was contracted from wind generation to fuel an alkaline

³¹ Project press release: *Strom zu Gas-Anlage der Thüga-Gruppe hat alle Erwartungen übertroffen*, August 8, 2017.



electrolyzer that produces the hydrogen feeding a chemical methanation reactor. Carbon dioxide produced by a bio-mass burning plant nearby is the other main input to the plant to produce methane. The main purpose of this project was to demonstrate full scale production of carbon neutral methane for its fleet of compressed natural gas vehicles. The Werlte plant also contributes balancing services to the German electrical grid.

Audi e-gas Plant, Allendorf

Audi opened a new PtG methane production facility based on microbial methanation of carbon dioxide and hydrogen inputs. The project employs a 1.1 MW PEM electrolyzer. Audi

distributes the gas through the existing German natural gas network to compressed natural gas (CNG) filling stations. The plant can produce about 1,000 metric tons of methane per year, chemically binding some 2,800 metric tons of CO2. Water and oxygen are the only by-products. Allendorf is the first industrial scale bio-methanation PtG facility in Germany.

Orkney Islands Hydrogen Projects

The European Marine Energy Centre (EMEC) maintains test sites for wave and tidal energy on Mainland Orkney and Eday Islands respectively. The Orkney archipelago lies 16 km off the



Figure 13 Audi Allendorf bio-methane plant. Source: <u>Schmack</u> <u>Biogas GmbH</u>.

northern coast of Scotland. Electric power reaches the islands through two 33 kV undersea cables from the mainland. The archipelago is home to substantial wind generation and is a net exporter of energy to the mainland, generating approximately 120% of the islands' power consumption. Eday Island hosts a 900 kW wind turbine and tidal energy test berths that can produce up to 4 MW of power—which is more than can be managed by the island's relatively weak grid system.

Under some conditions, the grid can become overloaded. In response, EMEC installed a 500 kW ITM Power PEM electrolyzer. Up to 500 kg of hydrogen can be stored on-site. Trucks capable of transporting 250 kg transfer the hydrogen from the Eday site to Kirkwall on Orkney Island via ferry. A 75 kW fuel cell system on the Kirkwall dock supplies auxiliary power to island ferries when they dock overnight, saving diesel emissions that the ferries would otherwise emit to power themselves. Electrolyzer and fuel cells were commissioned in September, 2017.

Plans call for the "BIGHIT" project that will add a 1 MW electrolyzer on Shapinsay, where the gas will be used to power ten hybrid hydrogen range-extended (180 mile) electric battery vans, and to heat schools.



Falkenhagen Wind-Gas Project

German utility E.ON operates several PtG projects in Germany, including the 2-MW Falkenhagen pilot plant. The Falkenhagen project reports 66 percent efficiency with off-theshelf equipment prior to any optimization of components. The electrolyzer is able to inject gas directly into the Hamburg area gas distribution pipeline system at 25 bar, without separate compression. German pipeline regulations limit the hydrogen mix in the pipeline system to less than 10%. The project started construction in 2012 and fed more than 2 million kWh (60,000 kg, or 68,000 therms) of hydrogen into the German grid.

Aberdeen Hydrogen Bus Project

The City of Aberdeen Scotland initiated a project to purchase ten hydrogen fuel cell buses and 1 MW Hydrogenics alkaline electrolyzer to provide the fuel. Initial project funding was for 20 million pounds, with support from a range of government and granting entities. The system became fully operational in 2015, and Aberdeen announced plans to double the bus fleet to 20 buses in March, 2017.³²

³² <u>Aberdeen's hydrogen bus fleet to double as Government pledges £3m</u>, Ryan Cryle, Evening Express, March 17, 2017



Summary

Creating hydrogen from electricity and converting that hydrogen to methane are both wellproven technologies whose costs are declining with advances in the technology and economies of scale. Europe leads in the number of PtG facilities due to the higher cost of gas and the continent's commitment to greenhouse gas emission reduction targets. There are megawatt scale projects in Europe producing both hydrogen and methane that are designed for specific fuel uses (e.g. transportation, fuel cell electric power) and for injection into gas grids. Plans for hundred-megawatt scale projects have received funding commitments and are expected to go forward at this time.

Electric utilities, regulators, and renewable resource advocates in the US are focused on the need for energy storage to accommodate the variable nature of the generation from those sources. Much of the attention is given to the range of battery technologies and pumped hydro storage. The costs of seasonal energy storage with those technologies are orders



Figure 14 September 2016 inaugural flight of the HY4, the world's first four-seater hydrogen fuel cell aircraft with a range of 750-1,500 km and maximum speed of 200 km/hr. Source: <u>HY4.org</u>

of magnitude greater than the equivalent cost of creating and storing gas through PtG in the gas pipeline system. While the ability of PtG and gas grids to provide needed storage is well recognized in Europe, it is generally neglected, and sometimes specifically excluded from energy storage discussions, policies and mandates in the US. This suggests the need for policy interventions for PtG advocates.

The economic advantage of PtG over competing bulk energy storage options is overwhelming. Nevertheless, achieving cost parity of the produced gas with conventionally produced natural gas is more difficult. Several projects have leveraged the flexibility of PtG loads to earn additional value from the power system operators. Carbon-neutral transportation fuels may be eligible for state and federal clean fuel credits that offer significant value and cost reductions. PtG can provide additional protection against risk deriving from high natural gas price volatility and price risk due to future carbon regulation. Cost of the produced gas can be expected to fall over time, with electrolyzer economies of scale and downward price pressure on wholesale electric prices due to the continual expansion of power from renewable sources.

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Appendices



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A. Electrolyzer Technology Comparison Chart

	Source: THE POTENTIAL OF POWER-TO-GAS, ENEA, January 2016					
Q.	Alkaline	PEM	Methanation			
Efficiency (HHV)	 74 % to 78 % with H2 at atmospheric pressure 66 % with H2 delivered at 10 bar Includes energy consumption of auxiliaries and purification unit. 	Expected to be slightly higher than for alkaline electrolysis**. Commercial performance at large scale (10 MWel) to be confirmed.	79.40%			
Start-up Time	 10 to 40 minutes for cold start-up (depends on the initial temperature) Few seconds for standby start-up (auxiliaries ready to run) 	 10 to 40 minutes for cold start-up (depends on the initial temperature) few seconds for standby start-up (auxiliaries ready to run) 	 Continuous operation of the reactor thanks to hydrogen buffer storage upstream. Maintain the reactor at a sufficient temperature thanks to external heating or a thermal insulation of the reactor (e.g. if maintained at 250 °C the reactor can be started up in few minute 			
Lifetime	 60,000 hours for the cell stack 20 – 30 years for the rest of the full installation 	 40,000 hours for the cell stack 20 – 30 years for the rest of the full installation 	 20,000 to 25,000 hours for the catalysts when the reactor is cycling (not yet validated in commercial conditions) 20 years for the reactor vessel 			
CAPEX	Installed turnkey CAPEX at 10 bar including balance of plant, transport, installation and commissioning, excluding civil work and connection to other section of the plant: • 500 kW: 2000 €/kW • 1 MW: 1500 €/kW • 10 MW: 1000 €/kW	In the coming years: 10 MWe: 1000 €/kWel 2030 1 MWe: 1000 €/kWel 10 MWe: 700€/kWel 2050 1 MWe: 500-550 €/kWel 10 MWe: 350-400 €/kWel	Estimated factory gate cost of a 5 MWHHV-SNG methanation reactor (no feedback available from commercial units): • For the coming years: 1,500 €/kWHHV-SNGout • In 2030: 1,000 €/kWHHV-SNGout • In 2050: 700 €/kWHHV-SNGout Additional costs for balance of plant, transport, installation and commissioning: 50 % of the factory gate cost.			
Maturity	Commercial, mature, economies of scale primary channel for cost reduction.	Used commercially at small scale and under commercial demonstration at large scale for power- to-gas applications (1-10 MWel). 100 MW plant in design by ITM Power.	The first generation of methanation reactors for power- to-gas application is under demonstration (e.g. Audi Werlte plant). New generation of technologies are under development (e.g. KIC InnoEnergy CO2SNG, DemoSNG projects).			
OPEX	 1-2% of CAPEX/year (for a 10 MW electrolyzer) 4-5% of CAPEX/year (for a 1 MW electrolyzer) Cell Stack Replacement: Approximately 30% of the total CAPEX every 60,000 hours of operation. 	 1-2 % of CAPEX/year (for a 10 MW electrolyzer) 4-5 % of CAPEX/year (for a 1 MW electrolyzer) Cell stack replacement: Approximately 50 % of the total CAPEX every 40,000 hours of operation. 	Cost of operation and maintenance (including catalyst replacement): • 5-10 % of CAPEX/year (for a reactor corresponding to a 10 MWel electrolyzer input)			

