Zachary Kravitz
Director, Rates & Regulatory Affairs
Tel: 503.220.2379
Email: zachary.kravitz@nwnatural.com

NW Natural
220 NW 2ND AVENUE
PORTLAND, OR 97209
TEL 503.226.4211
www.nwnatural.com

December 30, 2019 NWN Advice No. OPUC 19-21

VIA ELECTRONIC FILING AND PERSONAL DELIVERY

Public Utility Commission of Oregon
Attn: Filing Center
201 High Street SE Suite 100
Post Office Box 1088
Salem, Oregon 97308-1088

Re: UG 388 - Application of NW Natural for a General Rate Revision

In accordance with OAR 860-022-0019, Northwest Natural Gas Company, dba NW Natural ("NW Natural" or "Company"), files herewith its Application for a General Rate Revision. Twenty (20) copies of the Executive Summary, Direct Testimonies, and Exhibits are included with this filing. Responses to the Standard Data Requests are being provided on the Public Utility Commission of Oregon's (Commission) Huddle site and work papers are being provided to puc.workpapers@state.or.us. Notices will be published in accordance with the requirements of OAR 860-022-0017.

Please note the filing contains some confidential information that represents business-sensitive, non-public information. Confidential and Highly Confidential information will be provided subject to a General Protective Order and Modified Protective Order, respectively.

Included with this filing are the following revisions to Tariff, P.U.C. Or. 25, stated to become effective with service on and after **November 1, 2020**:

Third Revision of Sheet 167-1	Schedule 167	General Adjustments to Rates

The Company waives paper service in this proceeding.

Please address correspondence on this matter to me with copies to the following[1]:

Eric Nelsen
NW Natural
Senior Regulatory Attorney
220 NW Second Avenue
Portland, Oregon 97209
Telephone: (503) 721-2476
eric.nelsen@nwnatural.com
OSB # 192566

eFiling
NW Natural
Rates and Regulatory Affairs
220 NW Second Avenue
Portland, Oregon 97209
Telephone: (503) 226-4211, ext. 3589
eFiling@nwnatural.com

[1] The Company will be relocating in early 2020; NW Natural will file a letter in this docket informing parties of the effective date of its new address upon moving to the new location.

Lisa Rackner
Jocelyn Pease
McDowell Rackner & Gibson PC
419 SW 11th Ave, Ste. 400
Portland, OR 97205
Tel: 503-595-3620
dockets@mrg-law.com

Sincerely,

NW NATURAL

/s/ Zachary Kravitz

Zachary Kravitz
Director, Rates & Regulatory Affairs

Enclosures

BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UG 388

In the Matter of NORTHWEST NATURAL GAS COMPANY dba NW Natural Application for a General Rate Revision.	**NW NATURAL'S EXECUTIVE SUMMARY**

I. INTRODUCTION

Northwest Natural Gas Company dba NW Natural ("NW Natural" or "Company") is filing a general rate revision with the Public Utility Commission of Oregon ("Commission"), in accordance with ORS 757.205, 757.215 and 757.220, to revise its schedules of rates and charges for natural gas service in Oregon to become effective with service provided on and after November 1, 2020. With this filing, the Company requests a revision to customer rates that will increase the Company's annual Oregon jurisdictional revenues by $71.4 million, or an approximately 11.5 percent increase over current customer rates.

The revised rates produce revenues necessary to sustain the provision of safe, reliable, and low-cost natural gas service to customers in Oregon, while preserving the Company's ability to attract capital for future investments. The Company files this Executive Summary in accordance with OAR 860-022-0019(1). Exhibit A to the Executive Summary provides the required information in accordance with OAR 860-022-0019(1)(a)-(h).

II. BACKGROUND

NW Natural is an Oregon corporation whose principal place of business is 220 NW Second Avenue, Portland, Oregon, 97209.[1] NW Natural is a public utility providing natural gas service in Oregon within the meaning of ORS 757.005, and is subject to the jurisdiction of this Commission. NW Natural has approximately 756,000 customers, consisting of approximately 686,000 residential, 69,000 commercial, and 1,100 industrial customers. Approximately 89 percent of NW Natural's customers are located in Oregon.

Communications regarding this filing, including data requests issued to the Company, should be addressed to:

eFiling
NW Natural
Rates and Regulatory Affairs
220 NW Second Avenue
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OSB #: 192566

[1] The Company will be relocating in early 2020; NW Natural will file a letter in this docket informing parties of the effective date of its new address upon moving to the new location.

III. CASE SUMMARY

A. The Test Year

The Company's test year in this case is the 12-months ending October 31, 2021 ("Test Year"). NW Natural provides information for a historical base year of the twelve months ending December 31, 2019 ("Base Year"), and makes adjustments to that information to reflect the forecast Test Year. In order to meet the legal requirement that rates be fair, just, reasonable, and sufficient, the Company has selected the Test Year to closely reflect the investment and expense levels that will exist during the time that the rates adopted in this case are expected to be in effect. The new rates are filed with a requested effective date of November 1, 2020. This assumes the addition of the full nine-month statutory suspension period to the 30-day effective date normally applicable to tariff revisions.

B. Return on Equity

The Company's current authorized return on equity ("ROE") is 9.4 percent, as established in the Company's most recent rate case, docket UG 344, Order No. 18-419. In this case, the Company seeks an authorized ROE of 10.0 percent. As described in the testimony of Dr. Bente Villadsen, the Company believes that an ROE of 10.0 percent represents a fair balance between the interests of shareholders and customers.

C. Factors Driving Rate Adjustment

As described in the testimony of David Anderson, while NW Natural strives to keep rates low for its customers, the Company has continued to make needed substantial investments in the safety and reliability of its distribution system and Mist storage facility. In addition, a variety of factors have put building pressure on the need

to adjust rates. These factors include the move to the Company's new operations center, and increased operations and maintenance ("O&M") expense attributable to inflation, work force-related costs and increases in other costs of providing utility service. NW Natural's goal is to provide safe and reliable service, at affordable rates for its customers. NW Natural continues to manage its costs through careful planning and budgeting, with an ongoing focus on controlling costs. However, the investments that the Company is currently making to ensure we can provide high-quality and reliable natural gas service requires the Company to file a rate case at this time.

IV. TESTIMONY SUMMARY

The Company's direct case consists of the testimony and exhibits of 11 witnesses:

- In NW Natural/100, **David Anderson**, NW Natural's President and Chief Executive Officer, describes NW Natural's overall operating environment, as well as the Company's current efforts and goals and provides a high-level overview of the Company's application for a general rate revision.
- In NW Natural/200, **Brody Wilson**, Vice President, Treasurer, Chief Accounting Officer and Controller, provides testimony about the Company's cost of capital. His testimony provides information about the Company's cost of debt during the Test Year. He demonstrates that the Company continues to adhere to its policy of balancing debt and equity financing with a 50/50 capital structure, and thus requests that the Commission recognize this capital structure when approving rates in this case.
- In NW Natural/300, **Dr. Bente Villadsen**, Principal of the Brattle Group, is an outside expert on utility finance and required rates of return for regulated

companies who provides testimony about the Company's cost of equity, or in other words, the return that investors in NW Natural should reasonably expect to have the opportunity to earn. Dr. Villadsen's testimony provides a range of return on equity that NW Natural should be given the opportunity to earn in order to attract capital. Her testimony supports the Company's request for approval to include a 10.0 percent return on equity in the revenue requirement authorized in this proceeding (the mid-point of the range that Dr. Villadsen has determined is reasonable for NW Natural's investors).

- In NW Natural/400, **Joe Karney**, Senior Director of Engineering and Chief Engineer, provides testimony about some of the major improvements to NW Natural's distribution system and storage operations that the Company has undertaken in order to keep its system safe, reliable, and economical.
- In NW Natural/500, **Wayne Pipes**, Director of Facilities, Security and Emergency Management, describes the Company's decision-making process and move to its new seismically resilient operations center, and discusses three other planned facilities projects that will be completed soon. Additionally, Mr. Pipes describes the Company's physical security staffing and explains the Company's need to hire three additional resources.
- In NW Natural/600, **Jim Downing**, Vice President and Chief Information Officer, describes the Company's recent Information Technology & Services (IT&S) initiatives, including the Company's new digital portal project, which is a newly redesigned website and customer portal that will provide NW Natural's customers with enhanced accessibility to their customer information and a platform for

mobile users. Mr. Downing will also describe an upcoming project referred to as the “Horizon” Project. This will be a comprehensive refresh of major IT&S systems like SAP and the Company’s Customer Information System that are both reaching end of life. Additionally, Mr. Downing will describe the Company’s efforts to hire an additional 14 employees on the IT&S team to meet the increasing demands on this area of the Company.

- In NW Natural/700, **Melinda Rogers**, Vice President and Chief Human Resources and Diversity Officer, provides testimony on NW Natural’s labor costs, and describes the Company’s practices related to compensation, which ensure that all employees receive compensation at market-median rates. Ms. Rogers describes the compensation changes as a result of a new collective bargaining agreement that was recently entered into with the union. Additionally, Ms. Rogers describes our overall employee count and explains why we have needed to increase our employee count over the last two years. She sets forth the Company’s request to include these costs in the Company’s revenue requirement.
- In NW Natural/800, **Cory Beck**, Senior Manager of External Communications and User Experience, provides testimony about the Company’s communications to customers, on matters of safety, as well as communicating information to customers about the nature of the services offered to them by the Company, and opportunities to conserve and be educated about the products that they purchase from NW Natural.

- In NW Natural/900, **Tobin Davilla**, Manager of Budget and Financial Analysis, provides testimony about the O&M expense levels that the Company has been incurring and expects to incur, as well as overall capital spending, for which it requests recovery in this application.
- In NW Natural/1000, **Kyle Walker**, Manager of Rates, provides the calculation of the Company's "revenue requirement," which represents the annual dollars needed to recover prudently incurred costs of operating the utility business.
- In NW Natural/1100, **Robert Wyman**, Rates and Regulatory Analyst, provides the Company's use-per-customer forecast, long-run incremental cost study, and provides the proposed spread across rates of the revenue requirement increase requested.

V. CONCLUSION

For the reasons described in this application, and further by the testimony of the witnesses offered in this proceeding, the Company requests that the Commission issue an order approving the proposed rate changes and tariff sheet.

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DATED: December 30th, 2019

NORTHWEST NATURAL GAS COMPANY

/s/Eric Nelsen

Eric Nelsen (OSB# 192566)

MCDOWELL RACKNER & GIBSON PC

/s/Lisa F. Rackner

Lisa F. Rackner (OSB# 873844)
Jocelyn C. Pease (OSB#102065)

Attorneys for Northwest Natural Gas Company

Exhibit A to NW Natural's Executive Summary
Summary of Requested General Rate Increase
Filed December 30, 2019

Total Revenues Collected Under Proposed Rates:	$ 697,245,170
Revenue Change Requested:	$ 71,446,572
Revenues Net of any Credits from Federal Agencies:	$ 697,245,170
Percentage Change in Revenues Requested:	11.48%
Percentage Change in Revenues Net of any Credits from Federal Agencies:	11.48%
Test Period:	November 1, 2020 to October 31, 2021
Requested Overall Rate of Return	7.298%
Requested Rate of Return on Equity:	10.0%
Proposed Rate Base:	$1,471,695,226

Results of Operation

Before Proposed Rate Change[1]	
Utility Operating Income:	$56,706,442
Average Rate Base:	$1,471,695,226
Rate of Return on Capital:	3.853%
Rate of Return on Equity:	3.11%
After Proposed Rate Change[2]	
Utility Operating Income:	$107,404,318
Average Rate Base:	$1,471,695,226
Rate of Return on Capital:	7.298%
Rate of Return on Equity:	10.0%

[1] Based upon the Company's Projected Test Year Results of Operations.
[2] Based upon the Company's December 30, 2019 general rate case filing.

Effect of Rate Change on Each Customer Class

Rate Schedule	Current Average Monthly Bill	Proposed Average Monthly Bill	Change in Average Monthly Bill ($)	Change in Average Monthly Bill (%)
Schedule 2 - Residential	$54.01	$60.44	$6.43	11.9%
Schedule 3 - Commercial	$198.28	$223.68	$25.40	12.8%
Schedule 3 - Industrial	$944.52	$995.01	$50.49	5.3%
Schedule 27 – Dry Out	$40.39	$44.75	$4.36	10.8%
Schedule 31 - Firm Sales - Commercial	$3,171.04	$3,379.24	$208.20	6.6%
Schedule 31 - Firm Transportation - Commercial	$2,338.02	$2,651.65	$313.63	13.4%
Schedule 31 - Firm Sales - Industrial	$5,111.21	$5,375.62	$264.41	5.2%
Schedule 31 - Firm Transportation - Industrial	$3,561.60	$4,007.02	$445.42	12.5%
Schedule 32 - Firm Sales - Commercial	$6,327.64	$6,694.06	$366.42	5.8%
Schedule 32 - Firm Sales - Industrial	$15,804.26	$16,449.64	$645.38	4.1%
Schedule 32 - Transportation – Firm - Commercial	$4,588.75	$5,237.02	$648.27	14.1%
Schedule 32 - Transportation – Firm - Industrial	$8,811.56	$10,005.78	$1,194.22	13.6%
Schedule 32- Interruptible Sales - Commercial	$25,427,.57	$26,111.83	$684.26	2.7%
Schedule 32 - Interruptible Sales - Industrial	$27,148.02	$27,845.05	$697.03	2.6%
Schedule 32 - Transportation - Interruptible	$14,303.71	$15,967.34	$1,663.63	11.6%
Schedule 33 - Firm and Interruptible Transp Svcs	$38,250.00	$38,250.00	$0.00	0%

Rate Schedule 31 and 32 customers may choose demand charges at a volumetric rate or based on MDDV. For convenience of presentation, demand charges are not included in the calculation for those schedules.

SCHEDULE 167
GENERAL ADJUSTMENTS TO RATES

PURPOSE:
To identify adjustments made to the billing rates stated in the Rate Schedules listed below to reflect the effects of general rate changes approved by the Commission under the authority of ORS 757.210

DESCRIPTION:
The general rate changes shown in this Schedule 167 reflect the outcome of a Commission investigation in Docket UG-344 initiated following a Company request to change rates due to increases or decreases in the cost of general utility operations.

APPLICABLE:
To Customers taking service under the following Rate Schedules of this Tariff:

Rate Schedule 2	Rate Schedule 27	Rate Schedule 32
Rate Schedule 3	Rate Schedule 31	Rate Schedule 33

RATE ADJUSTMENTS: Effective: November 1, 2020 (C)
The Base Rates stated in the listed Rate Schedules were adjusted as follows:

	Adjustment Amount				Adjustment Amount	
Schedule/Class	**Customer Charge**	**Volumetric Charge**		**Schedule/Class**	**Customer Charge**	**Volumetric Charge**
02R	$0.00	$0.12095		03 CSF	$5.00	$0.08450
27	$0.00	$0.09500		03 ISF	$0.00	$0.04172

(C)

Schedule/ Class	Block	Amount		Schedule/ Class	Block	Amount		Schedule/ Class	Block	Amount
31 CSF	Cust. Charge	$0.00		32 ISF	Cust. Charge	$0.00		32 CSI	Cust. Charge	$0.00
	Block 1	$0.03919			Block 1	$0.01962			Block 1	$0.01527
	Block 2	$0.03575			Block 2	$0.01656			Block 2	$0.01289
31CTF	Cust. Charge	$0.00			Block 3	$0.01146			Block 3	$0.00892
	Block 1	$0.03766			Block 4	$0.00637			Block 4	$0.00495
	Block 2	$0.03443			Block 5	$0.00282			Block 5	$0.00257
31ISF	Cust. Charge	$0.00			Block 6	$0.00103			Block 6	$0.00083
	Block 1	$0.02753		32 CTF	Cust. Charge	$0.00		32 ISI	Cust. Charge	$0.00
	Block 2	$0.02482			Block 1	$0.01973			Block 1	$0.01498
31 ITF	Cust. Charge	$0.00			Block 2	$0.01676			Block 2	$0.01264
	Block 1	$0.02816			Block 3	$0.01184			Block 3	$0.00875
	Block 2	$0.02545			Block 4	$0.00691			Block 4	$0.00486
32 CSF	Cust. Charge	$0.00			Block 5	$0.00394			Block 5	$0.00252
	Block 1	$0.02698			Block 6	$0.00198			Block 6	$0.00081
	Block 2	$0.02277		32 ITF	Cust. Charge	$0.00		32 CTI/ITI	Cust. Charge	$0.00
	Block 3	$0.01579			Block 1	$0.01694			Block 1	$0.01371
	Block 4	$0.00878			Block 2	$0.01439			Block 2	$0.01165
	Block 5	$0.00375			Block 3	$0.01016			Block 3	$0.00823
	Block 6	$0.00136			Block 4	$0.00593			Block 4	$0.00480
					Block 5	$0.00338			Block 5	$0.00274
					Block 6	$0.00170			Block 6	$0.00137
								33	All	$0.00000

(C)

(C)

GENERAL TERMS:
Service under this Rate Schedule is governed by the terms of this Rate Schedule, the General Rules and Regulations contained in this Tariff, any other schedules that by their terms or by the terms of this Schedule apply to service under this Schedule, and by all rules and regulations prescribed by regulatory authorities, as amended from time to time.

UG 388
NOTICE OF APPLICATION FOR
GENERAL RATE REVISION

December 30, 2019

To All Parties Who Participated in UG 344:
Please be advised that on December 30, 2019 Northwest Natural Gas Company, dba NW Natural ("NW Natural" or the "Company"), has filed for a GENERAL RATE REVISION. A copy of the Company's ADVICE 19-21, EXECUTIVE SUMMARY, DIRECT TESTIMONIES, and EXHIBITS are available for inspection at its main office or at the Public Utility Commission of Oregon's ("Commission") eDocket website. An electronic courtesy copy is also attached.

The purpose of this Notice is to inform parties who participated in the Company's most recent general rate case, UG 344, that a General Rate Revision has been filed.

Parties who desire more information or who wish to obtain a copy of the filing, or notice of the time and place of any hearing, if scheduled, should contact the Company or the Commission as follows:

NW Natural
Attn: Zach Kravitz
220 NW Second Ave
Portland, Oregon 97209-3991
Telephone: (503) 220-2379

Public Utility Commission of Oregon
Attn: Filing Center
201 High Street SE, Suite 100
PO Box 1088
Salem, Oregon 97301-1088
Telephone: (503) 373-0886

Any person may submit to the Commission written comments on this General Rate Revision Application by January 29, 2020 or seek to intervene in the proceeding. The granting of this General Rate Revision Application will authorize a change in rates.

* * * * *

NW Natural

CERTIFICATE OF SERVICE
UG 388

I hereby certify that on December 30, 2019, I have served by electronic mail and/or physical copies ADVICE 19-21, EXECUTIVE SUMMARY, DIRECT TESTIMONIES AND EXHIBITS OF NW NATURAL'S OREGON GENERAL RATE REVISION upon all intervening parties of record in docket UG 344, which is the Company's most recent general rate case.

UG 344

OPUC Dockets
Oregon Citizens' Utility Board
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dockets@oregoncub.org

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DATED December 30, 2019, Portland, OR.

/s/ Erica Lee-Pella
Erica Lee-Pella
Rates & Regulatory Affairs
NW NATURAL
503-226-4211, extension 3589
erica.lee-pella@nwnatural.com

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of David H. Anderson

POLICY
EXHIBIT 100

December 30, 2019

EXHIBIT 100 - DIRECT TESTIMONY – POLICY

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is David H. Anderson. I am the President and Chief Executive Officer of NW Natural.

Q. Please summarize your educational background and business experience.

A. I received my Bachelor's degree in Accounting from Texas Tech University. I am a Certified Public Accountant (retired). I have spent over 30 years in the energy and utility industries. I joined NW Natural in 2004, and became Chief Executive Officer in 2016. Prior to being CEO, I held positions including President and Chief Operating Officer, Executive Vice President and Chief Operating Officer, Executive Vice President of Operations and Regulation, and Senior Vice President and Chief Financial Officer. Prior to joining NW Natural, I worked for TXU Corporation (formerly Texas Utilities Corporation) for 17 years, where I held various management and executive positions including Vice President of Investor Relations and Shareholder Services, Senior Vice President and Chief Accounting Officer for the parent company, and Senior Vice President and CFO of TXU's gas distribution company – TXU Gas. Prior to TXU, I spent five years in public accounting.

I also serve on the board of directors of the American Gas Association ("AGA"), American Gas Foundation, and the Portland State University Foundation. I am currently Second Vice Chair of AGA, co-chairperson of the AGA's Carbon Policy Task Force, chairman of the AGA's Audit Committee, and a

member of AGA's Finance Committee and Safety, Resilience/Reliability and Security Task Force, and a board trustee of the American Gas Foundation. Additionally, I serve as a director of the Oregon Business Council, and I currently serve on Governor Kate Brown's Global Warming Commission.

Q. Please summarize your testimony.

A. In my testimony I:

- Describe NW Natural's overall operating environment, as well as the Company's current efforts and goals; and
- Provide a high-level overview of the Company's application for a general rate revision.

II. NW NATURAL'S OVERALL OPERATING ENVIRONMENT, CURRENT EFFORTS, AND GOALS

Q. Please describe the business of Northwest Natural.

A. NW Natural – the third oldest locally owned company in Oregon - has provided gas service in the Pacific Northwest for 161 years. Currently, NW Natural provides natural gas service as a local distribution company operating in Oregon and Southwest Washington. In the State of Oregon, we provide service in 126 cities in 15 different counties. Our employee base of nearly 1,200 serve over 2 million people in Oregon, with approximately 668 thousand customer accounts, which represents approximately 89 percent of our total gas system customer base.

Q. As Chief Executive Officer, can you please describe NW Natural's goals as a company?

A. Our absolute priority is to provide safe, reliable and cost effective gas service to our customers. To effectively provide this service, we must maintain more than 14,000 miles of transmission and distribution pipelines, over 20 billion cubic feet of natural gas storage, strong customer satisfaction, reasonable rates for customers, and financial strength. We also must remain true to our core values that guide us: Safety, Integrity, Environmental Stewardship, Service Ethic, and Caring.

Q. Can you discuss some of the ways NW Natural has exemplified its core value of Safety?

A. Yes. Safety is part of our culture at NW Natural. Our highest priority is to deliver our product safely and reliably to our customers. We have one of the most modern and safest systems in the country, in large part due to the proactive work of our system integrity team that has replaced all of the bare steel and cast iron piping throughout our distribution system. This was accomplished with the support of the Public Utility Commission of Oregon ("Commission") and our stakeholders by supporting a ratemaking mechanism, known as our System Integrity Program, which allowed us to track safety related capital projects into rates on an annual basis.

Additionally, we have been, and will continue, securing our infrastructure to increase the resiliency of our system in the event of a major seismic event. These efforts are in concert with Governor Kate Brown's Task Force on

Resilience Plan Implementation, which is recommending that regulated energy providers conduct seismic assessments of regulated operations. We are currently performing a comprehensive seismic assessment of our transmission and high pressure distribution system. This assessment will be used to identify, plan and prioritize projects to address seismic resiliency. Joe Karney, our Senior Director of Engineering and Chief Engineer, describes these efforts more in his Direct Testimony.

We are also addressing seismic resiliency at our facilities, including our headquarters facility and regional field service locations. Several of our facilities were constructed prior to the established seismic standards that are in place today, and are currently not equipped to be operational after a seismic event. We have assessed our facilities and determined whether each facility can be retrofitted to withstand a seismic event or if a relocation to a new facility is necessary to better serve our customers and reduce operational risk. As will be discussed more in the Direct Testimony of Wayne Pipes, our Director of Facilities, Security and Emergency Management, our current headquarters facility, which serves as our operations center, was not designed to withstand a large seismic event. It is essential that we can continue to operate our key operational functions out of our operational headquarters, such as the resource management center, gas control center, emergency dispatch customer call center, operations and engineering in the immediate hours, days, and weeks following a major event. With our existing lease expiring in 2020, we made seismic resiliency a top priority when evaluating whether to extend our lease or

find a new location. We ultimately decided that we needed to find a new location, which will be occupiable and fully operational after an earthquake, to put NW Natural in the best position to be able to provide critical service in the event of an emergency.

Q. With respect to NW Natural's core value of Environmental Stewardship, how does NW Natural view its role on issues related to climate change?

A. Our goal is to continue to be a national leader in the natural gas industry when it comes to combatting climate change. We believe that there is a climate imperative, and that we must play an important role in reducing greenhouse gas emission. We recognize that our operations contribute to the overall greenhouse gas emissions in Oregon, but it's critical to understand our actual impact when we consider how to achieve the emission reduction goals in Oregon and the Pacific Northwest. The chart below shows that of all the emissions in Oregon, NW Natural's delivery of natural gas to our sales customers is about 5 percent of the overall greenhouse gas emissions in the State. To put that 5 percent in perspective, NW Natural serves 70 percent of the space heating needs in our service territory, and, on the coldest days of the year, our residential space and water heating customers are getting 90 percent of their home's energy needs met by our system.

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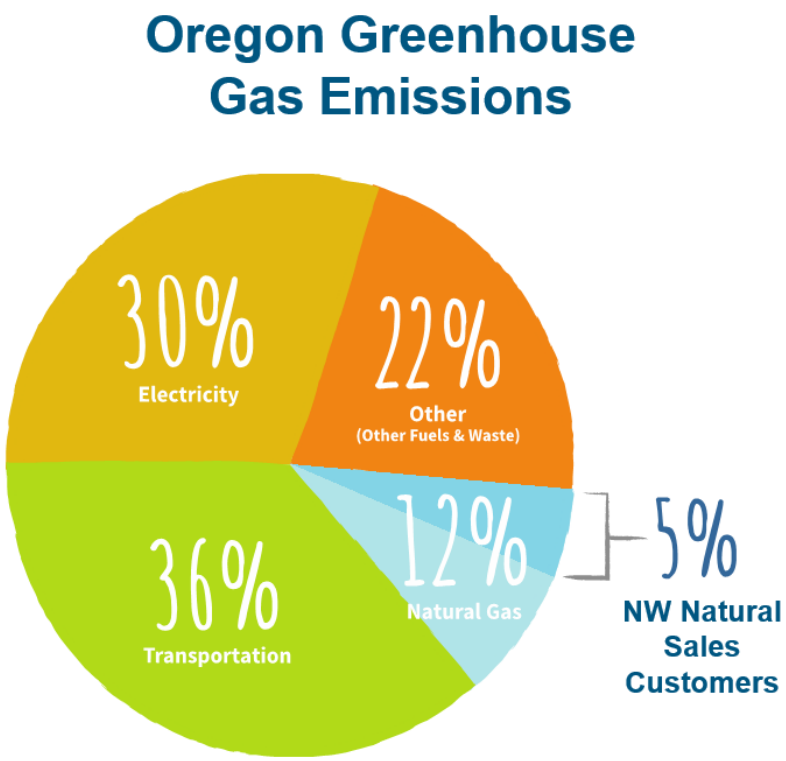


Source: ODEQ In-Boundary GHG Inventory 2015

While our customers' use of natural gas represents a modest percentage of the overall emissions in Oregon relative to the vast amount of energy we deliver, we know we can do even better – which is why we have launched our "Less We Can" low carbon pathway initiative.

Q. What are your current plans to drive down greenhouse gas emissions?

A. Under our "Less We Can" initiative, we have established a goal to create carbon savings equivalent to 30 percent of the Company's 2015 emissions by 2035 utilizing our system - one of the tightest pipeline distribution networks in the country - in new and innovative ways.[1]

[1] More information about this initiative be found at http://www.lesswecan.com.

Our low carbon pathway focuses on driving down emissions in three main categories. First, we want to lower the carbon intensity of our supply by using carbon intensity as a criteria in our supply purchases, and by heating homes and businesses with renewable natural gas ("RNG") and renewable hydrogen. Second, we want to continue to drive down emissions by working with our customers to lower use through energy efficiency, new technologies and demand response measures. Third, we want to work with fleet owners to convert heavy-duty, return-to-base vehicles to compressed natural gas, renewable natural gas or hydrogen.

Additionally, we have worked with the City of Portland's Columbia Boulevard Wastewater Treatment Plant to build out the service pipelines needed to support the City's RNG Project at the facility, which is the City of Portland's single largest climate action project to date. The City of Portland is accomplishing this by investing in conditioning equipment that cleans the methane biogas produced at the wastewater treatment plant to meet pipeline quality RNG specifications. The City is also utilizing our high pressure gas service to fuel their fleet with RNG, displacing diesel pollution. This marks the first time an RNG facility will be interconnected with our distribution system.

Q. How does the new law, known as Senate Bill 98, fit into the Company's carbon savings goals?

A. Senate Bill 98 (SB 98) is the most meaningful and aggressive law that has been passed, nationwide, aimed at reducing carbon emissions on the gas network, and it fits squarely within our low carbon pathway. Prior to the enactment of this

law, there was a barrier for us to acquire RNG because it is currently more costly than conventional natural gas. With SB 98, Governor Kate Brown and the Oregon legislature recognized that RNG is an important resource to transition our State to a clean energy future because it provides similar climate benefits to wind and solar energy. This new law provides the policy framework to enable NW Natural to begin procuring this renewable energy source for our customers. Beginning in 2020, the law sets percentage targets for NW Natural to deliver RNG to our customers - with the goal of reaching 30 percent RNG flowing through our system by 2050. We believe that under this new law, we will have the smallest carbon footprint of any local distribution company in the country.

Q. Recently, there have been proposals by municipalities to ban new hook-ups for natural gas as a way for municipalities to reduce greenhouse gas emissions. What is your reaction to these efforts?

A. First and foremost, our customers enjoy the benefits that natural gas provides. Whether it's used for cooking in restaurants or heating homes, natural gas is a fuel of choice that our customers want. It is also an affordable energy option, and we anticipate that prices for natural gas will remain low for years to come.

Second, at a time when there are resource adequacy concerns in the Pacific Northwest, the direct end-use of natural gas that we provide relieves some of the strain on the electric grid. Additionally, during extreme weather, wildfires, or other events that can cause power outages, natural gas equipment can continue to operate, and natural gas generators and fuel cells offer additional resiliency benefits during times of emergency.

Third, if the purpose of these proposed bans is to reduce natural gas use, they are not effective measures. For the last two years we have studied these issues, and the simple answer is this: even in homes that are subject to natural gas bans, natural gas will still be used to power those homes.

Q. How will natural gas be used in a home if a municipality bans natural gas hook-ups to homes?

A. If a municipality takes away people's choice to use natural gas in their end-use appliances, such as furnaces and water heaters, then we must examine what fuel source will be generating the electricity to power those appliances. In Oregon, approximately 50 percent of the electricity is generated using coal and natural gas. Therefore, if we are not using natural gas directly in our homes and businesses, we will be using it indirectly and in greater quantities through electricity generated by our power plants.

Q. Can you describe NW Natural's efforts to understand these issues?

A. Yes. NW Natural hired Energy and Environmental Economics ("E3") to conduct an economy-wide deep decarbonization study for Oregon and Washington, based on E3's experience pioneering this type of work in California and throughout the U.S. We asked E3 to build on its deep decarbonization work by specifically looking at serving space heating in a deeply decarbonized economy, *i.e.* 80 percent carbon reductions by 2050. To look into this issue, E3 hired a building scientist to analyze how high efficiency and cold climate heat pumps perform in cold weather and at peak, comparing that performance against a furnace and gas heat pump, and exploring the possibilities of demand response.

The results of the study shared many of the commonalities of E3's other deep decarbonization studies. Even in scenarios where E3 assumed electrification of space heating, getting to the goal of 80 percent carbon reduction by 2050 will take aggressive energy efficiency, a massive ramp up of renewables on the electric system, electrification of passenger vehicles, rapid biofuels development, and the strategic use of natural gas.

The question raised in all of these studies is not whether natural gas will be used in 2050, but rather, how natural gas will be used. It is important to remember that the natural gas system in place in the Pacific Northwest delivers more energy than the region's entire hydroelectric system. Thus, when the cost of decarbonizing is factored into the equation, E3's study showed that using the gas system that is already in place with a blend of 25 percent RNG can get us to a decarbonized economy more affordably, reliably and with less risk, and that analysis included continued projections of growth in direct use gas customers out to 2050. This is because we can leverage the billions of dollars already invested in the gas system, including our seasonal storage capabilities at facilities like our underground storage facility at Mist, as opposed to building out new natural gas power plants or large scale battery storage, which currently does not have technical feasibility to meet the storage needs of the Pacific Northwest's long, cold winters.

Q. How are you reaching out to communities in Oregon to explain this?

A. It's currently one of the top priorities at our Company. We are engaging our customers, policy makers and stakeholders at all levels and all corners of our

service territory to make sure they understand the actual emissions related to natural gas, how important the existing gas infrastructure is to our energy economy, and the future of the gas system that includes renewable natural gas that will drive down emissions even lower. We believe we share many of the same climate goals as our stakeholders, but we also want to make sure that any solutions developed actually drive down overall emissions, and that we do it in a way that protects our customers from unnecessary and extreme rate increases, as well as maintains diversification and reliability in the energy system particularly during peak events.

Q. Can you describe NW Natural's core values of Integrity, Service Ethic and Caring?

A. Yes. Integrity means being honest and ethical in everything we do, and being true to our word. Service ethic underlies our commitment to reliable and efficient operations as well as a desire to help others solve problems. Caring is reflected in the importance of valuing diversity, community involvement, and employee volunteerism. All of these values guide us to thoughtfully and ethically engage with our customers, employees and the communities we call home. We want to be connected with our customers and responsive to their needs and their expectations of a modern utility--as we often say: "We grew up here".

Every day I am proud of the way our employees are devoted to serving our customers. This ethic is instilled in all of our employees, and we are always appreciative of our customers when our efforts to provide excellent service are recognized. As an example, for the 7th year in a row, NW Natural has received

the highest score for large utilities in the West in the 2019 J.D. Power Gas Utility Residential Customer Satisfaction Study, and this year we ranked first in the country. Now in its 18th year, the study independently measures residential customer satisfaction with natural gas utilities across six factors: safety and reliability, billing and payment, price, corporate citizenship, communications and customer service. 2019 was the 10th time in 13 years that the Company has ranked first in the West and top five in the country.

We are also thankful to our customers for continuing to support our Gas Assistance Program. This program, funded by our customers and our shareholders, helps low-income families and seniors in the Pacific Northwest pay their heating bills during the cold winter months. In 2019, the Gas Assistance Program contributed over $143 thousand to our customers that needed additional help with their bills.

III. NW NATURAL'S APPLICATION FOR GENERAL RATE REVISION

Q. Can you please summarize the Company's requested rate increase?

A. NW Natural is seeking to increase revenues from base rates by $71.4 million. The rate increase requested in our application would result in approximately an 11.5 percent increase to revenues collected from customers' base rates. The Direct Testimony of Kyle Walker, NW Natural's Manager of Rates, also demonstrates that without the requested increase in base rates, NW Natural's gas distribution utility would expect to earn a return of only 3.11 percent in the test year. The Company, therefore, needs to increase its rates in order to

maintain an ability to earn a reasonable return that will allow it to attract the capital that is required to run its utility system for the benefit of its customers.

Q. What are the factors that are causing the Company to request this increase to base rates?

A. The main factor is that we have continued to make substantial investments in the safety and reliability of our distribution system. By November of 2020, we will have completed several system reinforcement projects that are designed to ensure that our distribution system has adequate pressure to supply our customers with the energy they need through cold winters when demand for natural gas increases. Specifically, we have reinforcement projects in Sandy, Salem, Hood River, Oregon City, and Happy Valley that are necessary to continue to provide reliable service to our customers. Each of these projects has been thoughtfully planned and discussed in our integrated resource planning process.

Additionally, as contemplated in our 2016 integrated resource plan, we will be replacing the large dehydration system at our Mist underground storage facility in 2020. The dehydrator at Mist originally went into service in 1998. Over the last few years, we have studied the operations of the dehydrator, which removes liquids from the natural gas we withdraw from Mist so that the gas is safe to put on our distribution system. Those studies have concluded that the dehydrator is reaching its end of life, and that we must replace it to support the operations at Mist. Without this replacement, Mist cannot operate as needed under the winter conditions when we need it the most. Without our operations at

Mist, we cannot meet the needs of our customers during cold weather events. Simply put, Mist is a critical resource on our distribution system. Mr. Karney will describe these projects in greater detail in his testimony, *NW Natural/400, Karney*.

Q. Are there other reasons why Mist is important to providing reliable service to your customers?

A. Yes. Last year's disruption on the upstream pipeline system in Canada highlights why Mist is so important to our distribution system and the energy needs of our region. This is because there is only one major interstate pipeline that delivers natural gas into our service territory, and the bulk of that gas is fed from a single pipeline in Canada. In 2018, there was an incident that caused the pipeline in Canada to rupture, which greatly reduced supplies flowing into our region. On the days following that rupture, Mist provided the resiliency needed to sustain service to our customers.

This year we also began operations at North Mist. While the North Mist facility is not in our customers' rates, the underground storage facility (adjacent to our Mist storage facility) is providing important benefits to many of our customers that receive electric service from Portland General Electric Company ("PGE"). The North Mist facility provides no-notice gas storage service to PGE's Port Westward natural gas generating plants. This service provides PGE more flexibility to support their growing renewable energy portfolio when variable sources of energy are not available, and it shows the importance of a diversified and balanced energy system in our region.

Q. Are there other factors that led the Company to file a rate case?

A. Yes, as mentioned above, we will be moving to a new operations center in early 2020. As a company, we have been planning and preparing for this move since 2014, when we embarked on a multi-year, multi-phased process to thoughtfully consider options for renewing our existing lease or selecting a new location. After reviewing several alternatives, we ultimately decided that moving to our new location at 250 Taylor Street in downtown Portland was the best long-term solution to meet the needs of our Company and customers. In addition to the operational needs of the Company, the new facility will meet our selection criteria for seismic resiliency, safety and security, proximity to transit, and parking for employee and company vehicles. As a result, we took advantage of low interest rates and our strong financial position and entered into a 20-year lease for the 10-floor office space in downtown Portland. While the move to the new location will cause rates to increase slightly, the new location was the least-cost, least-risk option, and our deliberate process and thoughtful management of the project is resulting in an on-time and on-budget move.

Q. Can you please comment on the considerations NW Natural undertook before filing this general rate revision?

A. As described above, NW Natural is committed to customer satisfaction, and providing safe and reliable natural gas service at reasonable rates for customers. Natural gas is a reliable and affordable energy resource in our region that will be critical in meeting the Pacific Northwest's energy needs for decades to come. To continue to provide this service, we must invest in our infrastructure, attract and

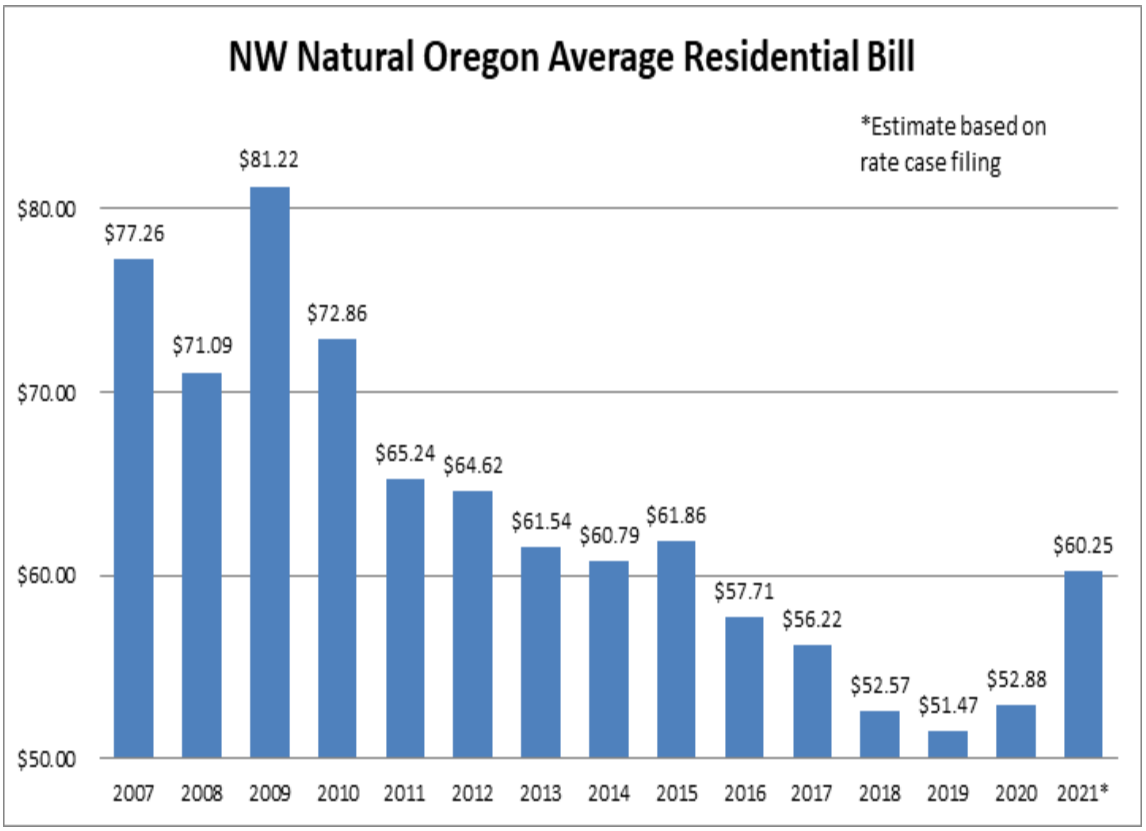
retain a talented workforce, and be responsive to our customers' expectations and preferences for seamless web-based interactions with our Company.

We do not take lightly the prospect of a general rate case. These cases can cause customers concern, and any significant increase in overall rates can present a financial hardship for some of our customers. Rate cases also cause strain on the utility's and our stakeholders' resources and personnel. Finally, not all households and businesses have natural gas service, and they have other options for serving their energy needs. This means that, even as a regulated utility, we compete for business with other energy providers, and therefore are always motivated to keep natural gas rates as low as possible while still being able to provide excellent customer service, exceed safety standards, and maintain financial integrity as a Company. With all of that carefully considered, we decided that NW Natural would file this application with the Commission seeking to revise its rates to recognize an increased revenue requirement.

Q. Can you comment on customers' bills over the past several years, and how this rate case may affect them?

A. Over the last decade, customer bills have consistently remained lower than what their bills were over 15 years ago. This is mainly driven by the costs of natural gas declining during this period, with the exception of a minor increase last year caused by an anomalous event on a Canadian pipeline that disrupted the natural gas market. Even taking into account the anomaly last year, and our rate case in 2018, average customer bills are still lower than they were prior to 2008, and we expect that the costs of natural gas will decrease next year and remain a low cost

commodity for years to come. The chart below shows overall billing rates for the average residential customer since 2007. Over this period, customers have been able to take gas service at rates that have dramatically fallen.



The chart is not the rationale for raising rates in this application, but I point this out because it provides relevant context when evaluating the impact on customers of this request.

Q. Can you briefly describe the testimony provided by other witnesses in this case?

A. Ten other witnesses describe the various components of cost that demonstrate the need for the requested rate increase.

Brody Wilson, Vice President, Treasurer, Chief Accounting Officer and Controller, provides testimony about the Company's cost of capital. His testimony provides information about the Company's cost of debt during the Test Year. Mr. Wilson's testimony also explains that the Company continues to adhere to its policy of balancing long-term debt and shareholder equity financing by targeting a 50/50 capital structure.

Dr. Bente Villadsen, Principal of the Brattle Group, an outside expert on utility finance and required rates of return for regulated companies, provides testimony about the Company's cost of equity, or in other words, the return that investors in NW Natural should reasonably expect to have the opportunity to earn. Dr. Villadsen's testimony provides an analysis of NW Natural's cost of equity, and a range of return on equity that NW Natural should be given the opportunity to earn in order to attract capital. Her testimony supports the Company's request for approval to include a 10.0 percent return on equity in the revenue requirement authorized in this proceeding (the mid-point of the range that Dr. Villadsen has determined is reasonable for NW Natural's investors).

I also note that Dr. Villadsen provides additional testimony on the topic of the risk presented to the local distribution company industry, and NW Natural specifically, by climate change policies. Dr. Villadsen has not included these risks in her calculation of her proposed ROE, but I raise these risks because I believe it is important for the Commission and our stakeholders to understand the changing business environment within which NW Natural operates. As I mentioned above, we have made significant investments on behalf of our

customers in our distribution system that provides more energy than any other utility in Oregon, and we should leverage this system to meet our region's climate goals. However, we face increasing pressure to innovate and evolve as a Company as policy decisions around climate change are increasingly interconnected with the energy industry, and the natural gas industry, specifically.

Joe Karney, Senior Director of Engineering and Chief Engineer, provides testimony about some of the major improvements to our distribution system and storage facility that the Company has undertaken in order to keep our system safe, reliable, and economical.

Wayne Pipes, Director of Facilities, Security and Emergency Management, describes the Company's decision-making process and move to its new seismically resilient operations center, and discusses three other facilities projects that will be completed soon. Additionally, Mr. Pipes describes the Company's physical security staffing and explains the Company's need to hire additional security resources.

Jim Downing, Vice President and Chief Information Officer, describes the Company's recent Information Technology & Services ("IT&S") initiatives, including the Company's new digital portal project, which is a newly redesigned website and customer portal that will provide our customers with enhanced accessibility to their customer information and a platform for mobile users. Mr. Downing will also describe an upcoming project we call our "Horizon" Project. This will be a comprehensive refresh of major IT&S systems like SAP and our Customer Information System that are both reaching end of life. While we are

not seeking cost recovery in this case for the Horizon Project, we want to provide visibility into upcoming projects that will be major initiatives for our Company.

Melinda Rogers, Vice President and Chief Human Resources and Diversity Officer, provides testimony on our labor costs, and describes the Company's practices related to compensation, which ensure that all employees receive compensation at market-median rates. Additionally, Ms. Rogers describes our overall employee count and explains why we have needed to increase our employee count over the last two years. Ms. Rogers sets forth the Company's request to include these costs in the Company's revenue requirement.

Cory Beck, Senior Manager of External Communications and User Experience, provides testimony about the Company's communications to customers on matters of safety, as well as communicating information to customers about the nature of the services offered to them by the Company, and opportunities to conserve and be educated about the products that they purchase from us.

Tobin Davilla, Manager of Budget and Financial Analysis, provides testimony about the operations and maintenance expense levels that the Company has been incurring and expects to incur in the test year, as well as overall capital spending, for which it requests recovery in this application. In particular, Mr. Davilla describes the capital investments that we will make in the test year and explains why there is a high level of certainty that these investments will be used and useful during the test year.

Kyle Walker, Manager of Rates, provides the calculation of the Company's revenue requirement, which represents the annual dollars needed to recover prudently incurred costs of operating the utility business.

Robert Wyman, Rates & Regulatory Analyst, provides the Company's use-per-customer forecast, long-run incremental cost study, and proposed spread across rates of the revenue requirement increase requested.

As described by these witnesses in greater detail, NW Natural is requesting to revise the rates we charge to reflect increasing costs, and continued investment in our distribution system. While we recognize that rate increases can be difficult for our customers, the recovery of the critical investments in our system will ultimately benefit our customers because it supports NW Natural's ability to operate a financially sound natural gas utility that will continue to provide safe and reliable service.

Q. Does this conclude your testimony?

A. Yes it does.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Brody J. Wilson

COST OF CAPITAL
EXHIBIT 200

REDACTED VERSION

December 30, 2019

EXHIBIT 200 – DIRECT TESTIMONY– COST OF CAPITAL

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is Brody J. Wilson. My current position is Vice President, Treasurer, Chief Accounting Officer, and Controller at NW Natural.

Q. Please state your experience and educational background.

I received a Bachelor of Arts in Accounting from George Fox University in 2001. From 2001 through 2012, I worked at PricewaterhouseCoopers, LLP, in the Power and Utilities Assurance practice. I joined NW Natural in 2012 as Accounting Director. In 2013, I was appointed as Controller and Chief Accounting Officer of NW Natural and its subsidiaries. In 2016, I also became Treasurer.

Q. Please summarize your testimony.

A. In my testimony I discuss the Company's appropriate capital structure and overall rate of return, the cost of long-term debt, and the Company's credit ratings. More specifically, I:

- Explain NW Natural's financing strategy, now that NW Natural is under the holding company structure of Northwest Natural Holding Company ("NW Natural Holdings");
- Discuss the Company's current credit ratings and why it is important for the Company to maintain its current credit ratings;

- Present NW Natural's request for a capital structure of 50 percent common equity and 50 percent long-term debt, with an overall rate of return ("ROR") on rate base of 7.298 percent;
- Explain how I determined that the proposed capital structure is appropriate;
- Describe NW Natural's plan to maintain its proposed ratios of equity and debt; and
- Explain how I calculated the cost of debt for the Test Year (November 1, 2020 – October 31, 2021).

II. FINANCING STRATEGY

Q. Please describe the Company's financing strategy.

A. The Company's financing strategy is to maintain a capital structure to support our strong credit ratings, which provides us optimal access to capital markets. We work to manage interest rate risk and secure low cost capital to fund utility growth and operations. To do this, we focus on maintaining a strong balance sheet, focused on financing short-term obligations with short-term debt including commercial paper and financing our ongoing long-term assets of the Company through a balance of long-term debt and equity financings.

Q. What is the Company's strategy for funding these ongoing capital expenditures?

A. To fund these ongoing capital expenditures, the Company seeks to maintain a strong capital structure and solid investment grade credit ratings. The Company

targets a capital structure consisting of 50 percent equity and 50 percent long-term debt. The Company will use short-term debt primarily to fund seasonal working capital needs or as a temporary funding tool for capital as the Company generally tries to limit the number of times it seeks to access the capital markets for long-term debt to minimize the overall costs. Achieving the target capital structure and maintaining sufficient liquidity are necessary to maintain attractive credit ratings and to have access to capital markets at reasonable rates. Over the last three years, the Company has averaged an equity ratio (excluding short-term debt) of 49.82 percent.[1]

Q. Has the formation of NW Natural Holdings changed NW Natural's financing strategy?

A. The overall financing strategy has not changed. As discussed above, NW Natural targets a 50/50 capital structure, and when the Company needs equity to maintain that capital structure, it will request equity infusions from NW Natural Holdings. Further, Order No. 17-526 in docket UM 1804 (NW Natural's approval to reorganize to form a holding company), requires the Company to maintain a capital structure of no lower than 44 percent equity levels or face restrictions on its ability to issue dividends to NW Natural Holdings (among other conditions placed upon NW Natural). Additionally, NW Natural Holdings maintains similar credit metric goals as did NW Natural. To the extent needed, NW Natural Holdings uses the public equity markets to raise equity that is needed for NW

[1] Average of the 13 mo. AMA for September 30, 2019, 2018 and 2017.

Natural. NW Natural Holdings has no intention to increase leverage by borrowing to fund equity requirements of the Company.

Q. Do the equity markets view NW Natural Holdings different from NW Natural?

A. No. Equity markets realize that the Company earns nearly all of NW Natural Holdings' total annual earnings and that the Company is the primary driver of all critical financial and credit metrics of NW Natural Holdings. It is also clear from investor presentations that the primary consideration given is to the growth and development of NW Natural Gas Company and its overall contribution to NW Natural Holdings.

III. CREDIT RATINGS

Q. What are NW Natural's current debt ratings?

A. The table below and *NW Natural/201, Wilson* show the Company's current ratings for each type of debt security from Moody's Investor Service ("Moody's") and Standard and Poor's Ratings ("S&P").

	Moody's	S&P
Corporate	Baa1	A+
Secured	A2	AA-
Commercial Paper	P-2	A-1
Outlook	Stable	Stable

Q. How does NW Natural's debt rating benefit customers?

A. The Company's interest expense, and to a large extent the Company's access to capital during turbulent market conditions, depends upon the debt ratings. As described further in my testimony below, the Company was downgraded by

Moody's on May 17, 2019. Moody's updated credit report following the downgrade is included in *NW Natural/201, Wilson/1-10*. The Company's downgrade could have a direct impact to interest expense, which may increase future issuances. Also, lower credit ratings have a direct impact on financial terms the Company is able to negotiate from suppliers, and may limit access to capital markets. In summary, credit ratings affect our cost of debt and subsequently our cost of capital and customer rates.

Q. Please explain the implications of the credit ratings in terms of NW Natural's ability to access capital markets.

A. Generally speaking, companies with higher credit ratings will have greater access to investors at lower yields, given the lower risk profile of such companies. Lower-rated companies may find it difficult to access capital, or potentially pay significantly more, especially in challenging capital market conditions. The capital market environment changes as macro business cycles move up and down, which creates tighter and looser access to capital. In order to ensure that the Company continues to have favorable pricing or, at times, access to capital markets during all market environments, it is imperative that the Company increase, or at least retain, its A2 secured credit rating.

Q. Are there other important factors that the rating agencies review in determining NW Natural's ratings?

A. Yes. Moody's and S&P's rate the Company's debt based on their independent review of the Company's financial condition and credit metrics. Independent

credit reviews consist of qualitative and quantitative metrics; for example, the regulatory environment and cash flow metrics. Although each rating agency has a slightly different methodology for analyzing credit risk, many of the key financial ratios are the same, or at least comparable.

The tables below display Moody's and S&P's benchmarks and NW Natural's financial forecast, as a consolidated company, for the 2021 year-end (YE) period.

Table 1 – Moody's Benchmarks

Ratio	Moody's "A" Benchmark	NW Natural's 2021 YE Forecast	Comment	Sources and Other Comments
Pre-tax Interest Coverage	4.5x to 6.0x	4.9x	Within "A" rating band	(FFO + Interest)/Interest Based on September 2019 Forecast
Debt Leverage	40%-50%	52.60%	Out of range for "A" rating but within the "Baa" rating	Total Debt/Book Capitalization Based on September 2019 Forecast
FFO to Debt	19% to 27%	15.5%	Out of range for "A" rating but within the "Baa" rating	FFO/Debt Based on September 2019 Forecast
Retained Cash Flow	15% to 23%	11.2%	Out of range for "A" rating but within the "Baa" rating	CFO Pre-W/C Dividends/Debt FFO-Dividends/Debt Based on September 2019 Forecast

Table 2 – S&P's Benchmarks

Ratio	S&P "A" Benchmark	NW Natural's 2021 YE Forecast	Comment	Sources and Other Comments
FFO/Debt	13% - 23%	14.80%	Within "A" rating band	FFO/Adjusted Debt Based on September 2019 Forecast
Debt/EBITDA (x)	3x – 4x	4.9x	Within "BBB" rating band	Debt/EBITDA Based on September 2019 Forecast
CFO/Debt	12%-20%	14.70%	Within "A" rating band	CFO/Debt Based on September 2019 Forecast

FFO = Funds From Operations
EBITDA = Earnings Before Interest, Taxes, Depreciation and Amortization
CFO = Cash Flow from Operations

Q. Have any of NW Natural's credit ratings changed since the Commission issued its order in the Company's 2017 rate case (UG 344)?

A. Yes, Moody's made a change since the Company's most recent rate case (UG 344), while S&P has made no changes. As noted above, Moody's downgraded the Company's secured credit rating on May 17, 2019 from A1 to A2. The reason for the downgrade was due to financial performance more in line with Baa1 peers. Moody's current credit outlook for the Company is stable. The latest rating agency credit reports can be found in *NW Natural/201, Wilson.* Historical ratings for each rating agency can be found in *NW Natural/202, Wilson*.

IV. CAPITAL STRUCTURE AND RATE OF RETURN

Q. What is NW Natural's current Commission-authorized ratemaking capital structure and overall ROR?

A. In the Company's last general rate case (UG 344), the Commission adopted the following capital structure, capital costs and overall ROR:

NW NATURAL'S CAPITAL STRUCTURE AND RATE OF RETURN
ORDER NO. 18-419

Component	Ratio	Cost	Weighted Cost
Long-term Debt	50%	5.233%	2.617%
Common Equity	50%	9.40%	4.70%
Total	**100%**		**7.317%**

Q. What is NW Natural's requested capital structure for ratemaking purposes in this proceeding?

A. NW Natural is requesting a continued capital structure of 50 percent equity and 50 percent long-term debt, with an overall ROR on rate base of 7.298 percent, based upon a 4.596 percent embedded cost of long-term debt and a 10.0 percent cost of equity. The following table presents the proposed capital structure along with the calculation of the Company's ROR for the Test Year:

REQUESTED CAPITAL STRUCTURE AND RATE OF RETURN

Component	Ratio	Cost	Weighted Cost
Long-term Debt	50%	4.596%	2.298%
Common Equity	50%	10.0%	5.0%
Total	**100%**		**7.298%**

Q. Does NW Natural always maintain exactly a 50/50 capital structure?

A. No. Although NW Natural's target capital structure has for a long time been, and continues to be, 50/50, there is a natural fluctuation in this ratio on a temporary basis over time. The fluctuation does not, however, represent a meaningful departure from our targeted capital structure. For example, NW Natural forecasts the Test Year to have an average equity ratio of almost exactly 50 percent (49.71 percent to be precise) but that number will fluctuate over and under 50/50 throughout the year.

Q. Why is maintaining a 50/50 capital structure at the utility important?

A. Maintaining a 50 percent utility common equity ratio is important for several reasons. This equity ratio demonstrates the Company's commitment to a strong and stable balance sheet, which helps maintain the Company's current credit ratings. Strong investment grade credit ratings provide the Company with financing flexibility and liquidity, thereby ensuring timely, efficient, and cost-effective access to capital markets, which in turn helps to lower the cost of capital. The cost of capital and capital structure directly impact the return for debt service and common equity investors within the revenue requirement calculation.

The converse is true, too. Generally, companies with higher debt ratios are considered more risky. By maintaining a long-term debt ratio at 50 percent, the Company is maintaining its risk profile in line with its historical risk profile and with other peer group local distribution companies. If the Company were to

increase its debt ratio beyond 50 percent, it is likely that the rating agencies would view such an action negatively. In the event our ratings were further downgraded, the Company could face more difficulty accessing capital markets and higher costs of debt – potentially causing detriment to both our customers and our shareholders.

Q. How does NW Natural's proposed utility capital structure compare with the natural gas peer group?

A. The Company's proposed capital structure has a slightly lower equity to capital ratio than the average of our peer group identified by Dr. Bente Villadsen in the Company's Return on Equity Testimony (*NW Natural/300, Villadsen*). The average equity to capital ratio of our peers is 51.3 percent.

V. COMMON EQUITY

Q. How does NW Natural now access the equity market after formation of NW Natural Holdings?

A. The Company is unable to access the equity markets directly. Therefore, all equity needs for the Company are provided directly from NW Natural Holdings, which has direct access to the public equity markets to raise equity as needed.

Q. Did NW Natural Holdings infuse equity to NW Natural after NW Natural Holdings' public offering on June 7, 2019?

A. Yes. NW Natural Holdings issued 1,437,500 shares of common stock, with total net proceeds of $93.2 million. The timing and amount issued were based on the Company's financial forecasts for the purpose of maintaining our equity exposure

within a target range. The total amount of equity from this offering was infused to NW Natural and used for corporate purposes, primarily to fund NW Natural's ongoing utility construction program and for general corporate purposes.

Q. What is NW Natural's plan to maintain the target utility common equity ratio over the next few years?

A. The Company's plan includes taking a number of steps. In addition to the expected increase in common equity due to retained earnings growth each year, the Company intends to: (1) continue having NW Natural Holdings issue new shares of common stock to investors through its ongoing Dividend Reinvestment and Optional Cash Payment Plan; and (2) sell new common shares to investors through public offerings, as needed. [redacted].

VI. LONG-TERM DEBT

Q. How was the cost of long-term debt calculated for the Test Year?

A. Confidential *NW Natural/203, Wilson* presents the details of the Company's long-term debt outstanding ($904.7 million) and the corresponding weighted average cost (4.596 percent) forecasted for the Test Year. The cost of long-term debt includes existing debt and forecasted debt. The weighted average cost of long-term debt was calculated by multiplying the debt outstanding, including future projected debt issuances, by the average cost for each debt issue.

Column "o" of confidential *NW Natural/203*, *Wilson* shows the annualized expense of each individual issue in terms of an effective interest rate, which represents the total cost of issue, including coupon rate, premiums or discounts, underwriter's commissions, gains and losses on interest rate hedges, and other expenses related to the issue such as legal fees and unamortized debt discounts and early redemption premiums assigned to refunding issues. Unamortized debt discounts and early redemption premiums from previously outstanding debt issues are added to the new debt issuance because the Company was able to achieve a lower annualized cost of debt due to net present value savings from the early redemption.

Q. [redacted]

A. [redacted]

Q. [redacted]

A. [redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Q. [redacted]

A. [redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Q. [redacted]

A. [redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Q. [redacted]

A. [redacted]

///

///

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VII. CUSTOMERS HELD HARMLESS FROM REORGANIZATION

Q. Please describe NW Natural's obligation to hold customers harmless to changes to the Company's rate of return, common equity and long-term debt caused by the Company's reorganization to form a holding company.

A. Under Condition No. 6 of the stipulated conditions in Order No. 17-526 in docket UM 1804 (NW Natural's approval to reorganize to form a holding company), NW Natural and NW Natural Holdings guaranteed that customers would be held harmless from any adverse rate impacts caused by NW Natural's rate of return, common equity, and long-term debt becoming more costly after the restructuring than they would be had NW Natural not reorganized. For seven years following the reorganization, NW Natural bears the burden of demonstrating that any increase in its cost of debt or cost of common equity for which rate recovery is sought did not result from factors associated with either the reorganization or any subsequent acquisition activity of NW Natural Holdings.

Q. Has Condition 6 been triggered?

A. No. The rate of return and the cost of debt has gone down since our last rate case in UG 344 and the proposed equity cost is at par with our recommended equity percent in our last rate case proceeding.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Brody J. Wilson

COST OF CAPITAL
EXHIBITS 201 – 205

REDACTED VERSION

December 30, 2019

EXHIBITS 201-205 – COST OF CAPITAL

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Brody J. Wilson

COST OF CAPITAL
EXHIBIT 201

December 30, 2019

MOODY'S INVESTORS SERVICE

CREDIT OPINION
24 May 2019

Update

Rate this Research

RATINGS

Northwest Natural Gas Company

Domicile	Portland, Oregon, United States
Long Term Rating	(P)Baa1
Type	Senior Unsec. Shelf - Dom Curr
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3551-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454

Northwest Natural Gas Company

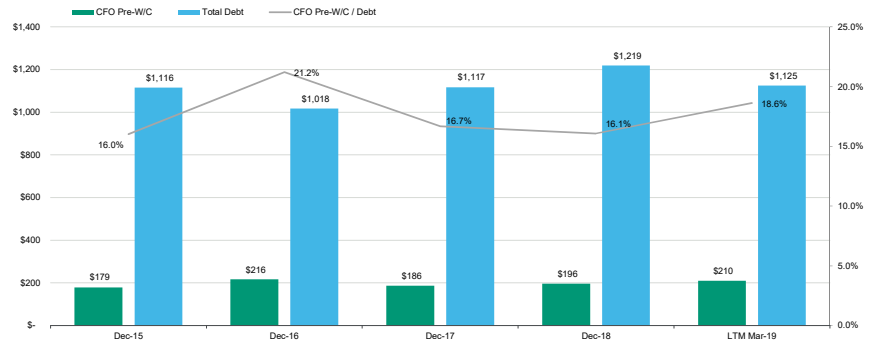
Update following downgrade to Baa1

Summary

Northwest Natural Gas Company's (NW Natural, Baa1 stable) credit profile is supported by 1) its low business risk as a local gas distribution company (LDC), 2) a supportive regulatory environment with a suite of cost recovery mechanisms and constructive stakeholder relationships and 3) stabilizing financial metrics following the completion of the company's first general rate case in Oregon since 2012.

NW Natural's credit profile is constrained by weak financial metrics compared to most LDCs, including a ratio of cash flow from operations before changes in working capital to debt (CFO pre-WC to debt) expected between 16-17% over the next several years. The financial profile is further limited by a shareholder dividend policy that has driven a payout ratio average between 70-80% over the past five years, resulting in adjusted CFO pre-WC less dividends to debt of around 14% over that time (15% through the last twelve months (LTM) ended 31 March 2019).

Exhibit 1
Historical CFO Pre-WC, Total Debt and CFO Pre-WC to Debt ($ MM)



Source: Moody's Financial Metrics

Credit strengths

» Low business risk local gas distribution company

» Supportive regulatory jurisdiction, including cost tracking mechanisms and a recent Oregon base rate increase to around $1.3 billion

» Good stakeholder relationships, which were evidenced in the constructive regulatory settlement of tax reform issues

Credit challenges

» Financial metrics historically trail those of peers

» Dividend payout ratio typically around 80% of earnings, but likely to decline

» Long-term risks associated with environmental remediation costs

Rating outlook

NW Natural's stable outlook reflects constructive regulatory decisions that will help maintain the company's financial profile, including CFO pre-WC to debt between 16-17% on a sustained basis.

Factors that could lead to an upgrade

» Sustainable CFO pre-WC to debt in the 17.5% range

» A lower dividend payout ratio, resulting in CFO pre-WC less dividends to debt consistently above 14%

» Enhanced cost recovery features

Factors that could lead to a downgrade

» Less supportive regulatory outcomes with the OPUC

» CFO pre-WC to debt sustained below 14%

Key indicators

Exhibit 2

Northwest Natural Gas Company [1]

	Dec-15	Dec-16	Dec-17	Dec-18	LTM Mar-19
CFO Pre-W/C + Interest / Interest	4.5x	5.6x	4.8x	5.1x	5.4x
CFO Pre-W/C / Debt	16.0%	21.2%	16.7%	16.1%	18.6%
CFO Pre-W/C – Dividends / Debt	11.6%	16.2%	11.9%	12.9%	15.2%
Debt / Capitalization	46.2%	42.1%	52.3%	54.9%	51.8%

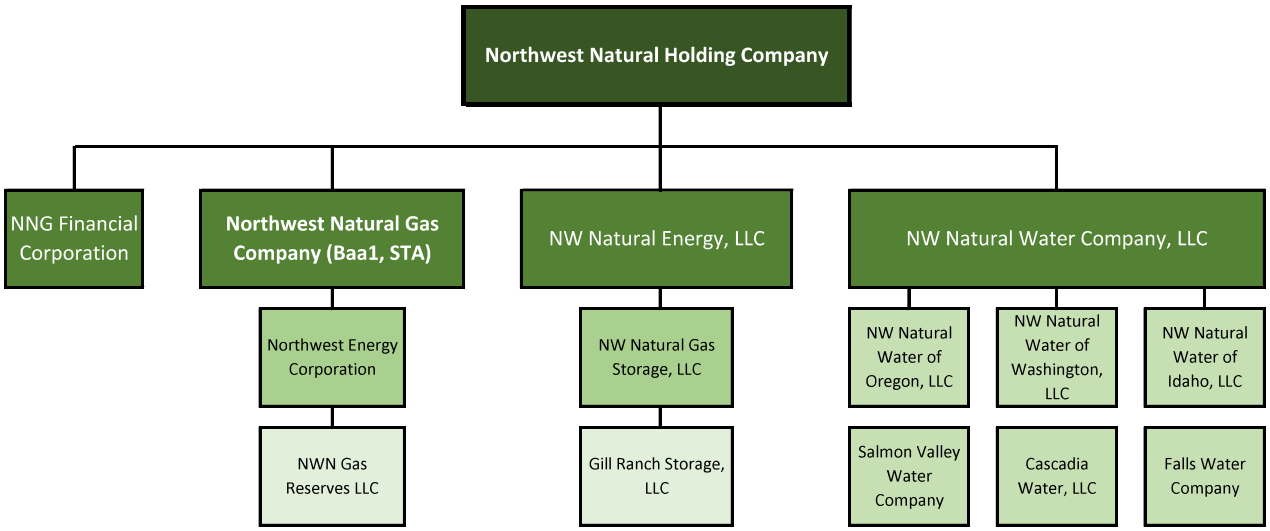
[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics

Profile

Northwest Natural Gas Company (NW Natural, Baa1 stable) is a natural gas local distribution company (LDC), serving over 750,000 customers in Oregon (about 90% of utility margins) and Washington (about 10% of utility margins). NW Natural is regulated by the Oregon Public Utility Commission (OPUC) and the Washington Utilities and Transportation Commission (WUTC).

As of 1 October 2018, Northwest Natural Holding Company was formed, which now has direct ownership of NW Natural and the non-utility activities that were previously consolidated up to the LDC. Exhibit 3 provides an illustrative chart of the new organizational structure.

Exhibit 3
NW Natural simplified organizational chart



Source: NW Natural

Detailed credit considerations

Low business risk profile with constructive regulatory and stakeholder relationships

NW Natural's low business risk profile is supported by gas distribution operations that receive supportive regulatory treatment from the Oregon Public Utility Commission (OPUC) and Washington Utilities and Transportation Commission (WUTC), which allows for several cost recovery mechanisms that help provide stability and predictability of the company's cash flow.

Oregon

The most important cost recovery mechanisms include: NW Natural's use of forward test years for capital expenditures; weather adjusted rate mechanism (WARM); conservation tariff (i.e., revenue decoupling); purchased gas adjustment (PGA); utility gas reserve investments included in rate base; and a Site Remediation and Recovery Mechanism (SRRM), primarily for the recovery of manufactured gas plant environmental expenditures. These various cost recovery mechanisms help support recovery of the most significant costs that NW Natural faces.

Moreover, its October 2018 general rate case order provided NW Natural with an annual revenue increase of about $25 million per year, froze the company's pension balancing account and raised the amount of annual pension expense recovery by over $8 million. The rates were set on a rate base of round $1,186 million, up from around $886 million established during the 2012 general rate case order. The approved ROE was 9.4% (down from 9.5% from the 2012 decision) on a 50/50 debt/equity capital structure.

In March 2019, the OPUC approved another settlement that gave NW Natural incremental recovery of pension regulatory assets, while also netting some regulatory assets against TCJA-generated liabilities that would have otherwise been cash outflows to customers. While the negotiated settlement also included a $10.5 million pension asset write-off, we estimate that the net cash flow contribution to NW Natural will be over $20 million of incremental cash flow per year.

Washington

On 24 May 2019, the company filed a form 8k with the SEC describing two settlements that the company filed with the WUTC. The first is an all-parties rate settlement for general rates and the second settlement is specifically related to the potential for the

company's adoption of revenue decoupling. If approved, the first settlement would allow NW Natural a $5 million annual rate increase based on a 49% equity layer, 9.4% allowed ROE on a total of nearly $174 million rate base. It also addressed customer benefits associated with tax reform and NW Natural's ability to recover environmental remediation costs. The second settlement could provide for revenue decoupling, but a revised procedural schedule has been established for the remainder of the rate case, and Public Counsel will have an opportunity to challenge the settlement.

We view the first settlement as credit supportive to NW Natural's financial profile and the addition of decoupling would further enhance NW Natural's cost recovery in Washington.

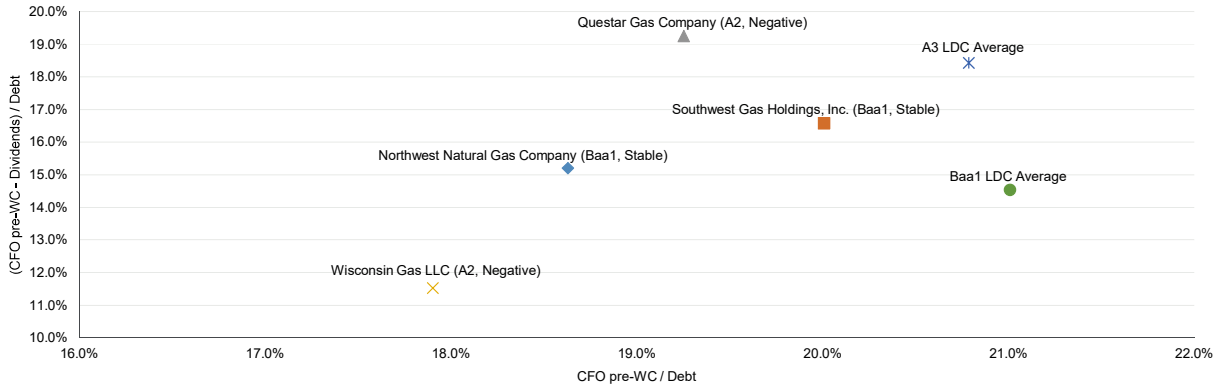
Financial metrics lag industry peers

The combination of the October 2018 and March 2019 regulatory outcomes will help the company to generate over $200 million of cash flow per annum. These supportive regulatory approvals will help NW Natural to maintain a stable financial profile, despite the headwinds of tax reform. We expect the company to generate key ratios such as CFO pre-WC to debt between 16-17% over the next several years.

However, this financial profile will continue to be worse than similarly rated peers, which have produced CFO pre-WC to debt ratios averaging around 20% over the same period. NW Natrual's very high payout ratio also pressures retained cash flow metrics, and weakens the company's relative positioning versus other LDCs. For example, NW Natrual's ratio of CFO pre-WC less dividends to debt was 15% through LTM 31 March 2019, compared to the A3 LDC peer average of over 18%.

Exhibit 4

NW Natural's cash flow metrics lag those of peers



Cash flow metrics as of latest available last twelve months.
Source: Moody's Financial Metrics

Greater pension recovery and a lower dividend payout could improve these metrics over the long-term, as would incremental rate cases to begin recovery of a base capital plan of about $175 million per year through 2023. But for now, we see the company's key metrics remaining steady by way of the recent rate case outcomes.

Low carbon transition risk, but other environmental remediation risks persist

NW Natural has low carbon transition risk within the utility sector because it is a gas LDC and natural gas commodity purchase costs are fully passed through to customers with an effective cost recovery mechanism. Moreover, we see NW Natural as one of the more active LDC's in the industry regarding proactive carbon transition activities. For example, the company has established a voluntary goal of 30% carbon savings (based on the level of emissions in 2015) by 2035 through reducing the carbon intensity of its supply chain and operations, enhancing the efficient use of the product and replacing natural gas for less carbon intensive fuels used by the company.

However, NW Natural will continue to have the overhang of environmental liabilities associated with legacy manufactured gas plants (MGPs) that release contaminants into surrounding areas. These liabilities may require a significant amount of environmental

remediation, the costs for which are often uncertain and subject to the orders of the Environmental Protection Agency (EPA) and state environmental agencies. The cash outlay for these efforts can be substantial and require an ample amount of liquidity.

We view the SRRM to be an important mechanism since it allows for full cost recovery over time; however, we note that it does have a limited benefit to the company's near-term cash profile, since cash recovery occurs over a five year period. Therefore, if NW Natural were to incur a material level of costs in any given year, its cash and financial position would be impaired for some time as it waits for full recovery in authorized rates. We note that the company is able to collect interest on the balance outstanding - a positive.

For NW Natural, the Portland Harbor site represents its largest uncertainty, as efforts to determine a remediation plan, scope the necessary work and allocate corrective responsibility amongst various parties is ongoing. The current present value cost estimated by the EPA for site remediation for Portland Harbor is approximately $1.05 billion with an accuracy between -30% and +50% of actual costs. We expect the ultimate plan and identification of NW Natural costs to be highly contentious with protracted litigation; however, we note that when the matter is resolved and costs are to be incurred, NW Natural's financial position could be impaired for several years. NW Natural's credit profile would likely decline commensurately, if the SRRM (or other regulatory provided recovery mechanism) is insufficient to maintain NW Natural's cash flow at levels to cover debt in the mid-to-high teens.

Liquidity analysis

We expect NW Natural to maintain adequate liquidity over the next 12-18 months, with the use of its external credit facility.

In October 2018, NW Natural renewed a 5-year, $300 million committed credit facility. The agreement also contains features to increase the committed amount up to a maximum of $450 million and extend the commitments for two additional one-year periods. The primary restrictive covenant requires the company to maintain a debt to capitalization ratio of 70% or less, which NW Natural was in compliance with at 31 March 2019 (53.5%).

At 31 March 2019, NW Natural had approximately $6.8 million of cash on hand and generated $174 million of reported CFO over 2018. This compares to about $206 million in capital expenditures and $39 million in dividends for the same period. We expect the company to continue to produce around this amount of cash flow from operations over the next twelve months, which will approximate capital expenditures of around $175 million in 2019, leaving the potential need to finance its growing dividend through the revolver and capital markets.

NW Natural's 2019 debt maturities include $10 million of senior debt in September and $20 million in December. The next sizeable maturity is $75 million in February 2020.

Rating methodology and scorecard factors

Exhibit 5
Rating factors
Northwest Natural Gas Company

Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 3/31/2019		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	A	A	A	A
b) Consistency and Predictability of Regulation	A	A	A	A
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	Aa	Aa	Aa	Aa
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	Baa	Baa	Baa	Baa
b) Generation and Fuel Diversity	N/A	N/A	N/A	N/A
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	5.2x	A	4.5x - 5x	A
b) CFO pre-WC / Debt (3 Year Avg)	18.7%	Baa	16% - 17%	Baa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	14.2%	Baa	11% - 13%	Baa
d) Debt / Capitalization (3 Year Avg)	47.5%	A	45% - 50%	A
Rating:				
Scorecard-Indicated Outcome Before Notching Adjustment		A3		A3
HoldCo Structural Subordination Notching		0		0
a) Indicated Outcome from Scorecard		A3		A3
b) Actual Rating Assigned		Baa1		Baa1

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2] As of 3/31/2019;
[3] This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Financial Metrics

Appendix

Exhibit 6

Cash Flow and credit metrics [1]

CF Metrics	Dec-15	Dec-16	Dec-17	Dec-18	LTM Mar-19
As Adjusted					
FFO	**189**	**204**	**190**	**195**	**202**
+/- Other	(10)	12	(4)	1	7
CFO Pre-WC	**179**	**216**	**186**	**196**	**210**
+/- ΔWC	17	21	37	(9)	(22)
CFO	**196**	**237**	**223**	**187**	**188**
- Div	49	52	54	38	39
- Capex	124	145	216	218	209
FCF	**23**	**41**	**(46)**	**(69)**	**(60)**
(CFO Pre-W/C) / Debt	16.0%	21.2%	16.7%	16.1%	18.6%
(CFO Pre-W/C - Dividends) / Debt	11.6%	16.2%	11.9%	12.9%	15.2%
FFO / Debt	16.9%	20.0%	17.0%	16.0%	18.0%
RCF / Debt	12.5%	14.9%	12.2%	12.9%	14.6%
Revenue	724	676	755	706	727
Cost of Good Sold	323	256	320	256	253
Interest Expense	51	47	49	48	48
Net Income	38	56	(61)	37	48
Total Assets	3,114	3,115	3,116	3,253	3,142
Total Liabilities	2,344	2,275	2,385	2,547	2,404
Total Equity	771	840	731	706	738

[1] All figures and ratios are calculated using Moody's estimates and standard adjustments. Periods are Financial Year-End unless indicated. LTM = Last Twelve Months.
Source: Moody's Financial Metrics

Exhibit 7

Peer comparison table [1]

	Northwest Natural Gas Company			Questar Gas Company			Wisconsin Gas LLC			Southwest Gas Holdings, Inc.		
	Baa1 Stable			A2 Negative			A2 Negative			Baa1 Stable		
	FYE	FYE	LTM	FYE	FYE	FYE	FYE	FYE	FYE	FYE	FYE	FYE
(in US millions)	Dec-17	Dec-18	Mar-19	Dec-16	Dec-17	Dec-18	Dec-16	Dec-17	Dec-18	Dec-16	Dec-17	Dec-18
Revenue	755	706	727	921	947	918	572	614	650	2,460	2,549	2,880
CFO Pre-W/C	186	196	210	157	184	166	153	139	140	571	568	586
Total Debt	1,117	1,219	1,125	883	1,044	863	653	708	784	2,199	2,697	2,930
CFO Pre-W/C / Debt	16.7%	16.1%	18.6%	17.8%	17.6%	19.3%	23.5%	19.7%	17.9%	26.0%	21.1%	20.0%
CFO Pre-W/C – Dividends / Debt	11.9%	12.9%	15.2%	14.4%	17.6%	19.3%	12.0%	13.3%	11.5%	22.2%	17.7%	16.6%
Debt / Capitalization	52.3%	54.9%	51.8%	43.9%	51.2%	40.1%	37.0%	41.9%	42.9%	46.7%	54.2%	50.7%

[1] All figures & ratios calculated using Moody's estimates & standard adjustments. FYE = Financial Year-End. LTM = Last Twelve Months.
Source: Moody's Financial Metrics

Ratings

Exhibit 8

Category	Moody's Rating
NORTHWEST NATURAL GAS COMPANY	
Outlook	Stable
First Mortgage Bonds	A2
Senior Secured	A2
Senior Unsecured MTN	(P)Baa1
Pref. Shelf	(P)Baa3
Commercial Paper	P-2

Source: Moody's Investors Service

REPORT NUMBER 1172909

CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3551-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454

S&P Global
Ratings

Research

Summary:

Northwest Natural Gas Co.

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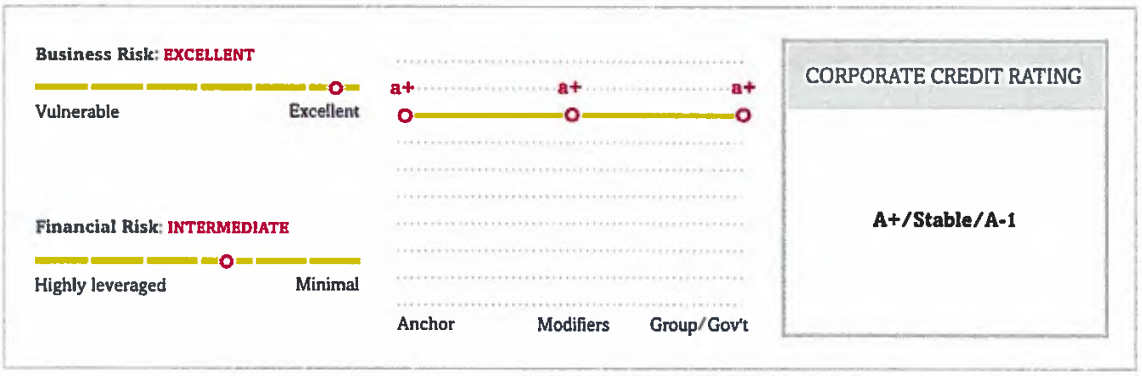
1872505

Summary:

Northwest Natural Gas Co.



Rationale

Business Risk: Excellent	Financial Risk: Intermediate
• Primarily low-risk natural gas distribution operations with limited unregulated storage operations. • Strong service territory with modest regulatory and economic diversity. • Unregulated businesses help mitigate volatility in natural gas pricing, but are subject to some commodity risk. • Multiple regulatory mechanisms help recover costs on a timely basis.	• Leverage and cash flow measures consistent with an intermediate financial risk profile. • Elevated capital spending in 2017 related to the expansion of the Mist storage facility. • Dividend payout ratio moderately higher than industry averages. • Negative discretionary cash flow over the next few years, indicating external funding needs.

Outlook: Stable

S&P Global Ratings' stable rating on Portland, Ore.-based Northwest Natural Gas Co. (NWN) reflects our expectation of strong financial and operating performance and regulatory support over the next two years. We expect funds from operations (FFO) to debt to be between 18% and 20% during this period.

Downside scenario

Ratings pressure could occur over the next two years if FFO to debt consistently drops below 15%. This could occur if the company relies heavily on external financing to fund cash shortfalls, if investments in unregulated operations exceed our expectations, or cash flows suffer due to mismanagement of regulatory risk.

Upside scenario

Although unlikely over the next two years, we could raise the ratings if the company improves financial measures on a sustained basis, including FFO to debt of more than 23%. This could occur through strengthened operating cash flow or reduced debt leverage.