* Oregon Startup company HydroStar claims non-toxic alkaline electrolyzer at lower cost **PEM electrolyzers generate hydrogen up to 30 bar, with development efforts aimed at 80 bar. MWhHHV-SNG means higher heating value MWh of synthetic natural gas kWhHHV-SNGout means higher heating value of synthetic gas output of the reactor



B. Manufacturers

Alkaline Electrolyzers	PEM Electrolyzers	Methanation Plants		
ELB Elektrolyse Technik	Acta Spa	CEA		
Hydrogenics	AREVA H2 Gen	Etogas		
Idroenergy	H-Tec Systems	Haldor Topsoe		
IHT	Hydrogenics	кіт		
McPhy Energy	ITM Power	MAN Diesel & Turbo SE		
NEL Hydrogen	Proton Onsite			
Teledyne Energy Systems	Siemens			



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Flink Energy Consulting $\mathbb C$ 2018

	А		C			
1	Category A Test Year Advertising Budget					
2						
3	TOTAL CATEGORY A					
4	Category A Channels		System Total Budget	OR Only (-10% of System)		
5	Salaries/Overhead	\$	585,000	\$ 526,500		
6	Bill inserts	\$	240,000	\$ 216,000		
7	eNewsletter	\$	30,000	\$ 27,000		
8	Website support	\$	3,000	\$ 2,700		
9	Postage	\$	75,000	\$ 67,500		
10	Media - IVR	\$	10,000	\$ 9,000		
11	Media - Telephone directory	\$	60,000	\$ 54,000		
12	Media - Environmental TV/Digital media	\$	200,000	\$ 180,000		
13	Production - Environmental TV/Digital Phase 2	\$	300,000	\$ 270,000		
14	Media - Customer Programs TV/Digital media	\$	200,000	\$ 180,000		
15	Production -Customer Programs TV/Digital/Print	\$	132,000	\$ 118,800		
16	Media - Fees	\$	50,000	\$ 45,000		
17						
18		Category A Totals \$	1,885,000	\$ 1,696,500		

Staff Methodology - Advertising						Staff			Staff
		9	Staff		Me	ethod w/		Cá	alculation
		Bas	e Year		T	est Year		<u> </u>	est Year
1	Total Category A		2,134,000			1,885,000			1,885,000
2	Environmental		1,152,000			500,000			
4 5 6	Removal from A (disallowed and reclass)		60%			60%			
6 7	Removal \$		691,200			300,000			
8 9 10	Portion of removal not reclassed (50%)		345,600	disallowed		150,000	disallowed		
10	Portion Reclassed to C (50%)		345,600			150,000			
12	Portion disallowed (30%)		103,680	disallowed		45,000	disallowed		
14 15 16	Total disallowance		449,280			195,000			449,280
17	Remaining A		1,684,720			1,690,000			1,435,720
10 19 20	Oregon Allocation Effect					1,521,000			1,292,148
20 21 22	Base Year Customers		640,000			669,659			669,661
22	Amount / Customer	\$	2.63		\$	2.27		\$	1.93

2017 Natural Gas Safety Tracking Survey

Market Intelligence, Strategic Planning January 2018
Research Background

- Methodology: telephone survey fielded in December 2017
- Sample size: 150 gas customers, 150 noncustomers.
- Sample design: both customers and noncustomers samples are randomly selected to represent both the total customers and general public in NW Natural service territories
- Confidence level: 95%
 Margin of error: +/-8%

Importance of Information Sources

Please rate how important the following sources of news and information are to you on 5 point scale.



Total: 300

NW Natural/2103 Heiting/4

Demographic Information

Total: 300





BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of Andrew Speer

LONG RUN INCREMENTAL COSTS AND RATE SPREAD Exhibit 2200

May 23, 2018

EXHIBIT 2200 - REPLY TESTIMONY – LONG RUN INCREMENTAL COSTS AND RATE SPREAD

Table of Contents

I.	Introduction and Summary	1
II.	Long-Run Incremental Cost Study	1
III.	Rate Spread	5

i – REPLY TESTIMONY OF ANDREW SPEER – Table of Contents

1		I. INTRODUCTION AND SUMMARY
2	Q.	Are you the same Andrew Speer who filed direct testimony in this
3		proceeding on behalf of Northwest Natural Gas Company ("NW Natural" or
4		"the Company")?
5	Α.	Yes, I presented NW Natural/1100, Speer.
6	Q.	What is the purpose of your reply testimony?
7	A.	I summarize and respond to the issues raised by George Compton and Scott
8		Gibbens on behalf of Commission Staff ("Staff"), and Michael Gorman and
9		Edward Finklea on behalf of the Alliance of Western Energy Consumers
10		("AWEC") on the topics of Long-Run Incremental Cost (LRIC) and rate spread for
11		which the Company proposed.
12	Q.	Please summarize your reply testimony.
13	A.	In my reply testimony, I review AWEC's and Staff's proposals for LRIC and rate
14		spread, include updates to my original LRIC study, and use the updated cost
15		study to support the Company's rate spread proposal.
16		II. LONG-RUN INCREMENTAL COST STUDY
17	Q.	Did AWEC propose any methodology changes to the Company's proposed
18		LRIC study?
19	A.	No. AWEC did not propose any methodology changes to the Company's LRIC
20		study.
21	Q.	Did AWEC find any other issue with the Company's LRIC Study?

Did AWEC find any other issue with the Company's LRIC Study? Q.

1 - REPLY TESTIMONY OF ANDREW SPEER

- 1 Α. Yes. AWEC's witness Mr. Michael Gorman stated that the Company incorrectly 2 allocated a portion of the \$1,949,612¹ included in the Company's revenue 3 deficiency related to increased gas costs to transport customers. Q. Given AWEC's assertion of gas costs being embedded in the revenue 4 deficiency request, were any errors found in the LRIC study? 5 6 Α. Yes. After review, the Company did find that on lines 22 and 23 of the LRIC 7 study², that line 23 did contain gas cost related to "line loss" revenue. However, 8 line 23 only shows the Company's margin at current rates and is not 9 representative of the original calculation for NW Natural's incremental revenue requirement in this case. Of course, because line loss is a component of gas 10 costs, these amounts should not be allocated to transport customers. 11 12 Q. Were the gas costs identified by AWEC included in the Company's revenue requirement, or its deficiency request? 13 No. The Company did not include any line loss revenues or any other gas costs 14 Α. 15 in its original incremental revenue requirement request of \$52.4 million or updated request of \$37.8 million. The error of \$1,949,612 of gas costs identified 16 17 by AWEC only impacted the Company's LRIC and rate spread studies. 18 Q. Has the Company provided an update to NW Natural/1101 to reflect the change proposed by AWEC? 19
- 20 A. Yes. See NW Natural/2201, Speer, lines 20-23 and NW Natural/2202, Speer.