Our Base-Case Scenario

Assumptions

- Low- to mid-single-digit annual-gross-margin growth in 2017 and 2018.
- Capital spending of about $160 million annually with a peak of about $250 million in 2017.
- Dividends in excess of $50 million per year.
- Cost recovery remains adequate through base rates and rate surcharges.
- Debt maturities refinanced.
- Negative discretionary cash flow from 2017 onward indicates external funding needs.

Key Metrics

	2016A	2017E	2018E
FFO to debt (%)	21.3	17-20	17-20
OCF to debt (%)	26.2	17-20	16-19
Debt to EBITDA (x)	3.6	3.9-4.3	3.9-4.3

S&P Global Ratings' adjusted figures. A--Actual. E--Estimate. FFO--funds from operations. OCF--Operating cash flow.

Business Risk: Excellent

We assess NWN's business risk based on the company's very low risk regulated gas distribution operations (accounts for about 90%-95% of consolidated cash flows) and its unregulated natural gas storage business, where we ascribe higher risk. About 90% of NWN's roughly 725,000 customers are in Oregon, primarily in the Salem and Portland metropolitan areas, remainder in Washington. The company benefits from stable and supportive regulatory environments in both of the jurisdictions it operates in, with purchased gas adjustments and environmental cost deferral in both jurisdictions, and decoupling, forward-looking test years, and weather normalization mechanisms in Oregon. These mechanisms reduce regulatory lag in collection of associated costs and help bolster cash flow stability

outside of rate cases. The utility's cash flows are further stabilized by a large, stable residential customer base (about 90% of all customers) with limited exposure to more cyclical commercial and industrial customers. A history of safe and reliable services also strengthens the company's business profile.

NWN's non-utility cash flows are mostly from its Mist and Gill Ranch storage facilities, which have contributed between 5% and 10% of annual operating income. The company is expanding its gas storage facility by 2.5 Bcf at Mist, Oregon, to provide storage services to Portland General Electric Co.'s (PGE) natural gas power plants under a 30-year contract with revenues recovered through an established tariff schedule. We consider the cash flow from this asset to be fairly reliable given the essential nature of the service it provides. The investment in the Gill Ranch natural gas storage facility near Fresno, Calif., is riskier because it is outside of Oregon and faces competition. Gill Ranch enters into a mix of short- and medium-term contracts for the large majority of its total storage capacity.

After factoring in these components, we view NWN's business risk profile at the stronger end of the excellent category, supported by the company's ability to effectively manage the regulatory process, which helps support higher and more stable profitability.

Financial Risk: Intermediate

Under our base-case scenario, with elevated capital spending in 2017 to support the Mist expansion, modestly rising dividend payments, and cost recovery through various regulatory mechanisms and rate cases, we expect the company's FFO to debt measures will be about 18%-20% in 2017 and 2018. Since the range of projected FFO to total debt is solidly in the middle of the intermediate financial risk profile category, it supports a modest cushion to the ratings. We assess NWN's financial risk profile based on financial ratios that are measured against the most relaxed benchmarks used for corporate issuers, reflecting the low-risk nature of the company's natural gas distribution operations in supportive regulatory environments. We assume that NWN will continue to manage regulatory risk well and fully recover capital spending on a timely basis.

Liquidity: Adequate

We assess liquidity as adequate for Northwest Natural Gas Co. because we believe sources are likely to cover uses by more than 1.1x over the next 12 months. We also project sources will meet cash outflows even in the event of a 10% decline in EBITDA. The adequate assessment also reflects the company's generally prudent risk management, sound relationships with banks, and generally satisfactory standing in credit markets.

Principal Liquidity Sources	Principal Liquidity Uses
• Forecast cash FFO of about $180 million • Revolving credit facilities of about $300 million.	• Debt maturities, including outstanding commercial paper, of about $90 million • Capital spending of about $225 million • Dividends of about $55 million.

Other Credit Considerations

Other modifiers have no effect on the rating outcome.

Group Influence

NWN is subject to the group rating methodology criteria. We view NWN as the parent and driver of the group credit profile. As a result, NWN's group and stand-alone credit profiles are the same at 'a+'.

Recovery Analysis/Issue Rating

NWN's first mortgage bonds benefit from a first-priority lien on substantially all of the utility's real property owned or subsequently acquired. Collateral coverage of more than 1.5x supports a recovery rating of '1+' and an issue rating one notch above the issuer credit rating.

The short-term rating on NWN is 'A-1' based on the issuer credit rating and our assessment of its liquidity as at least adequate.

Ratings Score Snapshot

Corporate Credit Rating

A+/Stable/A-1

Business risk: Excellent

- **Country risk:** Very low
- **Industry risk:** Very low
- **Competitive position:** Strong

Financial risk: Intermediate

- **Cash flow/Leverage:** Intermediate

Anchor: a+

Modifiers

- **Diversification/Portfolio effect:** Neutral (no impact)
- **Capital structure:** Neutral (no impact)
- **Financial policy:** Neutral (no impact)
- **Liquidity:** Adequate (no impact)
- **Management and governance:** Satisfactory (no impact)
- **Comparable rating analysis:** Neutral (no impact)

Stand-alone credit profile : a+

- **Group credit profile:** a+

Related Criteria And Research

- General Criteria: Methodology For Linking Long-Term And Short-Term Ratings, April 7, 2017
- Criteria - Corporates - General: Methodology And Assumptions: Liquidity Descriptors For Global Corporate Issuers, Dec. 16, 2014
- General Criteria: Country Risk Assessment Methodology And Assumptions, Nov. 19, 2013
- Criteria - Corporates - Utilities: Key Credit Factors For The Regulated Utilities Industry, Nov. 19,2013
- General Criteria: Methodology: Industry Risk, Nov. 19, 2013
- General Criteria: Group Rating Methodology, Nov. 19, 2013
- Criteria - Corporates - General: Corporate Methodology, Nov. 19, 2013
- Criteria - Corporates - Utilities: Collateral Coverage And Issue Notching Rules For '1+' And '1' Recovery Ratings On Senior Bonds Secured By Utility Real Property, Feb. 14, 2013
- General Criteria: Methodology: Management And Governance Credit Factors For Corporate Entities And Insurers, Nov. 13, 2012
- Criteria - Corporates - General Criteria: Use Of CreditWatch And Outlooks, Sept. 14, 2009
- Debt Now Better Reflects Anticipated Absolute Recovery, Nov. 10, 2008
- Utilities: Notching Of U.S. Investment-Grade Investor-Owned Utility Unsecured, Nov. 10, 2008
- Criteria - Corporates - General: 2008 Corporate Criteria: Rating Each Issue, April 15, 2008

Business And Financial Risk Matrix

	Financial Risk Profile					
Business Risk Profile	Minimal	Modest	**Intermediate**	Significant	Aggressive	Highly leveraged
Excellent	aaa/aa+	aa	**a+/a**	a-	bbb	bbb-/bb+
Strong	aa/aa-	a+/a	a-/bbb+	bbb	bb+	bb
Satisfactory	a/a-	bbb+	bbb/bbb-	bbb-/bb+	bb	b+
Fair	bbb/bbb-	bbb-	bb+	bb	bb-	b
Weak	bb+	bb+	bb	bb-	b+	b/b-
Vulnerable	bb-	bb-	bb-/b+	b+	b	b-

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Brody J. Wilson

COST OF CAPITAL
EXHIBIT 202

December 30, 2019

NW Natural
UG 388 - Exhibit 202
NW Natural Credit Ratings 2017 to 2019

Debt Ratings History

Standard & Poors

	Credit Ratings			
Rating Type	**Pre 2017**	**6/21/2017**	**7/20/2018**	**Current**
Outlook	Stable	Stable	Stable	Stable
Senior Secured LT Debt	AA-	AA-	AA-	AA-
Corporate Credit Rating	A+	A+	A+	A+
Short-Term	A-1	A-1	A-2	A-2

Moody's Investor Service

Rating Type	Credit Ratings					
Outlook	**Pre 2017**	**2/24/2017**	**2/1/2018**	**1/10/2019**	**5/17/2019**	**Current**
Senior Secured LT Debt	Stable	Stable	Negative (1)	Negative	Stable (2)	Stable
Corporate Credit Rating	A1	A1	A1	A1	A2 (2)	A2
Short-Term	A3	A3	A3	A3	Baa1 (2)	Baa1
	P-2	P-2	P-2	P-2	P-2	P-2

Explanation for Rating Changes:

(1) Reason for the change in rating outlook reflects the potential for cash leakage due to newly signed US tax law and the possibility of CFO pre-WC to debt falling below 16% on a sustainable basis.

(2) Reasons for the downgrade: 1) Financial performance more in-line with Baa1 peers, 2) Ratio of cash flow to debt steady at around 16 - 17%, and 3) Regulatory lag. The company will need to rely on general rate case filings to recover the majority of its significant capital spend. In comparison, many of NW Natural's peers recover capital investment through annual riders.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

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COST OF CAPITAL
EXHIBIT 203

REDACTED VERSION

December 30, 2019

NW Natural
UG 388 - Exhibit 203
Embedded Cost of Long Term Debt

NORTHWEST NATURAL GAS COMPANY
EMBEDDED COST OF LONG-TERM DEBT CAPITAL AT
October 31, 2021

#	Coupon Rate	Description of Issue	Date Issued	Maturity Date	10/31/2021 Years to Maturity	Outstanding	Offered	Premium or Discount Amount	Premium or Discount Per $ 100 Principal Amount	Underwriter's Commission Amount	Underwriter's Commission Per $ 100 Principal Amount	Expense of Issue Amount		Net Proceeds Per $ 100 Principal Amount	Net Proceeds Amount	Net Proceeds Per $100 Principal Amount	Original Term to Maturity Yrs.	Cost of Money (Bond Table)	Annual Cost Out-standing Debt
		(a)	(b)	(c)		(d)	(e)	(f)	(g)	(h)	(i)	(j)		(k)	(l)	(m)	(n)	(o)	(p)
		Medium-Term Notes																	
		First Mortgage Bonds:																	
1	3.542%	3.542% Series	8/19/2013	8/19/2023	1.8	50,000,000	50,000,000	0	0.00	312,500	0.625	325,679		0.65	49,361,821	98.724	10	3.696%	1,848,000
2	5.620%	5.620% Series	11/21/2003	11/21/2023	2.1	40,000,000	40,000,000	0	0.00	372,588	0.931	2,952,850	[4]	7.38	36,674,562	91.686	20	6.360%	2,544,000
3	7.720%	7.720% Series	9/6/2000	9/1/2025	3.8	20,000,000	20,000,000	0	0.00	150,000	0.750	1,136,261	[2]	5.68	18,713,739	93.569	25	8.336%	1,667,200
4	6.520%	6.520% Series	12/1/1995	12/1/2025	4.1	10,000,000	10,000,000	0	0.00	62,500	0.625	27,646		0.28	9,909,854	99.099	30	6.589%	658,900
5	7.050%	7.050% Series	10/15/1996	10/15/2026	5.0	20,000,000	20,000,000	0	0.00	125,000	0.625	50,940		0.25	19,824,060	99.120	30	7.121%	1,424,200
6	3.211%	3.211% Series	12/5/2016	12/5/2026	5.1	35,000,000	35,000,000	0	0.00	218,750	0.625	288,003		0.82	34,493,247	98.552	10	3.383%	1,184,050
7	7.000%	7.000% Series	5/20/1997	5/21/2027	5.6	20,000,000	20,000,000	0	0.00	125,000	0.625	28,906		0.14	19,846,094	99.230	30	7.062%	1,412,400
8	2.822%	2.822% Series	9/13/2017	9/13/2027	5.9	25,000,000	25,000,000	0	0.00	150,000	0.600	159,885		0.64	24,690,115	98.760	10	2.966%	741,500
9	6.650%	6.650% Series	11/10/1997	11/10/2027	6.0	19,700,000	19,700,000	0	0.00	125,000	0.635	37,800	[5]	0.19	19,537,200	99.174	30	6.714%	1,322,658
10	6.650%	6.650% Series	6/1/1998	6/1/2028	6.6	10,000,000	10,000,000	0	0.00	75,000	0.750	23,300		0.23	9,901,700	99.017	30	6.727%	672,700
11	3.141%	3.141% Series	6/17/2019	6/15/2029	7.6	50,000,000	50,000,000	0	0.00	312,500	0.625	255,252		0.51	49,432,248	98.864	10	3.275%	1,637,500
12	7.740%	7.740% Series	8/29/2000	8/29/2030	8.8	20,000,000	20,000,000	0	0.00	150,000	0.750	1,354,914	[1]	6.77	18,495,086	92.475	30	8.433%	1,686,600
13	7.850%	7.850% Series	9/6/2000	9/1/2030	8.8	10,000,000	10,000,000	0	0.00	75,000	0.750	678,107	[3]	6.78	9,246,893	92.469	29	8.551%	855,100
14	5.820%	5.820% Series	9/24/2002	9/24/2032	10.9	30,000,000	30,000,000	0	0.00	225,000	0.750	165,382		0.55	29,609,618	98.699	30	5.913%	1,773,900
15	5.660%	5.660% Series	2/25/2003	2/25/2033	11.3	40,000,000	40,000,000	0	0.00	300,000	0.750	56,663		0.14	39,643,337	99.108	30	5.723%	2,289,200
16	5.250%	5.250% Series	6/21/2005	6/21/2035	13.6	10,000,000	10,000,000	0	0.00	75,000	0.750	22,974		0.23	9,902,026	99.020	30	5.316%	531,600
17	4.000%	4.000% Series	10/30/2012	10/31/2042	21.0	50,000,000	50,000,000	0	0.00	300,000	0.600	235,479		0.47	49,464,522	98.929	30	4.062%	2,031,000
18	4.136%	4.136% Series	12/5/2016	12/5/2046	25.1	40,000,000	40,000,000	0	0.00	300,000	0.750	307,712		0.77	39,392,288	98.481	30	4.226%	1,690,400
19	3.685%	3.685% Series	9/13/2017	9/13/2047	25.9	75,000,000	75,000,000	0	0.00	562,500	0.750	367,946		0.49	74,069,554	98.759	30	3.754%	2,815,500
20	4.110%	4.110% Series	9/10/2018	9/10/2048	26.9	50,000,000	50,000,000	0	0.00	127,000	0.254	186,195		0.37	49,686,805	99.374	30	4.147%	2,073,500
21	3.869%	3.869% Series	6/17/2019	6/15/2049	27.6	90,000,000	90,000,000	0	0.00	675,000	0.750	415,358		0.46	88,909,642	98.788	30	3.938%	3,544,200
[redacted]																			
						$904,700,000	$904,700,000	$0		$6,243,338		$9,853,250			$888,603,412			4.596%	$41,583,258

WEIGHTED EMBEDDED COST: $41,583,258 $904,700,000 EQUALS = 4.596%

[1] INCLUDES $992,143 PREMIUM, $178,966 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 9.75% SERIES BONDS, AND $148,605 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 15.375% SERIES BONDS ALLOCATED TO THE 7.74% SERIES.

[2] INCLUDES $826,786 PREMIUM, $149,139 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 9.75% SERIES BONDS, AND $123,837 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 15.375% SERIES BONDS ALLOCATED TO THE 7.72% SERIES.

[3] INCLUDES $496,071 PREMIUM, $89,483 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 9.75% SERIES BONDS, AND $74,302 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 15.375% SERIES BONDS ALLOCATED TO THE 7.85% SERIES.

[4] INCLUDES $150,000 PREMIUM AND $405,971 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 7.50% SERIES BONDS, $413,600 PREMIUM AND $1,116,479 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 7.52% SERIES BONDS AND $730,000 PREMIUM AND $136,800 UNAMORTIZED COSTS ON EARLY REDEMPTION OF 7.25% SERIES BONDS ALLOCATED TO 5.62% SERIES.

[5] In November 2009 one investor exercised its right under a one-time put option to redeem $0.3 million of the $20 million outstanding. This one-time put option has now expired, and the remaining $19.7 million remaining principal outstanding is expected to be redeemed at maturity in November

BEFORE THE

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UG 388

NW Natural

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COST OF CAPITAL
EXHIBIT 204

December 30, 2019

Market Implied Treasury Forwards

	2019	2020				2021				2022			
Indices	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Fed Funds	1.55	1.48	1.43	1.40	1.35	1.36	1.38	1.39	1.43	1.45	1.45	1.45	1.45
3 Month LIBOR	1.86	1.76	1.67	1.66	1.60	1.59	1.59	1.62	1.71	1.74	1.74	1.71	1.70
5 Year UST Note	1.76	1.79	1.82	1.85	1.87	1.89	1.91	1.93	1.95	1.97	1.99	2.01	2.03
10 Year UST Note	1.95	1.98	2.01	2.04	2.07	2.09	2.11	2.14	2.16	2.19	2.21	2.24	2.26
30 Year UST Bond	2.42	2.44	2.45	2.46	2.47	2.48	2.49	2.50	2.51	2.52	2.53	2.54	2.55

Source: Bloomberg, as of November 12, 2019

BEFORE THE

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UG 388

NW Natural

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COST OF CAPITAL
EXHIBIT 205

December 30, 2019

ce: Company Filings, Bloomberg, and Wells Fargo Securities as of 12/5/2019
Disclaimer at bottom

High Grade Public $1,000 Par Secured Domestic 10-Year & 30-year Utility & Power Issuance - 1/1/17 - 12/5/2019

Announce Date	Issuer	Description	Ratings		Amount	Tenor	Coupon	Issue	NIC	Whisper	Guidance	Order	Times
			Moody's	S&P	($ mm)			Spread				Book	Oversubscribed
11/21/2019	Duke Energy Florida, LLC	Green First Mortgage	A1	A	$700	10.0yrs	2.500%	73.0bps	3bps	90-95	75 area	$1,500	2.1x
11/18/2019	Ameren Illinois Co.	First Mortgage	A1	A	$300	30.0yrs	3.250%	98.0bps	3bps	110-115	100 area	$750	2.5x
11/13/2019	Entergy Mississippi, LLC	First Mortgage Reopening	A2	A	$135	30.0yrs	3.850%	105.0bps	0bps	115-120	107 area	$285	2.1x
11/4/2019	Commonwealth Edison Co.	First Mortgage	A1	A	$300	30.0yrs	3.200%	97.0bps	0bps	110-115	100 area	$1,600	5.3x
10/1/2019	MidAmerican Energy Co.	Green First Mortgage Reopening	Aa2	A+	$250	10.0yrs	3.650%	75.0bps	0bps	90 area	77 area	$1,100	4.4x
10/1/2019	MidAmerican Energy Co.	Green First Mortgage	Aa2	A+	$600	30.0yrs	3.150%	107.0bps	0bps	125 area	110 area	$2,100	3.5x
9/25/2019	Duke Energy Indiana, LLC	First Mortgage	Aa3	A	$500	30.0yrs	3.250%	120.0bps	5bps	137.5 area	125 area	$1,600	3.2x
9/23/2019	Ameren Missouri	First Mortgage	A2	A	$330	30.0yrs	3.250%	112.0bps	0bps	125 area	115 area	$950	2.9x
9/16/2019	Entergy Texas, Inc.	First Mortgage	Baa1	A	$300	30.0yrs	3.550%	128.0bps	3bps	150 area	130 area	$1,550	5.2x
9/10/2019	Florida Power & Light Co.	First Mortgage	Aa2	A	$800	30.0yrs	3.150%	100.0bps	0bps	120 area	105 area	$1,950	2.4x
9/10/2019	Connecticut Light & Power Co.	First Mortgage Reopening	A1	A+	$200	8.0yrs	3.200%	73.0bps	3bps	85-90	75 area	$475	2.4x
9/9/2019	Oncor Electric Delivery Co. LLC	First Mortgage	A2	A+	$700	30.0yrs	3.100%	102.0bps	2bps	120-125	105 area	$2,600	3.7x
9/3/2019	PPL Electric Utilities Corp.	First Mortgage	A1	A	$400	30.0yrs	3.000%	115.0bps	5bps	130-135	120 area	$1,500	3.8x
9/3/2019	PECO Energy Co.	First Mortgage	Aa3	A	$325	30.0yrs	3.000%	110.0bps	1bps	130 area	115 area	$1,625	5.0x
9/3/2019	Northern States Power Co. - MN	Green First Mortgage	Aa3	A	$600	30.0yrs	2.900%	105.0bps	0bps	125 area	110 area	$2,700	4.5x
8/20/2019	Rochester Gas & Electric Co.	First Mortgage Reopening	A1	A	$150	8.0yrs	3.100%	95.0bps	5bps	110 area	100 area	$500	3.3x
8/19/2019	Puget Sound Energy, Inc.	First Mortgage	A2	A-	$450	30.0yrs	3.250%	120.0bps	10bps	135-140	125 area	$1,000	2.2x
8/19/2019	Consumers Energy Co.	First Mortgage	Aa3	A	$550	31.0yrs	3.100%	105.0bps	7bps	125-130	110 area	$1,750	3.2x
8/12/2019	Westar Energy, Inc.	First Mortgage	A2	A	$300	30.0yrs	3.250%	117.0bps	5bps	130 area	120 area	$725	2.4x
8/12/2019	Duke Energy Carolinas, LLC	First Mortgage	Aa2	A	$450	10.0yrs	2.450%	82.0bps	0bps	100 area	85 area	$1,000	2.2x
8/12/2019	Duke Energy Carolinas, LLC	First Mortgage	Aa2	A	$350	30.0yrs	3.200%	110.0bps	8bps	120-125	110#	$700	2.0x
8/8/2019	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$400	30.0yrs	3.200%	98.0bps	1bps	115 area	100 area	$1,750	4.4x
8/6/2019	Public Service Co. of Colorado	Green First Mortgage	A1	A	$550	30.0yrs	3.200%	100.0bps	2bps	110-115	105 area	$1,750	3.2x
8/1/2019	Southern California Edison Co.	First Mortgage	A3	A-	$400	10.0yrs	2.850%	95.0bps	-5bps	125 area	105.0bps	$1,700	4.3x
8/1/2019	Southern California Edison Co.	First Mortgage Reopening	A3	A-	$800	30.0yrs	4.000%	130.0bps	0bps	150 area	135.0bps	$1,800	2.3x
6/24/2019	Public Service Co. of New Hampshire	First Mortgage	A1	AA-	$300	30.0yrs	3.600%	105.0bps	3bps	125-130	110 area	$1,650	5.5x
6/11/2019	Southwestern Public Service Co.	Green First Mortgage	A3	A	$300	30.0yrs	3.750%	120.0bps	0bps	130 area	N/A	$500	1.7x
6/11/2019	**Northwest Natural Gas Co.**	**First Mortgage MTN**	**A2**	**AA-**	**$50**	**10.0yrs**	**3.141%**	**100.0bps**	**N/A**	**120 area**	**N/A**	**$125**	**2.5x**
6/11/2019	**Northwest Natural Gas Co.**	**First Mortgage MTN**	**A2**	**AA-**	**$90**	**30.0yrs**	**3.689%**	**125.0bps**	**N/A**	**150 area**	**N/A**	**$140**	**1.6x**
6/3/2019	The Dayton Power & Light Co.	First Mortgage	A3	BBB+	$425	30.0yrs	3.950%	145.0bps	7bps	155-160	150 area	$1,000	2.4x
5/30/2019	Southern California Gas Co.	First Mortgage	Aa2	A+	$350	30.0yrs	3.950%	130.0bps	15bps	135 area	N/A	$550	1.6x
5/30/2019	Entergy Mississippi, LLC	First Mortgage	A2	A	$300	30.0yrs	3.850%	127.0bps	5bps	140-145	130 area	$900	3.0x
5/28/2019	San Diego Gas & Electric Co.	First Mortgage	A2	A	$400	30.0yrs	4.100%	140.0bps	10bps	150 area	145 area	$800	2.0x
5/22/2019	Consumers Energy Co.	First Mortgage	Aa3	A	$300	31.0yrs	3.750%	100.0bps	0bps	115-120	102 area	$600	2.0x
5/20/2019	Oncor Electric Delivery Co. LLC	First Mortgage Reopening	A2	A+	$300	10.0yrs	3.700%	78.0bps	1bps	90 area	80 area	$800	2.7x
5/20/2019	Oncor Electric Delivery Co. LLC	First Mortgage	A2	A+	$500	30.0yrs	3.800%	100.0bps	2bps	115-120	105 area	$1,300	2.6x
5/6/2019	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$375	10.0yrs	3.200%	75.0bps	0bps	90-95	80 area	$1,300	3.5x
5/6/2019	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$375	30.0yrs	3.850%	95.0bps	4bps	110-115	100 area	$1,000	2.7x
3/25/2019	Connecticut Light & Power Co.	First Mortgage Reopening	A1	AA-	$300	30.0yrs	4.000%	100.0bps	5bps	120 area	105 area	$1,500	5.0x
3/18/2019	Kansas City Power & Light Co.	First Mortgage	A2	A	$400	30.0yrs	4.125%	115.0bps	0bps	135 area	120 area	$900	2.3x
3/18/2019	Louisville Gas & Electric Co.	First Mortgage	A1	A	$400	30.0yrs	4.250%	125.0bps	15bps	120-125	125#	$500	1.3x
3/18/2019	Kentucky Utilities Co.	First Mortgage Reopening	A1	A	$300	26.0yrs	4.375%	125.0bps	15bps	120-125	125#	$400	1.3x
3/13/2019	Entergy Arkansas, LLC	First Mortgage	A2	A	$350	30.0yrs	4.200%	123.0bps	5bps	135 area	125 area	$700	2.0x
3/12/2019	Southern California Edison Co.	First Mortgage	A3	A-	$500	10.0yrs	4.200%	165.0bps	0bps	200 area	170 area	$4,000	8.0x
3/12/2019	Southern California Edison Co.	First Mortgage	A3	A-	$600	30.0yrs	4.875%	190.0bps	5bps	230 area	195 area	$4,500	7.5x
3/6/2019	Entergy Louisiana, LLC	First Mortgage	A2	A	$525	31.0yrs	4.200%	117.0bps	5bps	130 area	120 area	$1,100	2.1x
3/6/2019	Public Service Co. of Colorado	First Mortgage	A1	A	$400	30.5yrs	4.050%	103.0bps	5bps	115 area	105 area	$650	1.6x
3/4/2019	Ameren Missouri	First Mortgage	A2	A	$450	10.0yrs	3.500%	78.0bps	-2bps	95-100	80 area	$1,250	2.8x
3/4/2019	Duke Energy Progress, LLC	Green First Mortgage	Aa3	A	$600	10.0yrs	3.450%	78.0bps	-2bps	95-100	80 area	$2,900	4.8x
2/25/2019	PacifiCorp	First Mortgage	A1	A+	$400	10.0yrs	3.500%	85.0bps	3bps	95-100	90 area	$1,200	3.0x
2/25/2019	PacifiCorp	First Mortgage	A1	A+	$600	31.0yrs	4.150%	115.0bps	5bps	120-125	115#	$900	1.5x
2/21/2019	Florida Power & Light Co.	First Mortgage	Aa2	A	$600	30.0yrs	3.990%	95.0bps	3bps	110 area	95-98	$1,200	2.0x
2/11/2019	Commonwealth Edison Co.	First Mortgage	A1	A-	$400	30.0yrs	4.000%	105.0bps	0bps	125 area	110 area	$1,600	4.0x
2/11/2019	DTE Electric Co.	Green First Mortgage	Aa3	A	$650	30.0yrs	3.950%	100.0bps	0bps	120 area	105 area	$2,500	3.8x
1/28/2019	Nevada Power Co.	Gen. & Ref. Mortgage	A2	A+	$500	10.0yrs	3.700%	100.0bps	5bps	115 area	105 area	$1,200	2.4x
1/10/2019	CenterPoint Energy Houston Electric, LLC	General Mortgage	A1	A	$700	30.0yrs	4.250%	122.0bps	7bps	135-140	125 area	$2,600	3.7x
1/7/2019	MidAmerican Energy Co.	Green First Mortgage	Aa2	A+	$600	10.0yrs	3.650%	97.0bps	3bps	115 area	100 area	$2,400	4.0x
1/7/2019	MidAmerican Energy Co.	Green First Mortgage	Aa2	A+	$900	30.0yrs	4.250%	130.0bps	14bps	145 area	130#	$2,900	3.2x
1/3/2019	Duke Energy Ohio, Inc.	First Mortgage	A2	A	$400	10.0yrs	3.650%	110.0bps	10bps	120-125	115 area	$1,000	2.5x
1/3/2019	Duke Energy Ohio, Inc.	First Mortgage	A2	A	$400	30.0yrs	4.300%	140.0bps	10bps	150-155	145 area	$1,200	3.0x
1/3/2019	Entergy Texas, Inc.	First Mortgage	Baa1	A	$300	10.0yrs	4.000%	145.0bps	25bps	140-145	N/Acomp	$425	1.4x
11/6/2018	Indianapolis Power & Light Co.	First Mortgage	A2	A-	$105	30.0yrs	4.875%	145.0bps	N/A	140-145	N/A	N/A	N/A
11/5/2018	Ameren Illinois Co.	First Mortgage	A1	A	$500	30.0yrs	4.500%	107.0bps	5bps	120-125	110 area	$1,350	2.7x
11/5/2018	Duke Energy Carolinas, LLC	Green First Mortgage	Aa2	A	$650	10.0yrs	3.950%	80.0bps	8bps	90-95	80#	$1,300	2.0x
10/29/2018	Southwestern Public Service Co.	First Mortgage	A3	A	$300	30.0yrs	4.400%	110.0bps	5bps	120-125	N/A	$600	2.0x
10/29/2018	Consumers Energy Co.	First Mortgage	Aa3	A	$300	10.0yrs	3.800%	73.0bps	3bps	90 area	75 area	$1,250	4.2x
10/29/2018	Consumers Energy Co.	First Mortgage	Aa3	A	$550	30.5yrs	4.350%	103.0bps	8bps	115 area	105 area	$1,600	2.9x
10/9/2018	Atlantic City Electric Co.	First Mortgage	A3	A	$350	10.0yrs	4.000%	80.0bps	0bps	95-100	85 area	$1,250	3.6x
9/19/2018	Southern California Gas Co.	First Mortgage	Aa2	A+	$550	30.5yrs	4.300%	107.0bps	5bps	120-125	110 area	$1,350	2.5x
9/5/2018	Northern States Power Co. - WI	First Mortgage	Aa3	A	$200	30.0yrs	4.200%	115.0bps	N/A	135 area	N/A	$700	3.5x
9/5/2018	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$325	10.0yrs	3.650%	75.0bps	-2bps	90-95	78 area	$1,500	4.6x
9/4/2018	PECO Energy Co.	First Mortgage Reopening	Aa3	A-	$325	30.0yrs	3.900%	105.0bps	4bps	115-120	N/A	$1,100	3.4x
8/15/2018	South Carolina Electric & Gas Co.	First Mortgage	Baa1	BBB+	$400	10.0yrs	4.250%	143.0bps	20bps	175 area	145 area	$2,000	5.0x
8/8/2018	Entergy Louisiana, LLC	Collateral Trust Mortgage	A2	A	$600	30.0yrs	4.200%	110.0bps	5bps	120 area	N/A	$1,100	1.8x
8/7/2018	Commonwealth Edison Co.	First Mortgage	A1	A-	$550	10.0yrs	3.700%	75.0bps	0bps	95 area	77 area	$1,900	3.5x
8/7/2018	Oncor Electric Delivery Co. LLC	Senior Secured	A2	A+	$350	10.0yrs	3.700%	73.0bps	-2bps	95 area	75 area	$1,300	3.7x
8/7/2018	Oncor Electric Delivery Co. LLC	Senior Secured	A2	A+	$450	30.0yrs	4.100%	98.0bps	-2bps	120 area	100 area	$1,500	3.3x
8/6/2018	Duke Energy Progress, LLC	First Mortgage	Aa3	A	$500	10.0yrs	3.700%	77.0bps	0bps	95 area	80 area	$1,200	2.4x
7/30/2018	Southern California Edison Co.	First Mortgage Reopening	Aa3	A	$550	30.0yrs	4.125%	125.0bps	5bps	140-145	130 area	$3,000	5.5x
7/10/2018	PacifiCorp	First Mortgage	A1	A+	$600	30.5yrs	4.125%	117.0bps	5bps	low 130s	120 area	$1,600	3.2x
6/18/2018	Duke Energy Florida, LLC	First Mortgage	A1	A	$600	10.0yrs	3.800%	90.0bps	10bps	100 area	95 area	$1,100	1.8x
6/18/2018	Duke Energy Florida, LLC	First Mortgage	A1	A	$400	30.0yrs	4.200%	115.0bps	10bps	125 area	120 area	$1,100	2.8x
6/14/2018	Public Service Co. of Colorado	Green First Mortgage	A1	A	$350	10.0yrs	3.700%	78.0bps	-2bps	90-95	80 area	$1,000	2.9x
6/14/2018	Public Service Co. of Colorado	Green First Mortgage	A1	A	$350	30.0yrs	4.100%	105.0bps	5bps	115-120	105$	$1,200	3.4x
6/11/2018	PPL Electric Utilities Corp.	First Mortgage	A1	A	$400	30.0yrs	4.150%	108.0bps	6bps	120-125	110 area	$1,450	3.6x
6/4/2018	Puget Sound Energy, Inc.	First Mortgage	A2	A-	$600	30.0yrs	4.223%	113.0bps	8bps	130 area	115 area	$1,700	3.4x
5/30/2018	Southern California Edison Co.	First Mortgage Reopening	Aa3	A	$350	30.0yrs	4.125%	130.0bps	15bps	140-145	130#	$1,500	4.3x
5/15/2018	Avista Corp.	First Mortgage	A2	A-	$375	30.0yrs	4.350%	115.0bps	N/A	125 area	115#	$850	2.3x
5/14/2018	San Diego Gas & Electric Co.	First Mortgage	Aa2	A+	$400	30.0yrs	4.150%	105.0bps	5bps	110 area	105#	$715	1.8x
5/14/2018	Ameren Illinois Co.	First Mortgage	A1	A	$430	10.0yrs	3.800%	82.0bps	3bps	95 area	85 area	$1,100	2.6x
5/10/2018	Southern California Gas Co.	First Mortgage	Aa2	A+	$400	30.0yrs	4.125%	100.0bps	5bps	110 area	N/A	$900	2.3x
5/8/2018	Entergy Arkansas, Inc.	First Mortgage	A2	A	$250	10.0yrs	4.000%	103.0bps	N/A	120 area	105 area	$540	2.2x
5/3/2018	Florida Power & Light Co.	First Mortgage	Aa2	A	$500	30.0yrs	4.125%	100.0bps	7bps	110 area	100#	$800	1.6x
5/2/2018	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$375	10.0yrs	3.700%	77.0bps	2bps	90-95	80 area	$1,300	3.5x
5/2/2018	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$325	30.0yrs	4.050%	95.0bps	5bps	105-110	97 area	$800	2.5x
5/1/2018	Consumers Energy Co.	First Mortgage	Aa3	A	$550	30.0yrs	4.050%	97.0bps	5bps	110 area	100 area	$925	1.9x
4/30/2018	DTE Electric Co.	Green First Mortgage	Aa3	A	$525	30.0yrs	4.050%	97.0bps	3bps	110 area	100 area	$1,050	2.0x
4/3/2018	Ameren Missouri	First Mortgage	A2	A	$425	30.0yrs	4.000%	100.0bps	2bps	115-120	105 area	$1,250	2.9x
3/19/2018	Connecticut Light & Power Co.	First Mortgage	A2	AA-	$500	30.0yrs	4.000%	93.0bps	3bps	110 area	95 area	$2,000	4.0x
3/13/2018	Idaho Power Co.	First Mortgage	A1	A-	$220	30.0yrs	4.200%	110.0bps	N/A	110 area	105-110	$315	1.4x
2/28/2018	Southern California Edison Co.	First Mortgage	Aa3	A	$400	10.0yrs	3.650%	80.0bps	15bps	80-85	80#	$600	1.5x
2/28/2018	Southern California Edison Co.	First Mortgage	Aa3	A	$400	30.0yrs	4.125%	100.0bps	15bps	100-105	100#	$575	1.4x
2/26/2018	Duke Energy Carolinas, LLC	First Mortgage	Aa2	A	$500	30.0yrs	3.950%	82.0bps	3bps	95-100	85 area	$1,100	2.2x
2/26/2018	Florida Power & Light Co.	First Mortgage	Aa2	A	$1,000	30.0yrs	3.950%	82.0bps	6bps	95-100	85 area	$2,500	2.5x
2/26/2018	CenterPoint Energy Houston Electric, LLC	General Mortgage	A1	A	$400	30.0yrs	3.950%	82.0bps	0bps	100 area	85 area	$1,800	4.5x
2/15/2018	PECO Energy Co.	First Mortgage	Aa3	A-	$325	30.0yrs	3.900%	77.0bps	-3bps	95 area	80 area	$1,500	4.6x
2/12/2018	Commonwealth Edison Co.	First Mortgage	A1	A-	$800	30.0yrs	4.000%	85.0bps	7bps	95 area	85 area	$1,850	2.3x
1/29/2018	MidAmerican Energy Co.	Green First Mortgage	Aa2	A+	$700	30.5yrs	3.650%	75.0bps	-3bps	90-95	78 area	$2,900	5.8x
12/4/2017	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$350	30.0yrs	3.600%	82.0bps	3bps	95 area	85 area	$1,450	4.1x
11/27/2017	Northern States Power Co. - WI	First Mortgage	Aa3	A	$100	30.0yrs	3.750%	100.0bps	N/A	110 area	125 area	$220	2.2x
11/16/2017	Ameren Illinois Co.	First Mortgage	A1	A	$500	30.0yrs	3.700%	93.0bps	3bps	105 area	95 area	$900	1.8x
11/14/2017	Entergy Texas, Inc.	First Mortgage	Baa1	A	$150	10.0yrs	3.450%	110.0bps	N/A	115 area	115 area	$180	1.2x
11/13/2017	Florida Power & Light Co.	First Mortgage	Aa2	A	$700	30.0yrs	3.700%	87.5bps	5bps	95-100	115 area	$1,400	2.0x
11/9/2017	Entergy Mississippi, Inc.	First Mortgage	A2	A	$150	10.0yrs	3.250%	95.0bps	N/A	100-105	105 area	$250	1.7x
11/9/2017	Duke Energy Carolinas, LLC	First Mortgage	Aa2	A	$550	30.0yrs	3.700%	90.0bps	7bps	100 area	90 area	$1,800	3.3x
9/18/2017	Oncor Electric Delivery Co. LLC	First Mortgage	A3	A	$325	30.0yrs	3.800%	100.0bps	0bps	115 area	185 area	$1,825	5.0x
9/11/2017	PECO Energy Co.	First Mortgage	Aa3	A-	$325	30.0yrs	3.700%	98.0bps	1bps	115 area	100 area	$1,250	3.8x
9/6/2017	**Northwest Natural Gas Co.**	**First Mortgage MTN**	**A1**	**AA-**	**$25**	**10.0yrs**	**2.822%**	**75.0bps**	**N/A**	**90 area**	**N/A**	**$126**	**5.0x**
9/6/2017	**Northwest Natural Gas Co.**	**First Mortgage MTN**	**A1**	**AA-**	**$75**	**30.0yrs**	**3.685%**	**95.0bps**	**N/A**	**110 area**	**95 area**	**$150**	**2.0x**
9/6/2017	Northern States Power Co. - MN	First Mortgage	Aa3	A	$600	30.0yrs	3.600%	93.0bps	4bps	105 area	90 area	$1,000	1.7x
9/5/2017	Duke Energy Progress, LLC	First Mortgage	Aa3	A	$500	30.0yrs	3.600%	92.0bps	2bps	110 area	95 area	$825	1.7x
9/5/2017	Southern California Edison Co.	First Mortgage Reopening	Aa3	A	$300	30.0yrs	4.000%	90.0bps	0bps	100 area	130 area	$700	2.3x
8/16/2017	Commonwealth Edison Co.	First Mortgage	A1	A-	$350	10.0yrs	2.950%	75.0bps	2bps	85-90	78 area	$1,300	3.7x

8/16/2017	Commonwealth Edison Co.	First Mortgage	A1	A-	$650	30.0yrs	3.750%	95.0bps	3bps	105-110	98 area	$1,500	2.3x
8/8/2017	Connecticut Light & Power Co.	First Mortgage Reopening	A2	A+	$225	30.0yrs	4.300%	85.0bps	0bps	100-105	100 area	$1,100	4.9x
8/2/2017	Southwestern Public Service Co.	First Mortgage	A2	A	$450	30.0yrs	3.700%	88.0bps	0bps	105 area	90 area	$1,900	4.2x
7/31/2017	DTE Electric Co.	First Mortgage	Aa3	A	$440	30.0yrs	3.750%	85.0bps	-1bps	105 area	87-90	$1,900	4.3x
6/12/2017	Public Service Co. of Colorado	First Mortgage	A1	A	$400	30.0yrs	3.800%	95.0bps	0bps	115 area	95-100	$1,250	3.1x
6/6/2017	Ameren Missouri	First Mortgage	A2	A	$400	10.0yrs	2.950%	85.0bps	0bps	90-95	115-120	$800	2.0x
6/5/2017	San Diego Gas & Electric Co.	First Mortgage	Aa2	A+	$400	30.0yrs	3.750%	93.0bps	0bps	115 area	95 area	$1,500	3.8x
5/17/2017	Entergy Louisiana LLC	First Mortgage	A2	A	$450	10.0yrs	3.120%	90.0bps	3bps	100 area	N/A	$1,000	2.2x
5/17/2017	Rochester Gas & Electric Corp.	First Mortgage	A1	A-	$300	10.0yrs	3.100%	90.0bps	N/A	100-105	90#	$900	3.0x
5/15/2017	Potomac Electric Power Co.	First Mortgage Reopening	A2	A	$200	30.0yrs	4.150%	100.0bps	0bps	110 area	110 area	$350	1.8x
5/9/2017	Monongahela Power Co.	First Mortgage	A3	BBB+	$250	10.0yrs	3.550%	115.0bps	N/A	135 area	120 area	$625	2.5x
5/9/2017	Entergy Arkansas, Inc.	First Mortgage Reopening	A2	A	$220	10.0yrs	3.500%	80.0bps	-1bps	95 area	85 area	$750	3.4x
5/8/2017	PPL Electric Utilities Corp.	First Mortgage	A1	A	$475	30.0yrs	3.950%	98.0bps	-4bps	115 area	100 area	$1,400	2.9x
5/2/2017	Public Service Electric & Gas Co.	First Mortgage	Aa3	A	$425	10.0yrs	3.000%	73.0bps	-2bps	85-90	75 area	$1,400	3.3x
3/22/2017	Duke Energy Ohio	First Mortgage Reopening	A2	A	$100	30.0yrs	3.700%	107.0bps	5bps	107 area	N/A	$350	3.5x
3/21/2017	Southern California Edison Co.	First Mortgage	Aa3	A	$700	30.0yrs	4.000%	95.0bps	5bps	105-110	95#	$1,400	2.0x
3/2/2017	Connecticut Light & Power Co.	First Mortgage	A2	A+	$300	10.0yrs	3.200%	75.0bps	0bps	90 area	80 area	$1,300	4.3x
2/27/2017	Westar Energy, Inc.	First Mortgage	A2	A	$300	10.0yrs	3.100%	78.0bps	-8bps	95-100	80 area	$1,335	4.5x
2/15/2017	Consumers Energy Co.	First Mortgage	A1	A	$350	30.5yrs	3.950%	87.5bps	-7.5bps	110 area	90 area	$2,500	7.1x
1/23/2017	MidAmerican Energy Co.	Green First Mortgage	Aa2	A+	$375	10.0yrs	3.100%	70.0bps	0bps	85-90	75 area	$1,400	3.7x
1/23/2017	MidAmerican Energy Co.	Green First Mortgage	Aa2	A+	$475	30.5yrs	3.950%	95.0bps	0bps	110-115	100 area	$2,100	4.4x
1/9/2017	CenterPoint Energy Houston Electric, LLC	General Mortgage	A1	A	$300	10.0yrs	3.000%	70.0bps	0bps	85 area	75 area	$525	1.8x
1/3/2017	Duke Energy Florida, LLC	First Mortgage	A1	A	$650	10.0yrs	3.200%	75.0bps	0bps	90 area	80 area	$1,925	3.0x

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Dr. Bente Villadsen

RETURN ON EQUITY
EXHIBIT 300

REDACTED VERSION

December 30, 2019

EXHIBIT 300 – DIRECT TESTIMONY – RETURN ON EQUITY

Table of Contents

I. INTRODUCTION AND PURPOSE

Q. Please state your name, occupation and business address for the record.

A. My name is Bente Villadsen and I am a Principal of The Brattle Group, whose business address is One Beacon Street, Suite 2600, Boston, Massachusetts, 02108.

Q. Briefly describe your educational and professional qualifications.

A. I have 20 years of experience working with regulated utilities on cost of capital and related matters. My practice focuses on cost of capital, regulatory finance, and accounting issues. I am the co-author of the text, "Risk and Return for Regulated Industries"[1] and a frequent speaker on regulatory finance at conferences and webinars. I have testified or filed expert reports on cost of capital in Alaska, Arizona, California, Illinois, Michigan, New Mexico, New York, Oregon,[2] and Washington, as well as before the Bonneville Power Administration, Federal Energy Regulatory Commission ("FERC"), the Surface Transportation Board, the Alberta Utilities Commission, and the Ontario Energy Board. I have provided white papers on cost of capital to the British Columbia Utilities Commission, the Canadian Transportation Agency as well as to European and Australian regulators on cost of capital. I have testified or filed testimony on regulatory accounting

[1] Bente Villadsen, Michael J. Vilbert, Dan Harris, A. Lawrence Kolbe, "Risk and Return for Regulated Industries," Academic Press, 2017.

[2] Previously I filed testimony on cost of equity before the Public Utility Commission of Oregon ("Commission") in dockets UG 344, UE 345, UE 319, UE 294, and UE 283.

issues before the FERC, the Regulatory Commission of Alaska, the Michigan Public Service Commission, and the Texas Public Utility Commission as well as in international and U.S. arbitrations and regularly provide advice to utilities on regulatory matters as well as risk management.

I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus, Denmark. *NW Natural/301, Villadsen* contains more information on my professional qualifications as well as a list of my prior testimonies and publications.

Q. What is the purpose of your testimony in this proceeding?

A. Northwest Natural Gas Company dba NW Natural ("NW Natural" or the "Company") has asked me to estimate the cost of equity that the Commission should allow NW Natural an opportunity to earn on the equity-financed portion of its regulated gas utility rate base in Oregon for the period after November 1, 2020. I also consider the relative risk of the Company and its proposed regulatory capital structure ratio to arrive at my recommendation for the allowed Return on Equity ("ROE").

II. SUMMARY OF CONCLUSIONS

Q. Do you have any preliminary comments regarding the appropriate ROE?

A. Yes. NW Natural's allowed ROE in its most recent Oregon rate case, UG 344, was determined in a settlement at 9.4 percent. Since then, interest rates have declined and economic growth has increased. At the same time, growth rates are up for the industry and the long-term development of the natural gas

distribution industry has become more uncertain as evidenced by, for example, the City of Berkeley's ban on natural gas hook-ups in new buildings.[3] Interest rates are expected to increase but at a slower pace than expected a year or two ago. However, current economic growth as well as industry growth is higher than at the time of UG 344. Consequently, there are contradicting factors regarding economic and industry conditions, so that the cost of equity might be relatively constant – in NW Natural's last case, UG 344, the Company requested an ROE of 10 percent and is this time requesting an ROE of 10 percent without flotation costs, which I find reasonable.

I provide more discussion of the current capital market conditions and their impact on the ROE for NW Natural in Oregon in Section IV.

Q. Please summarize your recommendation for NW Natural's ROE.

A. I recommend that NW Natural be allowed to earn a 10 percent rate of return on the equity portion of its regulated rate base including the requested 50 percent equity. This recommendation is based on my implementations of standard cost of capital estimation models including two versions each of the Discounted Cash Flow ("DCF") model and Capital Asset Pricing Model ("CAPM"), as well as an implied risk premium analysis, along with an analysis

[3] Ravani, Sarah, "Berkeley becomes first U.S. city to ban natural gas in new homes," *San Francisco Chronicle*, July 2019. For clarity, my recommended ROE of 10 percent in this proceeding **does not** incorporate the risks of such bans but merely points to potential future risks to the industry.

of NW Natural's risks. I recognize that the Commission in the past has de-emphasized the CAPM[4] and therefore place primary reliance on the DCF and risk premium models, while I use the CAPM to confirm the reasonableness of the results. Figure 1 below summarizes the model results using the requested 50 percent equity. The corresponding reasonable ranges that are presented are discussed in Section V below. Based on my consideration of the model results in the context of Oregon and NW Natural's specific risk, I believe it is appropriate to place NW Natural's allowed return in the upper half of the reasonable range.

Using NW Natural's requested 50 percent equity, I find a range of 9.5 to 10.5 percent rate of return on equity to be reasonable using a sample of regulated gas utilities. I further support that range with a sample of highly regulated water utilities, which confirm the reasonableness of the estimate.[5] In the current environment, where there has been considerable consolidation in the natural gas industry and considerations of switching from gas to other fuels, I find it beneficial to confirm the estimates with additional companies and a sample of highly regulated water utilities that are in my opinion the closest to a gas LDC sample. I explain that further in Section V below.

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[4] See, for example, Order No. 01-777, p. 32.

[5] The range of 9.5 to 10.5 percent is fully supported by the gas LDC sample.

Figure 1
Summary of Reasonable Ranges of Estimates at 50% Equity

	Gas Sample			Full Sample		
CAPM / ECAPM	9.25%	-	10.25%	9.50%	-	10.75%
DCF	9.50%	-	11.50%	9.25%	-	12.00%
Risk Premium	9.90%	-	10.00%	n/a	-	n/a
Average	9.54%	-	10.50%	9.50%	-	11.17%

I note that the average of the DCF methods is 10.5 percent for the Gas Sample and a bit higher for the Full Sample. The risk premium points to an ROE of about 10 percent, while the CAPM / ECAPM, which the Commission in the past has de-emphasized, supports a slightly lower range than does the DCF or risk premium.

Q. Do you have other recommendations?

A. Yes. I recommend that NW Natural be allowed to recover flotation costs associated with the Company's issuance of equity shares.[6] Specifically, I recommend that the flotation costs be recovered as an expense line in the revenue requirement.[7] I discuss this issue in Section VI.B, below.

Q. How is the remainder of your testimony organized?

A. Section III formally defines the cost of capital and explains the techniques for estimating it in the context of utility rate regulation. Section IV discusses conditions and trends in capital markets and their impact on the cost of capital. Section V explains my analyses and presents the results. Section VI

[6] See also *NW Natural/1000, Walker/15-16.*

[7] As an alternative, the cost could be recovered as an addition to the cost of equity.

discusses NW Natural's business risk characteristics, unique risks facing Oregon-based gas utilities, and other company-specific circumstances relevant to my recommended allowed ROE including flotation costs analyses. Finally, Section VII concludes with a summary of my recommendations.

III. COST OF CAPITAL PRINCIPLES AND APPROACH

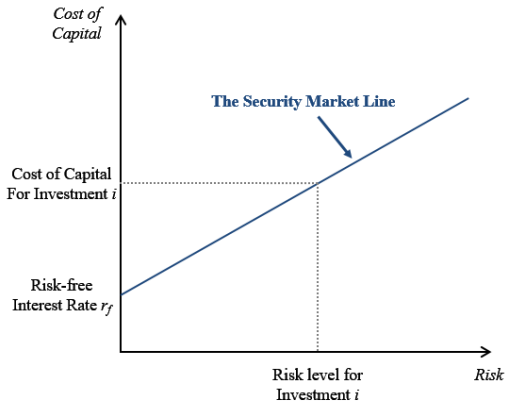
A. Risk and the Cost of Capital

Q. How is the "Cost of Capital" defined?

A. The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. Put differently, it is the rate of return investors require based on the risk-return alternatives available in competitive capital markets. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect" and "expected," as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return that can be represented by the "security market risk-return line" or "Security Market Line" for short. This line is depicted in Figure 2 below. The higher the risk, the higher the cost of capital required.

Figure 2
The Security Market Line



Q. What factors contribute to systematic risk for an equity investment?

A. When estimating the cost of equity for a given asset or business venture, two categories of risk are important. The first is business risk, which is the degree to which the cash flows generated by the business (and its assets) vary in response to moves in the broader market. In context of the CAPM, business risk can be quantified in terms of an "assets beta" or "unlevered beta." For a company with an assets beta of 1, the value of its enterprise will increase (decrease) by 1 percent for a 1 percent increase (decline) in the market index.

The second category of risk relevant for an equity investment depends on how the business enterprise is financed and is called financial risk. Section III.B below explains how financial risk affects the systematic risk of equity.

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Q. What are the guiding standards that define a just and reasonable allowed rate of return on rate-regulated utility investments?

A. The seminal guidance on this topic was provided by the U.S. Supreme Court in the *Hope* and *Bluefield* cases,[8] which found that:

- The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks;[9]
- The return should be reasonably sufficient to assure confidence in the financial soundness of the utility; and
- The return should be adequate, under efficient and economical management, for the utility to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[10]

Q. How does the standard for just and reasonable rate of return relate to the cost of capital?

A. The first component of the *Hope* and *Bluefield* standard, as articulated above, is directly aligned with the financial concept of the opportunity cost of

[8] Bluefield Water Works & Improvement Co. v. Public Service Com'n of West Virginia, 262 U.S. 679 (1923) ("Bluefield"), and Federal Power Com'n v. Hope Natural Gas Co., 320 U.S. 591 (1944) ("Hope").

[9] Hope, 320 U.S. at 603.

[10] Bluefield, 262 U.S. at 680.

capital.[11] The cost of capital is the rate of return investors can expect to earn in capital markets on alternative investments of equivalent risk.[12]

By investing in a regulated utility asset, investors are tying up some capital in that investment, thereby foregoing alternative investment opportunities. Hence, the investors are incurring an "opportunity cost" equal to the returns available on those alternative investments. The allowed return on equity needs to be at least as high as the expected return offered by alternative investments of equivalent risk or investors will choose these alternatives instead. If it is not, the utility's ability to raise capital and fund its operations will be negatively impacted. This is a fundamental concept in cost of capital proceedings for regulated utilities such as NW Natural.

Q. Please summarize how you considered risk when estimating the cost of capital.

A. To evaluate comparable business risk, I looked to a proxy group of regulated natural gas and water utilities. The natural gas and water utilities I consider have a high proportion of regulated assets and revenue with the majority having more than 80 percent of assets subject to regulation. Additionally, they all have a network of assets that are used to serve end-use customers

[11] A formal link between the opportunity cost of capital as defined by financial economics and the proper expected rate of return for utilities was developed by Stewart C. Myers, "Application of Finance Theory to Public Utility Rate Cases*," Bell Journal of Economics & Management Science* 3:58-97 (1972).

[12] The opportunity cost of capital is also referred to as simply the "cost of capital," and can be equivalently described in terms of the "required return" needed to attract investment in a particular security or other asset (i.e., the level of expected return at which investors will find that asset at least as attractive as an alternative investment).

and they are capital intensive (meaning that each dollar in revenue requires substantial investment in fixed assets). Further (as explained in Section III.B below), I analyzed and adjusted for differences in financial risk due to different levels of financial leverage among the proxy companies and between the capital structures of the proxy companies and the regulatory capital structure that will be applied to NW Natural for ratemaking purposes. To determine where in the estimated range NW Natural's ROE reasonably falls, I compared the business risk of NW Natural to that of the proxy group companies.

B. Financial Risk and the Cost of Equity

Q. How does capital structure affect the cost of equity?

A. Debtholders in a company have a fixed claim on the assets of the company and are paid prior to the company's owners (equity holders) who hold the inherently variable residual claim on the company's operating cash flows. Because equity holders only receive the profit that is left over after the fixed debt payments are made, higher degrees of debt in the capital structure amplify the variability in the expected rate of return earned by equity-holders. This phenomenon of debt resulting in financial leverage for equity holders means that, all else equal, a greater proportion of debt in the capital structure increases risk for equity holders, causing them to require a higher rate of return on their equity investment, even for an equivalent level of underlying business risk.

Q. How do differences in financial leverage affect the estimation of the cost of equity?

A. The DCF models as well as versions of the CAPM rely on market data to estimate the cost of equity for the proxy companies, so the results reflect the value of the capital that investors hold during the estimation period (market values).

The authorized ROE is applied to the regulatory equity portion of NW Natural's rate base. Because the cost of equity is measured using a group of proxy companies, it may well be the case that these companies finance their operations with a different debt and equity proportion than the proportion the Commission allows in NW Natural's rate base. Specifically, the DCF models (and the CAPM) measure the cost of equity using market data and consequently are measures of the cost of equity using the proportion of debt and equity that is inherent in that data. Therefore, I consider the impact of any difference between the financial risk inherent in those cost of equity estimates and the capital structure used to determine NW Natural's required return on equity.

Differences in financial risk due to the different degree of financial leverage in NW Natural's regulatory capital structure compared to the capital structures of the proxy companies mean that the equity betas measured for the proxy companies must be adjusted before they can be applied in

determining NW Natural's return on equity.[13] Similarly, the cost of equity measured by applying the DCF models to the proxy companies' market data requires adjustment if it is to serve as an estimate of the appropriate allowed ROE for NW Natural at the regulatory capital structure the Commission grants.

Importantly, taking differences in financial leverage into account does not change the value of the rate base. Rather, it acknowledges the fact that a higher degree of financial leverage in the regulatory capital structure imposes a higher degree of financial risk for an equity investment in NW Natural's rate base than is experienced by equity investors in the market-traded stock of the less leveraged proxy companies.

Q. How specifically do you consider financial risk in your analysis of the market data use for the proxy group companies?

A. The impact of financial risk is taken into account in an analysis of cost of equity using market-based models such as the DCF and CAPM in several manners.[14] One way is to determine the after-tax weighted-average cost of capital for the proxy group using the equity and debt percentages as the weight assigned to the cost of equity and debt. Financial theory holds that for a given level of business risk, the weighted-average cost of capital is constant

[13] This has previously been acknowledged by Commission Staff. See, for example, Opening Testimony of Matt Muldoon in Docket No. UE 319, Staff Exhibit 500, p. 15.

[14] The impact of financial leverage on the risk premium model needs to be considered separately as it uses regulatory data rather than market data, meaning that differences in regulatory capital structures are relevant for this model.

over a broad set of capital structures, i.e., the weighted-average cost of capital is the same at, for example, 55 and 45 percent equity, as the cost of equity increases as the percentage of equity decreases. I estimate the weighted cost of capital for each utility in the proxy group based on that utility's capital structure. I then evaluate the average weighted cost of capital across the proxy group. Once the weighted cost of capital is determined for the proxy group, I can then determine the cost of equity that is required at NW Natural's capital structure. This approach assumes that the after-tax weighted-average cost of capital is constant for a range that spans the capital structures used to estimate the cost of equity and the regulatory capital structure.

A second approach was developed by Professor Hamada, who estimated the cost of equity using the CAPM and made comparisons between companies with different capital structures using beta. Specifically, in the Hamada approach, I use the estimated beta to calculate what beta would be associated with a 100 percent equity financed firm to obtain a so-called all-equity or assets beta and then re-lever the beta to determine the beta associated with the regulatory capital structure. This requires an estimate of the systematic risk associated with debt (*i.e.*, the debt beta), which is usually quite small. In *NW Natural/302, Villadsen*, I set forth additional technical details regarding the methods that can be used to account for financial risk when estimating the cost of capital.

Q. Can you provide a numerical illustration of how the cost of equity changes, all else being equal, when the degree of leverage changes?

A. Yes. I constructed a simple example below, where only the leverage of a company varies. I assumed the return on equity is 11.00 percent at a 50 percent equity capital structure and determine the return on equity that would result in the same overall return if the percentage of equity in the capital structure were reduced to 45 percent.

Figure 3
Illustration of Impact of Financial Risk on ROE

		Company A (50% Equity)	Company B (45% Equity)
Rate Base	[a]	$1,000	$1,000
Equity	[b]	$500	$450
Debt	[c]	$500	$550
Total Cost of Capital (8%)	[d] = [a] × 8%	$80.0	$80.0
Cost of Debt (5%)	[e] = [c] × 5%	$25.0	$27.5
Equity Return	[f] = [d] - [e]	$55.0	$52.5
Rate of Return on Equity (ROE)	**[g] = [f] / [b]**	**11.00%**	**11.67%**

Figure 3, above, illustrates how financial risk[15] affects returns and the ROE. The overall return remains the same for Company A and B at $80. But Company B with the lower equity share and higher financial leverage must earn a higher percentage ROE in order to maintain the same overall return. This higher percentage allowed ROE represents the increased risk to equity investors caused by the higher degree of leverage.

[15] Financial risk is risk that a company has due to its capital structure; specifically the higher a company's debt, the larger the financial risk.

The principle illustrated in Figure 3 is an example of the adjustments I performed to account for differences in financial risk when conducting estimates of the cost of equity applicable to NW Natural.

Q. Does this approach apply to the risk premium analysis?

A. Yes, to the extent that there are differences between the capital structures of the companies used to determine the benchmark ROE and NW Natural, I need to consider whether I am comparing apples to apples. However, because the allowed ROE usually is applied to book value capital structures, it is the book value capital structure that is relevant for the risk premium method. Because the average book value capital structure for natural gas utilities for which I have allowed ROE data in the past has been close to that of NW Natural, I do not need to make any adjustments to the estimated ROE. I note, however that for 2019, the average and median allowed equity percentage was 51.3 percent and 52.5 percent, respectively.[16]

C. Approach to Estimating the Cost of Equity

Q. Please describe your approach for determining the cost of equity for NW Natural.

A. As stated above, the standard for establishing a fair rate of return on equity requires that a regulated utility be allowed to earn a return equivalent to what an investor could expect to earn on an alternative investment of equivalent risk. Therefore, my approach to estimating the cost of equity for NW Natural

[16] S&P Global Market Intelligence, "Rate Case History" Online version as of November 15, 2019.

focuses on measuring the expected returns required by investors to invest in companies that face business and financial risks comparable to those faced by NW Natural. Because certain models require market data, my consideration of comparable companies is restricted to those that have publicly traded stock. To this end, I have selected two proxy groups consisting of publicly traded companies. The first proxy group consists of companies providing primarily regulated natural gas distribution services and the second proxy group consists of highly regulated companies in the water utility industry.[17] I consider both the natural gas distribution sample and the full sample when deriving estimates of the representative cost of equity according to standard financial models including two versions of the DCF.

I also perform an analysis of historical allowed ROEs for gas local distribution companies ("LDCs") in relation to prevailing risk-free interest rates at the time the ROE was authorized, and use the implied allowed risk-premium relationship to estimate a utility cost of equity consistent with current economic conditions. The results of this implied risk premium analysis (sometimes referred to herein as the "Risk Premium" model) are an additional

[17] I consider both a natural gas distribution utility sample (because NW Natural is a natural gas distribution utility) and a sample including water utilities. The latter sample has the advantage of being highly regulated and, like gas distribution utilities, being engaged in distributing a commodity through an extensive network of pipes. Additionally, there is no substitute for water, while there are initiatives to substitute gas for renewable sources. As a result, the estimates from water companies are less influenced by individual state policies or changing federal policies than those of the natural gas companies – i.e., they reflect to a larger degree the fundamental risks of regulated utilities. Lastly, the number of companies in the natural gas distribution industry has been reduced due to mergers and acquisitions, so the water utility industry serves to increase the number of available, fully regulated utilities that serve customers through a network of pipes.

consideration that supports my recommendation and serves as a check on the reasonableness of my market-based results.

Q. How does your approach and the models you employ compare to what the Commission has considered in prior NW Natural proceedings?

A. The Commission has in past decisions put primary emphasis on the DCF although it has also reviewed data on CAPM-based and risk premium models.[18] Additionally, the Commission Staff has recognized the need to consider financial leverage and economic conditions,[19] and the Commission approved the resulting settlement in UG 344. Because the Commission in the past has emphasized the DCF model, I present that model first and demonstrate how my recommendation is supported by the model.

Q. Are there any potential concerns about how current capital market conditions may influence the DCF model results that may caution against giving it disproportionate weight in setting NW Natural's ROE?

A. Yes. If investors use utility stocks to flee to safety as some online investor sites suggest,[20] then the demand for such stocks increases and the price-earnings ratio will be high relative to a steady-state ratio. In such circumstances utility stocks act as a *relatively* less-risky investment vehicle for

[18] In UG 288, the Commission was presented with multiple cost of equity methods, including the CAPM. Order No. 16-076 Supplemented and Affirmed, pp. 7-10 discusses the CAPM, but does not explain the methods relied upon for the ultimate decision.

[19] Opening Testimony of Matt Muldoon in Docket No. UE 319, Staff Exhibit 500, p. 15.

[20] Richard Suttmeier, "'Flight to Safety' Into Treasuries and Utilities Continues Despite Stock Market Rebound" in Seeking Alpha, June 9, 2019. Schott Van Voorhis, "Utility and Infrastructure Closed-End Funds See Flight to Safety" in The Street, July 13, 2018.

risk-averse investors, who look for returns during a time of volatile capital markets and low government bond yields. As a result, the dividend yields are unrepresentatively low—compared to what investors might expect in a more normal interest rate environment. If this is the case, implementing the DCF model using current market data may produce results that understate what investors' required returns will be when interest rates move higher, as expected. Thus, the DCF model's results may be artificially low. Additionally, some companies distribute cash to shareholders through buybacks of shares rather than through dividends. When that is the case, the dividend yield under-estimates the cash yield shareholders get.[21]

The FERC addressed a similar issue in a recent order, where the FERC expressed its concern about the reliability of DCF model results in the current market environment as follows.

> Under [the premise of the DCF methodology], increases in a company's actual earnings or projected growth in earnings would ordinarily be required to justify an increase in the company's stock price. Moreover, there is no evidence that investments in the utility sector have become less risky during these periods. However, it appears that during the periods at issue in these complaint proceedings, average utility stock prices have increased by more than would be justified by any increase in actual utility earnings or projected growth in earnings. From October 1, 2012 through December 1, 2017, the Dow Jones Utility Average increased from about 450 to 762.59, an increase of almost 70 percent. However, utility earnings did not increase by nearly the same amount, as demonstrated in Figure 3 below, which shows the substantial increase in utilities'

[21] This is currently not a relevant consideration for any of the sample companies. Atmos and New Jersey Resources have in the past engaged in share buybacks. Henceforth, it might be a consideration in future proceedings.

> price to earnings (PE) ratio during the same period. Moreover, average IBES three to five year growth projections appear not to have increased during that period. Thus, there has not been an increase in either current or projected utility earnings that would justify the substantial increase in utility stock prices.[22]

The FERC concluded from this discussion that recent investor behavior with respect to utility stocks appears to have diverged from the DCF model's predictions, a factor that informed FERC's decision to reconsider its primary reliance on the multi-stage DCF in favor of giving equal weight to four different and complementary models. Similarly, this concern informs the way I consider the results of the DCF models as well as the consideration given to the results from the CAPM and risk premium models.

IV. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL

Q. Why do you discuss capital market conditions in testimony aimed at determining NW Natural's ROE?

A. This section discusses important market conditions that affect the inputs to the cost of equity models. DCF model inputs are affected by the developments in the economy in general as economic growth affects growth rates and utility stock prices. Consequently, the capital market developments affect the growth rates, dividend yield, and the assessment of the estimates' reasonableness.

[22] Coakley v. Bangor Hydro-Electric Co., 165 FERC ¶61,030, October 2018 ("NETO Briefing Order"), paragraph 45 (citations omitted).

Further, the risk-free rate is an input to the risk premium model and CAPM, thus recent and expected developments in risk-free government interest rates are important to assess the validity of any measure of the risk-free rate. Similarly, the Market Risk Premium ("MRP") is an input to the CAPM, so factors that affect the MRP (*e.g*., volatility and changes in investors' risk perception) are vital for an accurate determination of the ROE.

Finally, the Tax Cuts and Jobs Act of 2017 ("TCJA") affected utilities differently than other companies in that tax reductions generally flow to customers and, consequently, impact the utility's credit metrics and earnings volatility. As a result, it is necessary that the allowed ROE and appropriate equity capital structure ratio for NW Natural fulfill the requirements set forth by *Hope* and *Bluefield* once the implications of the TCJA are considered. This is particularly important as NW Natural was among those Moody's put on negative watch immediately after the TCJA was signed into law and NW Natural was downgraded on May 17, 2019.[23]

Q. Please summarize how your analysis of capital market conditions affects your conclusions.

A. First, I conclude that interest rates are unusually low and expected to increase over the next few years. This supports my reliance on forecasts of long-term U.S. Treasury yields for the risk-free rate in models that use the

[23] Moody's Investor Service, "Rating Action: Moody's downgrade Northwest Natural Gas Company to Baa1 from A3; outlook negative," May 17, 2019.

risk-free rate as an input.

Second, there are several indicators that the forward-looking estimates of the MRP are above the historical average. I base this conclusion on several observations. The forecasts from Bloomberg and the forecasts that result from using the methodology relied upon by the FERC in its recent Briefing Order regarding the New England Transmission Owners,[24] which find a MRP above the historical average. Further, the spread between utility bond yields and Treasury bonds of the same maturity is elevated by approximately 42 basis points relative to the historical spread prior to the 2008 financial crisis.

The elevation in the spread between utility bond yields and Treasury bond yields is an indication that monetary policy has put downward pressure on risk-free rates or that the MRP has increased. Under the first explanation, risk-free rates are downward biased. Alternatively, the increased yield spread is an indication that investors require a higher premium to hold assets that are not risk-free. Under that explanation, the historical MRP is downward biased relative to the current or forward-looking MRP. Consequently, I consider two scenarios in the risk premium and CAPM-based models. In Scenario I, I rely on the forecasted yield on the 10-year Treasury as of March 2019, the latest Blue Chip forecast for 2021 I have, plus 50 basis points that account for the

[24] 165 FERC ¶61,030, FERC Order Directing Briefs in Dockets EL11-66-001 etc., issued October 16, 2018 ("NETO Briefing Order").

maturity premium between a 20-year and a 10-year government bond. I combine this forecast with the historical average arithmetic MRP. In Scenario II, I use the most recent forecast on the 10-year Treasury bond from Congressional Budget Office ("CBO") plus 50 basis points to account for the maturity premium.[25] I combine this risk-free rate with a forecasted MRP of 7.91 percent, which is in between the Bloomberg forecasted rate and that obtained using the FERC methodology to determine the MRP. Alternatively, the Scenario II MRP can be viewed as accounting for the increase in yield spread as an increase in the yield spread of 25 basis points would relate to an increase in the MRP of about 1 percent as explained in *NW Natural/302, Villadsen*.

I note that the development in interest rates has been dramatic in October and November 2019 as the 10-year and 20-year yield as of October 4 reached a low of 1.5 percent and 1.8 percent, respectively, but has since recovered to 1.92 percent and 2.24 percent as of November 12, respectively. Hence, there has been non-trivial movements in interest rates in an upward direction following the Federal Reserve's most recent cut in the Federal Funds Rate on October 30, 2019. Additionally, Blue Chip Economic

[25] Blue Chip Economic Indicators, March 2019 forecast the 10-year yield at 3.1 percent in 2021, while the CBO in August 2019 forecast the year-end 2021 10-year yield at 2.7 percent; https://www.cbo.gov/about/products/budget-economic-data#4
The use of the CBO forecast is a deviation from my practice of using the most recent Blue Chip forecast, but given the decline in actual and forecast interest rates and the lack of a recent forecast for 2021 as of the date of estimation, I find the use of an alternate source justified. For the same reason, I did not add any portion of the current yield spread to the Scenario I risk-free rate.

Indicators as of October 2019 provided a forecasted 10-year yield of 2.2 percent for 2022, which is lower than their March 2019 forecast and lower than that of the CBO. At the same time, the spread between utility bond yields and yields on long-term government bonds have increased, so that there is evidence that either the government bond yield is artificially low or the premium investors require to hold securities that are not risk-free has increased. However, given that the Commission in the past has de-emphasized the CAPM model, I have not updated the results since September.

Further, I conclude that because (all else equal) the TCJA results in reduced cash flows and increased volatility of cash flows for NW Natural, it is appropriate to consider the impact on NW Natural's need for equity capital (or its ROE). As noted above, this is particularly relevant to NW Natural as Moody's earlier in 2019 downgraded Northwest Natural Gas Company.[26] Additionally, NW Natural Holdings issued common stock in June 2019.[27]

A. Interest Rate Developments

Q. What are the relevant developments regarding interest rates?

A. Interest rates, including the long-term government bond yields that are typically used to represent the risk-free rate in the context of regulated utility

[26] See footnote 23 above.

[27] NWN Press Release, "NW Natural Holdings Prices Public Offering of Common Stock," June 4, 2019.

ratemaking, have remained extremely low in the years since the global financial crisis of 2008. While current yields are very low with the 20-year government bond yield around 2¼ percent,[28] the yield is expected to increase over the next few months or years. Blue Chip Economic Indicators, Consensus Forecasts, and the CBO expect the 10-year yield to increase to 2.1 – 2.6 percent in 2022 for a 20-year government bond yield of 2.6 to 2.7 percent.[29] This is an increase of 60 to 70 basis points. The 2022 yield on long-term (e.g., 10-year) government bond is expected to increase additionally. Figure 4 below shows the development in 10-year government bond yields as well as the forecasts for 2020 through 2022. The yield on 20-year government bonds is expected to be higher by about 50 basis points.

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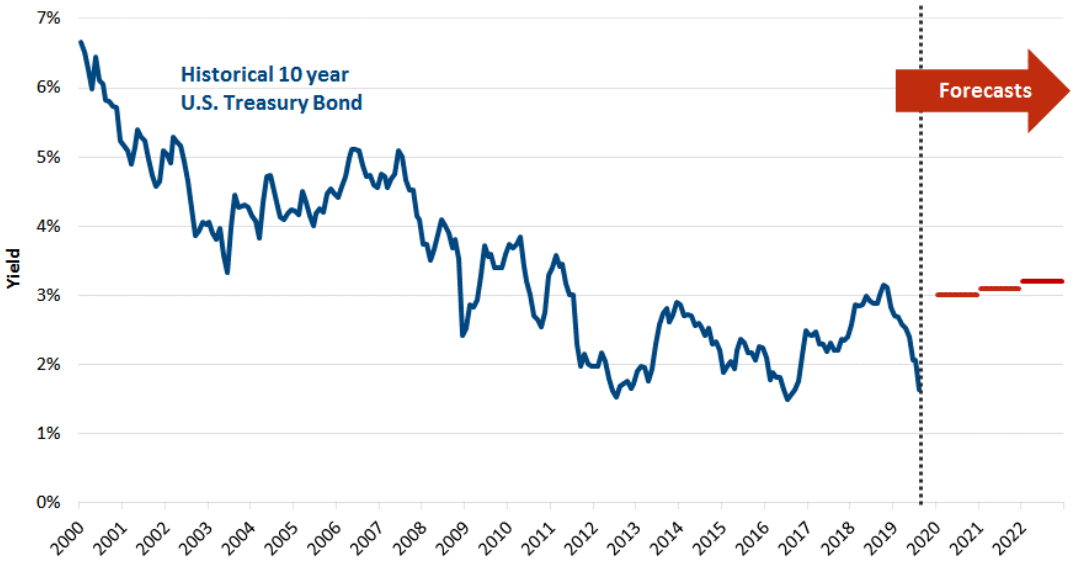
[28] As of November 8, 2019, the Federal Reserve of St. Louis reported the 20-year yield at 2.27 percent.

[29] Blue Chip Economic Indicators, August 10, 2019 expect the 10-year government bond yield at 2.1 percent; Consensus Forecast, August 12, 2019 expects the 10-year government bond yield at 2.2 percent and CBO expects the 10-year government bond yield at 2.2 – 2.3 percent in 2020. Adding 50 basis points to the 10-year estimate for the maturity premium, the 20-year government bond yield is expected to be 2.6 to 2.8 percent.

Figure 4
Historical and Projected Ten-Year Treasury Bond Yields



Source: Historical data from Bloomberg. Forecasts from Blue Chip Economic Indicators March 2019 issue.

Q. What forces contributed to the sustained period of very low interest rates over the decade following the 2008 financial crisis?

A. The monetary policy actions of the Federal Reserve (the "Fed") in response to the financial crisis were a key driver of the low interest rates. The Fed's Federal Open Market Committee ("FOMC") undertakes market actions to influence interest rates—especially the so-called "federal funds rate"[30]—subject to its statutory mandate to maximize employment and keep inflation under control. In response to the financial crisis, the FOMC drastically reduced its target federal funds rate from 5.25 percent in August 2007 to

[30] The federal funds rate is the rate at which large banks lend and borrow funds in the short-term. It is therefore influential in determining market interest rates throughout the economy.

0.00 – 0.25 percent starting in December 2008.[31] The Fed's zero interest rate policy remained in effect for the next seven years, ending in December 2015 when the FOMC finally raised its federal funds target to 0.25 - 0.50 percent.[32]

Concurrent with its sustained monetary policy actions related to the short-term federal funds rate, the Fed also implemented several unprecedented policy interventions with the explicit goal of reducing interest rates on long-term borrowing instruments. This "quantitative easing" program of long-term government bonds served to keep Treasury yields at very low levels for an extended period of time. Importantly, even after the FOMC ceased buying securities, it maintained trillions of dollars' worth of Treasuries and government-backed mortgage backed securities on its balance sheet, continuing to reinvest the principal when the assets matured.[33]

Global economic conditions also contributed to the unprecedented low rates on U.S. government debt. For example, at the height of the European sovereign debt crisis in 2011-2012, flight from European bonds and yield-lowering actions by the European Central Bank ("ECB") spurred increased demand for U.S. Treasury bonds—thus driving up prices and bringing yields

[31] See FOMC Statements issued August 7, 2007 and December 16, 2008 accessed at https://www.federalreserve.gov/monetarypolicy/fomc_historical.htm.

[32] See FOMC Statement, December 16, 2015 accessed at https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm.

[33] As of June 30, 2019, the Fed's long-term Treasury and Agency securities balance was at $3.8 trillion. See Board of Governors of the Federal Reserve System, Credit and Liquidity Programs and the Balance Sheet, accessed at https://www.federalreserve.gov/aboutthefed/files/quarterly-report-20190630.pdf.

down. This pattern repeated in 2016 in the period leading up to, and especially following, the "Brexit" vote. Indeed, on July 10, 2016, shortly after Great Britain officially voted to leave the European Union, the 10-year U.S. Treasury Yield reached its all-time low of 1.37 percent.[34] The materialization of Brexit and its consequences have yet to occur.

Q. How does current interest rates relate?

A. As shown in Figure 4 above, U.S. Treasury bond yields have recently declined. Following an upward trajectory from mid-2016 through year-end 2018, the yield on 10-year Treasury bonds (as well as that of other government bonds) started to decline, so that the current yield on the 10-year Treasury bond is below 2 percent and the yield on the 20-year Treasury bond is around 2¼ percent.

At the same time the Federal Reserve has lowered the federal funds rate three times in 2019 (year-to-date) – most recently on October 30, 2019, when the Federal Reserve lowered the target range for the funds rate to 1½ to 1¾ percent.[35] Interest rate forecasts have similarly changed throughout 2019, so that Blue Chip Economic Indicators as well as, for example, the CBO have lowered the forecasted rate relative to late 2018 and forecast a slow albeit steady increase in the risk-free rate. As a result, I am

[34] Yield from Bloomberg. See also "U.S. 10-Year Treasury Yield Closes at Record Low" (July 5, 2016) The Wall Street Journal, accessed at: https://www.wsj.com/articles/government-bond-yields-in-u-s-europe-hit-historic-lows-1467731411.

[35] Federal Reserve Press Release, "Federal Reserve Issued FOMC Statement," October 30, 2019; https://www.federalreserve.gov/newsevents/pressreleases/monetary20191030a.htm.

conservatively using a forecasted risk-free rate of 3.35 and 3.60 percent for the 20-year Treasury yield in 2021-22. The forecast of 3.35 percent is combined with a forecasted market risk premium that takes any unusual market conditions into account, whereas the 3.60 percent takes the unusual market conditions into account and is combined with a historical average market risk premium. Hence the two versions span a range of capital market conditions as explained below.

B. Risk Premiums and Yield Spreads

Q. What is the Market Risk Premium?

A. In general, a risk premium is the amount of "excess" return—above the risk-free rate of return—that investors require to compensate them for taking on risk. As illustrated above in Figure 2, the riskier the investment, the larger the risk premium investors will require.

The MRP is the risk premium associated with investing in the market as a whole. Since the so-called "market portfolio" embodies the maximum possible degree of diversification for investors,[36] the MRP is a highly relevant benchmark indicating the level of risk compensation demanded by capital market participants. It is also a direct input necessary to estimating the cost of equity using the CAPM and other risk-positioning models.

[36] In finance theory, the "market portfolio" describes a value-weighted combination of all risky investment assets (e.g., stocks, bonds, real estate) that can be purchased in markets. In practice, academics and financial analysts nearly always use a broad-based stock market index, such as the S&P 500, to represent the overall market.

Q. Do you have any data on how estimates of the MRP have evolved over the time leading up to and since the 2008 financial crisis?

A. Yes. There are several versions of a forecasted MRP including one from Bloomberg, using the method the FERC relied upon in its NETO Briefing Order, as well as a multitude of academic suggestions. I briefly discuss these methods below.

Several forecasters, including Bloomberg, publish a forward-looking estimate of the MRP. Bloomberg bases its forecast on market prices and expected dividends for U.S. stocks.[37] Figure 5 displays the development of Bloomberg's forecasted MRP since 2006.

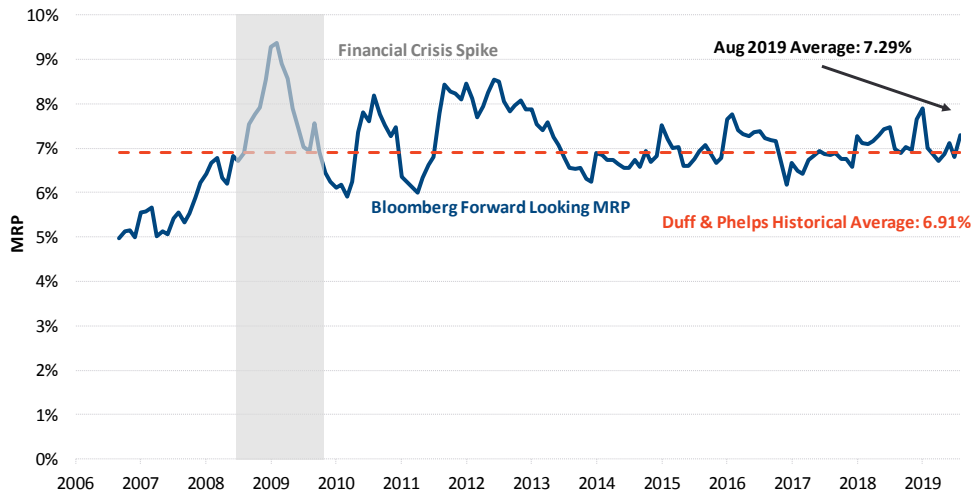
The Bloomberg MRP increased substantially with the onset of the financial crisis and has remained elevated relative to pre-crisis levels, though the August 2019 average forward-looking MRP reported by Bloomberg is in line with the long-term historical average MRP.[38] While the MRP has moderated since the financial crisis, it has been above the historical average almost every month since the financial crisis.[39]

[37] Bloomberg's calculation of the expected market return is based on an implementation of a multi-stage DCF model (see Section V.B below) applied to all dividend paying stocks in the S&P 500 index; Bloomberg calculates the MRP by subtracting the current 10-year Treasury bond yield from the estimated expected market return, however, it is also possible to calculate the MRP measured relative to a 20-year Treasury bond yield. This is the calculation I perform for ease of comparison to historical average risk premiums calculated by comparing the Ibbotson data on stock market returns in excess income returns on long-term U.S. Treasury yields with an approximate average maturity of 20 years.