2 – REPLY TESTIMONY OF ANDREW SPEER

¹ See AWEC/100, Gorman/5, lines 3-5.

² Lines 22 and 23 of the LRIC study shows the Company's total revenue and margin at current rates during the test year.

1	Q.	What changes did Staff propose?
2	A.	Staff argued that the Company should make an adjustment to capture the true
3		incremental costs associated with "system core mains," and that in the LRIC the
4		Company should assume a replacement of all of these components.
5	Q.	How does Staff define system core mains?
6	A.	System core mains are defined by Staff as mains that are larger in diameter
7		which transport gas from the interstate pipeline and interconnect with smaller
8		diameter mains used to serve neighborhoods ³ .
9	Q.	Does the Company agree with Staff's definition of "system core mains"?
10	A.	Yes.
11	Q.	What is the basis for Staff's system core main cost estimate of
12		\$245,000,000?
13	A.	Staff uses the Company's response to data request UG 344 OPUC DR 350^4 as
14		the revenue requirement costs which the Company calculated specifically as a
15		response to OPUC DR 350.
16	Q.	What is the consequence of underestimating system core mains?
17	A.	An underestimate of incremental costs associated with serving customer rate
18		schedules heavily influences the "margin-to-cost" ratio ⁵ . A margin-to-cost ratio
19		equal to 1 shows a situation where revenue matches costs, and an

3 – REPLY TESTIMONY OF ANDREW SPEER

³ See Staff/1200, Compton/6, lines 8-10.

⁴ See Exhibit Staff/1203, Compton/1.

⁵ See Exhibit NW Natural/1101, Speer/1, line 25A.

1		underrepresentation of one or more cost categories would yield ratios that do not
2		correctly represent a rate schedule's fully-loaded cost of service. Given that rate
3		spread is based on the observations from the cost study, margin-to-cost ratios
4		that do not accurately reflect a rate schedule's cost of service may influence rate
5		spread allocation to over- or under-allocate revenue incorrectly across rate
6		schedules.
7	Q.	How does Mr. Compton propose to spread the \$245 million of system core
8		mains across rate schedules?
9	A.	Mr. Compton allocates system core main costs using an "average-and-excess"
10		demand (A&E) method which combines a mix of capacity and throughput
11		allocators (<i>i.e.</i> average usage and load factor) for each specific rate schedule to
12		assign costs.
13	Q.	Does the Company accept the changes to the LRIC study proposals made by
14		Staff and has the Company provided an update to NW Natural/1101, Speer?
15	Α.	Yes. The Company agrees that "system core mains" were underestimated in the
16		LRIC study filed in this case and accepts the use of the \$245 million in the update
17		proposed by Staff. With regards to the A&E method for allocating system core
18		main costs, the Company also accepts and agrees that such an approach is
19		reasonable, and that Staff's update and mathematical computation appear sound.
20		NW Natural provided an updated version to its LRIC study as an exhibit to this
21		testimony to reflect Staff's proposed changes made by Staff. See NW Natural/
22		2201, Speer/1, lines 3 & 10.

4 - REPLY TESTIMONY OF ANDREW SPEER

1		III. <u>RATE SPREAD</u>
2	Q.	Which parties proposed changes to the Company's rate spread proposal?
3	Α.	AWEC and Staff both proposed changes to the Company's original rate spread.
4	Q.	What did AWEC and Staff propose?
5	Α.	AWEC and Staff both had similar methodology proposals. Both methodologies
6		tend to show a reduction of the burden on rate schedules that are identified by
7		the LRIC study to be subsidizing other rate schedules.
8	Q.	Taking the recommended LRIC changes proposed by Mr. Compton into
9		account, what is the Company's view of AWEC and Staff's rate spread
10		proposals?
11	Α.	Mr. Compton's "relative margin to cost at present rates" ⁶ shows that some
12		disparity exists and that some rate schedules are subsidizing others. However,
13		given "Bonbright's principles of rate making" referenced by Staff ⁷ , the Company's
14		initial proposal for spreading incremental revenue requirement using an "equal
15		percentage of margin" methodology fulfills the goals of "simplicity", "fairness" and
16		"stability" in price setting. The Company acknowledges that the Company's
17		proposal does not achieve all eight of Bonbright's goals in rate making, but at this
18		time, the Company believes its' proposal provides a sound and fair spread of
19		rates.
20	Q.	Is the Company open to other proposals on rate spread from the parties?

⁶ See Exhibit Staff/1202, Compton/1, line 25A.

5 – REPLY TESTIMONY OF ANDREW SPEER

⁷ See Exhibit Staff/600, Gibbens/8, lines 4-15.

- 1 Α. Yes. The Company is open to other modifications to its proposed rate spread to 2 the extent the parties can develop a proposal that meets their objectives, and 3 which may balance the various principles underlying rate spread in different ways. At this time, the Company believes, however, that spreading the revenue 4 requirement on an equal percent of margin basis, which maintains the relative 5 margin to cost ratios, is reasonable (especially in light of the modifications to the 6 LRIC that show rate schedules much closer to parity). 7 8 Q. Does this conclude your testimony?
- 9 A. Yes.

6 – REPLY TESTIMONY OF ANDREW SPEER

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibits of Andrew Speer

LONG RUN INCREMENTAL COSTS AND RATE SPREAD EXHIBITS 2201-2202

May 23, 2018

EXHIBITS 2201-2202 - LONG RUN INCREMENTAL COSTS AND RATE SPREAD

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NW Natural Oregon Jurisdictional Rate Case Test Year Twelve Months Ended October 31, 2019 Long-Run Incremental Cost Study Summary of Results