[38] As noted below, the historical average MRP calculated using the long-established Ibbotson stock and bond market data currently published by Duff & Phelps is 6.91 percent.

[39] Average of Bloomberg forecasted MRP (relative to 20-year Treasury Bonds) for the U.S. from January 2009 - August 2019. Bloomberg as of August 31, 2019.

Figure 5
Bloomberg Forward looking MRP (2006-2019)



Source: Bloomberg as of 8/31/2019.

A somewhat higher result is obtained if I, instead of looking to Bloomberg, consider the MRP that results from implementing the DCF model on the S&P 500 using growth forecasts from the Institutional Brokers' Estimation System ("IBES")[40] and current dividend yields as the FERC did in its NETO Briefing Order.[41] This resulted in a forecasted MRP of 9.02 percent at the end of Q3, 2019.[42] The FERC Staff in a recent filing presented an MRP of 7.65 percent over the 30-year Treasury bond or the equivalent of approximately 7.9 to 8.15 percent over the 20-year Treasury bond although this calculation did not

[40] IBES is a database that gathers and compiles the different estimates made by stock analysts on the future earnings for the majority of U.S. publicly traded companies.

[41] See *NW Natural/303, Villadsen*, Schedule BV-17.

[42] The FERC in its NETO Briefing Order seemingly endorsed a forward-looking MRP of the type estimated here calculated as the market value weighted dividend yield plus growth rate for the S&P 500 minus the prevailing 30-year government bond yield.

follow the FERC's NETO Briefing Order.[43] Consequently, empirical evidence suggests that the forward-looking MRP is substantially higher than the historical average MRP and some regulators are considering these results.[44]

Q. Are these observations supported by academic research?

A. Yes, a study by Duarte and Rosa of the Federal Reserve of New York aggregates the results of many models of the required MRP in the U.S. and tracks them over time. The study finds a very high MRP following the financial crisis.

The analysis estimates the MRP that results from a range of models each year from 1960 through the present.[45] The analysis then reports the average as well as the first principal component of results.[46] The analysis then finds that the models used to determine the risk premium are converging to provide more comparable estimates and that the average annual estimate of the MRP was at an all-time high in 2013. These estimates show a persistent elevation of the MRP over the historical figure. Figure 6 below replicates Duarte and Rosa's summary findings.

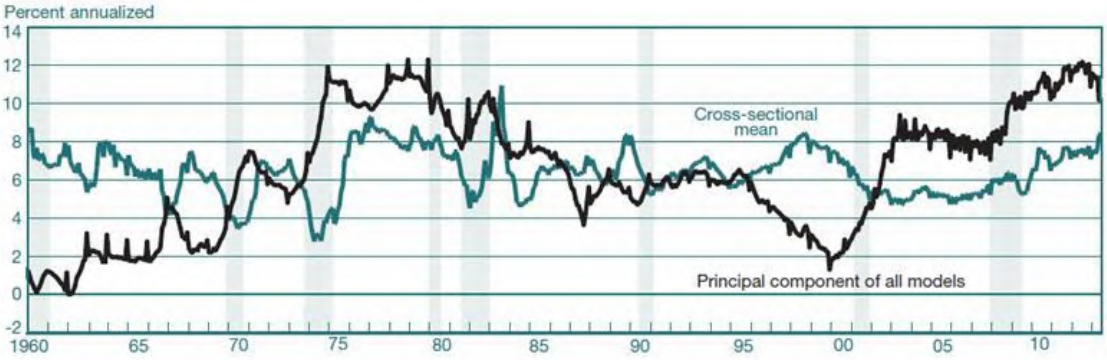
[43] Affidavit of Trial Staff Witness Robert J. Keyton in Dockets Nos. EL11-66-001 et al., January 11, 2019, p. 28. The MRP over a 20-year Treasury bond was calculated using the spread between 30-year and 20-year Treasury bond yields as of April 4, 2019 and the average since 1990, respectively.

[44] FERC has issued a Notice of Inquiry to re-examine its policies on the appropriate inputs to and approach for measuring the ROE for public utilities:
https://www.ferc.gov/media/news-releases/2019/2019-1/03-21-19-E-2.asp#.XOgrRaHsaHs.

[45] Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models," Federal Reserve Bank of New York, December 2015 (Duarte & Rosa 2015).

[46] Duarte & Rosa emphasize the "first principal component" of the 20 models. This means that the authors used statistics to compute the weighted average combination of the models that captures the most variability among the 20 models over time.

Figure 6
Duarte and Rosa's Chart 3
One-Year Ahead MRP and Cross-Sectional Mean of Models



Q. Is there any other market evidence concerning risk premiums?

A. Yes. One observable risk premium is the spread between yields on risk-free Treasury bonds and yields on corporate bonds of the same maturity. Unlike U.S. government bonds, debt instruments issued by corporate entities come with some probability of default and have some associated level of systematic risk. To compensate for this risk, corporate bonds—including utility bonds—offer higher expected returns (as measured by the market yield) than do government bonds.

Figure 7 plots the yield spread for BBB-rated utility bonds compared to Treasury bonds for the longest period of available data. As the figure shows, utility yield spreads spiked dramatically with the onset of the financial crisis and have remained elevated to their pre-crisis average level.

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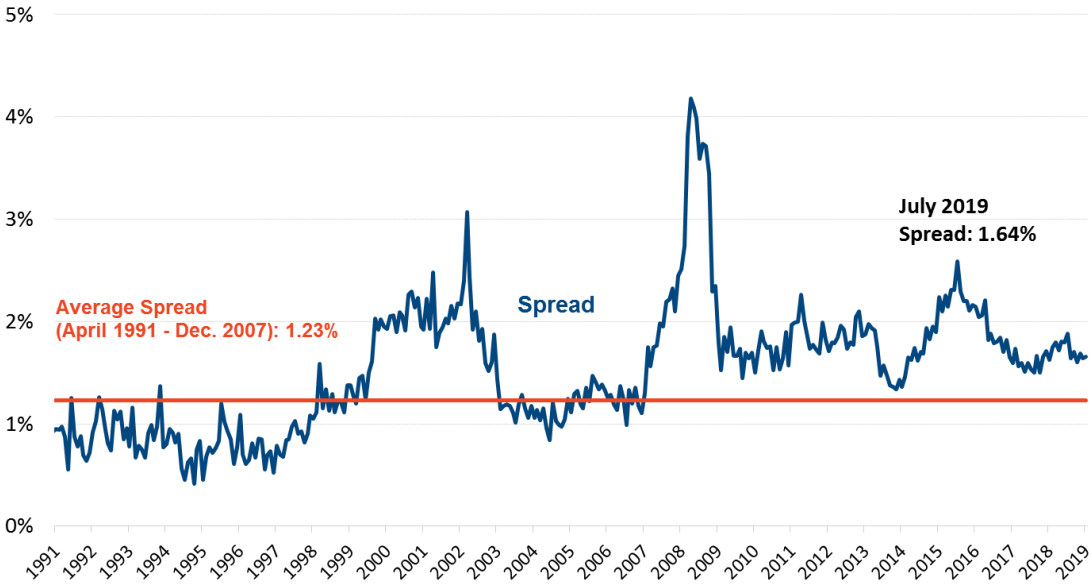
Figure 7
Spread between 20-year BBB-rated Utility Bond and 20-year Treasury Bond Yields



Source: Bloomberg as of 7/31/2019.

Q. What are the implications of elevated yield spreads to the cost of equity?

A. The yield spread is simply one form of risk premium, albeit for assets (corporate bonds) that are relatively lower risk compared to equity securities (*i.e.,* stock). Consequently, one explanation for the elevated yield spread is that investors are requiring a higher premium to take on market risk than they did on average prior to the financial crisis.[47] This would indicate an elevated MRP compared to the historical average.

An alternative explanation for the elevated yield spread is that the yield on Treasury bills remains artificially low due to the lingering after-effects of the

[47] See "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, The Journal of Finance, February 2001, pp. 247-277.

Fed's unprecedented monetary policy over the last decade. Under this explanation, the yield spread would be expected to return to its historical average level as the risk-free rate returns to more normal levels over an extended period of time. I reflect these two possibilities in my testimony by (i) combining a forecasted risk-free rate of 3.6 percent with the historical MRP (artificially low risk-free rate) and (ii) combining a forecasted risk-free rate of 3.35 percent with a forecasted MRP (investors are requiring a higher premium to invest in equities).

As discussed in *NW Natural/302, Villadsen*, an increase in yield spread indicates an increase in the risk premium investors require to hold securities that are not risk-free.

C. Market Volatility

Q. How does the stock market's volatility relate to the cost of capital?

A. Academic research has found that investors expect higher risk premiums during more volatile periods,[48] indicating that the MRP may increase when market volatility is high, even when investors' level of risk aversion remains unchanged. This is relevant to estimating the Company's cost of equity

[48] See, e.g., K. French, W. Schwert and R. Stambaugh (1987), "Expected Stock Returns and Volatility," *Journal of Financial Economics*, Vol. 19, p. 3:

> We find evidence that the expected market risk premium (the expected return on a stock portfolio minus the Treasury bill yield) is positively related to the predictable volatility of stock returns. There is also evidence that unexpected stock returns are negatively related to the unexpected change in the volatility of stock returns. This negative relation provides indirect evidence of a positive relation between expected risk premiums and volatility.

because increased volatility suggests higher risk premiums and therefore higher market-required ROE.

A measure of the market's expectations for volatility is the VIX index below in Figure 8 below, which measures the 30-day implied volatility of the S&P 500 index.[49] These indices are also referenced as the "market's fear gauge."[50] While the VIX has recently been trading below its long term historical average of approximately 19.2, it spiked substantially above that level in December 2018 and again in early August 2019, each time concurrent with a significant drop in the stock market.[51] The VIX averaged 11.1 in 2017, increased to average 16.6 in 2018, and has averaged 19.0 in August 2019 – close to its long-run average and up from the level in the last two years.

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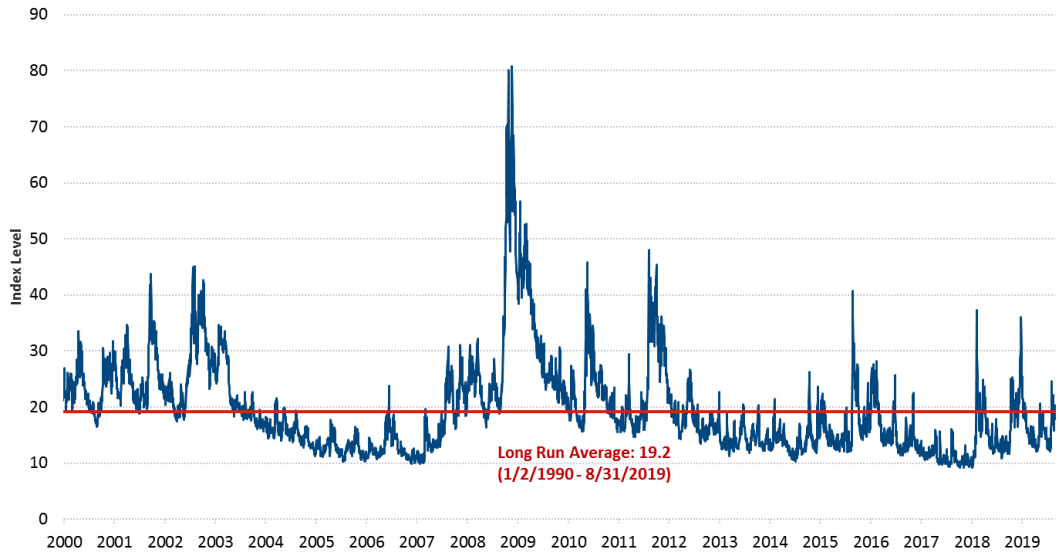
[49] *See*, *e.g.*, Chicago Board Option Exchange at http://www.cboe.com/micro/VIX/vixintro.aspx.

[50] CNBC, "VIX, the Market's Fear Gauge Plunges in Historic One-Week Move," July 5, 2016.

[51] As an illustration of the market volatility, the S&P 500 dropped more than 350 points (12 percent) during the first three weeks of December 2018.

Figure 8
VIX Index



Source: Bloomberg as of 8/31/2019

Q. Do you look at any other indexes regarding market volatility?

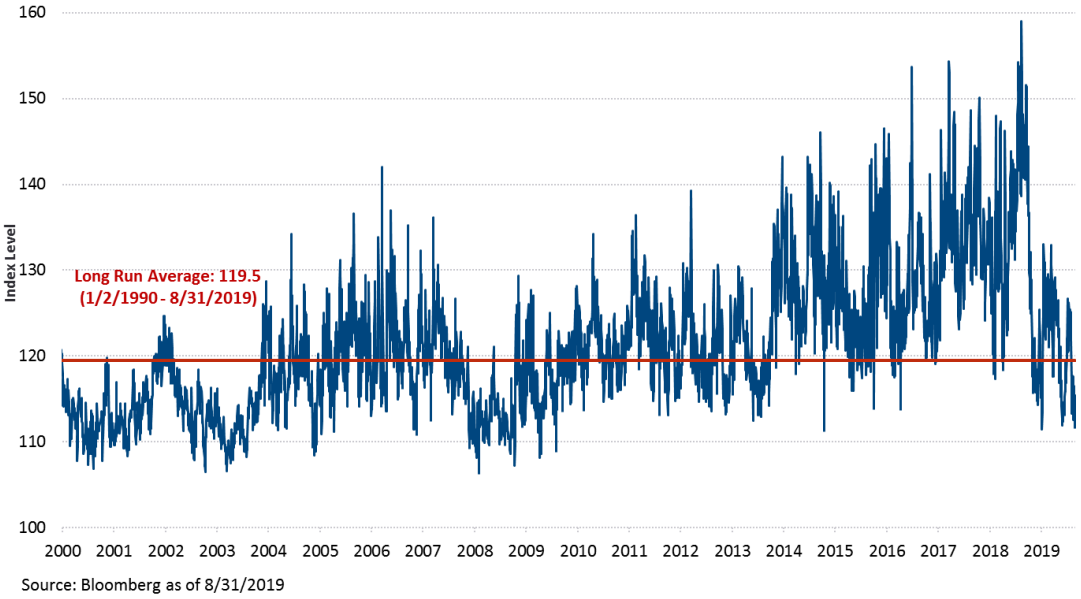
A. Yes. The SKEW index, which measures the market's willingness to pay for protection against negative "black swan" stock market events (*i.e.*, sudden substantial downturns),[52] offers a reason to be cautious of interpreting recent low VIX levels as an indicator of improved capital market certainty over the long term. A SKEW value of 100 indicates outlier returns are unlikely, but as the SKEW increases, the probability of outlier returns becomes more significant. Figure 9 shows that the SKEW currently averaged approximately 121 to-date in 2019, while the index has averaged 119.5 since January 1990. This indicates that investors are willing to pay for protection against downside

[52] See, for example, http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew.

risk and thus are exhibiting signs of elevated risk aversion concerns of downside tail risk.

The SKEW was on an upward trend until late 2018 but has since oscillated around the long-run average of about 120. The SKEW averaged 134.8 in 2017, declined slightly to 132.4 in 2018, and has been slightly above the long-run average at an average of 121.2 to-date in 2019.

Figure 9
SKEW Index



Source: Bloomberg as of 8/31/2019

Q. Are there reasons why capital markets may exhibit high volatility going forward?

A. Yes. A few contributing factors in recent capital market volatility include notably the shut-down of the federal government, challenging tariff negotiations between the U.S. and its trading partners, the uncertainty regarding Brexit, substantial uncertainty in the Middle East, and other

geopolitical events. Lastly, the slow-down in Europe and the lower-than-expected growth in the first few months of 2019 could result in market interruptions.

Q. Why are market volatility and interruptions relevant for the cost of equity?

A. All else equal, higher market volatility and market interruptions impact investor perceptions and they require a higher return to invest in securities that are not risk-free. Thus, it is important to consider whether traditional (and especially backward-looking methods) fully capture investor sentiment.

Q. Are there other developments that are relevant for the purpose of determining NW Natural's cost of equity?

A. Yes. The Tax Cuts and Jobs Act of 2017 ("TCJA") was passed in late 2017 and reduced the federal corporate marginal tax rate from 35 percent to 21 percent. Although the TCJA is likely to be a net positive for investors in unregulated companies, for the Company, the vast majority (if not all) of the benefits will flow to customers. This is because the savings in income taxes will flow through to customers in the form of lower rates.

The TCJA reduces a regulated utility's credit metrics absent an action from the utility or other changes. One way to increase the credit metrics is to increase the proportion of equity that is used to finance the company or at least not allow it to become reduced. Two important developments for the Company in 2019 are worth mentioning. Moody's downgraded NW Natural in

May, and in June NW Natural's parent company issued equity. In the light of NW Natural's need for capital investments and the TCJA impact on credit metrics, it is important to NW Natural to maintain its equity percentage and hence issue equity periodically. Such issuances benefit customers in that it maintains the credit worthiness of the Company and the cost of the equity issuances are thus incurred for the benefit of customers.

V. ESTIMATING THE COST OF EQUITY

A. Proxy Group Selection

Q. How do you identify proxy companies of comparable business risk to NW Natural?

A. NW Natural is primarily engaged in the regulated natural gas distribution business. The business risk associated with these endeavors depends on many factors, including the specific characteristics of the service territory and regulatory environment in which the provider of these services operates. Consequently, it is not possible to identify publicly traded proxy companies that replicate every aspect of NW Natural's risk profile. However, selecting companies with business operations concentrated in regulated industries or having similar lines of business and/or business environments is an appropriate starting point for selecting one or more proxy groups of comparable risk to NW Natural. As a second step, I must evaluate NW Natural or Oregon-specific risks to ensure that the Company's ROE is placed appropriately relative to the sample companies.

To this end, I have selected a sample of natural gas distribution utilities and water utilities. Jointly these companies comprise the "Full Sample." I also report results for the gas distribution utilities that are included in the Full Sample and refer to that sample as the "Gas Sample." The proxy companies are similar to NW Natural in that they are rate-regulated by state utility commissions, provide customers a product through a network of pipeline assets, and rely on substantial capital to provide service; i.e., they are capital-intensive as is NW Natural.

It is important that a proxy group used to assess the cost of equity for NW Natural (absent of any unique Oregon or Company characteristics) is regulated, because regulation tends to place substantial requirements and also protections on the companies. I also believe the physical characteristics of the industry – e.g., network, capital-intensive, serving many different customers – is a characteristic of NW Natural and of the selected natural gas distribution and water utilities. The network characteristic implies that assets cannot readily be employed in a different capacity, capital intensity affects the operating risks through the split between fixed and variable costs, and the customer composition affects the demand risk. For example, many natural gas and water utilities face declining per-customer demand due to conservation.

Q. Why are you including water utilities when evaluating the cost of capital for a natural gas distribution utility?

A. For several reasons. First, the natural gas distribution industry is expected to undergo substantial changes as customers, regulators and the legislature focus on carbon reductions. This means that initiatives in a specific state influences stock prices and analysts' evaluations along with more fundamental operating and market conditions. I therefore select a group of water utilities, where there are no carbon considerations, to assess whether the estimates from the gas LDCs are reasonable. Second, investors make comparisons across regulated companies, so it becomes important to consider whether the returns awarded NW Natural are comparable not only to other natural gas utilities but also to other similar risk benchmarks – I consider a broader sample of natural gas and water utilities a reasonable such benchmark. Third, natural gas and water utilities generally share not only regulators but also the characteristics of being (a) capital-intensive, (b) network industries, and (c) providing essential services and interfacing with the local community. As discussed below, Oregon and the City of Portland have climate policy initiatives to reduce the emission of carbon dioxide ("CO_2") and the Oregon legislature has discussed House Bill 2020 ("HB 2020"), which has not passed but is indicative of possible policies. All such initiatives will impact NW Natural. In addition, NW Natural is smaller in size as measured by revenue or equity than the comparable companies. I

therefore believe these companies provide a useful benchmark when evaluating the cost of equity for NW Natural.

Water utilities are better proxies for natural gas utilities than, for example, electric utilities for several reasons: (i) water utilities serve customers through a network of pipes similar to gas utilities, (ii) water utilities are highly regulated while some electric utilities own unregulated generation, (iii) water utilities and gas utilities are currently undertaking substantial investment in pipe replacement, and (iv) water utilities have generally had stable credit ratings similar to those of gas utilities.

I note that my recommended ROE for NW Natural is fully supported by the gas utility sample but I find the water sample provides additional confirmation on the numbers.

Q. Please summarize how you selected the members of the Full Sample and the Gas Sample.

A. To identify companies suitable for inclusion in the Full Sample, I started with the universe of publicly traded companies in the natural gas and water utility industry as identified by *Value Line Investment Analyzer* (*"Value Line")*. I started with *Value Line's* list of publicly traded companies classified as gas LDCs or water utilities. Next, I reviewed business descriptions and financial reports of these companies and eliminated companies that had less than 50 percent of their assets dedicated to regulated utility activities in their industry; e.g., natural gas or water utility services.

With this group of companies, I applied further screening criteria to eliminate companies that have had recent significant events that could affect the market data necessary to perform cost of capital estimation. Specifically, I identified companies that have cut their dividends or engaged in substantial merger and acquisition ("M&A") activities over the relevant estimation window.[53] I eliminated companies with such dividend cuts because the announcement of a cut may produce disturbances in the stock prices and growth rate expectations in addition to potentially being a signal of financial distress. I generally eliminated companies with significant M&A activities because such events typically affect a company's stock price in ways that are not representative of how investors perceive its business and financial risk characteristics. For example, a utility's stock price will commonly jump upon the announcement of an acquisition to match the acquirer's bid.

Further, I require companies have an investment grade credit rating[54] and more than $300 million in annual revenues for liquidity purposes. A final, and fundamental, requirement is that the proxy companies have the necessary data available for estimation.

[53] As described in Sections V.D, the CAPM requires five years of historical data, while the DCF relies on current market data.

[54] In some cases, a proxy company does not have a credit rating from any of the major rating agencies. However, if they were to be rated, they would receive an investment grade rating. In these instances, I assign the company the average credit rating of the rest of the proxy group.

Q. What are the characteristics of the Gas and Water Utility Proxy Group?

A. I calculate my results for both the gas proxy group and for the combined Gas and Water Utility Proxy Group. The proxy group(s) are comprised of gas and water utilities whose primary source of revenues and majority of assets are subject to regulation. The final proxy group consists of the nine gas and five water utilities listed in Figure 10 below.

All companies are engaged in the distribution of a commodity to end-use customers through a network of pipes and mains. While the product differs across gas and water utilities, they are all focused on distribution, a mix of residential, commercial and industrial customers and all are regulated. Further, the proxy group companies have credit ratings in the range of BBB to A+, which is consistent with NW Natural's credit rating albeit the average for the proxy companies is slightly higher.

Figure 10 reports the proxy companies' annual revenues for the most recent four quarters as of Q2, 2019 and also reports the market capitalization, credit rating, beta and growth rate. The annual revenue as well as the market cap was obtained from Bloomberg. The credit rating is reported by Bloomberg. The growth rate estimate is a weighted average between estimates from Thomson Reuters and *Value Line*. Betas were obtained from *Value Line*.

Figure 10
Gas and Water Proxy Group

Company	Annual Revenue (Q2 2019) ($MM)	Regulated Assets	Market Cap. (Q2 2019) ($MM)	S&P Credit Rating	Long-Term Growth Estimate	Value Line Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Atmos Energy	$2,903	M	$12,430	A	6.6%	0.60
Chesapeake Utilities	$700	R	$1,538	A-	9.3%	0.65
New Jersey Resources	$2,760	R	$4,491	A-	6.6%	0.70
NiSource Inc.	$5,237	R	$10,787	BBB+	5.6%	0.55
Northwest Natural	$727	M	$2,094	A	6.9%	0.60
ONE Gas Inc.	$1,654	R	$4,782	A	6.7%	0.65
South Jersey Inds.	$1,796	R	$3,070	BBB	13.1%	0.80
Southwest Gas	$3,001	M	$4,830	BBB+	7.3%	0.70
Spire Inc.	$1,966	R	$4,288	A-	4.4%	0.65
Amer. States Water	$462	R	$2,735	A+	9.0%	0.65
Amer. Water Works	$3,521	R	$21,123	A	7.5%	0.60
California Water	$692	R	$2,414	A+	8.4%	0.70
Middlesex Water	$136	R	$992	A	3.3%	0.70
York Water Co. (The)	$50	R	$453	A-	11.5%	0.75

Sources and Notes:
[1]: Bloomberg as of August 30, 2019.
[2]: Key R - Regulated (More than 80% of assets regulated).
M - Mostly Regulated (50%-80% of assets regulated).
D - Diversified (Less than 50% of assets regulated).
Source: Calculations based on EEI definitions and Company 10-Ks.
[3]: See Schedule No. BV-3 Panels A through I.
[4]: Bloomberg as of August 30, 2019.
[5]: See Schedule No. BV-5.

I note that I included NW Natural in the proxy group for comparability, but I ensure the Company does not unduly influence the estimated cost of equity.

Q. How do the proxy companies compare to NW Natural in terms of financial metrics?

A. NW Natural's regulated gas operations expects to generate revenues of [redacted] in 2019,[55] while NW Natural Holdings had revenue of $706 million in 2018.[56] Compared to the annual revenues of the proxy companies, NW

[55] NW Natural.

[56] NW Natural Holdings 2018 Annual Report, p. 64. NW Natural's regulated Oregon operations are a portion of NW Natural Holdings.

Natural is smaller. NW Natural's unsecured credit rating at Baa1 from Moody's is towards the lower end of the comparable companies. Lastly, as noted above, NW Natural is a regulated distribution company as is the proxy companies.

Q. What regulatory capital structure did you use for NW Natural?

A. As recommended by NW Natural witness Brody Wilson, I use a capital structure including 50 percent equity in my recommendation.

B. DCF-Based Estimates

Q. Can you describe the DCF model's approach to estimating the cost of equity?

A. The DCF model attempts to estimate the cost of capital for a given company directly, rather than based on its risk relative to the market as the CAPM does. The DCF method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow—literally a stream of expected "cash flows" discounted at a risk-appropriate discount rate. When the cash flows are dividends, that discount rate is the cost of equity capital:

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$$\boldsymbol{P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T}} \quad (1)$$

Where,

$\boldsymbol{P_0}$ is the current market price of the stock;

$\boldsymbol{D_t}$ is the dividend cash flow expected at the end of period $\boldsymbol{t}$;

$\boldsymbol{T}$ is the last period in which a dividend cash flow is to be received; and

$\boldsymbol{r}$ is the cost of equity capital.

Importantly, this formula implies that if the current market price and the pattern of expected dividends are known, it is possible to "solve for" the discount rate r that makes the equation true. In this sense, a DCF analysis can be used to estimate the cost of equity capital implied by the market price of a stock and market expectations for its future dividends.

Many DCF applications assume that the growth rate lasts into perpetuity, so the formula can be rearranged algebraically to directly estimate the cost of capital. Specifically, the implied DCF cost of equity can then be calculated using the well-known "DCF formula" for the cost of capital:

$$\boldsymbol{r = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1 + g) + g} \quad (2)$$

where $\boldsymbol{D_0}$ is the current dividend, which investors expect to increase at rate $\boldsymbol{g}$ by the end of the next period, and over all subsequent periods into perpetuity. Equation (2) says that if equation (1) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the single-stage DCF model; it is also known as

the Gordon Growth model, in honor of its originator, Professor Myron J. Gordon.

Q. Are there other versions of the DCF model?

A. Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).[57] One such alternative expands the Gordon Growth model to three stages. In the multistage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period.[58]

In my implementation of the multi-stage DCF, I assume that companies grow their dividend for five years at the forecasted company-specific rate of earnings growth, with that growth then tapering over the next five years toward the growth rate of the overall economy (*i.e*., the long-term gross domestic product (GDP) growth rate forecasted to be in effect 10 years or more into the future).

1. DCF Inputs and Results

Q. What growth rate information do you use?

A. The first step in my DCF analysis (either constant growth or multi-stage formulations) is to examine a sample of investment analysts' forecasted

[57] The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009.

[58] See *NW Natural/302, Villadsen*, Section I for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

earnings growth rates for companies in my proxy group. For the single-stage DCF and for the first stage of the multi-stage DCF, I use investment analyst forecasts of company-specific growth rates sourced from *Value Line* and Thomson Reuters *IBES*.

For the long-term growth rate for the final, constant-growth stage of the multistage DCF estimates, I use the long-term U.S. GDP growth forecast of 4.0 from Blue Chip Economic Indicators.[59] Thus, the long-run (or terminal) growth rate in the multi-stage model is nominal GDP growth.

Q. What are the pros and cons of the input data?

A. Both the Gordon Growth and single-stage DCF models require forecast growth rates that reflect investor expectations about the pattern of dividend growth for the companies over a sufficiently long horizon, but estimates are typically only available for three - five years. In the multi-stage version, I taper these growth rates toward a stable growth rate corresponding to a forecast of long-term GDP growth for all companies.

One issue with the data is that it includes solely dividend payments as cash distributions to shareholders, while some companies also use share repurchases to distribute cash to shareholders. To the extent that companies distribute cash to shareholders via share repurchases, a DCF model that uses dividends as the payment to shareholders will under-estimate the cost of equity capital.

[59] See Blue Chip Economic Indicators, March 2019, p. 14.

Q. Please summarize the DCF-based cost of equity estimates for the proxy groups.

A. The results of the DCF-based estimation for the proxy groups are displayed below in Figure 11.

Figure 11
DCF Model Results at 50% Equity

	Simple	Multi-stage
	[1]	[2]
Gas Sample	12.5%	9.0%
Water Sample	13.9%	8.4%

Q. How do you interpret the results of your DCF analyses?

A. The DCF models are estimated based on dividend yields that may be expected to increase as interest rates continue to rise in the coming months and years. As Price / Earnings ratios change with interest rates, so does the dividend yield (assuming a reasonable constant payout ratio). As a consequence, the dividend yield is more likely to be under-estimated than over-estimated going forward. At the same time, the Blue Chip forecasted GDP growth is well below the GDP growth the U.S. recently has experienced, so if the 2018 and first half of 2019 GDP growth pattern continues, the multi-stage model will incorporate a GDP growth that is too low.[60] Therefore, I

[60] Blue Chip's forecasted GDP growth was 4.0 percent at the time of estimation, while the realized nominal GDP growth for 2018 per the Bureau of Economic Analysis is 5.2 percent (real GDP of 2.9 percent plus inflation of 2.3 percent). The 2019 GDP growth to date has been approximately 4.9 percent. Source: https://www.bea.gov/system/files/2019-05/gdp1q19_2nd_0.pdf

believe the multi-stage DCF model is downward biased in that it suffers from both of these effects. As a result I acknowledge that the single-stage DCF model makes the strong assumption that current three-to-five year Earnings Per Share growth expectations will persist into perpetuity. I conclude that a reasonable low-end estimate is higher than the multi-stage DCF model's results, while the high end is lower than the single-stage DCF model's results. Looking to the gas sample, I find a range of 9.5 to 11.5 percent reasonable, while the water sample indicates a wider range of approximately 9 to 13 percent.[61]

C. Risk Premium Model Estimates

Q. Did you estimate the cost of equity that results from an analysis of risk premiums implied by allowed ROEs in past utility rate cases?

A. Yes. In this type of analysis, sometimes called the "risk premium model," the cost of equity capital for utilities is estimated based on the historical relationship between allowed ROEs in utility rate cases and the risk-free rate of interest at the time the ROEs were granted. These estimates add a "risk premium" implied by this relationship to the relevant (prevailing or forecast) risk-free interest rate:

$$Cost\ of\ Equity = r_f + Risk\ Premium \quad (3)$$

[61] 9.5 percent is equivalent to the multi-stage result plus 50 bps, while 11.5 percent is equivalent to the single-stage result minus 100 bps. The average of the DCF results is 10.75 for the gas sample, which I view as a reasonable point estimate for the DCF model.

Q. What are the merits of this approach?

A. First, it estimates the cost of equity from regulated entities as opposed to holding companies, so that the relied-upon figure is directly applicable to a rate base. Second, the allowed returns are readily observable to market participants, who will use this one data input in making investment decisions, so that the information is at the very least a good check on whether the return is comparable to that of other investments. Third, I analyze the spread between the allowed ROE at a given time and the then-prevailing interest rate to ensure that I properly consider the interest rate regime at the time the ROE was awarded. This implementation ensures that I can compare allowed ROE granted at different times and under different interest rate regimes.

Q. How did you use rate case data to estimate the risk premiums for your analysis?

A. The rate case data from 1990 through Q2 2019 is derived from Regulatory Research Associates.[62] Using this data I compared (statistically) the average allowed rate of return on equity granted by U.S. state regulatory agencies in gas distribution rate cases to the average 20-year Treasury bond yield that prevailed in each quarter.[63] I calculated the allowed utility "risk premium" in each quarter as the difference between allowed returns and the Treasury

[62] SNL Financial as of September 2019.

[63] I rely on the 20-year government bond to be consistent with the analysis using the CAPM to avoid confusion about the risk-free rate. While it is important to use a long-term risk-free rate to match the long-lived nature of the assets, the exact maturity is a matter of choice.

bond yield, since this represents the compensation for risk allowed by regulators. Then I used the statistical technique of ordinary least squares ("OLS") regression to estimate the parameters of the linear equation:

$$Risk\ Premium\ =\ A_0\ +\ A_1\ \times\ (Treasury\ Bond\ Yield) \quad (4)$$

I derived my estimates of A_0 and A_1 using standard statistical methods (OLS regression) and found that the regression has a high degree of explanatory power in a statistical sense. I report my results for the respective classifications of rate cases below in Figure 12.[64] I note that the results displayed in Figure 12 below show that the risk premium model fits the data well as the R-squared is above 80 percent and R-squared is a measure of how well the data fits the model. An R-squared above 0.8 indicates a solid result.

Figure 12
Implied Risk Premium Model Estimates

	R Squared	Estimate of A_0	Estimate of A_1	Implied Cost of Equity Range	
	[1]	[2]	[3]	[4]	[5]
Natural Gas Utility	0.853	8.40%	-0.545	9.9%	10.0%

Sources and Notes
[1]-[3]: Estimated using SNL Rate Case data as of 7/31/2019 and Bloomberg Treasury yield data as of 8/30/2019.
[4]: Risk-free Rate of 3.35% (includes utility yield spread adjustment of -0.25%).
[5]: Risk-free Rate of 3.60% (includes utility yield spread adjustment of 0.00%).

The negative slope coefficient reflects the empirical fact that regulators grant smaller risk premiums when risk-free interest rates (as measured by Treasury bond yields) are higher. This is consistent with past observations

[64] *NW Natural/303, Villadsen,* Schedule BV-16 contain my risk premium analysis.

that the premium investors require to hold equity over government bonds increases as government bond yields decline. In the regression described above the risk premium declined by less than the increase in Treasury bond yields. Therefore, the allowed ROE on average declined by less than 100 bps when the government bond yield declined by 100 bps. Based on this analysis, I find that the current market conditions are consistent with an ROE of 9.9 to 10.0 percent for natural gas distribution utilities.

Q. What conclusions did you draw from your risk premium analysis?

A. The results in Figure 12 indicate a ROE of 9.9 to 10.0 percent for an average gas distribution utility based on the risk premium model, which is consistent with the middle of my estimates. While the risk premium model based on historical allowed returns is not underpinned by fundamental finance principles in the manner of the CAPM or DCF models, I believe that this analysis, when properly designed and executed and placed in the proper context, is a valid and useful approach to estimating utility ROE. Because the risk premium analysis as implemented takes into account the interest rate prevailing during the quarter the decision that granted an ROE used in the analysis was issued, it provides a useful benchmark for the cost of equity in any interest environment. Because it relies on the returns for regulated utilities, I believe this method provides a good way to directly assess whether the ROE is commensurate with that available to alternative regulated investments of similar risk.

D. The CAPM-Based Cost of Equity Estimates

Q. Please briefly explain the CAPM.

A. CAPM assumes the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line (see Figure 2 in Section III), in which the required expected return on an asset (above the risk-free return) is proportional to that asset's relative risk as measured by that asset's beta.

More precisely, the CAPM states that the cost of capital for an investment, S (*e.g.*, a particular common stock), is determined by the risk-free rate plus the stock's systematic risk (as measured by beta) multiplied by the market risk premium. Mathematically, the relationship is given by the following equation:

$$\boldsymbol{r_s = r_f + \beta_s \times MRP} \quad (5)$$

- $\boldsymbol{r_S}$ is the cost of capital for investment S;
- $\boldsymbol{r_f}$ is the risk-free interest rate;
- $\boldsymbol{\beta_S}$ is the beta risk measure for the investment S; and
- $\boldsymbol{MRP}$ is the market equity risk premium.

The CAPM is a "risk-positioning model," which operates on the principle (corroborated by empirical data) that investors price risky securities to offer a

higher expected rate of return than safe securities. It says that an investment, whose returns do not vary relative to market returns, should receive the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 2), whereas investments of the same risk as the overall market (*i.e.*, those that by definition have average systematic market risk) are priced so as to expect to return the risk-free rate plus the MRP. Further, it says that the risk premium of a security over the risk-free rate equals the product of the beta of that security and the MRP.

1. Inputs to the CAPM

Q. What inputs does your implementation of the CAPM require?

A. As demonstrated by equation (5), estimating the cost of equity for a given company requires a measure of the risk-free rate of interest and the MRP, as well as a measure of the stock's beta. There are several choices and sources of data that inform the selection of these inputs. I discuss these issues below. (Additional technical detail, along with a discussion of the finance theory underlying the CAPM is provided in *NW Natural/302, Villadsen*.)

Q. What value did you use for the risk-free rate of interest?

A. I use the yield on a 20-year U.S. Treasury bond as the risk-free asset for purposes of my analysis. I rely on a forecast of what Treasury bond yields will be in 2021 using Blue Chip's and the CBO's forecast. Specifically, Blue Chip Economic Indicators project that the yield on a 10-year Government

Bond will be 3.1 percent by 2021[65] while the CBO forecast the yield at 2.7 percent.[66] I adjust this value upward by 50 basis points ("bps"), which is my estimate of the representative historical maturity premium for the 20-year over the 10-year Government Bond. This produces a basic risk-free rate of 3.6 percent for 2021.

I consider this a reasonable estimate as the spread between the yield on BBB-rated utility bonds and the 20-year Treasury bond is elevated by approximately 40 basis points relative to the spread's long-run average as shown in Figure 4. Thus, an adjustment for yield spread might be warranted. However, I conservatively do not add such spread.

Alternatively, the increase in yield spread can be viewed as an increase in the return investors require to hold assets that are not risk-free; i.e., an increase in the Market Risk Premium ("MRP"). I consider this possibility in a second scenario, where I (i) use forecast on the 10-year Treasury bond from CBO for 2021 and adjust that for the maturity premium between a 20-year and a 10-year Treasury bond yield for a risk-free rate of 3.35 percent.[67] In this scenario, I consider the plausible elevation in the MRP using three benchmarks: (i) I evaluate what increase in the MRP that the 42 bps increase in the yield spread indicates, (ii) look to Bloomberg's forecasted

[65] Blue Chip Economic Indicators, March 2019, p. 3.
[66] https://www.cbo.gov/about/products/budget-economic-data#4

[67] This is a deviation from my prior practices and was done to ensure I took current forecasts into account as Blue Chip had not published an update to its March 2019 forecasts at the time of estimation. I therefore used the CBO forecast.

MRPs and (iii) look to the forecasted MRP using FERC's methodology. All three considerations show an increase in the MRP over and above the historical average at between 38 basis points (Bloomberg) and over 200 basis points (FERC Method). Consequently, I consider an increase of 100 basis points in Scenario II, which is below that indicated by the increase in yield spread and the FERC methodology.

Q. What value did you use for the MRP?

A. Like the cost of capital itself, the MRP is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can expect to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable. Rather, it must be inferred or forecasted based on known market information. One commonly used method for estimating the MRP is to measure the historical average premium of market returns over the income returns on government bonds a long historical period.[68] The average market risk premium from 1926 to the present (2018) is 6.91 percent.[69] I use this value of the MRP along with a risk-free rate of 3.60 percent in one of my CAPM scenarios.

I also use a forward-looking MRP of 7.91 percent, which I use in combination with a lower risk-free rate of 3.35 percent. The 7.91 percent

[68] The longest period for which Duff & Phelps reports data is 1926 to current. Based on financial textbooks such as Ross, Westerfield and Jaffe, "*Corporate Finance*," 10th Edition, 2013, pp. 324-327, I use the longest period for which reliable estimates are available – in this case 1926 to 2018.

[69] Duff & Phelps, *Ibbotson SBBI 2019 Valuation Yearbook* 10-21.

MRP was chosen by looking to forecasted MRPs and the increase in yield spread discussed above. Specifically, Bloomberg's forward-looking market-implied MRP is currently estimated at approximately 7.29 percent (when expressed relative to 20-year bond yields) and was above the 6.91 percent long-term historical average.[70] At the same time, I recently estimated a MRP of 9.02 percent using the methodology in FERC's NETO Briefing Order.[71]

Lastly, the increase in yield spread can be used to provide a quantitative benchmark for the implied increase in MRP based on a paper by Edwin J. Elton, et al., which documents that the yield spread on corporate bonds is normally a combination of a default premium, a tax premium, and a systematic risk premium.[72] Of these components, it is the systematic risk premium that likely explains the vast majority of the yield spread increase. In other words, unless the risk-free rate is underestimated as described above, the market equity risk premium has increased relative to its "normal" level.[73]

[70] As noted earlier, the reliance on a forecasted MRP based on the methodology used in the NETO Briefing Order would result in a higher MRP of 9.02 percent as of Sept. 30, 2019, while the FERC Staff witness recommendation corresponds to an MRP of 7.9 to 8.15 percent over the 20-year Treasury Bond.

[71] See attached *NW Natural/ 303, Villadsen,* Schedule BV-17.

[72] "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, *The Journal of Finance*, February 2001, pp. 247-277.