		CUSTOMER CLASS	Residential	Commercial	Industrial	Commercial	Commercial	Commercial	Industrial	Industrial	Commercial	Industrial		Commercial	Industrial			
		SERVICE TYPE	Sales	Sales	Sales	Sales	Sales	Transportation	Sales	Transportation	Sales	Sales	Transportation	Sales	Sales	Transportation	Transportation	
			Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Interruptible	Interruptible	Interruptible		Special
Line No	l.	RATE SCHEDULE	02	03CSF	03ISF	27CSF	31CSF	31CTF	31ISF	31ITF	32 CSF	32ISF	32TF	32CSI	32151	32TI	33T	Contracts
	STATISTICS	Totals																
1	2010 ANNUAL THERM DELIVERIES	1 072 764 979	295 050 420	166 461 516	4 974 416	1 107 619	25 200 021	2 406 596	14 010 541	262 669	20.002.010	12 012 121	02 722 465	22 722 672	27 416 494	106 067 402		70 164 217
2	2015 ANNOAL THERW DELIVERIES	1,075,704,878	610 272	E9 753	4,074,410	1,157,018	23,350,021	5,450,560	14,010,341	505,506	35,052,610	13,023,132	52,722,403	23,733,073	27,410,484	190,907,402	-	75,104,217
2	AVERAGE ANNUAL THERM DELIVERIES DER CUSTOMER	073,209	621	36,732	12 721	1,902	24 211	47 251	64 565	72 714	433	222 054	520 912	409 201	402 194	2 217 264		11 209 174
3.	ESTIMATED DESIGN DAY LOAD FACTOR		370	2,000	13,751	370/	34,511	47,251	04,505	72,714	30,204	222,554	520,515	405,201	405,104	2,517,204	-	11,505,174
34	Average Sime Daily Daliverias		27%	20%	37%	27%	34%	28%	46%	61%	33/0	37/6	47%	20%	21%	33/6	01%	33%
20	Average Firm Daily Deliveries	2,045,159	1,054,933	456,059	13,355	3,281	69,562	9,580	38,385	996	107,104	37,872	254,034	-	-	-	-	216,888
30	Peak Firm Day Deliveries	7,521,024	3,867,055	2,321,162	36,017	12,028	207,093	34,285	79,790	1,628	322,952	102,298	536,716	-	-	-	-	621,093
3d	System Firm Load Factor	27%																
4	Demand Charges	\$76,015,833	\$44,619,642	\$19,289,561	\$564,846	\$138,779	\$2,942,198	\$0	\$1,623,544	\$0	\$4,530,076	\$1,601,827	\$0	\$327,287	\$378,073	\$0	\$0	\$0
5	Cost of Gas	\$198,888,064	\$109,238,807	\$47,225,131	\$1,382,872	\$339,765	\$7,203,149	\$0	\$3,974,789	\$0	\$11,090,630	\$3,921,623	\$0	\$6,733,242	\$7,778,056	\$0	\$0	\$0
6	Total Cost of Gas	\$274,903,897	\$153,858,449	\$66,514,692	\$1,947,718	\$478,544	\$10,145,347	\$0	\$5,598,333	\$0	\$15,620,706	\$5,523,450	\$0	\$7,060,529	\$8,156,129	\$0	\$0	\$0
7	Account Services (Meter Reading, Billing, etc.)	\$26,500,696	\$23,676,365	\$2,361,734	\$14,270	\$76,118	\$143,459	\$14,397	\$42,068	\$973	\$83,943	\$12,020	\$34,234	\$11,244	\$13,334	\$16,537	\$0	\$1,362
	Customer Canital Investment Costs																	
8	Meter & Regulators	\$31,271,274	\$23,199,887	\$6,259,399	\$156,723	\$78.040	\$398.513	\$39.725	\$174.291	\$3.648	\$415,271	\$85,920	\$201.874	\$83,708	\$34,530	\$139,745	\$0	\$11.508
9	Services	\$234,118,449	\$213,913,778	\$18,100,185	\$260,111	\$687,723	\$417.002	\$40,236	\$125,210	\$2,981	\$266.931	\$34,696	\$118.399	\$45,969	\$40.826	\$64,401	\$0	\$5,304
10	Main Extensions	\$315,808,952	\$218,871,639	\$90,254,775	\$545,348	\$703.662	\$1.136.782	\$113.678	\$1,209,835	\$27.876	\$665,171	\$345,667	\$992,400	\$89,099	\$379.119	\$473,899	\$0	\$39.027
10a	System Mains Replacement Rev. Reg.	\$245,000,000																
10h	System Mains Annual Through-Put Allocated	\$66 621 780 65	\$25 792 005	\$11 150 166	\$326 505	\$80 221	\$1 700 711	\$234 213	\$938.474	\$24 353	\$2 618 571	\$925 921	\$6 210 870	\$1 589 763	\$1 836 451	\$13 193 556	\$0	\$0
100	System Mains - Firm Domand Allocated	\$179 279 210	\$01 716 020	\$FE 0E1 627	¢9520,305	\$205,222	\$4,011,695	\$234,213	¢1 903 202	\$29,555	\$7,6E0,E42	\$2,426,227	\$12 720 429	\$2,505,705	\$1,050,451	¢10,100,000	00 60	00 00
11	Storage Costs	\$2 166 914	\$1,710,025	\$55,051,057	\$10 240	\$263,203	\$4,511,085	\$015,137	\$1,092,393	\$36,002	\$7,039,343	\$2,420,237	\$12,725,438	\$70 795	\$101 201	30 \$0	30 \$0	30 \$0
12	Total Customer Capital Investment Costs	\$1.073.365.488	\$574.603.554	\$181,482,438	\$2,153,264	\$1,838,360	\$8.624.144	\$1,241,010	\$4,363,110	\$97.460	\$11,718,198	\$3,847,808	\$20,252,981	\$1,879,335	\$2,392,226	\$13,871,600	\$0 \$0	\$55,839
		\$1,075,303,400	\$374,003,534	\$101,402,450	\$2,155,204	\$1,030,500	\$101.000	\$1,241,010	\$4,505,110	\$37,400	\$11,710,150	\$5,647,666	\$20,252,501	\$2,075,555	\$2,552,220	\$13,071,000		469,555
13	Total System Reinforcement Cost	\$3,759,945	\$1,901,185	\$1,140,999	\$17,709	\$2,909	\$101,808	\$16,856	\$39,226	\$800	\$158,766	\$50,299	\$263,830	ŞU	ŞU	\$0	\$0	\$62,558
14	Long Run Incremental Distribution Cost	\$1,378,530,027	\$754,039,553	\$251,499,862	\$4,132,960	\$2,398,932	\$19,014,758	\$1,272,263	\$10,042,737	\$99,233	\$27,581,613	\$9,433,577	\$20,551,045	\$8,951,108	\$10,561,689	\$13,888,137	\$0	\$119,759
	Proposed Cost by Functional Classification																	
15	Cost of Gas Commodity	\$277,606,225	\$155,370,890	\$67,168,537	\$1,966,864	\$483,248	\$10,245,077	\$0	\$5,653,365	\$0	\$15,774,259	\$5,577,746	\$0	\$7,129,935	\$8,236,304	\$0	\$0	\$0
16	Account Services (Meter Reading, Billing, etc.) Costs	\$45,522,961	\$40,671,318	\$4,056,992	\$24,514	\$130,756	\$246,434	\$24,731	\$72,265	\$1,671	\$144,197	\$20,647	\$58,807	\$19,315	\$22,906	\$28,407	\$0	\$48,819
17	Meters & Services Costs	\$66,791,966	\$59,675,588	\$6,130,699	\$104,907	\$192,724	\$205,245	\$20,124	\$75,377	\$1,668	\$171,693	\$30,356	\$80,605	\$32,637	\$18,965	\$51,378	\$0	\$85,882
18	System Core Main Costs	\$254,781,629	\$176,014,813	\$72,866,804	\$448,906	\$565,718	\$987,486	\$104,071	\$995,835	\$22,863	\$656,898	\$315,691	\$1,001,550	\$71,036	\$302,259	\$377,824	\$0	\$1,654,166
19	Storage Costs	\$19,775,660	\$10,132,514	\$6,080,841	\$94,367	\$31,491	\$542,586	\$0	\$209,050	\$0	\$846,137	\$268,022	\$0	\$646,120	\$924,531	\$0	\$0	\$0
20	Proposed Cost	\$664,478,441	\$441,865,124	\$156,303,873	\$2,639,559	\$1,403,937	\$12,226,828	\$148,926	\$7,005,892	\$26,202	\$17,593,184	\$6,212,462	\$1,140,962	\$7,899,042	\$9,504,965	\$457,609	\$0	\$1,788,868
21	LRIC Based Target Margin	\$386,872,216	\$286,494,233	\$89,135,336	\$672,694	\$920,689	\$1,981,751	\$148,926	\$1,352,527	\$26,202	\$1,818,925	\$634,716	\$1,140,962	\$769,108	\$1,268,661	\$457,609	\$0	\$1,788,868
22	Revenue at Current Rates	\$626,662,560	\$387,770,097	\$137,975,522	\$3,740,132	\$1,038,854	\$18,521,031	\$1,113,636	\$8,813,710	\$89,844	\$24,565,050	\$7,608,655	\$7,460,021	\$9,271,906	\$10,710,650	\$6,194,584	\$0	\$1,788,868
23	Margin Revenue at Current Rates	\$349,809,051	\$232,672,334	\$71,019,860	\$1,780,460	\$556,990	\$8,316,491	\$1,113,636	\$3,187,208	\$89,844	\$8,865,834	\$2,060,888	\$7,460,021	\$2,181,744	\$2,520,290	\$6,194,584	\$0	\$1,788,868
24	Current Revenue to Proposed Cost (Includes Cost of Gas)	0.94	0.88	0.88	1.42	0.74	1.51	7.48	1.26	3.43	1.40	1.22	6.54	1.17	1.13	13.54		-
25	Current Margin Revenue to LRIC Based Target Margin	0.90	0.81	0.80	2.65	0.60	4.20	7.48	2.36	3.43	4.87	3.25	6.54	2.84	1.99	13.54		
	25A Relative Margin to Cost at Present Rates	1.00	0.90	0.88	2.93	0.67	4.64	8.27	2.61	3.79	5.39	3.59	7.23	3.14	2.20	14.97	-	-
26	Component LRIC Target Increase by Schedule	\$37,815,881	\$54,095,026	\$18,328,351	(\$1,100,573)	\$365,083	(\$6,294,203)	(\$964,710)	(\$1,807,818)	(\$63,642)	(\$6,971,866]) (\$1,396,193)	(\$6,319,060)	(\$1,372,864)	(\$1,205,685)	(\$5,736,975)	\$0	\$0
27	Target Increase as Percent of Total Present Revenue	6.03%	13.95%	13.28%	-29.43%	35.14%	-33.98%	-86.63%	-20.51%	-70.84%	-28.38%	-18.35%	-84.71%	-14.81%	-11.26%	-92.61%	0.00%	0.00%
	27A Target Increase as Percent of Present Margin Revenue	10.81%	23.25%	25.81%	-29.43%	65.55%	-75.68%	-86.63%	-56.72%	-70.84%	-78.64%	-67.75%	-84.71%	-62.93%	-47.84%	-92.61%	0.00%	0.00%