[73] In theory, some of the increase in yield spread for A-rated debt may be due to an increase in default risk, but the increase in default risk for A-rated debt is undoubtedly very small because utilities with A-range-rated debt have a low default risk. This means that the vast majority—if not all—of the increase in A-rated yield spreads is due to a combination of the increased systematic risk premium and the downward pressure on the yields of government debt. Although there is no increase in the tax premium discussed in the Elton et al. paper due to coupon payments, there may be some increase due to a small tax effect resulting from the probability of increased capital gains taxes when the debt matures.

For example, assuming a beta of 0.25 for A-rated debt[74] means that an increase in the MRP of one percentage point translates into a ¼ percentage point increase in the risk premium on A-rated debt (i.e., 0.25 (beta) times 1 percentage point (increase in MRP) = ¼ percentage point increase in yield spread). Thus, a 25 bps increase in the yield spread is therefore consistent with a 1.0 percentage point increase in the MRP ($\frac{0.25\%}{0.25} = 1.0\%$). Thus, there is evidence that the current MRP is higher than the historical MRP of 6.91 percent.

The fact that recent forward-looking estimates of the MRP exceeded the historical average level is consistent with the broader body of evidence that risk premiums have remained elevated relative to their pre-financial crisis levels. (See Section IV above).

Therefore, I believe the 6.91 percent long-term historical average MRP value I rely on is a low-end estimate of what the market risk premium will be during the period at issue in this proceeding. I similarly believe that the 7.91 percent I rely on for my Scenario 2, a 100 basis point increase relative to the MRP in Scenario 1, is a good approximation for the forward-looking MRP.

[74] Elton, *et al*. estimates the average beta on BBB-rated corporate debt as 0.26 over the period of their study, and A-rated debt will have a slightly lower beta than BBB-rated debt. I note that 0.25 is a conservatively high estimate of the beta on A-rated utility debt. Most academic estimates, including those presented in *Berk & Demarzo* that I utilize for my Hamada adjustments are significantly lower: in the range of 0.0 – 0.1 percent and would result in a substantially higher MRP estimate.

Q. Please summarize the parameters of the scenarios and variations you considered in your CAPM and ECAPM analyses.

A. The parameters are displayed in Figure 13 below. As discussed above, I consider two scenarios; in each case, the risk-free interest rate represents Blue Chip Economic Indicators projection for the 10-year Treasury Yield to prevail in 2020, adjusted to a 20-year horizon. However, I consider that the elevated spread between the yield on A-rated utility bonds and 20-year Treasury bonds could either be reflected predominantly in the risk-free rate (Scenario 1) on in the MRP (Scenario 1). The MRP is the long-term historical arithmetic average of annual realized premiums of U.S. stock market returns over long-term (approximately 20-year maturity) Treasury bond income returns from 1926 to 2018 as reported by Duff & Phelps in Scenario 1. In Scenario 2, I look to the forecasted yield from Bloomberg, recent forecasts using FERC's recently suggested methodology, and looking to reflecting the yield spread in the MRP rather than in the risk-free rate.

Figure 13
Parameters in Risk Positioning Analyses

	Scenario 1	Scenario 2
Risk-Free Interest Rate	3.60%	3.35%
Market Risk Premium	6.91%	7.91%

Q. What betas did you use for the companies in your proxy groups?

A. I used *Value Line* betas, which are estimated using the most recent five years of weekly historical returns data.[75] The *Value Line* levered equity betas are reported in Figure 10 above. Importantly, as explained in Section V.B above, these betas—which are measured (by *Value Line*) using the market stock return data of the proxy companies—reflect the level of financial risk inherent in the proxy companies' market value leverage ratios over the estimation period. Because NW Natural's regulatory capital structure includes a substantially higher proportion of debt financing than does the market data on the proxy companies used to estimate the ROE, the financial risk associated with an equity investment in NW Natural's rate base is correspondingly greater than the financial risk borne by investors in the proxy companies' publicly traded stock.[76] Importantly, the DCF model and the CAPM-based models use market data to estimate the ROE, so that it is the market value capital structure that is the relevant comparison across companies. As the risk premium model's ROE estimates are based on book value capital structures, the relevant comparison is across book value capital structures for that model.

Consequently, standard textbook techniques are applied to unlever the *Value Line* betas reported in Figure 10 above and relever the resulting asset

[75] See *Value Line* Glossary, accessible at http://www.valueline.com/Glossary/Glossary.aspx.

[76] A further detailed discussion is contained in *NW Natural/302, Villadsen,* Section III.

betas at NW Natural's regulatory capital structure. See *NW Natural/303, Villadsen, Schedule BV-15*.[77]

2. The Empirical CAPM

Q. What other equity risk premium model do you use?

A. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted.[78] A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

The second variation on the CAPM that I employ makes use of these empirical findings. It estimates the cost of capital with the equation,

$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \qquad (6)$$

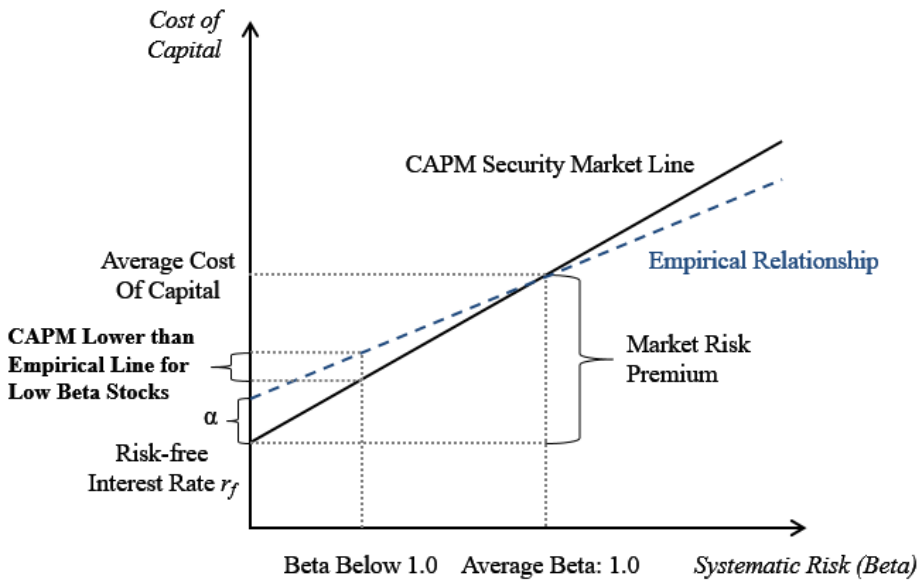
where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see equation (6) above).

[77] The Technical Appendix (*NW Natural/302, Villadsen*) to this testimony provides a detailed description of the standard textbook formulas used to implement the "Hamada" technique for unlevering measured equity betas based on the proxy companies' capital structures to calculate "asset betas" that measure the proxy companies' business risk independent of the financial risk impact of differing capital structures. The proxy group average asset betas are then relevered at the target capital structure (i.e., NW Natural's regulatory capital structure), with the precise relevered beta depending on the specific version of the unlevering/relevering formula employed.

[78] See Figure A-2 in *NW Natural/302, Villadsen* for references to relevant academic articles.

I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line in Figure 2, which results in a Security Market Line that more closely matches the results of empirical tests. This adjustment is portrayed in Figure 14 below. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Figure 14
The Empirical Security Market Line



Q. Why do you use the ECAPM?

A. Academic research finds that the CAPM has not generally performed well as an empirical model. One of its short-comings is directly addressed by the ECAPM, which recognizes the consistent empirical observation that the CAPM underestimates the cost of capital for low beta stocks. In other words,

the ECAPM is based on recognizing that the actual observed risk-return line is flatter and has a higher intercept than that predicted by the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact, which has been established by repeated empirical tests of the CAPM. In summary, these studies estimate alpha parameters that range between 1 percent[79] and 7.32 percent.[80] I apply an alpha parameter of 1.5 percent in my application of the ECAPM. *NW Natural/302, Villadsen, Section II.C* provides further discussion of the empirical findings that have tested the CAPM and also provides documentation for the magnitude of the adjustment, α.

3. Results from the CAPM-Based Models

Q. Please summarize the results of the CAPM-based models.

A. The results of CAPM and ECAPM estimation for the two proxy groups are presented in Figure 15 below. The ranges of results for each model (CAPM and ECAPM) reflect the application of different specific versions of the textbook formulas used to account for the impact of different financial leverage on financial risk.

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[79] Black, Fischer. Beta and Return. *The Journal of Portfolio Management* 20 (Fall): 8-18.

[80] Fama, Eugene F. and Kenneth R. French. 1992. The Cross-Section of Expected Stock Returns. *Journal of Finance* 47 (June): 427-465.

Figure 15
CAPM / ECAPM Summary at 50% Equity

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Gas Sample		
Financial Risk Adjusted Method		
CAPM	10.0%	10.5%
ECAPM (α = 1.5%)	10.6%	11.2%
Hamada Adjustment Without Taxes		
CAPM	9.5%	10.1%
ECAPM (α = 1.5%)	9.7%	10.3%
Hamada Adjustment With Taxes		
CAPM	9.2%	9.8%
ECAPM (α = 1.5%)	9.5%	10.0%
Water Sample		
Financial Risk Adjusted Method		
CAPM	11.1%	11.7%
ECAPM (α = 1.5%)	11.8%	12.4%
Hamada Adjustment Without Taxes		
CAPM	10.3%	11.0%
ECAPM (α = 1.5%)	10.4%	11.1%
Hamada Adjustment With Taxes		
CAPM	9.9%	10.5%
ECAPM (α = 1.5%)	10.0%	10.7%

Sources and Notes:
[1]: Long-Term Risk Free Rate of 3.60%, Long-Term Market Risk Premium of 6.91%.
[2]: Long-Term Risk Free Rate of 3.35%, Long-Term Market Risk Premium of 7.91%.

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Q. How do you interpret the results of your CAPM and ECAPM Analyses?

A. Looking to Figure 15 above, the results range from 9.2 percent to 12.4 percent with a majority of the results in the range of 9.5 to 10.75 percent.[81] As discussed above, the established academic evidence indicates that the traditional CAPM tends to understate the cost of equity for lower-than-average risk companies such as those in Figure 10 above, so the ECAPM may be more applicable. In recognition of the Commission Staff's reliance on the Hamada methodology,[82] I emphasize the Hamada methodology over the financial risk adjustment and consider a range of 9.25 to 10.25 percent representative for the Gas Sample, while the Water Sample indicates those figures are on the low side.

Q. Please summarize your results before considering where to place NW Natural.

A. Figure 16 below summarizes the reasonable ranges of results I obtained above with the risk premium results focused on natural gas distribution and water utilities and the CAPM results based on the Hamada as opposed to the financial risk adjusted methods.

[81] I round to the nearest 0.25 percent when determining ranges of reasonable results. Clearly, there are numbers below 9 percent and numbers above 10.5 percent in Figure 15, but if rounding to the nearest .25 percent, I have a small number of observations above and below the range. I round to the nearest 25 basis points because the cost of capital cannot, in my opinion, be determined with greater precision.

[82] See, for example, Opening Testimony by Matt Muldoon in Case UE 294, Staff 200, p.15.

Figure 16
Summary of Reasonable Ranges

	Gas Sample			Full Sample		
CAPM / ECAPM	9.25%	-	10.25%	9.50%	-	10.75%
DCF	9.50%	-	11.50%	9.25%	-	12.00%
Risk Premium	9.90%	-	10.00%	n/a	-	n/a
Average	9.54%	-	10.50%	9.50%	-	11.17%

VI. NW NATURAL SPECIFIC CIRCUMSTANCES

A. Business Risk Characteristics

Q. Are there any differences in the regulatory environment in which the comparable companies and NW Natural operates?

A. Like many of the sample companies, NW Natural benefits from certain regulatory policies that reduce regulatory lag, including a forward test year for rate cases, and an annual recovery mechanism for expenses such as gas costs.[83] NW Natural also has a partial decoupling mechanism and a mechanism to adjust rates due to weather related usage in the winter months for full decoupling once the WARM program is considered. However, the WARM has an opt-out provision, by which approximately 10 percent of residential and small commercial customers opt out. However, these mechanisms are similar to those of the majority of the sample companies. According to Regulatory Research Associates ("RRA") only 11 states do not

[83] S&P Global Market Intelligence, "RRA Regulatory Focus: Adjustment Clauses – A state-by-state overview," September 2018.

have a decoupling mechanism in place for gas utilities.[84] RRA also reports some fuel adjustment mechanisms for all gas utilities they follow.

Q. How does the business risk of NW Natural compare to that of the sample?

A. Like the sample companies, NW Natural's business is concentrated in the regulated gas distribution industry. It also has a credit rating that is comparable to that of the sample but is one of the few utilities that have been downgraded over the past year. Regulatory policy plays a role in the business risk of the Company. In the current environment of declining energy demand and an emphasis on decreasing carbon emissions, there is some uncertainty about NW Natural's future demand. Both the State of Oregon and the City of Portland have initiatives to reduce CO2 emissions significantly. Because burning natural gas releases CO2 into the atmosphere, these initiatives create stranded cost risks for NW Natural. Oregon is a founding member of the Pacific Coast Collaborative, which calls for reducing emission levels to two tons per capita by 2050. To this end, Oregon has committed to expand on existing programs to establish a price on CO2 emissions[85] and to reduce its greenhouse gas emissions by 10 percent in 2020 and by 75

[84] *Ibid.* Some states do not have gas utilities and others are not listed by Regulatory Research Associates.

[85] Pacific Coast Action Plan on Climate and Energy, October 28, 2013 and Pacific Coast Climate Leadership Action Plan, June 1, 2016.

percent in 2050 (relative to 1990 levels).[86] Similarly, the City of Portland has committed to reducing CO2 emissions by 40 percent in 2030 and by 80 percent in 2050 (relative to 1990 levels).[87]

In addition to these initiatives, the State of Oregon has a history of pursuing policies to reduce CO2 emissions. In 2010, Oregon's Environmental Quality Commission negotiated a settlement with Portland General Electric (PGE) to close the state's sole coal-fired power plant in 2020, rather than continuing its operations through 2040.[88] The state recently passed an aggressive renewable portfolio standard (RPS) requiring utilities to obtain 50 percent of their energy from renewable sources by 2040. The bill also directs the Commission to exclude all costs related to coal generation from rates after 2035.[89] More recently, HB 2020 proposed to substantially reduce carbon emissions in Oregon.[90] While the bill did not pass, it may be reintroduced in future legislative sessions and is indicative of the legislation that may substantially impact NW Natural's demand and financials going forward.

[86] http://www.keeporegoncool.org/content/roadmap-2020.

[87] Climate Action Plan Summary, June 2015, p. 12.

[88] Learn, Scott. "PGE's coal-fired Boardman plant gets approval to close in 2020, with fewer pollution controls." *The Oregonian* 9 December 2010.

[89] Stanfield, Jeff. "Ore. Legislature passes coal phase-out bill that doubles RPS to 50%." *S&P Global* 3 March 2016.

[90] Oregon Legislative Assembly – 2019 Regular Session, "B-Engrossed House Bill 2020," Ordered by the House June 12, Including House Amendments dates May 21 and June 12.

State actions to date have focused on reducing coal usage and increasing renewable resource generation, but the policy focus will likely shift towards reducing reliance on natural gas. As an example, Portland recently announced plans to use renewable resources for 100 percent of the city's energy needs. Additionally, the city opposes plans by PGE to develop new gas-fired electric generation facilities.[91] Initiatives, such as these designed to decrease demand for natural gas, create stranded cost risks for NW Natural.

Outside Oregon, the City of Berkeley's ban on natural gas hook-ups in new buildings[92] and regulations pertaining to new housing's ability to use renewable resources are being introduced. For example, California has a requirement that all new homes have solar panels by 2020, while other states are considering similar regulations.[93] At the same time, there are substantial efforts to increase non-carbon heating through, for example, incentives for heat pump installations, which will reduce the amount of gas (and/or oil) used for heating.[94] If any of the risks discussed above were to materialize or be at high risk of materializing, NW Natural's risk would increase substantially. This risk is not included in my current recommendation.

[91] Hering, Garrett. "All-renewable Portland, Ore., 'not just a pipe dream'" S&P Global 12 April 2017.

[92] Ravani, Sarah, "Berkeley becomes first U.S. city to ban natural gas in new homes," *San Francisco Chronicle*, July 2019. For clarity, my recommended ROE of 10 percent in this proceeding **does not** incorporate the risks of such bans but merely points to potential future risks to the industry.

[93] Los Angeles Times, "Starting in 2020, all new homes in California must come with solar panels" by Jack Flemming, Dec, 14, 2018.

[94] For example, EfficiencyMaint (https://www.efficiencymaine.com/at-home/ductless-heat-pumps/) offers residential customers rebates for installing heat pumps.

Q. What is NW Natural's size relative to the sample companies?

A. The majority of the publicly traded gas LDCs in the U.S., as well as the companies I select for my full sample, are larger than NW Natural. For example, the average market capitalization of both the Gas and the Full Sample (including NW Natural) is $5.4 billion. That is twice NW Natural's market capitalization of $2.1 billion.[95] If I were to consider only NW Natural's Oregon-regulated portion the difference would be even larger.

Q. Why does the size of NW Natural matter?

A. Empirically, investors have required a higher premium to invest in smaller companies than in larger ones. For example, Duff & Phelps data indicate that NW Natural's market capitalization puts it in the 3rd size decile, while the average company in the sample falls in the 2nd size decile. Companies in the 3rd size decile on average have a return on equity evidence suggests that investors in smaller companies require a higher return than do investors in larger companies. The majority of the sample companies are materially larger than NW Natural. Empirical evidence suggests that investors in NW Natural may require a premium over and above that required for larger companies. Consequently, NW Natural requires a cost of equity higher than the average of that for the sample companies all else equal.

[95] See Figure 10 in Section V for details.

Q. Can you please summarize your assessment of NW Natural's business risk relative to the sample?

A. Relative to the gas sample, NW Natural is smaller and faces pressure from legislative initiatives to reduce carbon. While the impact of carbon reduction on NW Natural's risk profile could be substantial, I have not taken these aspects into account in my ROE recommendation. I simply note that these are factors that need to be monitored closely as the impact could be substantial in future years. My recommendation does not account for such risks. At the same time, NW Natural has, like most gas utilities, a gas cost adjustment mechanism and a decoupling mechanism. Consequently, from a business risk perspective, NW Natural is at least as risky as the sample.

B. Flotation Costs

Q. What are flotation costs and why is it relevant for NW Natural?

A. Flotation costs are the costs a company incurs to issue new stock. [redacted], the expectation is that NW Natural will incur flotation costs.[96]

Q. Why do companies such as NW Natural incur flotation costs?

A. The issuance of equity, just like the issuance of debt, is not free. Just as companies incur issuance costs and possibly a premium or discount for debt, which is commonly recovered in rates, so should the costs of issuing equity be recovered. The proceeds from equity issuances are, just like the proceeds

[96] *NW Natural/1000, Walker/15-16 (Confidential).*

from issuing debt, used to finance the rate base of the utility and hence necessary to finance the utility. That means that the costs are a simple part of running the business and therefore should be recovered in rates.

Q. How should flotation costs be recovered?

A. I recommend that flotation costs be treated similar to any other cost of running the business and therefore be recovered in rates over an appropriate period of time. As NW Natural does not issue equity each and every year, I recommend NW Natural be allowed to recover the cost of issuing equity similarly to the cost of issuing debt and a three-year horizon is reasonable. A simple amortization that allocates the amount equally over the 2019 through 2021 period is reasonable.

In the alternative, some jurisdictions allow for the recovery of flotation costs in the allowed ROE - thus, they increase the allowed ROE by an amount that ensures the recovery of flotation costs. The magnitude of the increase in the ROE can be determined using a variation of the DCF model. Specifically, the DCF model in equation (2) above can be modified to take into account the percentage of total proceeds that were used to cover flotation costs. Specifically, instead of the standard DCF model in equation (2) above, the following formula is used

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

where f is the percentage of proceeds lost to underwriting fees or other flotation costs. This formula recognizes that if shares trade at (for example)

$100, but 7.5 percent of the proceeds of the initial issuance of those shares was spent on underwriting fees, only $\$100 \times (1 - 0.075) = \$92.5$ represents value invested in cash-flow generating assets. Therefore, it is relative to this "adjusted" price—not the nominal market price—that investors' required return should be measured.

Comparing the flotation cost-adjusted formula to the standard DCF formula for values of the dividend yield, growth rate, and financial leverage that are representative of the natural gas utility sample (see Figure 17 below). I find that approximately 27 basis points is an appropriate ROE adjustment to allow recovery of flotation costs, when issuance costs amount to 7.5 percent of the total issuance. The impact of flotation costs is the difference between the calculated ROE with flotation costs and without flotation costs. I note that in the table below, I use the average growth rate for the gas sample as representative.

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Figure 17
Representative Flotation Cost Adjustment

		Without Flotation Cost Adjustment	With Flotation Cost Adjustment
Flotation cost share of issuance proceeds	[a]		7.50%
Dividend Yield (D1/P0)	[b]	2.38%	2.57%
Growth Rate	[c]	7.59%	7.59%
Simple DCF Cost of Equity	[d]	9.96%	10.16%
Equity to Market Value Ratio	[e]	0.709	0.709
Debt to Market Value Ratio	[f]	0.291	0.291
Implied Marginal Cost of Debt	[g]	3.3%	3.3%
Tax Rate	[h]	27%	27%
Simple DCF Overall Cost of Capital	[i]	7.76%	7.90%
Northwest Natural's Regulatory Equity %	[j]	0.500	0.500
Northwest Natural's Regulatory Debt %	[k]	0.500	0.500
Northwest Natural's Implied Marginal Cost of Debt	[l]	3.2%	3.2%
Implied Cost of Equity	[m]	13.20%	13.47%

VII. COST OF CAPITAL RECOMMENDATION

Q. Please summarize your conclusions regarding NW Natural's risk and the necessary return.

A. I find NW Natural to have higher risk than the average sample company and merits placement in the upper end of the reasonable range that I summarized in Figure 16 above. I therefore recommend that NW Natural be placed at the upper end of the reasonable range.

Q. What do you recommend for NW Natural's cost of equity in this proceeding?

A. The DCF methods show a reasonable range of 9.5 to 11.5 percent, while other models shows a range of 9.25 to 10.25. Consequently, I find a range of approximately 9.5 to 10.5 percent to be the reasonable range for NW Natural and recommend that NW Natural be placed at the median or above. Specifically, I fully endorse NW Natural's request for an ROE of 10 percent, which is fully supported by my gas LDC sample and validated by the water sample. I also recommend that NW Natural be allowed to recover flotation costs as an expense item in its revenue requirement.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Dr. Bente Villadsen

RETURN ON EQUITY
EXHIBITS 301-303

December 30, 2019

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EXHIBIT NW NATURAL 301:

RESUME OF DR. BENTE VILLADSEN

Dr. Bente Villadsen's work concentrates in the areas of regulatory finance and accounting. Her recent work has focused on accounting issues, damages, cost of capital and regulatory finance. Dr. Villadsen has testified on cost of capital and accounting, analyzed credit issues in the utility industry, risk management practices as well the impact of regulatory initiatives such as energy efficiency and de-coupling on cost of capital and earnings. Among her recent advisory work is the review of regulatory practices regarding the return on equity, capital structure, recovery of costs and capital expenditures as well as the precedence for regulatory approval in mergers or acquisitions. Dr. Villadsen's accounting work has pertained to disclosure issues and principles including impairment testing, fair value accounting, leases, accounting for hybrid securities, accounting for equity investments, cash flow estimation as well as overhead allocation. Dr. Villadsen has estimated damages in the U.S. as well as internationally for companies in the construction, telecommunications, energy, cement, and rail road industry. She has filed testimony and testified in federal and state court, in international and U.S. arbitrations and before state and federal regulatory commissions on accounting issues, damages, discount rates and cost of capital for regulated entities.

Dr. Villadsen holds a Ph.D. from Yale University's School of Management with a concentration in accounting. She has a joint degree in mathematics and economics (BS and MS) from University of Aarhus in Denmark. Prior to joining The Brattle Group, Dr. Villadsen was a faculty member at Washington University in St. Louis, University of Michigan, and University of Iowa.

She has taught financial and managerial accounting as well as econometrics, quantitative methods, and economics of information to undergraduate or graduate students. Dr. Villadsen serves as the president of the Society of Utility Regulatory Financial Analysts for 2016-2018.

AREAS OF EXPERTISE

- Regulatory Finance
  - Cost of Capital
  - Cost of Service (including prudence)
  - Energy Efficiency, De-coupling and the Impact on Utilities Financials
  - Relationship between regulation and credit worthiness
  - Risk Management
  - Regulatory Advisory in Mergers & Acquisitions
- Accounting and Corporate Finance
  - Application of Accounting Standards
  - Disclosure Issues
  - Credit Issues in the Utility Industry
- Damages and Valuation (incl. international arbitration)
  - Utility valuation
  - Lost Profit for construction, oil&gas, utilities

- Valuation of construction contract
- Damages from the choice of inaccurate accounting methdology

EXPERIENCE

Regulatory Finance

- Dr. Villadsen has testified on cost of capital and capital structure for many regulated entities including electric and gas utilities, pipelines, railroads, water utilities and barges in many jurisdictions including at the FERC, the Surface Transportation Board, the states of Alaska, Arizona, California, Hawaii, Illinois, Michigan, New Mexico, New York, Oregon, and Washington as well as in the provinces of Alberta and Ontario.
- On behalf of the Association of American Railroads, Dr. Villadsen appeared as an expert before the Surface Transportation Board (STB) and submitted expert reports on the determination of the cost of equity for U.S. freight railroads. The STB agreed to continue to use two estimation methods with the parameters suggested.
- For several electric, gas and transmission utilities as well as pipelines in Alberta, Canada, Dr. Villadsen filed evidence and appeared as an expert on the cost of equity and appropriate capital structure for 2015-17. Her evidence was heard by the Alberta Utilities Commission.
- Dr. Villadsen has estimated the cost of capital and recommended an appropriate capital structure for natural gas and liquids pipelines in Canada, Mexico, and the US. using the jurisdictions' preferred estimation technique as well as other standard techniques. This work has been used in negotiations with shippers as well as before regulators.
- For the Ontario Energy Board Staff, Dr. Villadsen submitted evidence on the appropriate capital structure for a power generator that is engaged in a nuclear refurbishment program.
- She has estimated the cost of equity on behalf of Anchorage Municipal Light and Power, Arizona Public Service, Portland General Electric, Anchorage Water and Wastewater, American Water, California Water, and EPCOR in state regulatory proceedings. She has also submitted testimony before the Bonneville Power Authority. Much of her testimony involves not only cost of capital estimation but also capital structure, the impact on credit metrics and various regulatory mechanisms such as revenue stabilization, riders and trackers.

- In Australia, she has submitted led and co-authored a report on cost of equity and debt estimation methods for the Australian Pipeline Industry Association. The equity report was filed with the Australian Energy Regulator as part of the APIA's response to the Australian Energy Regulator's development of rate of return guidelines and both reports were filed with the Economic Regulation Authority by the Dampier Bunbury Pipeline. She has also submitted a report on aspects of the WACC calculation for Aurizon Network to the Queensland Competition Authority.
- In Canada, Dr. Villadsen has co-authored reports for the British Columbia Utilities Commission and the Canadian Transportation Agency regarding cost of capital methodologies. Her work consisted partly of summarizing and evaluating the pros and cons of methods and partly of surveying Canadian and world-wide practices regarding cost of capital estimation.
- Dr. Villadsen worked with utilities to estimate the magnitude of the financial risk inherent in long-term gas contracts. In doing so, she relied on the rating agency of Standard & Poor's published methodology for determining the risk when measuring credit ratios.
- She has worked on behalf of infrastructure funds, pension funds, utilities and others on understanding and evaluating the regulatory environment in which electric, natural gas, or water utilities operate for the purpose of enhancing investors ability to understand potential investments. She has also provided advise and testimony in the approval phase of acquisitions.
- On behalf of utilities that are providers of last resort, she has provided estimates of the proper compensation for providing the state-mandated services to wholesale generators.
- In connection with the AWC Companies application to construct a backbone electric transmission project off the Mid-Atlantic Coast, Dr. Villadsen submitted testimony before the Federal Energy Regulatory Commission on the treatment the accounting and regulatory treatment of regulatory assets, pre-construction costs, construction work in progress, and capitalization issues.
- On behalf of ITC Holdings, she filed testimony with the Federal Energy Regulatory Commission regarding capital structure issues.

- Testimony on the impact of transaction specific changes to pension plans and other rate base issues on behalf of Balfour Beatty Infrastructure Partners before the Michigan Public Service Commission.
- On behalf of financial institutions, Dr. Villadsen has led several teams that provided regulatory guidance regarding state, provincial or federal regulatory issues for integrated electric utilities, transmission assets and generation facilities. The work was requested in connection with the institutions evaluation of potential investments.
- For a natural gas utility facing concerns over mark to market losses on long term gas hedges, Dr. Villadsen helped develop a program for basing a portion of hedge targets on trends in market volatility rather than on just price movements and volume goals. The approach was refined and approved in a series of workshops involving the utility, the state regulatory staff, and active intervener groups. These workshops evolved into a forum for quarterly updates on market trends and hedging positions.
- She has advised the private equity arm of three large financial institutions as well as two infrastructure companies, a sovereign fund and pension fund in connection with their acquisition of regulated transmission, distribution or integrated electric assets in the U.S. and Canada. For these clients, Dr. Villadsen evaluated the regulatory climate and the treatment of acquisition specific changes affecting the regulated entity, capital expenditures, specific cost items and the impact of regulatory initiatives such as the FERC's incentive return or specific states' approaches to the recovery of capital expenditures riders and trackers. She has also reviewed the assumptions or worked directly with the acquirer's financial model.
- On behalf of a provider of electric power to a larger industrial company, Dr. Villadsen assisted in the evaluation of the credit terms and regulatory provisions for the long-term power contract.
- For several large electric utility, Dr. Villadsen reviewed the hedging strategies for electricity and gas and modeled the risk mitigation of hedges entered into. She also studies the prevalence and merits of using swaps to hedge gas costs. This work was used in connection with prudence reviews of hedging costs in Colorado, Oregon, Utah, West Virginia, and Wyoming.
- She estimated the cost of capital for major U.S. and Canadian utilities, pipelines, and railroads. The work has been used in connection with the companies' rate hearings before the Federal Energy Regulatory Commission, the Canadian National Energy Board, the Surface Transportation Board, and state and provincial regulatory bodies. The work has been performed for pipelines, integrated electric utilities, non-integrated

electric utilities, gas distribution companies, water utilities, railroads and other parties. For the owner of Heathrow and Gatwick Airport facilities, she has assisted in estimating the cost of capital of U.K. based airports. The resulting report was filed with the U.K. Competition Commission.

- For a Canadian pipeline, Dr. Villadsen co-authored an expert report regarding the cost of equity capital and the magnitude of asset retirement obligations. This work was used in arbitration between the pipeline owner and its shippers.
- In a matter pertaining to regulatory cost allocation, Dr. Villadsen assisted counsel in collecting necessary internal documents, reviewing internal accounting records and using this information to assess the reasonableness of the cost allocation.
- She has been engaged to estimate the cost of capital or appropriate discount rate to apply to segments of operations such as the power production segment for utilities.
- In connection with rate hearings for electric utilities, Dr. Villadsen has estimated the impact of power purchase agreements on the company's credit ratings and calculated appropriate compensation for utilities that sign such agreements to fulfill, for example, renewable energy requirements.
- Dr. Villadsen has been part of a team assessing the impact of conservation initiatives, energy efficiency, and decoupling of volumes and revenues on electric utilities financial performance. Specifically, she has estimated the impact of specific regulatory proposals on the affected utilities earnings and cash flow.
- On behalf of Progress Energy, she evaluated the impact of a depreciation proposal on an electric utility's financial metric and also investigated the accounting and regulatory precedent for the proposal.
- For a large integrated utility in the U.S., Dr. Villadsen has for several years participated in a large range of issues regarding the company's rate filing, including the company's cost of capital, incentive based rates, fuel adjustment clauses, and regulatory accounting issues pertaining to depreciation, pensions, and compensation.
- Dr. Villadsen has been involved in several projects evaluating the impact of credit ratings on electric utilities. She was part of a team evaluating the impact of accounting fraud on an energy company's credit rating and assessing the company's credit rating but-for the accounting fraud.

- For a large electric utility, Dr. Villadsen modeled cash flows and analyzed its financing decisions to determine the degree to which the company was in financial distress as a consequence of long-term energy contracts.
- For a large electric utility without generation assets, Dr. Villadsen assisted in the assessment of the risk added from offering its customers a price protection plan and being the provider of last resort (POLR).
- For several infrastructure companies, Dr. Villadsen has provided advice regarding the regulatory issues such as the allowed return on equity, capital structure, the determination of rate base and revenue requirement, the recovery of pension, capital expenditure, fuel, and other costs as well as the ability to earn the allowed return on equity. Her work has spanned 12 U.S. states as well as Canada, Europe, and South America. She has been involved in the electric, natural gas, water, and toll road industry.

Accounting and Corporate Finance

- For an electric utility subject to international arbitration, Dr. Villadsen submitted expert testimony on the application of IFRS as it pertains to receivables, the classification of liabilities and contingencies.
- In international arbitration, she submitted an expert report on IFRS' requirements regarding carve out financials, impairment, the allocation of costs to segments, and disclosure issues.
- On behalf of a construction company in arbitration with a sovereign, Dr. Villadsen filed an expert report report quantifying damages in the form of lost profit and consequential damages.
- In arbitration before the International Chamber of Commerce Dr. Villadsen testified regarding the true-up clauses in a sales and purchase agreement, she testified on the distinction between accruals and cash flow measures as well as on the measurement of specific expenses and cash flows.
- On behalf of a taxpayer, Dr. Villadsen recently testified in federal court on the impact of discount rates on the economic value of alternative scenarios in a lease transaction.

- On behalf of a taxpayer, Dr. Villaden has provided an expert report on the nature of the cost of equity used in regulatory proceedings as well as the interest rate regine in 2014.
- In an arbitration matter before the International Centre for Settlement of Investment Disputes, she provided expert reports and oral testimony on the allocation of corporate overhead costs and damages in the form of lost profit. Dr. Villadsen also reviewed internal book keeping records to assess how various inter-company transactions were handled.
- Dr. Villadsen provided expert reports and testimony in an international arbitration under the International Chamber of Commerce on the proper application of US GAAP in determining shareholders' equity. Among other accounting issues, she testified on impairment of long-lived assets, lease accounting, the equity method of accounting, and the measurement of investing activities.
- In a proceeding before the International Chamber of Commerce, she provided expert testimony on the interpretation of certain accounting terms related to the distinction of accruals and cash flow.
- In an arbitration before the American Arbitration Association, she provided expert reports on the equity method of accounting, the classification of debt versus equity and the distinction between categories of liabilities in a contract dispute between two major oil companies. For the purpose of determining whether the classification was appropriate, Dr. Villadsen had to review the company's internal book keeping records.
- In U.S. District Court, Dr. Villadsen filed testimony regarding the information required to determine accounting income losses associated with a breach of contract and cash flow modeling.
- Dr. Villadsen recently assisted counsel in a litigation matter regarding the determination of fair values of financial assets, where there was a limited market for comparable assets. She researched how the designation of these assets to levels under the FASB guidelines affect the value investors assign to these assets.
- She has worked extensively on litigation matters involving the proper application of mark-to-market and derivative accounting in the energy industry. The work relates to the proper valuation of energy contracts, the application of accounting principles, and disclosure requirements regarding derivatives.

- Dr. Villadsen evaluated the accounting practices of a mortgage lender and the mortgage industry to assess the information available to the market and ESOP plan administrators prior to the company's filing for bankruptcy. A large part of the work consisted of comparing the company's and the industry's implementation of gain-of-sale accounting.
- In a confidential retention matter, Dr. Villadsen assisted attorneys for the FDIC evaluate the books for a financial investment institution that had acquired substantial Mortgage Backed Securities. The dispute evolved around the degree to which the financial institution had impaired the assets due to possible put backs and the magnitude and estimation of the financial institution's contingencies at the time of it acquired the securities.
- In connection with a securities litigation matter she provided expert consulting support and litigation consulting on forensic accounting. Specifically, she reviewed internal documents, financial disclosure and audit workpapers to determine (1) how the balance's sheets trading assets had been valued, (2) whether the valuation was following GAAP, (3) was properly documented, (4) was recorded consistently internally and externally, and (5) whether the auditor had looked at and documented the valuation was in accordance with GAAP.
- In a securities fraud matter, Dr. Villadsen evaluated a company's revenue recognition methods and other accounting issues related to allegations of improper treatment of non-cash trades and round trip trades.
- For a multi-national corporation with divisions in several countries and industries, Dr. Villadsen estimated the appropriate discount rate to value the divisions. She also assisted the company in determining the proper manner in which to allocate capital to the various divisions, when the company faced capital constraints.
- Dr. Villadsen evaluated the performance of segments of regulated entities. She also reviewed and evaluated the methods used for overhead allocation.
- She has worked on accounting issues in connection with several tax matters. The focus of her work has been the application of accounting principles to evaluate intra-company transactions, the accounting treatment of security sales, and the classification of debt and equity instruments.

- For a large integrated oil company, Dr. Villadsen estimated the company's cost of capital and assisted in the analysis of the company's accounting and market performance.
- In connection with a bankruptcy proceeding, Dr. Villadsen provided litigation support for attorneys and an expert regarding corporate governance.

Damages and Valuation

- For the Alaska Industrial Development and Export Authority, Dr. Villadsen co-authored a report that estimated the range of recent acquisition and trading multiples for natural gas utilities.
- On behalf of a taxpayer, Dr. Villadsen testified on the economic value of alternative scenarios in a lease transaction regarding infrastructure assets.
- For a foreign construction company involved in an international arbitration, she estimated the damages in the form of lost profit on the breach of a contract between a sovereign state and a construction company. As part of her analysis, Dr. Villadsen relied on statistical analyses of cost structures and assessed the impact of delays.
- In an international arbitration, Dr. Villadsen estimated the damages to a telecommunication equipment company from misrepresentation regarding the product quality and accounting performance of an acquired company. She also evaluated the IPO market during the period to assess the possibility of the merged company to undertake a successful IPO.
- On behalf of pension plan participants, Dr. Villadsen used an event study estimated the stock price drop of a company that had engaged in accounting fraud. Her testimony conducted an event study to assess the impact of news regarding the accounting misstatements.
- In connection with a FINRA arbitration matter, Dr. Villadsen estimated the value of a portfolio of warrants and options in the energy sector and provided support to counsel on finance and accounting issues.

- She assisted in the estimation of net worth of individual segments for firms in the consumer product industry. Further, she built a model to analyze the segment's vulnerability to additional fixed costs and its risk of bankruptcy.

- Dr. Villadsen was part of a team estimating the damages that may have been caused by a flawed assumption in the determination of the fair value of mortgage related instruments. She provided litigation support to the testifying expert and attorneys.

- For an electric utility, Dr. Villadsen estimated the loss in firm value from the breach of a power purchase contract during the height of the Western electric power crisis. As part of the assignment, Dr. Villadsen evaluated the creditworthiness of the utility before and after the breach of contract.

- Dr. Villadsen modeled the cash flows of several companies with and without specific power contract to estimate the impact on cash flow and ultimately the creditworthiness and value of the utilities in question.

BOOKS

"*Risk and Return for Regulated Industries*," (with Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe) Elsevier, May 2017.

PUBLICATIONS AND REPORTS

"Impact of New Tax Law on Utilities' Deferred Taxes," (with Mike Tolleth and Elliott Metzler), *CRRI 37'th Annual Eastern Conference*, June, 2018.

"Implications of the New Tax Law for Regulated Utilities," The Brattle Group, January 2018.

"Using Electric and Gas Forwards to Manage Market Risks: When a power purchase agreement with a utility is not possible, standard forward contracts can act as viable hedging instruments*,"* *North American Windpower*, May 2017, pp. 34-37.

"*Managing Price Risk for Merchant Renewable Investments: Role of Market Interactions and Dynamics on Effective Hedging Strategies*," (with Onur Aydin and Frank Graves), Brattle Whitepaper, January 2017.

"Aurizon Network 2016 Access Undertaking: Aspects of the WACC," (with Mike Tolleth), filed with the *Queensland Competition Authority*, Australia, November 2016.

"Report on Gas LDC multiples," with Michael J. Vilbert, *Alaska Industrial Development and Export Authority*, May 2015.

"Aurizon Network 2014 Draft Access Undertaking: Comments on Aspects of the WACC," prepared for Aurizon Network and submitted to the *Queensland Competition Authority*, December 2014

"Brattle Review of AE Planning Methods and Austin Task Force Report." (with Frank C. Graves) September 24, 2014.

Report on "Cost of Capital for Telecom Italia's Regulated Business" with Stewart C. Myers and Francesco Lo Passo before the *Communications Regulatory Authority of Italy* ("AGCOM"), March 2014. *Submitted in Italian.*

"Alternative Regulation and Ratemaking Approaches for Water Companies: Supporting the Capital Investment Needs of the 21st Century," (with J. Wharton and H. Bishop), prepared for the *National Association of Water Companies*, October 2013.

"Estimating the Cost of Debt," (with T. Brown), prepared for the Dampier Bunbury Pipeline and filed with the *Economic Regulation Authority*, Western Australia, March 2013.

"Estimating the Cost of Equity for Regulated Companies," (with P.R. Carpenter, M.J. Vilbert, T. Brown, and P. Kumar), prepared for the Australian Pipeline Industry Association and filed with the *Australian Energy Regulator* and the *Economic Regulation Authority*, Western Australia, February 2013.

"Calculating the Equity Risk Premium and the Risk Free Rate," (with Dan Harris and Francesco LoPasso), prepared for *NMa and Opta, the Netherlands*, November 2012.

"Shale Gas and Pipeline Risk: Earnings Erosion in a More Competitive World," (with Paul R. Carpenter, A. Lawrence Kolbe, and Steven H. Levine), *Public Utilities Fortnightly*, April 2012.