NW Natural Oregon Jurisdictional Rate Case Test Year Twelve Months Ended October 31, 2019 Rate Spread Study Allocation by Rate Schedule Summary

					Proposed			Total Revenue	Percentage
		Total Revenue at			Revenue	Total Revenue at		Percentage	Increase to
Line No.	Rate Schedule	P	Present Rates		Increase	Pr	oposed Rates	Increase	Average Bill
1	02	\$	387,770,097	\$	25,282,182	\$	413,052,279	6.52%	6.60%
2	03CSF	\$	137,975,522	\$	7,717,020	\$	145,692,542	5.59%	5.67%
3	03ISF	\$	3,740,132	\$	193,465	\$	3,933,596	5.17%	5.25%
4	27CSF	\$	1,038,854	\$	60,523	\$	1,099,376	5.83%	5.90%
5	31CSF	\$	18,521,031	\$	903,670	\$	19,424,701	4.88%	5.02%
6	31CTF	\$	1,113,636	\$	121,008	\$	1,234,644	10.87%	10.90%
7	31ISF	\$	8,813,710	\$	346,322	\$	9,160,032	3.93%	4.02%
8	31ITF	\$	89,844	\$	9,762	\$	99,607	10.87%	10.90%
9	32 CSF	\$	24,565,050	\$	963,362	\$	25,528,412	3.92%	4.43%
10	32ISF	\$	7,608,655	\$	223,936	\$	7,832,591	2.94%	3.36%
11	32TF	\$	7,460,021	\$	810,606	\$	8,270,627	10.87%	13.87%
12	32CSI	\$	9,271,906	\$	237,068	\$	9,508,974	2.56%	3.35%
13	32ISI	\$	10,710,650	\$	273,855	\$	10,984,505	2.56%	3.29%
14	32TI	\$	6,194,584	\$	673,104	\$	6,867,688	10.87%	11.50%
15	33T	\$	-	\$	-	\$	-	0.00%	0.00%
16	Total	\$	624,873,692	\$	37,815,882	\$	662,689,574	6.05%	

NW Natural Oregon Jurisdictional Rate Case Test Year Twelve Months Ended October 31, 2019 Rate Spread Study Rates by Rate Schedule & Block

								Current/Proposed	ł		
						Current Rates Volumetric	Proposed	Rates Monthly Base	Current Rates	Change Base Rate	Proposed Rates
Line No.	Schedule	Block		Volumes	Customers	Margin	Revenue Increase	Charge	Base Rate	Increase	Base Rate
1	2R		N/A	385,050,429	606,831	\$171,231,926	\$25,282,182	\$8	\$0.44470	\$0.06566	\$0.51036
2	3C Firm Sales		N/A	166,461,516	58,617	\$58,997,291	\$7,717,020	\$15	\$0.35442	\$0.04636	\$0.40078
3	3I Firm Sales		N/A	4,874,416	355	\$1,672,510	\$193,465	\$15	\$0.34312	\$0.03969	\$0.38281
4	27 Dry Out		N/A	1,197,618	1,962	\$405,286	\$60,523	\$6	\$0.33841	\$0.05054	\$0.38895
5	31C Firm Sales	Block 1	2,000	12,784,484	740	\$5,197,968	\$903,670	\$325	\$0.21386	\$0.03718	\$0.25104
6		Block 2	all additional	12,605,537					\$0.19546	\$0.03398	\$0.22944
7	31C Firm Trans	Block 1	2,000	1,523,968	74	\$603,036	\$121,008	\$575	\$0.18122	\$0.03636	\$0.21758
8		Block 2	all additional	1,972,618					\$0.16570	\$0.03325	\$0.19895
9	31I Firm Sales	Block 1	2,000	4,299,679	217	\$2,208,104	\$346,322	\$325	\$0.16888	\$0.02649	\$0.19537
10		Block 2	all additional	9,710,862					\$0.15261	\$0.02394	\$0.17655
11	31I Firm Trans	Block 1	2,000	91,578	5	\$55,344	\$9,762	\$575	\$0.16403	\$0.02893	\$0.19296
12		Block 2	all additional	271,990					\$0.14825	\$0.02615	\$0.17440
13	32C Firm Sales1	Block 1	10,000	28,058,173	433	\$3,656,050	\$963,362	\$675	\$0.09877	\$0.02603	\$0.12480
14		Block 2	20,000	9,518,066					\$0.08394	\$0.02212	\$0.10606
15		Block 3	20,000	1,350,403					\$0.05928	\$0.01562	\$0.07490
16		Block 4	100,000	166,168					\$0.03458	\$0.00911	\$0.04369
17		Block 5	600,000	-					\$0.01978	\$0.00000	\$0.01978
18		Block 6	all additional	-					\$0.00988	\$0.00000	\$0.00988
19	32I Firm Sales1	Block 1	10,000	5,409,612	62	\$1,147,760	\$223,936	\$675	\$0.09753	\$0.01903	\$0.11656
20		Block 2	20,000	5,816,515					\$0.08291	\$0.01618	\$0.09909
21		Block 3	20,000	2,020,748					\$0.05851	\$0.01142	\$0.06993
22		Block 4	100,000	576,257					\$0.03415	\$0.00666	\$0.04081
23		Block 5	600,000	-					\$0.01950	\$0.00000	\$0.01950
24		Block 6	all additional	-					\$0.00980	\$0.00000	\$0.00980
25	32 Firm Trans	Block 1	10,000	14,881,729	178	\$4,592,829	\$810,606	\$925	\$0.09698	\$0.01712	\$0.11410
26		Block 2	20,000	16,126,373					\$0.08241	\$0.01454	\$0.09695
27		Block 3	20,000	10,000,748					\$0.05820	\$0.01027	\$0.06847
28		Block 4	100,000	20,036,765					\$0.03395	\$0.00599	\$0.03994
29		Block 5	600,000	25,892,025					\$0.01939	\$0.00342	\$0.02281
30		Block 6	all additional	5,784,825					\$0.00973	\$0.00172	\$0.01145
31	32C Interr Sales	Block 1	10,000	5,114,441	58	\$1,524,771	\$237,068	\$675	\$0.10055	\$0.01563	\$0.11618
32		Block 2	20,000	6,268,233					\$0.08547	\$0.01329	\$0.09876
33		Block 3	20,000	3,312,192					\$0.06033	\$0.00938	\$0.06971
34		Block 4	100,000	6,448,719					\$0.03520	\$0.00547	\$0.04067
35		Block 5	600,000	2,385,488					\$0.02010	\$0.00313	\$0.02323
36		Block 6	all additional	-					\$0.01009	\$0.00000	\$0.01009
37	32I Interr Sales	Block 1	10,000	6,003,909	68	\$1,786,192	\$273,855	\$675	\$0.10033	\$0.01538	\$0.11571
38		Block 2	20,000	7,358,360					\$0.08530	\$0.01308	\$0.09838
39		Block 3	20,000	3,888,225					\$0.06021	\$0.00923	\$0.06944
40		Block 4	100,000	7,570,236					\$0.03512	\$0.00538	\$0.04050
41		Block 5	600,000	2,800,356					\$0.02006	\$0.00308	\$0.02314
42		Block 6	all additional	-					\$0.01005	\$0.00000	\$0.01005
43	32 Interr Trans	Block 1	10,000	7,385,146	85	\$5,251,084	\$673,104	\$925	\$0.09816	\$0.01258	\$0.11074
44		Block 2	20,000	12,638,632					\$0.08344	\$0.01070	\$0.09414
45		Block 3	20,000	9,591,680					\$0.05891	\$0.00755	\$0.06646
46		Block 4	100,000	30,167,941					\$0.03436	\$0.00440	\$0.03876
47		Block 5	600,000	53,015,711					\$0.01965	\$0.00252	\$0.02217
48		Block 6	all additional	84,168,292					\$0.00984	\$0.00126	\$0.01110
49	33		N/A			\$0	\$0	\$38,000	\$0,00566	\$0,00000	\$0,00566