"Survey of Cost of Capital Practices in Canada," (with Michael J. Vilbert and Toby Brown), prepared for *British Columbia Utilities Commission*, May 2012.

"Public Sector Discount Rates" (with rank Graves, Bin Zhou), *Brattle* white paper, September 2011

"FASB Accounting Rules and Implications for Natural Gas Purchase Agreements," (with Fiona Wang), *American Clean Skies Foundation*, February 2011.

"IFRS and You: How the New Standards Affect Utility Balance Sheets," (with Amit Koshal and Wyatt Toolson), *Public Utilities Fortnightly*, December 2010.

"Corporate Pension Plans: New Developments and Litigation," (with George Oldfield and Urvashi Malhotra), Finance Newsletter, Issue 01, *The Brattle Group*, November 2010.

"Review of Regulatory Cost of Capital Methodologies," (with Michael J. Vilbert and Matthew Aharonian), *Canadian Transportation Agency*, September 2010.

"Building Sustainable Efficiency Businesses: Evaluating Business Models," (with Joe Wharton and Peter Fox-Penner), *Edison Electric Institute*, August 2008.

"Understanding Debt Imputation Issues," (with Michael J. Vilbert and Joe Wharton and *The Brattle Group* listed as an author), *Edison Electric Institute*, June 2008.

"Measuring Return on Equity Correctly: Why current estimation models set allowed ROE too low," *Public Utilities Fortnightly*, August 2005 (with A. Lawrence Kolbe and Michael J. Vilbert).

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," (with A. Lawrence Kolbe and Michael J. Vilbert, and with "*The Brattle Group*" listed as author), *Edison Electric Institute,* April 2005.

"Communication and Delegation in Collusive Agencies," *Journal of Accounting and Economics*, Vol. 19, 1995.

"Beta Distributed Market Shares in a Spatial Model with an Application to the Market for Audit Services" (with M. Hviid), *Review of Industrial Organization*, Vol. 10, 1995.

SELECTED PRESENTATIONS

"Managing Price Risk for Merchant Renewable Investments," (with Onur Aydin) *EIA Electricity Pricing Workgroup* (webinar), April 30, 2019.

"Decoupling and its Impact on Cost of Capital" presented to *SURFA Members and Friends*, February 27, 2019.

"Current Issues in Cost of Capital" presented to *EEI Members*, July, 2018-19.

"Introduction to Capital Structure & Liability Management", presented at *the American Gas Association (AGA)/Edison Electric Institute (EEI) "Introduction and Advanced Public Utility Accounting Courses",* August 21, 2018, August 20 2019.

"Lessons from the U.S. and Australia" presented at *Seminar on the Cost of Capital in Regulated Industries: Time for a Fresh Perspective?* Brussels, October 2017.

"Should Regulated Utilities Hedge Fuel Cost and if so, How?" presented at *SURFA's 49 Financial Forum*, April 20-21, 2017.

"Transmission: The Interplay Between FERC Rate Setting at the Wholesale Level and Allocation to Retail Customers," (with Mariko Geronimo Aydin) presented at *Law Seminars International: Electric Utility Rate Cases*, March 16-17, 2017.

"Capital Structure and Liability Management," *American Gas Association and Edison Electric Institute Public Utility Accounting Course*, August 2015-2017.

"Current Issues in Cost of Capital," *Edison Electric Institute Advanced Rate School*, July 2013-2017.

"Alternative Regulation and Rate Making Approaches for Water Companies," *Society of Depreciation Professionals Annual Conference*, September 2014.

"Capital Investments and Alternative Regulation," *National Association of Water Companies Annual Policy Forum*, December 2013.

"Accounting for Power Plant," *SNL's Inside Utility Accounting Seminar*, Charlotte, NC, October 2012.

"GAAP / IFRS Convergence," *SNL's Inside Utility Accounting Seminar*, Charlotte, NC, October 2012.

"International Innovations in Rate of Return Determination," *Society of Utility Financial and Regulatory Analysts' Financial Forum*, April 2012.

"Utility Accounting and Financial Analysis: The Impact of Regulatory Initiatives on Accounting and Credit Metrics," 1.5 day seminar, EUCI, Atlanta, May 2012.

"Cost of Capital Working Group Eforum," *Edison Electric Institute webinar*, April 2012.

"Issues Facing the Global Water Utility Industry" Presented to Sensus' Executive Retreat, Raleigh, NC, July 2010.

"Regulatory Issues from GAAP to IFRS," NASUCA *2009 Annual Meeting*, Chicago, November 2009.

"Subprime Mortgage-Related Litigation: What to Look for and Where to Look," *Law Seminars International: Damages in Securities Litigation*, Boston, May 2008.

"Evaluating Alternative Business / Inventive Models," (with Joe Wharton). *EEI Workshop, Making a Business of Energy Efficiency: Sustainable Business Models for Utilities*, Washington DC, December 2007.

"Deferred Income Taxes and IRS's NOPR: Who should benefit?" *NASUCA Annual Meeting*, Anaheim, CA, November 2007.

"Discussion of 'Are Performance Measures Other Than Price Important to CEO Incentives?'" *Annual Meeting of the American Accounting Association*, 2000.

"Contracting and Income Smoothing in an Infinite Agency Model: A Computational Approach," (with R.T. Boylan) *Business and Management Assurance Services Conference*, Austin 2000.

TESTIMONY

Expert Report on IFRS Issues and Forensics. *SIAC Arbitration* No. 44 of 2018, October 2019.

Expert Report on IFRS issues. *ICC Arbitration* No. 23896/GSS, September 2019.

Direct Testimony on the cost of debt and equity capital as well as capital structure on behalf of Young Brothers, LLC. submitted to the *Public Utilities Commission of the State of Hawaii*, Docket No. 2019-0117, September 2019.

Expert Report on discount rates in property tax matter for Union Pacific Company in *Union Pacific Railroad Co. v. Utah State Tax Comm'n, et. al.*, Case No. 2:18-cv-00630-DAK-DBP, Utah August 2019.

Answering Testimony on the Cost of Equity on behalf of Northern Natural Gas Company submitted to the *Federal Energy Regulatory Commission*, Docket No. RP19-59-000, August 2019.

Direct Testimony on Cost of Equity on behalf of DTE Electric Company submitted to the *Michigan Public Service Commission*, Docket No. U-20561, July 2019.

Prepared Direct Testimony on Cost of Capital for Northern Natural Gas Company submitted to the Federal Energy Regulatory Commission, Docket No. RP19-1353-000, July 2019.

Prepared Direct Testimony on Cost of Capital and Term Differentiated Rates for Paiute Pipeline Company submitted to the Federal Energy Regulatory Commission, Docket No. RP19-1291-000, May 2019.

Expert report, deposition, and oral trial testimony on behalf of PacifiCorp in the Matter of *PacifiCorp, Inc. v. Utah State Tax Comm'n*, Case No. 180903986 TX, Utah District Court April, May, September 2019.

Direct Testimony, Rebuttal Testimony, and hearing appearance on the cost of capital for Southern California Edison submitted to the *California Public Utilities Commission*, Docket No. A.19-04-014, April 2019, August 2019.

Prepared Direct Testimony on the cost of equity for Southern California Edison's transmission assets submitted to the *Federal Energy Regulatory Commission*, Docket No. ER19-1553, April 2019.

Direct and Rebuttal Testimony on cost of equity for Consolidated Edison of New York submitted to the *New York Public Service Commission*, Matter No. 19-00317, January, June 2019.

Direct Testimony on cost of capital and capital structure for Northwest Natural Gas Company submitted to the *Washington Utilities and Transportation Commission*, Docket No. 181053, December 2018.

Pre-filed Direct Testimony and Reply Testimony on cost of capital and capital structure for Anchorage Water Utility and Anchorage Wastewater Utility submitted to the *Regulatory Commission of Alaska*, TA163-122 and TA164-126, December 2018, October 2019.

Direct Testimony on cost of capital for Portland General Electric Company submitted to the *Oregon Public Utility Commission* on behalf of Portland General Electric Company (with Hager and Liddle), EU 335, February 2018.

Direct Testimony and Rebuttal Testimony on cost of capital for NW Natural submitted to the *Oregon Public Utility Commission* on behalf of NW Natural, UG 344, December 2017, May 2018.

Direct Pre-filed Testimony and Reply Pre-filed Testimony on cost of equity and capital structure for Anchorage Water and Wastewater Utilities before the *Regulatory Commission of Alaska*, TA161-122 and TA162-126, November 2017, September 2018.

Direct Testimony, Rebuttal Testimony, deposition, and hearing appearance on wholesale water rates for Petitioner Cities, *Texas Public Utility Commission*, PUC Docket 46662, SOAH Docket 473-17-4964.WS, November 2017, January, June, July, October 2018.

Affidavit on Lifting the Dividend Restriction for Anchorage Water Utility for AWWU, *Regulatory Commission of Alaska*, U-17-095, November 2017.

Written Evidence, Rebuttal Evidence and Hearing appearance on the Cost of Capital and Capital Structure for the ATCO Utilities and AUI, 2018-2020 Generic Cost of Capital Proceeding, *Alberta Utilities Commission*, October 2017, February – March 2018.

Written Evidence, Rebuttal Evidence, and Hearing Appearance on Regulatory Tax Treatment for the ATCO Utilities and AUI, 201802020 Generic Cost of Capital Proceeding, *Alberta Utilities Commission*, October 2017, February – March 2018.

Affidavit on the Creation of a Regulatory Assets for PRV Rebates for Anchorage Water Utility, submitted to the *Regulatory Commission of Alaska*, U-17-083, August 2017.

Direct and Rebuttal Testimony, Hearing Appearance on Cost of Capital for California-American Water Company for California-American Water submitted to the *California Public Utilities Commission*, Application 17-04-003, April, August, September 2017.

Direct, Rebuttal, Surrebuttal, Supplemental, Supplemental Rebuttal Testimony and Hearing Appearance on the Cost of Capital for Northern Illinois Gas Company submitted to the *Illinois Commerce Commission*, GRM #17-055, March, July, August, September, and November 2017.

Direct and Rebuttal Testimony on Cost of Capital for Portland General Electric Company submitted to the *Oregon Public Utility Commission* on behalf of Portland General Electric Company, Docket No. UE 319, February, July 2017.

Pre-filed Direct and Reply Testimony and Hearing Appearance on Cost of Equity and Capital Structure for Anchorage Municipal Light and Power, *Regulatory Commission of Alaska*, Docket No. TA357-121, December 2016, August and December 2017.

Expert report and Hearing Appearance regarding the Common Equity Ratio for OPG's Regulated Generation for OEB Staff, *Ontario Energy Board*, EB-2016-0152, November 2016, April 2017.

Pre-filed Direct Testimony on Cost of Equity and Capital Structure for Anchorage Municipal Wastewater Utility, *Regulatory Commission of Alaska*, Docket No. 158-126, November 2016.

Expert Report and Reply Expert Report on damages (quantum) in exit arbitration (with Dan Harris), *International Center for the Settlement of Investment Disputes*, October 2016, October 2018.

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Dr. Bente Villadsen

RETURN ON EQUITY
EXHIBIT 302

December 30, 2019

EXHIBIT NW NATURAL 302:

TECHNICAL APPENDIX

Technical Appendix to the Direct Testimony of Bente Villadsen

This technical appendix contains methodological details related to my implementations of the DCF and CAPM / ECAPM models. It also contains a discussion of both the basic finance principles and the specific standard formulations of the financial leverage adjustments employed to determine the cost of equity for a company with the level of financial risk inherent in NW Natural's requested regulatory capital structure.

Table of Contents

I. DCF Models

A. DCF Estimation of Cost of Equity

The DCF method for estimating the cost of equity capital assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T} \quad (1)$$

where P_0 is the current market price of the stock; D_t is the dividend cash flow expected at the end of period t; r is the cost of equity capital; and T is the last period in which a dividend cash flow is to be received. The formula simply says that the stock price is equal to the sum of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received. Since the current market price is known, it is possible to infer the cost of equity that corresponds to that price and a forecasted pattern of expected future dividends. In terms of Equation (1), if P_0 is known and $D_1, D_2, \ldots D_T$ are estimated, an analyst can "solve for" the cost of equity capital r.

B. Details of the DCF Model

Perhaps the most widely known and used application of the DCF method assumes that the expected rate of dividend growth remains constant forever. In the so-called Gordon Growth Model, the relationship expressed in Equation (1) is such that the present value equation can be rearranged algebraically into a formula for estimating the cost of equity. Specifically, if investors expect a dividend stream that will grow forever at a steady rate, then the market price of the stock will be given by

$$P_0 = \frac{D_1}{r-g} \quad (2)$$

where D_1 is the dividend expected at the end of the first period, g is the perpetual growth rate, and P_0 and r are the market price and the cost of capital, as before. Equation (2) is a simplified version of Equation (1) that can be solved algebraically to yield the well-known "DCF formula" for the cost of equity capital,

$$r = \frac{D_1}{P_0} + g = \frac{D_0 \times (1+g)}{P_0} + g \quad (3)$$

There are other versions of the DCF model that relax this restrictive assumption and posit a more complex or nuanced pattern of expected future dividend payments. For example, if there is reason to believe that investors do *not* expect a company's dividends to grow at a steady rate forever, but rather have different growth rate expectations in the near term (e.g., over the next five or ten years), compared to the distant future (e.g., a period *starting* ten years from the present moment), a "multi-stage" growth pattern can be modeled in the present value formula (Equation (1)).

1. Dividends, Cash Flows, and Share Repurchases

In addition to the DCF model described above, there are many alternative formulations. Notable among these are versions of the model that use cash flows rather than dividends in the present value formula (Equation (1)).[1]

Because investors are interested in cash flow, it is technically important to capture *all* cash flows that are distributed to shareholders when estimating the cost of equity using the DCF method. In some circumstances, investors may expect to receive cash in forms other than dividends. An important example concerns the fact that many companies distribute cash to shareholders through share buybacks in addition to dividends. To the extent such repurchases are expected by investors, but not captured in the forecasted pattern of future dividends; a dividend-based implementation of the DCF model will underestimate the cost of equity.

Similarly, if investors have reason to suspect that a company's dividend payments will not reflect a full distribution of its available cash free cash flows in the period they were generated, it may be appropriate replace the forecasted dividends with estimated free cash flows to equity in the present value formula (Equation (1)). Focusing on *available* cash rather than that actually distributed in the form of dividends can help account for instances when near-term investing and financing activities (e.g., capital expenditures or asset sales, debt issuances or retirements, or share repurchases) may cause dividend growth patterns to diverge from growth in earnings.

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[1] For an example in a regulatory context, the U.S. Surface Transportation Board uses a cash flow based model with three stages to estimate the cost of equity for the railroads. See Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009. Confirmed in EP-664 (Sub-No. 2), October 31, 2016.

Many utility companies such as those included in my proxy group have long histories of paying a dividend. In fact, as mentioned in Section I of this Appendix, one of my standard requirements for inclusion in my proxy group is that a company pays dividends for 5-years without a gap or a dividend cut (on per share basis). Additionally, although some utility companies have engaged in share repurchase programs, the impact of such programs on the cash distribution to shareholders is small for the companies in my proxy group.[2]

C. DCF Model Inputs

1. Dividends and Prices

As described above, DCF models are forward-looking, comparing the *current* price of a stock to its expected *future* dividends to estimate the required expected return demanded by the market for that stock (i.e., the cost of equity). Therefore, the models demand the current market price and currently prevailing forecasts of future dividends as inputs.

The stock price input I employ for each proxy group company is the average of the closing stock prices for the 15 trading days ending on the date of my analysis. This guards against biases that may arise on a single trading day, yet is consistent with using current stock prices.

2. Company Specific Growth Rates

a. Analysts' Forecasted Growth Rates

Finding the right growth rate(s) is usually the "hard part" of applying the DCF model, which is sometimes criticized due to what has been called "optimism bias" in the earnings growth rate forecasts of security analysts. Optimism bias is defined as tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. Any optimism bias might be related to incentives faced by analysts that provide rewards not strictly based upon the accuracy of the forecasts. To the extent optimism bias is present in the analysts' earnings forecasts the cost of capital estimates from the DCF model would be too high.

While academic researchers during the 1990s as well as in early 2000s found evidence of analysts' optimism bias, there is some evidence that regulatory reforms have eliminated the issue. A more

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[2] While a number of companies in my proxy group have or have had share repurchase programs, the magnitude tends to be relatively small, so that an inclusion of the cash flow from repurchases would likely have a minimal impact on the average results for the proxy group. However, it is clear that not including the cash distributions from such repurchases downwardly biases the estimated cost of equity.

recent paper by Hovakimina and Saenyasiri (2010) found that recent efforts to curb analysts' incentive to provide optimistic forecasts have worked, so that "the median forecast bias essentially disappeared."[3] Thus, some recent research indicates that the analyst bias may be a problem of the past.

The findings of several academic studies[4] show that analyst earnings forecasts turn out to be too optimistic for stocks that are more difficult to value, for instance, stocks of smaller firms, firms with high volatility or turnover, younger firms, or firms whose prospects are uncertain. Coincidentally, stocks with greater analyst disagreement have higher analyst optimism bias—all of these describe companies that are more volatile and/or less transparent—none of which is applicable to the majority of utility companies with wide analyst coverage and information transparency. Consequently, optimism bias is not expected to be an issue for utilities.

b. Sources for Forecasted Growth Rates

For the reasons described above, I rely on analyst forecasts of earnings growth for the company-specific growth rate inputs to my implementations of the single- and multi-stage DCF models. Most companies in my proxy group have coverage from equity analysts reporting to Thomson Reuters IBES, so I use the consensus 3-5 year EPS growth rate provided by that service. I supplement these consensus values with growth rates based on EPS estimates from *Value Line*.[5]

II. CAPM and ECAPM

A. THE CAPITAL ASSET PRICING MODEL (CAPM)

The Capital Asset Pricing Model ("CAPM") is a theoretical model stating that the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with

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[3] A. Hovakimian and E. Saenyasiri, "Conflicts of Interest and Analyst Behavior: Evidence from Recent Changes in Regulation," *Financial Analysts Journal*, vol. 66, 2010.

[4] These studies include the following: (i) Hribar, P, McInnis, J. "Investor Sentiment and Analysts' Earnings Forecast Errors," *Management Science* Vol. 58, No. 2 (February 2012): pp. 293-307; (ii) Scherbina, A. (2004), "Analyst Disagreement, Forecast Bias and Stock Returns," downloaded from Harvard Business School Working Knowledge: http://hbswk.hbs.edu/item/5418.html; and (iii) Michel, J-S., Pandes J.A. (2012), "Are Analysts Really Too Optimistic?" downloaded from http://www.efmaefm.org.

[5] Specifically, I compute the growth rate implied by *Value Line*'s current year EPS estimate and its projected 3-5 year EPS estimate. I then average this in with the IBES consensus estimate as an additional independent estimate, giving it a weight of 1 and weighting the IBES consensus according to the number of analysts who contributed estimates.

the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line (see Figure 3 in my Direct Testimony), in which the required expected return on an asset is proportional to that asset's risk relative to the market as measured by its "beta". More precisely, the CAPM states that the cost of capital for an investment S (e.g., a particular common stock), is given by the following equation:

$$\boldsymbol{r_s = r_f + \beta_s \times MRP} \quad (4)$$

where $\boldsymbol{r_S}$ is the required return on investment S;
$\boldsymbol{r_f}$ is the risk-free interest rate;
$\boldsymbol{\beta_S}$ is the beta risk measure for the investment S; and
$\boldsymbol{MRP}$ is the market equity risk premium.

The CAPM is based on portfolio theory, and recognizes two fundamental principles of finance: (1) investors seek to minimize the possible variance of their returns for a given level of expected returns (or alternatively, they demand higher *expected* returns when there is greater uncertainty about those returns), and (2) investors can reduce the variability of their returns by diversifying—constructing portfolios of many assets that do not all go up or down at the same time or to the same degree. Under the assumptions of the CAPM, the market participants will construct portfolios of risky investments that minimize risk for a given return so that the aggregate holdings of all investors represent the "market portfolio". The risk-return trade-off faced by investors then concerns their exposure to the risk inherent in the market portfolio, as they weight their investment capital between the portfolio of risky assets and the risk-free asset.

Because of the effects of diversification, the relevant measure of risk for an individual security is its *contribution* to the risk of the market portfolio. Therefore, beta (β) is defined to capture the sensitivity of the security's returns to the market's returns. Formally,

$$\boldsymbol{\beta_s} = \frac{covariance(\boldsymbol{r_s}, \boldsymbol{R_m})}{variance(\boldsymbol{R_m})} \quad (5)$$

where $\boldsymbol{R_m}$ is the return on the market portfolio.

Beta is usually calculated by statistically comparing (using regression analysis) the excess (positive or negative) of the return on the individual security over the government bond rate with the excess of the return on a market index such as the S&P 500 over a government bond rate.

The basic idea behind beta is the risk that cannot be diversified away in large portfolios is what matters to investors. Beta is a measure of the risks that *cannot* be eliminated by diversification. It is this non-diversifiable risk, or "systematic risk", for which investors require compensation in the form of higher expected returns. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk; its returns vary to the same degree as those on the market as a whole. According to the CAPM, the required return demanded by investors (i.e., the cost of equity) for investing in that stock will match the expected return on the market as a whole. Similarly, stocks with betas above 1.0 have more than average risk, and so have a cost of equity greater than the expected market return; those with betas below 1.0 have less than average risk, and are expected to earn lower than market levels of return.

B. INPUTS TO THE CAPM

1. The Risk-free Interest Rate

The precise meaning of a "risk-free" asset according to the finance theory underlying the CAPM is an investment whose return is guaranteed, with no possibility that it will vary around its expected value in response to the movements of the broader market. (Equivalently, the CAPM beta of a risk-free asset is zero.) In developed economies like the U.S., government debt is generally considered have no default risk. In this sense they are "risk-free"; however, unless they are held to maturity, the rate of return on government bonds may in fact vary around their stated or expected yields.[6]

The theoretical CAPM is a single period model, meaning that it posits a relationship between risk and return over a single "holding period" of an investment. Because investors can rebalance their portfolios over short horizons, many academic studies and practical applications of the CAPM use the short-term government bond as the measure of the risk-free rate of return. However, regulators frequently use a version based on a measure of the long-term risk-free rate; e.g., a long-term government bond. I rely on the 20-year Treasury bond as a measure of the risk-free asset in this proceeding.[7] I use the term "risk-free rate" as describing the yield on the 20-year Treasury bond.

However, I do not believe the *current* yield on long-term Treasury bonds is a good estimate for the risk-free rate that will prevail over the time period relevant to this proceeding as currently

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[6] This is due to interest rate fluctuations that can change the market value of previously issued debt in relation to the yield on new issuances

[7] The use of a 20-year government bond is consistent with the measurement of the Ibbotson MRP and permits me to use a series that has been in consistent circulation since the 1990's (the 30-year government bond was not issued from 2002 to 2006).

prevailing bond yields are near historic lows for a variety of circumstances that should not be expected to persist for the reasons discussed in my direct testimony.

As shown in Figure A- 1 below, the current spread between utility bond yields and the 20-year treasury bond yield is elevated by almost 50 basis points.

Figure A- 1: Yield Spreads

Spreads between U.S. Utility Bond (20 year maturity) and U.S. Government Bond (20 year maturity) - bps

Periods	A-Rated Utility and Treasury	BBB-Rated Utility and Treasury	Notes
Period 1 - Average Apr-1991 - 2007	93	123	[1]
Period 2 - Average Aug-2008 - Mar-2019	149	195	[2]
Period 3 - Average Mar-2019	123	164	[3]
Period 4 - Average 15-Day (Mar 11, 2019 to Mar 29, 2019)	141	182	[4]
Spread Increase between Period 2 and Period 1	55	72	[5] = [2] - [1]
Spread Increase between Period 3 and Period 1	30	41	[6] = [3] - [1]
Spread Increase between Period 4 and Period 1	48	59	[7] = [4] - [1]

Sources and Notes:
Spreads for the periods are calculated from Bloomberg's yield data.
Average monthly yields for the indices were retrieved from Bloomberg as of March 31, 2019.

For this reason I rely on Blue Chip's forecast of 3.0% for the yield on a 10-year Treasury bond for 2020.[8] I adjust this value upward by 50 basis points, which is my estimate of the maturity premium for the 20-year over the 10-year Treasury Bond and add 25 basis points as a normalization to the forecasted risk-free rate.[9] Thus, I obtain a risk-free rate of 3.75% for 2020 in Scenario 1. I also consider a scenario, where the increase in yield spread is allocated to the MRP and only a small fraction of the increase in yield spread is allocated to the risk-free rate. In Scenario 2, which I discuss in more detail below, the risk-free rate for 2020 is 3.5%.

8 Blue Chip Economic Indicators, March 10, 2019.

9 This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Treasury Bonds over the period January 1990 – March 2019, using data from Bloomberg. See Exhibit A-14, Schedule D5.9.

2. The Market Equity Risk Premium

a. Historical Average Market Risk Premium

Like the cost of capital itself, the market risk premium is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can *expect* to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable, and must be inferred or forecasted based on known market information.

One commonly use method for estimating the MRP is to measure the historical average premium of market returns over the income returns on risk-free government bonds over some long historical period. When such a calculation is performed using the traditional industry standard Ibbotson data, the result is an arithmetic average of 6.91% for annual observed premiums of U.S. stock market returns over income returns on long-term (approximate average maturity of 20-years) U.S. Treasury bonds from 1926 to the present is 6.91%.[10]

b. Forward Looking Market Equity Risk Premium

An alternative approach to estimating the MRP eschews historical averages in favor of using current market information and forecasts to infer the expected return on the market as a whole, which can then be compared to prevailing government bond yields to estimate the equity risk premium. Bloomberg performs such estimates of country-specific MRPs by implementing the DCF model on the market as a whole—using forecast market-wide dividend yields and current level on market indexes; for the U.S. Bloomberg performs a multi-stage DCF using dividend-paying stocks in the S&P 500 to infer the expected market return.

When calculated relative to 20-year Treasury bond yields, Bloomberg's estimate of the forward-looking market-implied MRP over the month leading up to my analysis was approximately 6.86% This Bloomberg forward-looking MRP estimate was above the historical long-term average for much of 2018 was at 7.90% during January 2019.[11]

c. Yield Spreads and the Market Equity Risk Premium

As shown in Figure 7 of my testimony the yield spreads for 20-year A rated utility debt over 20-year Treasury bonds is elevated relative to its historical norm by about 40 bps relative to its long-term average leading up to the 2008 financial crisis. This means that investors require a higher

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[10] Duff & Phelps, "2019 SBBI Yearbook," p. 10-21.

[11] Bloomberg data.

return on investment grade utility debt relative to the return on T-bonds than they did before the crisis and ensuing economic turmoil.

This information can be used to provide a quantitative benchmark for the implied increase in MRP based on a paper by Edwin J. Elton, et al., which documents that the yield spread on corporate bonds is normally a combination of a default premium, a tax premium, and a systematic risk premium.[12] Of these components, it is the systematic risk premium that likely explains the vast majority of the yield spread increase. In other words, unless the risk-free rate is underestimated as described above, the market equity risk premium has increased relative to its "normal" level.[13] For example, assuming a beta of 0.25 for A rated debt[14] means that an increase in the MRP of one percentage point translates into a ¼ percentage point increase in the risk premium on A rated debt (i.e., 0.25 (beta) times 1 percentage point (increase in MRP) = ¼ percentage point increase in yield spread). Thus, a 25 bps increase in the yield spread is therefore consistent with a 1.0 percentage point increase in the MRP ($\frac{0.25\%}{0.25} = 1.0\%$). Thus, there is evidence that the current MRP is elevated relative to the historical MRP of 6.91%. While the increase in yield spread as well as an implementation of the DCF model on the S&P 500 could justify an MRP of upward 10%,[15] I conservatively use the historical average of 6.91% along with a scenario of 7.91%.

C. THE EMPIRICAL CAPM

1. Description of the ECAPM

Empirical research has shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than predicted by the CAPM

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[12] "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, *The Journal of Finance*, February 2001, pp. 247-277.

[13] In theory, some of the increase in yield spread for A rated debt may be due to an increase in default risk, but the increase in default risk for A rated debt is undoubtedly very small because utilities with A range rated debt have a low default risk. This means that the vast majority—if not all—of the increase in A rated yield spreads is due to a combination of the increased systematic risk premium and the downward pressure on the yields of government debt. Although there is no increase in the tax premium discussed in the Elton et al. paper due to coupon payments, there may be some increase due to a small tax effect resulting from the probability of increased capital gains taxes when the debt matures.

[14] Elton, *et al*. estimates the average beta on BBB-rated corporate debt as 0.26 over the period of their study, and A-rated debt will have a slightly lower beta than BBB-rated debt. I note that 0.25 is a conservatively high estimate of the beta on A-rated utility debt. Most academic estimates, including those presented in *Berk & Demarzo* that I utilize for my Hamada adjustments are significantly lower: in the range of 0.0 – 0.1 percent and would result in a substantially higher MRP estimate.

[15] See Direct Testimony of Bente Villadsen in Docket No. RP19-1291, May 2019, Exhibit PPC-011, p. 9 of 11. Using a debt beta of 0.25, the increased yield spread of 48 bps result in an increase in the MRP of 0.48/0.25 = 1.92%.

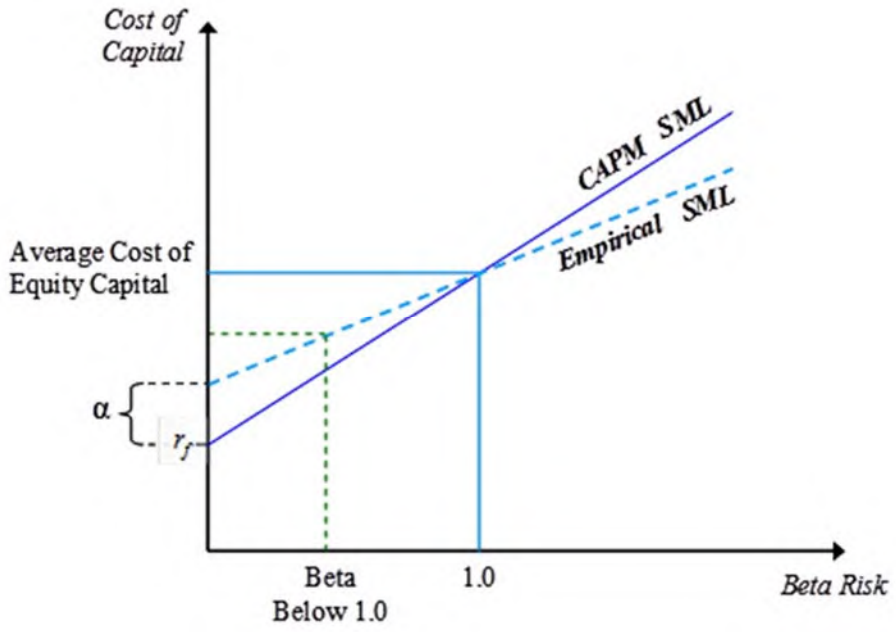
and high-beta stocks tend to have lower risk premiums than predicted. A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

The Empirical CAPM ("ECAPM") makes use of these empirical findings. It estimates the cost of capital with the equation,

$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \qquad (6)$$

where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see Equation (4)). The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line, which results in a Security Market Line that more closely matches the results of empirical tests. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Figure A-2
The Empirical Security Market Line



2. Academic Evidence on the Alpha Term in the ECAPM

Figure A- below summarizes the empirical results of tests of the CAPM, including their estimates of the "alpha" parameter necessary to improve the accuracy of the CAPM's predictions of realized returns.

Figure A-3

EMPIRICAL EVIDENCE ON THE ALPHA FACTOR IN ECAPM*

AUTHOR	RANGE OF ALPHA	PERIOD RELIED UPON
Black (1993)[1]	1% for betas 0 to 0.80	1931-1991
Black, Jensen and Scholes (1972)[2]	4.31%	1931-1965
Fama and McBeth (1972)	5.76%	1935-1968
Fama and French (1992)[3]	7.32%	1941-1990
Fama and French (2004)[4]	N/A	
Litzenberger and Ramaswamy (1979)[5]	5.32%	1936-1977
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 3.91%	1926-1978
Pettengill, Sundaram and Mathur (1995)[6]	4.6%	1936-1990

*The figures reported in this table are for the longest estimation period available and, when applicable, use the authors' recommended estimation technique. Many of the articles cited also estimate alpha for sub-periods and those alphas may vary.

[1]Black estimates alpha in a one step procedure rather than in an un-biased two-step procedure.

[2]Estimate a negative alpha for the subperiod 1931-39 which contain the depression years 1931-33 and 1937-39.

[3]Calculated using Ibbotson's data for the 30-day treasury yield.

[4]The article does not provide a specific estimate of alpha; however, it supports the general finding that the CAPM underestimates returns for low-beta stocks and overestimates returns for high-beta stocks.

[5]Relies on Lizenberger and Ramaswamy's before-tax estimation results. Comparable after-tax alpha estimate is 4.4%.

[6]Pettengill, Sundaram and Mathur rely on total returns for the period 1936 through 1990 and use 90-day treasuries. The 4.6% figure is calculated using auction averages 90-day treasuries back to 1941 as no other series were found this far back.

Sources:

Black, Fischer. 1993. Beta and Return. *The Journal of Portfolio Management* 20 (Fall): 8-18.

Black, F., Michael C. Jensen, and Myron Scholes. 1972. The Capital Asset Pricing Model: Some Empirical Tests, from Studies in the theory of Capital Markets. In *Studies in the Theory of Capital Markets*, edited by Michael C. Jensen, 79-121. New York: Praeger.

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III. Financial Risk and the Cost of Equity

A common issue in regulatory proceedings is how to apply data from a benchmark set of comparable securities when estimating a fair return on equity for the target/regulated company.[16] It may be tempting to simply estimate the cost of equity capital for each of the proxy companies (using one of the above approaches) and average them. After-all, the companies were chosen to be comparable in their business risk characteristics, so why would an investor necessarily prefer equity in one to the other (on average)?

The problem with this argument is that it ignores the fact that underlying asset risk (i.e., the risk inherent in the lines of business in which the firm invests its assets) for each company is typically divided between debt and equity holders. The firm's debt and equity are therefore financial derivatives of the underlying asset return, each offering a differently structured claim on the cash flows generated by those assets. Even though the risk of the underlying assets may be comparable, a different capital structure splits that risk differently between debt and equity holders. The relative structures of debt and equity claims are such that higher degrees of debt financing increase the variability of returns on equity, *even when the variability of asset returns remains constant*. As a consequence, otherwise identical firms with different capital structures will impose different levels of risk on their equity holders. Stated differently, increased leverage adds financial risk to a company's equity.[17]

A. The Effect of Financial Leverage on the Cost of Equity

To develop an intuition for the manner in which financial leverage affects the risk of equity, it is helpful to consider a concrete example. Figure A-4 and and Figure A-5 below demonstrate the impact of leverage on the risk and return for equity by comparing equity's risk when a company uses no debt to finance its assets, and when it uses a 50-50 capital structure (i.e., it finances 50 percent of its assets with equity, 50 percent with debt). For illustrative purposes, the figures assume that the cash flows will be either $5 or $15 and that these two possibilities have the same chance of occurring (e.g., the chance that either occurs is ½).

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16 This is also a common valuation problem in general business contexts.

17 I refer to this effect in terms of *financial risk* because the additional risk to equity holders stems from how the company chooses to finance its assets. In this context financial risk is distinct from and independent of the *business risk* associated with the manner in which the firm deploys its cash flow generating assets. The impact of leverage on risk is conceptually no different than that faced by a homeowner who takes out a mortgage. The equity of a homeowner who finances his home with 90% debt is much riskier than the equity of one who only finances with 50% debt.

Figure A-4: All Equity Capital Structure

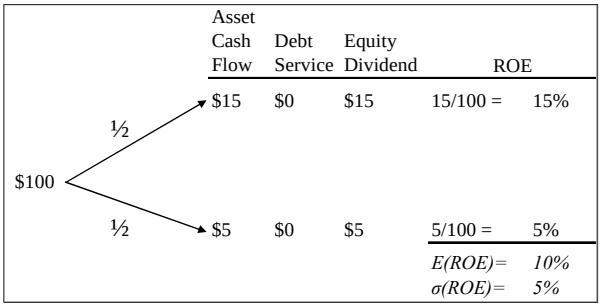
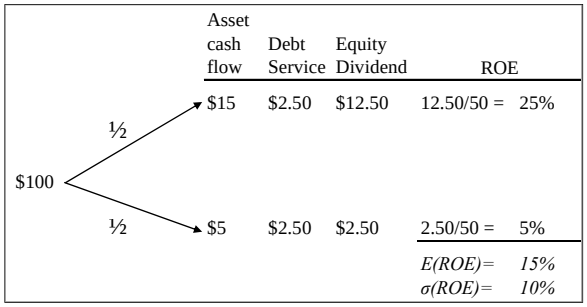


Figure A-5: 50/50 Capital Structure



In the figures, E(ROE) indicates the mean return and σ(ROE) represents the standard deviation. This simple example illustrates that the introduction of debt increases both the mean (expected) return to equity holders and the variance of that return, even though the firm's expected cash flows—which are a property of the line of business in which its assets are invested—are unaffected by the firm's financing choices. The "magic" of financial leverage is not magic at all—leveraged equity investors can only earn a higher return because they take on greater risk.

B. METHODS TO ACCOUNT FOR FINANCIAL RISK

1. Cost of Equity Implied by the Overall Cost of Capital

If the companies in a proxy group are truly comparable in terms of the systematic risks of the underlying assets, then the overall cost of capital of each company should be about the same across companies (except for sampling error), so long as they do not use extreme leverage or no leverage. The intuition here is as follows. A firm's asset value (and return) is allocated between equity and debt holders.[18] The expected return to the underlying asset is therefore equal to the value weighted

[18] Other claimants can be added to the weighted average if they exist. For example, when a firm's capital structure contains preferred equity, the term $\frac{P}{V} \times r_p$ is added to the expression for the overall cost of capital shown in Equation (7), where P refers to the market value of preferred equity, r_P is the cost of preferred equity and $V = E + D + P$. In my analysis, I attribute the same implied yield to the cost of preferred equity as to the cost of debt.

average of the expected returns to equity and debt holders – which is the overall cost of capital ($\boldsymbol{r}^*$), or the expected return on the assets of the firm as a whole.[19]

$$\boldsymbol{r}^* = \frac{E}{V} \times r_E + \frac{D}{V} \times r_D(1 - \tau_c) \quad (7)$$

where r_D is the market cost of debt,
r_E is the market cost of equity,
τ_c is the corporate income tax rate,
D is the market value of the firm's debt,
E is the market value of the firm's equity, and
$V = E + D$ is the total market value of the firm.

Since the overall cost of capital is the cost of capital for the underlying asset risk, and this is comparable across companies, it is reasonable to believe that the overall cost of capital of the underlying companies should also be comparable, so long as capital structures do not involve unusual leverage ratios compared to other companies in the industry.[20]

The notion that the overall cost of capital is constant across a broad middle range of capital structures is based upon the Modigliani-Miller theorem that choice of financing does not affect the firm's value. Franco Modigliani and Merton Miller eventually won Nobel Prizes in part for their work on the effects of debt.[21] Their 1958 paper made what is in retrospect a very simple point: if there are no taxes and no risk to the use of excessive debt, use of debt will have no effect on a company's operating cash flows (i.e., the cash flows to investors as a group, debt and equity combined). If the operating cash flows are the same regardless of whether the company finances

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[19] As this is on an after-tax basis, the cost of debt reflects the tax value of interest deductibility. Note that the precise formulation of the weighted average formula representing the required return on the firm's *assets* independent of financing (sometimes called the *unlevered* cost of capital) depends on specific assumptions made regarding the value of tax shields from tax-deductible corporate debt, the role of personal income tax, and the cost of financial distress. See Taggart, Robert A., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management*, 1991; 20(3) for a detailed discussion of these assumptions and formulations. Equation (7) represents the overall weighted average cost of capital to the firm, which can be assumed to be constant across a relatively broad range of capital structures.

[20] Empirically, companies within the same industry tend to have similar capital structures, while typical capital structures may vary between industries, so whether a leverage ratio is "unusual" depends upon the company's line of business.

[21] Franco Modigliani and Merton H. Miller (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48, pp. 261-297.

mostly with debt or mostly with equity, then the value of the firm cannot be affected at all by the debt ratio. In cost of capital terms, this means the overall cost of capital is constant regardless of the debt ratio, too.

Obviously, the simple and elegant Modigliani-Miller theorem makes some counterfactual assumptions: no taxes and no cost of financial distress from excessive debt. However, subsequent research, including some by Modigliani and Miller,[22] showed that while taxes and costs to financial distress affect a firm's incentives when choosing its capital structure as well as its overall cost of capital,[23] the latter can still be shown to be constant across a broad range of capital structures.[24]

This reasoning suggests that one could compute the overall cost of capital for each of the proxy companies and then average to produce an estimate of the overall cost of capital associated with the underlying asset risk. Assuming that the overall cost of capital is constant, one can then re-arrange the overall cost of capital formula to estimate what the implied cost of equity is at the target company's capital structure on a book value basis.[25]

2. Unlevering and Relevering Betas in the CAPM (Hamada Adjustment)

An alternative approach to account for the impact of financial risk is to examine the impact of leverage on beta. Notice that this means working within the CAPM framework as the methodology cannot be applied directly to the DCF models.

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[22] Franco Modigliani and Merton H. Miller (1963), "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53, pp. 433-443.

[23] When a company uses a high level of debt financing, for example, there is significant risk of bankruptcy and all the costs associated with it. The so called costs of financial distress that occurs when a company is over-leveraged can increase its cost of capital. In contrast a company can generally decrease its cost of capital by taking on reasonable levels of debt, owing in part to the deductibility of interest from corporate taxes.

[24] This is a simplified treatment of what is generally a complex and on-going area of academic investigation. The roles of taxes, market imperfections and constraints, etc. are areas of on-going research and differing assumptions can yield subtly different formulations for how to formulate the weighted average cost of capital that is constant over all (or most) capital structures.