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Reply Testimony of John Frankel

PROMOTIONS AND CONCESSIONS Exhibit 2300

May 23, 2018

EXHIBIT 2300 - REPLY TESTIMONY – PROMOTIONS AND CONCESSIONS

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II.	Marketing Activities

i – REPLY TESTIMONY OF JOHN FRANKEL – Table of Contents

1		I. INTRODUCTION AND SUMMARY
2	Q.	Please state your name and position with Northwest Natural Gas Company
3		("NW Natural" or "Company").
4	A.	My name is John Frankel. I am the Senior Manager of Marketing and Channel
5		Development. I am responsible for overseeing various administrative functions
6		at NW Natural involving marketing, customer service and trade ally development.
7		In my role, I am accountable for strategic planning, leadership of the marketing
8		team, and development of residential and commercial marketing programs.
9	Q.	Please summarize your educational background and business experience.
10	A.	I received a Bachelor of Science degree in Business Administration from Oregon
11		State University in 1986. I have been employed by NW Natural since 2005 and
12		have been in my current position since 2012. During my career I have held
13		various management positions in marketing, merchandising, operations,
14		purchasing and customer service.
15	Q.	What is the purpose of your testimony?
16	Α.	The purpose of my testimony is to respond to the adjustments proposed by Rose
17		Anderson on behalf of the Public Utility Commission of Oregon Staff ("Staff")
18		relating to promotional and marketing activities. I also briefly respond to one item
19		raised by Staff witness Lance Kaufman.
20		In the testimony of Staff witness Anderson, Staff has proposed to disallow
21		all of the expenses accounted for in three of the Company's FERC accounts
22		(911, 912, and 913) because Staff believes that those accounts are only used for

1 – REPLY TESTIMONY OF JOHN FRANKEL

1		promotional and concessions activities. While there are promotional and
2		concession expenses included in those accounts, those accounts are primarily
3		used for the Company's marketing department for a variety of prudent utility
4		activities. My testimony will explain in greater detail the expenses, and
5		demonstrate that those activities are prudently incurred utility expenses. With
6		respect to costs related to customer rebates, the Company has identified and will
7		remove those expenses from its request in this case.
8		II. MARKETING ACTIVITIES
9	Q.	Can you please describe what constitutes "marketing activities?"

A. The term "marketing" describes a broad range of activities. It can generally be
thought of as the portion of the utility operations that is involved in outreach to,
and education of potential customers, as well as the on-boarding of those
customers into the utility system. In terms of an organization, the "marketing
department," or "customer acquisition" group at NW Natural is the department
that conducts all of these activities. These specific activities are described more
below.

17 Q. Please explain Staff's position regarding the Company's expenses in FERC

18 **911, 912, and 913.**

19 A. Staff seeks to disallow \$4.3 million of expenses from NW Natural's revenue

- 20 requirement, based on what seems to be their conclusion that anything in FERC
- Accounts 911, 912, and 913 are "promotions and concessions" expenses that
- 22 should not be recoverable from utility customers.

2 - REPLY TESTIMONY OF JOHN FRANKEL

1

Q. Do you agree with Staff's position?

2 Α. No. These activities comprise far more than just promotions and concessions¹. 3 As mentioned above, these accounts include payroll and non-payroll and are 4 used primarily by the marketing department for a broad range of utility activities. 5 For example, these budgets include the costs of processing thousands of 6 inbound inquiries annually regarding new gas services. The varied assortment of 7 stakeholders contacting NW Natural during the process includes builders. 8 developers, HVAC contractors, fireplace dealers, plumbers, remodelers, 9 architects, and engineers (together, referred to as "tradespeople") as well as the 10 actual commercial and residential end-use customers who are adding natural gas 11 service. It is vitally important that our employees clearly communicate issues of 12 safety and compliance with regulatory policies when connecting gas service to 13 these stakeholders, while upholding NW Natural's high levels of customer 14 service. 15 In addition to the work of processing orders and managing tradespeople 16 interactions, NW Natural personnel engage in evaluation of processes,

17 development of data, creation of strategy, research on emerging trends and

18 coordination of system plans to meet customer demand in new growth areas.

19 Q. Are there other reasons for which you believe the calculation of Staff's

20

adjustment should be modified?

3 - REPLY TESTIMONY OF JOHN FRANKEL

¹ OAR 860-026-0010 does not include restrictive language which precludes other customer service or customer assistance costs from being charged to these FERC accounts

1	Α.	Yes. NW Natural intended to adjust category C advertising expense out of FERC
2		account 913 in our initial filing, as a non-recoverable item. However, most of the
3		adjustment was instead applied incorrectly to FERC account 909, and to a lesser
4		extent to account 913. ² The overall result of the adjustment by the Company,
5		including all FERC accounts is accurate, however.
6	Q.	If NW Natural had made the intended adjustment for Category C
7		Advertising expenses to FERC account 913, what would have been Staff's
8		adjustment?
9	A.	Staff's adjustment would have been \$3,842,310. See NW Natural/2301, Frankel
10		for this calculation.
11		The following table represents the Oregon Test Year expenses included in
12		FERC 911, 912, and 913, reflecting the appropriate adjustment for Category C
13		Advertising expense.

Category	Expense				
Payroll	\$2,331,895				
Non-Payroll	\$ 875,171				
Rebates	\$ 635,244				
Total	\$3,842,310				

14

15 Q. Please describe the positions in the Company whose payroll costs are

16 included in those accounts, and what those individuals do.

17 A. The following table summarizes the positions whose payroll costs are associated

18 with marketing activities.

4 - REPLY TESTIMONY OF JOHN FRANKEL

² See Confidential UG 344 OPUC DR 125 Supplement Attachment 2. "O&M TY FERC Allocation Summary" tab, column "V".

		Number
		of FTE's Job Type
		2 Engineer
		5 Channel Manager/ Marketing Consultant
		5 Marketing Account Manager / Perimeter
		2 Program Manager / Analyst
2		2 Marketing Managers
3	Q.	Please describe the position roles within the marketing department.
4	Α.	The following are positions in the marketing department:
5		Engineer – The engineer position provides technical and engineering
6		support for customers. This position is the primary liaison to Codes and
7		Standards boards as well as the engineering and architect industry. This position
8		also maintains business relationships with land developers, builders, and other
9		tradespeople who collaborate to design and build commercial and multifamily
10		projects. Providing accurate advice from certified and trained engineers ensures
11		that the projects are constructed in compliance with local and national fuel safety
12		codes as well as utility standards. Technical services include pipe sizing, design
13		of vertical main, meter room requirements, efficiency measures, equipment
14		recommendations and on-site consulting.
15		Channel Manager or Marketing Consultant— This position is the
16		primary liaison to tradespeople. In recent years, approximately 6,300 to 7,400
17		new homes are built annually. Employees involved in servicing the residential
18		new construction acquisition process (known as Channel Managers or
19		Consultants) have business relationships with developers, builders and

5 - REPLY TESTIMONY OF JOHN FRANKEL

contractors. They coordinate service requests for subdivisions, mains and
service lines, facilitate the construction process and oversee the application of
NW Natural's main and service line policy. Additionally, the new construction
marketing Channel Managers work with NW Natural engineers, local jurisdictions
and regional entities to determine the availability of mains and analyze the cost of
future service to new growth areas.

Approximately 3,000 to 3,700 households per year convert from oil or
electric to natural gas for space and water heating. Channel Managers involved
in providing service to the on-main or near-main conversion customers have
business relationships with heating, fireplace and plumbing contractors to
educate them about utility processes and explain relevant features of gas
equipment. They facilitate communication with tradespeople regarding efficiency
measures, safety, compliance issues, technical information and utility policy.

14Marketing Account Manager (Perimeter Manager)— These positions15provide customer service and market support in perimeter districts, including16Astoria, The Dalles, Lincoln City and Coos Bay. These representatives work in17the community as liaisons to trade partners, processing orders and providing18training as well as resolving regulatory, jurisdictional and customer service19issues.

Program Manager/Analyst— These positions administer the marketing
 programs and campaigns. They have responsibility for written and digital
 communication with tradespeople and partners explaining NW Natural programs

6 - REPLY TESTIMONY OF JOHN FRANKEL

1 and policies as well as development of campaigns that explain features of gas 2 equipment to both existing and prospective customers. The Marketing Program 3 Manager/Analysts have the primary responsibility for developing and executing 4 the marketing campaigns. These campaigns explain the features and benefits of 5 natural gas to customers. There are both existing customer and prospective 6 customer elements of the marketing campaigns that explain natural gas benefits, 7 tax credits, discounts, incentives as well as the efficiency measures provided by 8 Energy Trust. These employees are involved in database management as well 9 as evaluation and analysis of the department programs.

10 Marketing Manager (Sr. Manager and Channel Development Manager)— 11 Leadership and oversight of the marketing group is provided by a Senior 12 Marketing Manager and a Channel Development Manager. They are responsible 13 for oversight of marketing functions, partner relationships and 14 coaching/counseling of the marketing team. They act as Energy Trust liaisons, 15 coordinate peer utility relationships, administer budgets, develop marketing 16 strategy and most importantly, ensure high levels of customer service and 17 regulatory compliance.

Q. Please describe the categories of non-payroll expense included in those accounts (FERC 911,912,913).

20 A. Non-payroll expense is grouped in four categories: Administrative Marketing

21 expenses, Trade Relations expenses, Advertising expenses, and Rebates.

7 - REPLY TESTIMONY OF JOHN FRANKEL

The Administrative Marketing expenses listed are part of the overall
 management of the marketing department. These expenses include travel,
 meals, education, dues/memberships, mileage, supplies, parking and other costs
 associated with running the department.

5 Trade Relations expenses are related to overall development and 6 strengthening of partnerships with builders, developers, HVAC contractors, 7 dealers, plumbers, architects and engineers. Some expenses are directly related 8 to support of activities that showcase gas, provide education and promote 9 membership in relevant trade associations. For instance, purchases of 10 innovative gas equipment for builder showcases, homebuilder open houses for 11 gas homes, and trade association education seminars are critical to our 12 partnerships.

13 Advertising expenses include printing, postage and creative development 14 of direct marketing campaigns. These conversion campaigns explain rebates, 15 credits and discounts offered by Oregon Department of Energy, Energy Trust of 16 Oregon, contractors, retailers and NW Natural. The direct marketing materials 17 clearly outline the features and benefits of natural gas and explain verifiable 18 energy cost savings, comfort, performance, efficiency and convenience that gas 19 amenities offer. These materials help prospective customers make informed 20 decisions about natural gas service. Additionally, messaging to existing 21 customers about offers from contractors, ODOE, and ETO help to encourage 22 customers to upgrade to higher efficiency equipment.

8 - REPLY TESTIMONY OF JOHN FRANKEL

1		Rebates refer to the promotions and concessions that NW Natural offers
2		potential customers to initiate gas service or purchase gas appliances.
3	Q.	How can you demonstrate that NW Natural's marketing activities translate
4		into good customer care?
5	Α.	One way of measuring our success is to refer to industry-accepted
6		measurements of customer satisfaction such as J.D. Power. J.D Power
7		measures residential customer satisfaction across a variety of categories. For
8		five years running, NW Natural has received the highest score for large utilities in
9		the West in the 2017 J.D. Power Gas Utility Residential Customer Satisfaction
10		Study. All marketing efforts associated with on-boarding new customers,
11		resolving issues, providing relevant information and work with trade partners are
12		reflected in this "best-in-class" service score.
13	Q.	Please explain why natural gas utilities like NW Natural need to engage in
14		outreach to potential customers?
15		Unlike electric utilities, gas utilities are not the default provider of energy for
16		newly constructed homes and businesses. In other words, every new home that
17		is built will always receive electric service, but that is not the case for gas service.
18		Gas service is a choice for new construction projects. Our company must market
19		our product in order to gain some of these new customers. As such, requesting
20		cost recovery for our marketing team does not seem like a gratuitous request,
21		rather it is a necessary cost of doing business in our industry.

9 – REPLY TESTIMONY OF JOHN FRANKEL

2 distribution system? 3 Α. Yes. Existing customers benefit when the Company adds new customers to the 4 system. By adding customers, NW Natural can spread the fixed system costs 5 across a broader base of customers, which reduces the per customer burden of 6 those costs. 7 In order to remain viable, NW Natural should continue to grow. Outreach 8 to prospective customers is necessary to keep the utility strong, and stable while 9 responding to the growth demand in its service territory. 10 Q. Staff has specifically requested to disallow rebates. What is your position 11 on this? 12 Α. Staff correctly points out that NW Natural had identified in several reports that 13 these costs would not be recovered from ratepayers. These costs were 14 inadvertently included in the Company's request for recovery, and the Company 15 will remove these costs from its revenue requirement. The Oregon Test Year 16 cost for these promotions is \$558,811. 17 Please explain Staff's comparison of NW Natural's marketing costs to Q. 18 those of other utilities. 19 Α. It is my understanding that Staff reviewed FERC Form 2s to compare NW 20 Natural's FERC accounts 911, 912, and 913 with that of Avista Corporation, 21 Puget Sound Energy, and Cascade Natural Gas Company. Using this data, 22 Staff argues that NW Natural spends more on "promotional activities and

Do customers benefit when new customers are added to the gas

10 - REPLY TESTIMONY OF JOHN FRANKEL

Q.

1

concession spending" than other utilities. Staff appears to use this comparator
 as a factor in determining its disallowance of all costs in FERC accounts 911,
 912, 913.

4 Q. How do you respond to Staff's comparison?

- 5 Α. These comparisons to other utilities are inappropriate. As described throughout 6 my testimony, NW Natural does not solely account for "promotional activities and 7 concession spending" in the FERC accounts. NW Natural accounts for 8 marketing generally in these accounts. For this reason, Staff's claim that NW 9 Natural spends approximately \$4.8 million on promotions and concessions, as 10 that term is used by Staff, is not accurate. Furthermore, we do not know whether 11 the other utilities account for marketing in the same or different accounts simply 12 by reviewing their FERC accounts.
- 13 Q. You mention that the other utilities could account for marketing expense
- 14 differently than NW Natural. Is it possible that some of the costs NW
- 15 Natural allocated to FERC 911, 912 and 913 could be included in other
- 16 FERC accounts?
- 17 A. Yes. Under accounting guidelines, utilities often have different, but equally
- 18 legitimate, determinations of how certain activities are classified within the FERC
- 19 system of accounts³. Thus, it is possible for NW Natural to reclassify some of the
- 20 costs included in FERC 911, 912, and 913 to other FERC accounts.

11 – REPLY TESTIMONY OF JOHN FRANKEL

³ See Commission Order No. 99-697, Page 37

1 Q. What would a reasonable re-classification look like using actual 2017

2 results if NW Natural were to re-allocate 911, 912 and 913 costs?

A. NW Natural's accounting team reviewed the activities in these accounts and
 determined that they could appropriately be reclassified based on FERC account
 definitions. They determined it would be reasonable to reclassify costs in the
 following manner:

	2017 System	Actual Data				
FERC Acct.	Before Analysis	After Analysis	State Allocation	OR Allocated		
905		\$ 759.55	89.05%	\$ 676.37		
907		\$ 168,657.67	88.88%	\$ 149,902.94		
908		\$ 1,919,144.44	88.46%	\$ 1,697,675.17		
909		\$ 340,771.01	88.99%	\$ 303,252.12		
910		\$ 167,780.08	88.88%	\$ 149,122.94		
911	\$ 182,967.12	\$ 98,010.23	88.99%	\$ 87,219.30		
912	\$ 4,194,411.82	\$ 1,332,879.55	89.07%	\$ 1,187,195.82		
913	\$ 560,392.04	\$ 781,681.12	89.02%	\$ 695,852.53		
921		\$ 128,087.33	88.46%	\$ 113,306.05		
Total	\$ 4,937,770.98	\$ 4,937,770.98		\$ 4,384,203.24		

8 Please note, again, that these represent 2017 amounts, and not those from the

9 Test Year.

7

10 Q. Should the remaining amounts that stay in FERC accounts 911, 912 and

- 11 913 be removed from rate making?
- 12 A. No. As discussed above, activity in these FERC accounts should be
- 13 recoverable. We believe the only costs that are not recoverable in this case are

14 rebates.

- 15 Q. What do you conclude about the total marketing "promotional" expense
- 16 disallowed by Staff?

12 - REPLY TESTIMONY OF JOHN FRANKEL

A. By failing to distinguish between the service and promotion activities, Staff's
position suggests that customers should not have to pay for customer service,
assistance, and support even though customers want and expect excellent
customer service from NW Natural. Expenses related to customer service,
outreach, and education are an integral part of the utility service that NW Natural
provides and should continue to be recoverable in rates.

7 Q. Are there any other statements by Staff that you wish to address?

- 8 A. Yes. In Staff/700, Kaufman/46, Staff states that because NW Natural provided
- 9 some customer incentive dollars to customers in Southeast Eugene, "NW Natural
- 10 appears to have been targeting the stressed areas of its system for growth." I
- 11 would like to respond that this statement is not well-founded. NW Natural has
- 12 not been targeting stressed areas of its system for growth. NW Natural offers
- 13 incentives on a system-wide basis, to all customers, and the small amount of
- 14 uptake in Southeast Eugene would be no different than the customer uptake we
- 15 experience throughout the system.
- 16 Q. Does this conclude your testimony?
- 17 **A.** Yes.
- 18
- 19
- 20

13 - REPLY TESTIMONY OF JOHN FRANKEL

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibit of John Frankel

Promotions and Concessions EXHIBIT 2301

May 23, 2018

EXHIBIT 2301 – PROMOTIONS AND CONCESSIONS

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i - EXHIBITS OF JOHN FRANKEL - Table of Contents

Exhibit	2301
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INITIAL FILING											
FERC Test Year		Advertising			State Allocation	Or	egon Allocated				
Acct.	Expense		Adjustment		Total		Factor	Amount			
909	\$	2,893,475	\$	(617,972)	\$	2,275,503	89.14%	\$	2,028,383		
911	\$	177,769		n/a	\$	177,769	89.14%	\$	158,463		
912	\$	4,131,640		n/a	\$	4,131,640	89.16%	\$	3,683,846		
913	\$	689,881	\$	(173,713)	\$	516,168	89.14%	\$	460,112		
	\$	7,892,765	\$	(791,685)	\$	7,101,080		\$	6,330,805		

INITIAL FILING (Adjusted for Correct Advertising Allocation)											
FERC Test Year		Advertising			State Allocation Oregor		egon Allocated				
Acct.	Expense		Adjustment			Total Factor		Amount			
909	\$	2,893,475	\$	(101,804)	\$	2,791,671	89.14%	\$	2,488,496		
911	\$	177,769		n/a	\$	177,769	89.14%	\$	158,463		
912	\$	4,131,640		n/a	\$	4,131,640	89.16%	\$	3,683,846		
913	\$	689,881	\$	(689,881)	\$	-	89.14%	\$	-		
	\$	7,892,765	\$	(791,685)	\$	7,101,080		\$	6,330,805		

FERC 911, 912 and 913 after Advertising Adjustment											
FERC	-	Test Year	A	Advertising			State Allocation		Oregon Allocated		
Acct.	Expense		Adjustment Tota		Total	Factor		Amount			
911	\$	177,769		n/a	\$	177,769	89.	14%	\$	158,463	
912	\$	4,131,640		n/a	\$	4,131,640	89.	16%	\$	3,683,846	
913	\$	689,881	\$	(689,881)	\$	-	89.	14%	\$	-	
	\$	4,999,290	\$	(689,881)	\$	4,309,409			\$	3,842,310	