[25] Market value capital structures are used in estimating the overall cost of capital for the proxy companies.

Recognizing that under general conditions, the value of a firm can be decomposed into its value with and without a tax shield, I obtain:[26]

$$V = V_U + PV(ITS) \tag{8}$$

where $V = E + D$ is the total value of the firm as in Equation (7),
V_U is the "unlevered" value of the firm—its value if financed entirely by equity
$PV(ITS)$ represents the present value of the interest tax shields associated with debt

For a company with a fixed book-value capital structure and no additional costs to leverage, it can be shown that the formula above implies:

$$r_E = r_U + \frac{D}{E}(1 - \tau_c)(r_U - r_D) \tag{9}$$

where r_U is the "unlevered cost of capital"—the required return on assets if the firm's assets were financed with 100% equity and zero debt—and the other parameters are defined as in Equation (7).

Replacing each of these returns by their CAPM representation and simplifying them gives the following relationship between the "levered" equity beta β_L for a firm (i.e., the one observed in market data as a consequence of the firm's actual market value capital structure) and the "unlevered" beta β_U that would be measured for the same firm if it had no debt in its capital structure:

$$\beta_L = \beta_U + \frac{D}{E}(1 - \tau_c)(\beta_U - \beta_D) \tag{10}$$

where β_D is the beta on the firm's debt. The unlevered beta is assumed to be constant with respect to capital structure, reflecting as it does the systematic risk of the firm's assets. Since the beta on

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[26] This follows development in Fernandez (2003). Other standard papers in this area include Hamada (1972), Miles and Ezzell (1985), Harris and Pringle (1985), Fernandez (2006). (See Fernandez, P., "Levered and Unlevered Beta," IESE Business School Working Paper WP-488, University of Navarra, Jan 2003 (rev. May 2006); Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock," *Journal of Finance*, 27, May 1972, pp. 435-452; Miles, J.A. and J.R. Ezzell, "Reformulating Tax Shield Valuation: A Note," *Journal of Finance*, XL5, Dec 1985, pp. 1485-1492; Harris, R.S. and J.J. Pringle, "Risk-Adjusted Discount Rates Extensions form the Average-Risk Case," *Journal of Financial Research*, Fall 1985, pp. 237-244; Fernandez, P., "The Value of Tax Shields Depends Only on the Net Increases of Debt," IESE Business School Working Paper WP-613, University of Navarra, 2006.) Additional discussion can be found in Brealey, Myers, and Allen (2014).

an investment grade firm's debt is much lower than the beta of its assets (i.e., $\beta_D < \beta_U$), this equation embodies the fact that increasing financial leverage (and thereby increasing the debt to equity ratio) increases the systematic risk of *levered* equity (β_L).

An alternative formulation derived by Harris and Pringle (1985) provides the following equation that holds when the market value capital structures (rather than book value) are assumed to be held constant:

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D) \qquad (11)$$

Unlike Equation (10), Equation (11) does not include an adjustment for the corporate tax deduction. However, both equations account for the fact that increased financial leverage increases the systematic risk of equity that will be measured by its market beta. And both equations allow an analyst to adjust for differences in financial risk by translating back and forth between β_L and β_U. In principal, Equation (10) is more appropriate for use with regulated utilities, which are typically deemed to maintain a fixed book value capital structure. However, I employ both formulations when adjusting my CAPM estimates for financial risk, and consider the results as sensitivities in my analysis.

It is clear that the beta of debt needs to be determined as an input to either Equation (10), or Equation (11). Rather than estimating debt betas, I rely on the standard financial textbook of Professors Berk & DeMarzo, who report a debt beta of 0.05 for A rated debt and a beta of 0.10 for BBB rated debt.[27]

Once a decision on debt betas is made, the levered equity beta of each proxy company can be computed (in this case by Value Line) from market data and then translated to an unlevered beta at the company's market value capital structure. The unlevered betas for the proxy companies are comparable on an "apples to apples" basis, since they reflect the systematic risk inherent in the assets of the proxy companies, independent of their financing. The unlevered betas are averaged to produce an estimate of the industry's unlevered beta. To estimate the cost of equity for the regulated target company, this estimate of unlevered beta can be "re-levered" to the regulated

[27] Berk, J. & DeMarzo, P., *Corporate Finance, 2nd Edition.* 2011 Prentice Hall, p. 389.

company's capital structure, and CAPM reapplied with this levered beta, which reflects both the business and financial risk of the target company.

Hamada adjustment procedures—so-named for Professor Robert S. Hamada who contributed to their development[28]—are ubiquitous among finance practitioners when using the CAPM to estimate discount rates.

[28] Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock", *The Journal of Finance*, 27(2), 1971, pp. 435-452.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Dr. Bente Villadsen

RETURN ON EQUITY
EXHIBIT 303

December 30, 2019

EXHIBIT NW NATURAL 303

SUPPORTING SCHEDULES

Schedule No. BV-1

Table of Contents

Schedule No. BV-2

Full Sample

Classification of Companies by Assets

Company	Company Category
Atmos Energy	M
Chesapeake Utilities	R
New Jersey Resources	R
NiSource Inc.	R
Northwest Natural	M
ONE Gas Inc.	R
South Jersey Inds.	R
Southwest Gas	M
Spire Inc.	R
Amer. States Water	R
Amer. Water Works	R
California Water	R
Middlesex Water	R
York Water Co. (The)	R

Sources and Notes:

Calculations based on EEI definitions and Company 10K filings:

R = Regulated (greater than 80 percent of total assets are regulated).

M = Mostly Regulated (50 to 80 percent of total assets are regulated).

D = Diversified (less than 50 percent of total assets are regulated).

Schedule No. BV-3

Market Value of the Samples

Panel A: Atmos Energy

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$5,642	$5,642	$4,760	$3,902	$3,467	$3,238	$3,117	[a]
Shares Outstanding (in millions) - Common	118	118	111	106	104	101	100	[b]
Price per Share - Common	$110	$105	$88	$84	$77	$52	$52	[c]
Market Value of Common Equity	$12,954	$12,430	$9,783	$8,918	$7,998	$5,266	$5,222	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$12,954	$12,430	$9,783	$8,918	$7,998	$5,266	$5,222	[f]= [d] + [e]
Market to Book Value of Common Equity	2.30	2.20	2.06	2.29	2.31	1.63	1.68	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$504	$504	$453	$534	$649	$617	$775	[j]
Current Liabilities	$901	$901	$1,466	$746	$1,530	$917	$1,156	[k]
Current Portion of Long-Term Debt	$125	$125	$450	$0	$250	$0	$500	[l]
Net Working Capital	($273)	($273)	($563)	($211)	($631)	($300)	$119	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$75	$75	$245	$259	$670	$252	$0	[n]
Adjusted Short-Term Debt	$75	$75	$245	$211	$631	$252	$0	[o] = See Sources and Notes.
Long-Term Debt	$3,529	$3,529	$2,618	$3,067	$2,206	$2,455	$1,956	[p]
Book Value of Long-Term Debt	$3,729	$3,729	$3,313	$3,278	$3,087	$2,707	$2,456	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$3,162	$3,162	$3,382	$2,845	$2,669	$2,770	$2,676	
Carrying Amount	$3,085	$3,085	$3,085	$2,460	$2,460	$2,460	$2,460	
Adjustment to Book Value of Long-Term Debt	$77	$77	$297	$385	$209	$310	$216	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$3,806	$3,806	$3,610	$3,663	$3,296	$3,017	$2,672	[s] = [q] + [r].
Market Value of Debt	$3,806	$3,806	$3,610	$3,663	$3,296	$3,017	$2,672	[t] = [s].
MARKET VALUE OF FIRM	$16,759	$16,236	$13,393	$12,581	$11,294	$8,282	$7,895	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	77.29%	76.56%	73.04%	70.88%	70.82%	63.58%	66.15%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	22.71%	23.44%	26.96%	29.12%	29.18%	36.42%	33.85%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel B: Chesapeake Utilities

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$544	$544	$508	$462	$380	$351	$296	[a]
Shares Outstanding (in millions) - Common	16	16	16	16	15	15	10	[b]
Price per Share - Common	$94	$94	$78	$75	$61	$54	$46	[c]
Market Value of Common Equity	$1,538	$1,538	$1,271	$1,225	$933	$824	$450	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$1,538	$1,538	$1,271	$1,225	$933	$824	$450	[f]= [d] + [e]
Market to Book Value of Common Equity	2.82	2.83	2.50	2.65	2.46	2.35	1.52	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$124	$124	$116	$102	$87	$79	$80	[j]
Current Liabilities	$512	$512	$389	$272	$284	$200	$140	[k]
Current Portion of Long-Term Debt	$77	$77	$10	$12	$12	$9	$11	[l]
Net Working Capital	($311)	($311)	($263)	($157)	($185)	($112)	($48)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$301	$301	$235	$146	$180	$95	$48	[n]
Adjusted Short-Term Debt	$301	$301	$235	$146	$180	$95	$48	[o] = See Sources and Notes.
Long-Term Debt	$287	$287	$242	$202	$144	$156	$165	[p]
Book Value of Long-Term Debt	$665	$665	$487	$359	$336	$260	$224	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$324	$324	$215	$162	$165	$181	$137	
Carrying Amount	$327	$327	$205	$146	$154	$162	$122	
Adjustment to Book Value of Long-Term Debt	($3)	($3)	$10	$16	$11	$19	$15	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$662	$662	$497	$375	$347	$279	$239	[s] = [q] + [r].
Market Value of Debt	$662	$662	$497	$375	$347	$279	$239	[t] = [s].
MARKET VALUE OF FIRM	$2,199	$2,200	$1,768	$1,600	$1,281	$1,103	$690	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.91%	69.92%	71.88%	76.57%	72.88%	74.68%	65.32%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	30.09%	30.08%	28.12%	23.43%	27.12%	25.32%	34.68%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel C: New Jersey Resources

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$1,572	$1,572	$1,450	$1,285	$1,171	$1,123	$1,013	[a]
Shares Outstanding (in millions) - Common	90	90	88	86	86	85	84	[b]
Price per Share - Common	$45	$50	$43	$42	$37	$28	$28	[c]
Market Value of Common Equity	$4,035	$4,491	$3,815	$3,610	$3,186	$2,389	$2,352	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$4,035	$4,491	$3,815	$3,610	$3,186	$2,389	$2,352	[f]= [d] + [e]
Market to Book Value of Common Equity	2.57	2.86	2.63	2.81	2.72	2.13	2.32	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$510	$510	$737	$638	$605	$562	$695	[j]
Current Liabilities	$582	$582	$507	$776	$601	$403	$682	[k]
Current Portion of Long-Term Debt	$125	$125	$41	$186	$11	$36	$9	[l]
Net Working Capital	$53	$53	$270	$48	$15	$195	$23	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$99	$99	$57	$263	$245	$0	$175	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,212	$1,212	$1,220	$898	$968	$848	$627	[p]
Book Value of Long-Term Debt	$1,336	$1,336	$1,261	$1,084	$979	$884	$636	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$669	$669	$673	$732	$584	$587	$557	
Carrying Amount	$672	$672	$672	$708	$583	$558	$530	
Adjustment to Book Value of Long-Term Debt	($3)	($3)	$1	$24	$1	$29	$27	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,334	$1,334	$1,262	$1,108	$981	$913	$663	[s] = [q] + [r].
Market Value of Debt	$1,334	$1,334	$1,262	$1,108	$981	$913	$663	[t] = [s].
MARKET VALUE OF FIRM	$5,368	$5,825	$5,077	$4,718	$4,167	$3,302	$3,015	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	75.16%	77.11%	75.15%	76.52%	76.47%	72.36%	78.02%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	24.84%	22.89%	24.85%	23.48%	23.53%	27.64%	21.98%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel D: NiSource Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$5,096	$5,096	$5,069	$4,123	$3,811	$6,506	$6,028	[a]
Shares Outstanding (in millions) - Common	373	373	363	326	322	318	315	[b]
Price per Share - Common	$29	$29	$25	$26	$25	$18	$15	[c]
Market Value of Common Equity	$10,912	$10,787	$9,006	$8,423	$8,165	$5,852	$4,734	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$10,912	$10,787	$9,006	$8,423	$8,165	$5,852	$4,734	[f]= [d] + [e]
Market to Book Value of Common Equity	2.14	2.12	1.78	2.04	2.14	0.90	0.79	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$880	$880	$394	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$880	$880	$394	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$1,578	$1,578	$1,316	$1,281	$1,260	$2,336	$2,055	[j]
Current Liabilities	$3,814	$3,814	$2,560	$2,778	$2,696	$2,524	$3,431	[k]
Current Portion of Long-Term Debt	$20	$20	$598	$561	$312	$443	$530	[l]
Net Working Capital	($2,216)	($2,216)	($647)	($936)	($1,125)	$254	($847)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$2,081	$2,081	$600	$901	$1,101	$162	$1,101	[n]
Adjusted Short-Term Debt	$2,081	$2,081	$600	$901	$1,101	$0	$847	[o] = See Sources and Notes.
Long-Term Debt	$7,159	$7,159	$7,093	$6,777	$5,857	$8,881	$7,641	[p]
Book Value of Long-Term Debt	$9,260	$9,260	$8,290	$8,240	$7,270	$9,324	$9,018	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$7,228	$7,228	$8,603	$7,064	$6,976	$9,506	$8,697	
Carrying Amount	$7,155	$7,155	$7,797	$6,421	$6,382	$8,418	$8,135	
Adjustment to Book Value of Long-Term Debt	$73	$73	$807	$643	$594	$1,088	$562	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$9,333	$9,333	$9,097	$8,883	$7,863	$10,411	$9,580	[s] = [q] + [r].
Market Value of Debt	$9,333	$9,333	$9,097	$8,883	$7,863	$10,411	$9,580	[t] = [s].
MARKET VALUE OF FIRM	$21,125	$21,000	$18,497	$17,306	$16,028	$16,263	$14,313	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	51.65%	51.37%	48.69%	48.67%	50.94%	35.98%	33.07%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	4.17%	4.19%	2.13%	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	44.18%	44.44%	49.18%	51.33%	49.06%	64.02%	66.93%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel E: Northwest Natural

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$877	$877	$760	$865	$800	$777	$771	[a]
Shares Outstanding (in millions) - Common	30	30	29	29	28	27	27	[b]
Price per Share - Common	$71	$69	$61	$62	$61	$43	$46	[c]
Market Value of Common Equity	$2,157	$2,094	$1,770	$1,766	$1,684	$1,176	$1,248	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$2,157	$2,094	$1,770	$1,766	$1,684	$1,176	$1,248	[f]= [d] + [e]
Market to Book Value of Common Equity	2.46	2.39	2.33	2.04	2.10	1.51	1.62	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$239	$239	$181	$192	$202	$234	$219	[j]
Current Liabilities	$307	$307	$298	$235	$314	$328	$329	[k]
Current Portion of Long-Term Debt	$109	$109	$75	$62	$25	$0	$100	[l]
Net Working Capital	$41	$41	($42)	$19	($87)	($94)	($10)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$20	$20	$47	$0	$153	$190	$74	[n]
Adjusted Short-Term Debt	$0	$0	$42	$0	$87	$94	$10	[o] = See Sources and Notes.
Long-Term Debt	$807	$807	$684	$658	$570	$614	$622	[p]
Book Value of Long-Term Debt	$915	$915	$801	$720	$682	$707	$731	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$760	$760	$853	$793	$667	$757	$806	
Carrying Amount	$734	$734	$780	$719	$602	$662	$742	
Adjustment to Book Value of Long-Term Debt	$26	$26	$73	$74	$65	$95	$65	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$941	$941	$874	$794	$747	$802	$796	[s] = [q] + [r].
Market Value of Debt	$941	$941	$874	$794	$747	$802	$796	[t] = [s].
MARKET VALUE OF FIRM	$3,099	$3,035	$2,644	$2,560	$2,431	$1,979	$2,044	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.62%	68.98%	66.93%	68.98%	69.27%	59.45%	61.06%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	30.38%	31.02%	33.07%	31.02%	30.73%	40.55%	38.94%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel F: ONE Gas Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$2,108	$2,108	$2,022	$1,933	$1,876	$1,819	$1,780	[a]
Shares Outstanding (in millions) - Common	53	53	53	52	52	52	52	[b]
Price per Share - Common	$90	$91	$73	$71	$63	$43	$38	[c]
Market Value of Common Equity	$4,762	$4,782	$3,835	$3,719	$3,296	$2,221	$1,962	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$4,762	$4,782	$3,835	$3,719	$3,296	$2,221	$1,962	[f]= [d] + [e]
Market to Book Value of Common Equity	2.26	2.27	1.90	1.92	1.76	1.22	1.10	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$377	$377	$351	$412	$381	$478	$571	[j]
Current Liabilities	$578	$578	$749	$293	$218	$247	$268	[k]
Current Portion of Long-Term Debt	$6	$6	$300	$0	$0	$0	$0	[l]
Net Working Capital	($195)	($195)	($99)	$119	$163	$231	$303	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$293	$293	$185	$79	$0	$0	$0	[n]
Adjusted Short-Term Debt	$195	$195	$99	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,317	$1,317	$894	$1,193	$1,192	$1,201	$1,201	[p]
Book Value of Long-Term Debt	$1,518	$1,518	$1,292	$1,193	$1,192	$1,201	$1,201	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$1,400	$1,400	$1,300	$1,200	$1,200	$1,300	$1,200	
Carrying Amount	$1,300	$1,300	$1,200	$1,200	$1,200	$1,200	$1,000	
Adjustment to Book Value of Long-Term Debt	$100	$100	$100	$0	$0	$100	$200	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,618	$1,618	$1,392	$1,193	$1,192	$1,301	$1,401	[s] = [q] + [r].
Market Value of Debt	$1,618	$1,618	$1,392	$1,193	$1,192	$1,301	$1,401	[t] = [s].
MARKET VALUE OF FIRM	$6,381	$6,401	$5,228	$4,911	$4,488	$3,522	$3,363	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	74.64%	74.72%	73.37%	75.71%	73.44%	63.06%	58.33%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	25.36%	25.28%	26.63%	24.29%	26.56%	36.94%	41.67%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel G: South Jersey Inds.

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$1,476	$1,476	$1,304	$1,279	$1,278	$970	$872	[a]
Shares Outstanding (in millions) - Common	92	92	86	80	79	68	66	[b]
Price per Share - Common	$31	$33	$32	$35	$30	$25	$29	[c]
Market Value of Common Equity	$2,903	$3,070	$2,749	$2,815	$2,418	$1,725	$1,939	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$2,903	$3,070	$2,749	$2,815	$2,418	$1,725	$1,939	[f]= [d] + [e]
Market to Book Value of Common Equity	1.97	2.08	2.11	2.20	1.89	1.78	2.22	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$429	$429	$2,425	$356	$376	$528	$475	[j]
Current Liabilities	$1,646	$1,646	$2,115	$734	$758	$835	$701	[k]
Current Portion of Long-Term Debt	$480	$480	$1,369	$16	$245	$86	$85	[l]
Net Working Capital	($737)	($737)	$1,679	($362)	($138)	($221)	($142)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$680	$680	$336	$296	$145	$366	$207	[n]
Adjusted Short-Term Debt	$680	$680	$0	$296	$138	$221	$142	[o] = See Sources and Notes.
Long-Term Debt	$1,799	$1,799	$1,404	$1,067	$831	$879	$805	[p]
Book Value of Long-Term Debt	$2,960	$2,960	$2,773	$1,379	$1,214	$1,185	$1,032	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$895	$895	$839	$1,081	$1,079	$1,059	$713	
Carrying Amount	$893	$893	$822	$1,047	$1,036	$1,009	$701	
Adjustment to Book Value of Long-Term Debt	$2	$2	$17	$33	$43	$49	$12	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,961	$2,961	$2,789	$1,412	$1,257	$1,234	$1,044	[s] = [q] + [r].
Market Value of Debt	$2,961	$2,961	$2,789	$1,412	$1,257	$1,234	$1,044	[t] = [s].
MARKET VALUE OF FIRM	$5,864	$6,032	$5,538	$4,228	$3,675	$2,959	$2,983	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	49.50%	50.90%	49.63%	66.60%	65.79%	58.29%	65.01%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	50.50%	49.10%	50.37%	33.40%	34.21%	41.71%	34.99%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
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Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel H: Southwest Gas

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$2,419	$2,419	$1,933	$1,717	$1,644	$1,552	$1,467	[a]
Shares Outstanding (in millions) - Common	54	54	49	48	47	47	47	[b]
Price per Share - Common	$89	$89	$76	$75	$75	$54	$52	[c]
Market Value of Common Equity	$4,830	$4,830	$3,729	$3,576	$3,568	$2,519	$2,426	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$4,830	$4,830	$3,729	$3,576	$3,568	$2,519	$2,426	[f]= [d] + [e]
Market to Book Value of Common Equity	2.00	2.00	1.93	2.08	2.17	1.62	1.65	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$752	$752	$696	$484	$432	$481	$410	[j]
Current Liabilities	$727	$727	$664	$490	$583	$466	$383	[k]
Current Portion of Long-Term Debt	$46	$46	$32	$27	$50	$20	$24	[l]
Net Working Capital	$72	$72	$64	$21	($101)	$35	$52	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$23	$3	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$2,430	$2,430	$2,038	$1,686	$1,428	$1,522	$1,366	[p]
Book Value of Long-Term Debt	$2,476	$2,476	$2,070	$1,713	$1,477	$1,542	$1,390	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$2,155	$2,155	$1,920	$1,680	$1,646	$1,796	$1,463	
Carrying Amount	$2,107	$2,107	$1,799	$1,550	$1,551	$1,657	$1,392	
Adjustment to Book Value of Long-Term Debt	$48	$48	$121	$130	$94	$139	$71	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,523	$2,523	$2,191	$1,843	$1,572	$1,681	$1,461	[s] = [q] + [r].
Market Value of Debt	$2,523	$2,523	$2,191	$1,843	$1,572	$1,681	$1,461	[t] = [s].
MARKET VALUE OF FIRM	$7,353	$7,353	$5,920	$5,419	$5,140	$4,200	$3,887	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	65.68%	65.68%	63.00%	65.99%	69.42%	59.98%	62.42%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	34.32%	34.32%	37.00%	34.01%	30.58%	40.02%	37.58%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel I: Spire Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$2,371	$2,371	$2,308	$2,028	$1,802	$1,609	$1,534	[a]
Shares Outstanding (in millions) - Common	51	51	51	48	46	43	43	[b]
Price per Share - Common	$82	$84	$69	$71	$68	$52	$48	[c]
Market Value of Common Equity	$4,170	$4,288	$3,498	$3,427	$3,109	$2,260	$2,065	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$4,170	$4,288	$3,498	$3,427	$3,109	$2,260	$2,065	[f]= [d] + [e]
Market to Book Value of Common Equity	1.76	1.81	1.52	1.69	1.73	1.40	1.35	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$242	$242	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$242	$242	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$650	$650	$585	$629	$453	$483	$995	[j]
Current Liabilities	$1,220	$1,220	$814	$910	$492	$720	$320	[k]
Current Portion of Long-Term Debt	$165	$165	$156	$0	$0	$80	$0	[l]
Net Working Capital	($405)	($405)	($74)	($281)	($38)	($157)	$675	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$434	$434	$191	$451	$98	$211	$0	[n]
Adjusted Short-Term Debt	$405	$405	$74	$281	$38	$157	$0	[o] = See Sources and Notes.
Long-Term Debt	$2,042	$2,042	$2,025	$1,925	$1,840	$1,736	$977	[p]
Book Value of Long-Term Debt	$2,612	$2,612	$2,254	$2,206	$1,878	$1,974	$977	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$2,074	$2,074	$2,210	$2,257	$1,944	$1,937	$954	
Carrying Amount	$2,076	$2,076	$2,095	$2,084	$1,852	$1,851	$913	
Adjustment to Book Value of Long-Term Debt	($2)	($2)	$115	$173	$93	$86	$41	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,611	$2,611	$2,369	$2,379	$1,971	$2,060	$1,018	[s] = [q] + [r].
Market Value of Debt	$2,611	$2,611	$2,369	$2,379	$1,971	$2,060	$1,018	[t] = [s].
MARKET VALUE OF FIRM	$7,023	$7,141	$5,867	$5,807	$5,080	$4,320	$3,083	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59.38%	60.05%	59.62%	59.02%	61.21%	52.31%	66.98%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	3.45%	3.39%	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	37.17%	36.56%	40.38%	40.98%	38.79%	47.69%	33.02%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel J: Amer. States Water

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$579	$579	$539	$513	$477	$478	$495	[a]
Shares Outstanding (in millions) - Common	37	37	37	37	37	37	39	[b]
Price per Share - Common	$88	$74	$57	$49	$42	$37	$32	[c]
Market Value of Common Equity	$3,250	$2,735	$2,095	$1,779	$1,523	$1,390	$1,233	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$3,250	$2,735	$2,095	$1,779	$1,523	$1,390	$1,233	[f]= [d] + [e]
Market to Book Value of Common Equity	5.62	4.72	3.89	3.47	3.19	2.91	2.49	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$122	$122	$141	$150	$133	$150	$198	[j]
Current Liabilities	$106	$106	$130	$140	$160	$95	$128	[k]
Current Portion of Long-Term Debt	$2	$2	$40	$0	$0	$0	$21	[l]
Net Working Capital	$18	$18	$52	$9	($27)	$55	$92	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$44	$64	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$27	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$476	$476	$358	$321	$321	$326	$311	[p]
Book Value of Long-Term Debt	$478	$478	$398	$321	$348	$326	$332	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$388	$388	$424	$424	$404	$417	$413	
Carrying Amount	$325	$325	$325	$326	$326	$326	$332	
Adjustment to Book Value of Long-Term Debt	$63	$63	$99	$98	$78	$91	$80	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$541	$541	$497	$419	$426	$417	$412	[s] = [q] + [r].
Market Value of Debt	$541	$541	$497	$419	$426	$417	$412	[t] = [s].
MARKET VALUE OF FIRM	$3,791	$3,276	$2,592	$2,198	$1,949	$1,807	$1,646	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	85.73%	83.48%	80.82%	80.93%	78.13%	76.93%	74.94%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	14.27%	16.52%	19.18%	19.07%	21.87%	23.07%	25.06%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel K: Amer. Water Works

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$6,027	$6,027	$5,736	$5,384	$5,153	$5,053	$4,873	[a]
Shares Outstanding (in millions) - Common	181	181	180	178	178	180	179	[b]
Price per Share - Common	$124	$117	$83	$81	$79	$50	$48	[c]
Market Value of Common Equity	$22,443	$21,123	$14,903	$14,362	$14,130	$8,984	$8,668	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$22,443	$21,123	$14,903	$14,362	$14,130	$8,984	$8,668	[f]= [d] + [e]
Market to Book Value of Common Equity	3.72	3.50	2.60	2.67	2.74	1.78	1.78	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$741	$741	$833	$808	$691	$890	$708	[j]
Current Liabilities	$1,317	$1,317	$2,951	$2,661	$1,740	$1,512	$1,235	[k]
Current Portion of Long-Term Debt	$25	$25	$364	$686	$54	$62	$15	[l]
Net Working Capital	($551)	($551)	($1,754)	($1,167)	($995)	($560)	($512)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$397	$397	$1,649	$1,117	$950	$821	$702	[n]
Adjusted Short-Term Debt	$397	$397	$1,649	$1,117	$950	$560	$512	[o] = See Sources and Notes.
Long-Term Debt	$8,745	$8,745	$6,352	$5,659	$5,861	$5,448	$5,234	[p]
Book Value of Long-Term Debt	$9,167	$9,167	$8,365	$7,462	$6,865	$6,070	$5,761	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$7,921	$7,921	$7,643	$7,044	$6,757	$6,404	$5,783	
Carrying Amount	$7,638	$7,638	$6,809	$6,320	$5,914	$5,491	$5,224	
Adjustment to Book Value of Long-Term Debt	$283	$283	$834	$724	$843	$913	$559	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$9,450	$9,450	$9,199	$8,186	$7,708	$6,983	$6,320	[s] = [q] + [r].
Market Value of Debt	$9,450	$9,450	$9,199	$8,186	$7,708	$6,983	$6,320	[t] = [s].
MARKET VALUE OF FIRM	$31,893	$30,573	$24,102	$22,548	$21,838	$15,967	$14,988	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.37%	69.09%	61.83%	63.70%	64.70%	56.27%	57.83%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	29.63%	30.91%	38.17%	36.30%	35.30%	43.73%	42.17%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel L: California Water

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$723	$723	$686	$662	$637	$623	$596	[a]
Shares Outstanding (in millions) - Common	48	48	48	48	48	48	48	[b]
Price per Share - Common	$55	$50	$39	$37	$33	$23	$23	[c]
Market Value of Common Equity	$2,661	$2,414	$1,898	$1,760	$1,569	$1,117	$1,121	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$2,661	$2,414	$1,898	$1,760	$1,569	$1,117	$1,121	[f]= [d] + [e]
Market to Book Value of Common Equity	3.68	3.34	2.77	2.66	2.46	1.79	1.88	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$206	$206	$190	$171	$159	$150	$151	[j]
Current Liabilities	$331	$331	$622	$361	$202	$270	$222	[k]
Current Portion of Long-Term Debt	$7	$7	$105	$36	$6	$7	$7	[l]
Net Working Capital	($119)	($119)	($328)	($154)	($37)	($114)	($65)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$165	$165	$325	$190	$75	$127	$81	[n]
Adjusted Short-Term Debt	$119	$119	$325	$154	$37	$114	$65	[o] = See Sources and Notes.
Long-Term Debt	$821	$821	$415	$520	$556	$417	$423	[p]
Book Value of Long-Term Debt	$946	$946	$845	$710	$599	$537	$495	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$850	$850	$607	$631	$600	$534	$511	
Carrying Amount	$815	$815	$532	$558	$519	$426	$434	
Adjustment to Book Value of Long-Term Debt	$35	$35	$76	$73	$82	$108	$77	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$981	$981	$920	$783	$680	$645	$572	[s] = [q] + [r].
Market Value of Debt	$981	$981	$920	$783	$680	$645	$572	[t] = [s].
MARKET VALUE OF FIRM	$3,641	$3,395	$2,818	$2,543	$2,249	$1,762	$1,693	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	73.07%	71.12%	67.34%	69.21%	69.75%	63.38%	66.22%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	26.93%	28.88%	32.66%	30.79%	30.25%	36.62%	33.78%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel M: Middlesex Water

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$263	$263	$236	$222	$212	$201	$192	[a]
Shares Outstanding (in millions) - Common	17	17	16	16	16	16	16	[b]
Price per Share - Common	$60	$60	$43	$40	$40	$22	$21	[c]
Market Value of Common Equity	$1,000	$992	$699	$652	$656	$362	$336	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$1,000	$992	$699	$652	$656	$362	$336	[f]= [d] + [e]
Market to Book Value of Common Equity	3.80	3.77	2.96	2.93	3.09	1.80	1.75	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$2	[h]
Market Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$2	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$32	$32	$31	$30	$28	$29	$29	[j]
Current Liabilities	$103	$103	$82	$55	$39	$49	$54	[k]
Current Portion of Long-Term Debt	$8	$8	$7	$6	$6	$6	$6	[l]
Net Working Capital	($62)	($62)	($43)	($20)	($5)	($15)	($20)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$59	$59	$39	$17	$11	$18	$28	[n]
Adjusted Short-Term Debt	$59	$59	$39	$17	$5	$15	$20	[o] = See Sources and Notes.
Long-Term Debt	$170	$170	$142	$136	$131	$136	$132	[p]
Book Value of Long-Term Debt	$237	$237	$188	$160	$142	$156	$158	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$103	$103	$98	$85	$88	$91	$80	
Carrying Amount	$101	$101	$95	$83	$86	$89	$88	
Adjustment to Book Value of Long-Term Debt	$1	$1	$3	$2	$3	$1	($8)	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$238	$238	$191	$162	$145	$158	$150	[s] = [q] + [r].
Market Value of Debt	$238	$238	$191	$162	$145	$158	$150	[t] = [s].
MARKET VALUE OF FIRM	$1,241	$1,233	$892	$816	$803	$522	$488	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	80.59%	80.46%	78.32%	79.89%	81.68%	69.29%	68.71%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.20%	0.20%	0.27%	0.30%	0.30%	0.47%	0.50%	[w] = [i] / [u].
Debt - Market Value Ratio	19.22%	19.34%	21.41%	19.81%	18.02%	30.24%	30.79%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-3

Market Value of the Samples

Panel N: York Water Co. (The)

($MM)

	DCF Capital Structure	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	2nd Quarter, 2015	2nd Quarter, 2014	Notes
MARKET VALUE OF COMMON EQUITY								
	DCF Capital Structure	06/30/19	06/30/18	06/30/17	06/30/16	06/30/15	06/30/14	
Book Value, Common Shareholder's Equity	$129	$129	$122	$115	$112	$107	$102	[a]
Shares Outstanding (in millions) - Common	13	13	13	13	13	13	13	[b]
Price per Share - Common	$38	$35	$32	$37	$30	$22	$21	[c]
Market Value of Common Equity	$490	$453	$413	$474	$391	$283	$265	[d] = [b] x [c].
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity	$490	$453	$413	$474	$391	$283	$265	[f]= [d] + [e]
Market to Book Value of Common Equity	3.79	3.51	3.38	4.11	3.49	2.63	2.61	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$9	$9	$9	$8	$13	$10	$10	[j]
Current Liabilities	$10	$10	$19	$10	$6	$7	$9	[k]
Current Portion of Long-Term Debt	$0	$0	$11	$0	$0	$0	$0	[l]
Net Working Capital	($1)	($1)	$1	($1)	$7	$3	$1	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$96	$96	$81	$88	$85	$85	$85	[p]
Book Value of Long-Term Debt	$96	$96	$92	$88	$85	$85	$85	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt	$105	$105	$108	$99	$102	$100	$94	
Carrying Amount	$96	$96	$93	$87	$88	$85	$85	
Adjustment to Book Value of Long-Term Debt	$9	$9	$15	$12	$14	$15	$9	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$105	$105	$107	$100	$99	$100	$94	[s] = [q] + [r].
Market Value of Debt	$105	$105	$107	$100	$99	$100	$94	[t] = [s].
MARKET VALUE OF FIRM	$595	$558	$521	$574	$490	$383	$359	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	82.32%	81.14%	79.41%	82.62%	79.78%	73.87%	73.80%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	17.68%	18.86%	20.59%	17.38%	20.22%	26.13%	26.20%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of August 30, 2019
Capital structure from 2nd Quarter, 2019 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter, 2019 balance sheet information and a 15-trading day average closing price ending on 8/30/2019.
Prices are reported in Workpaper #1 to Schedule No. BV-6.
[e] = Market Value of GP equity is not estimated here.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2014 to 2018 10-Ks.

Schedule No. BV-4

Full Sample

Capital Structure Summary of the Full Sample

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio
	[1]	[2]	[3]	[4]	[5]	[6]
Atmos Energy	0.77	0.00	0.23	0.70	0.00	0.30
Chesapeake Utilities	0.70	0.00	0.30	0.73	0.00	0.27
New Jersey Resources	0.75	0.00	0.25	0.76	0.00	0.24
NiSource Inc.	0.52	0.04	0.44	0.45	0.01	0.54
Northwest Natural	0.70	0.00	0.30	0.66	0.00	0.34
ONE Gas Inc.	0.75	0.00	0.25	0.70	0.00	0.30
South Jersey Inds.	0.50	0.00	0.50	0.60	0.00	0.40
Southwest Gas	0.66	0.00	0.34	0.64	0.00	0.36
Spire Inc.	0.59	0.03	0.37	0.59	0.00	0.41
Amer. States Water	0.86	0.00	0.14	0.79	0.00	0.21
Amer. Water Works	0.70	0.00	0.30	0.62	0.00	0.38
California Water	0.73	0.00	0.27	0.68	0.00	0.32
Middlesex Water	0.81	0.00	0.19	0.77	0.00	0.23
York Water Co. (The)	0.82	0.00	0.18	0.79	0.00	0.21
Full Sample Average	0.70	0.01	0.29	0.68	0.00	0.32
Gas Sample Average	0.66	0.01	0.33	0.65	0.00	0.35
Water Sample Average	0.78	0.00	0.22	0.73	0.00	0.27

Sources and Notes:
[1], [4]:Workpaper #1 to Schedule No. BV-4.
[2], [5]:Workpaper #2 to Schedule No. BV-4.
[3], [6]:Workpaper #3 to Schedule No. BV-4.
Values in this table may not add up exactly to 1.0 because of rounding.

Schedule No. BV-5

Full Sample

Estimated Growth Rates of the Full Sample

	Thomson Reuters IBES Estimate		Value Line			
Company	Long-Term Growth Rate	Number of Estimates	EPS Year 2019 Estimate	EPS Year 2022-2024 Estimate	Annualized Growth Rate	Combined Growth Rate
	[1]	[2]	[3]	[4]	[5]	[6]
Atmos Energy	6.5%	2	4.30	5.60	6.8%	6.6%
Chesapeake Utilities	n/a	0	3.50	5.00	9.3%	9.3%
New Jersey Resources	6.0%	1	1.90	2.50	7.1%	6.6%
NiSource Inc.	4.7%	3	1.30	1.80	8.5%	5.6%
Northwest Natural	4.0%	1	2.40	3.50	9.9%	6.9%
ONE Gas Inc.	5.0%	1	3.45	4.75	8.3%	6.7%
South Jersey Inds.	4.6%	1	1.10	2.40	21.5%	13.1%
Southwest Gas	6.1%	2	4.00	5.80	9.7%	7.3%
Spire Inc.	2.7%	2	3.70	5.00	7.8%	4.4%
Amer. States Water	n/a	0	1.95	2.75	9.0%	9.0%
Amer. Water Works	8.2%	1	3.60	4.70	6.9%	7.5%
California Water	n/a	0	1.45	2.00	8.4%	8.4%
Middlesex Water	n/a	0	2.15	2.45	3.3%	3.3%
York Water Co. (The)	n/a	0	1.10	1.70	11.5%	11.5%

Sources and Notes:

[1] - [2]: Thomson Reuters as of August 30, 2019.
[3] - [4]: From Valueline Investment Analyzer as of 08/31/2019.
[5]: ([4] / [3]) ^ (1/4) - 1.
[6]: ([1] x [2] + [5]) / ([2] + 1).

Schedule No. BV-6

DCF Cost of Equity of the Full Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield (t+1)	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Atmos Energy	$109.59	$0.53	0.49%	6.6%	1.6%	8.7%
Chesapeake Utilities	$93.73	$0.41	0.44%	9.3%	2.3%	11.2%
New Jersey Resources	$44.87	$0.31	0.71%	6.6%	1.6%	9.6%
NiSource Inc.	$29.23	$0.20	0.69%	5.6%	1.4%	8.5%
Northwest Natural	$70.92	$0.48	0.68%	6.9%	1.7%	9.8%
ONE Gas Inc.	$90.31	$0.50	0.56%	6.7%	1.6%	9.0%
South Jersey Inds.	$31.42	$0.29	0.94%	13.1%	3.1%	17.3%
Southwest Gas	$88.91	$0.55	0.62%	7.3%	1.8%	10.0%
Spire Inc.	$82.08	$0.59	0.73%	4.4%	1.1%	7.5%
Amer. States Water	$88.25	$0.31	0.35%	9.0%	2.2%	10.5%
Amer. Water Works	$124.24	$0.50	0.41%	7.5%	1.8%	9.3%
California Water	$55.27	$0.20	0.36%	8.4%	2.0%	9.9%
Middlesex Water	$60.41	$0.24	0.40%	3.3%	0.8%	5.0%
York Water Co. (The)	$37.75	$0.17	0.47%	11.5%	2.8%	13.6%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. BV-6.
[2]: Workpaper #2 to Schedule No. BV-6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Schedule No. BV-5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Schedule No. BV-6

DCF Cost of Equity of the Full Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price	Most Recent Dividend	Combined Long-Term Growth Rate	Growth Rate: Year 6	Growth Rate: Year 7	Growth Rate: Year 8	Growth Rate: Year 9	Growth Rate: Year 10	GDP Long-Term Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Atmos Energy	$109.59	$0.53	6.6%	6.2%	5.7%	5.3%	4.9%	4.4%	4.0%	6.4%
Chesapeake Utilities	$93.73	$0.41	9.3%	8.4%	7.6%	6.7%	5.8%	4.9%	4.0%	6.6%
New Jersey Resources	$44.87	$0.31	6.6%	6.1%	5.7%	5.3%	4.9%	4.4%	4.0%	7.4%
NiSource Inc.	$29.23	$0.20	5.6%	5.3%	5.1%	4.8%	4.5%	4.3%	4.0%	7.2%
Northwest Natural	$70.92	$0.48	6.9%	6.5%	6.0%	5.5%	5.0%	4.5%	4.0%	7.4%
ONE Gas Inc.	$90.31	$0.50	6.7%	6.2%	5.8%	5.3%	4.9%	4.4%	4.0%	6.8%
South Jersey Inds.	$31.42	$0.29	13.1%	11.6%	10.0%	8.5%	7.0%	5.5%	4.0%	10.6%
Southwest Gas	$88.91	$0.55	7.3%	6.8%	6.2%	5.7%	5.1%	4.6%	4.0%	7.2%
Spire Inc.	$82.08	$0.59	4.4%	4.3%	4.3%	4.2%	4.1%	4.1%	4.0%	7.1%
Amer. States Water	$88.25	$0.31	9.0%	8.1%	7.3%	6.5%	5.7%	4.8%	4.0%	6.0%
Amer. Water Works	$124.24	$0.50	7.5%	7.0%	6.4%	5.8%	5.2%	4.6%	4.0%	6.1%
California Water	$55.27	$0.20	8.4%	7.6%	6.9%	6.2%	5.5%	4.7%	4.0%	6.0%
Middlesex Water	$60.41	$0.24	3.3%	3.4%	3.5%	3.7%	3.8%	3.9%	4.0%	5.6%
York Water Co. (The)	$37.75	$0.17	11.5%	10.2%	9.0%	7.7%	6.5%	5.2%	4.0%	7.1%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. BV-6.
[2]: Workpaper #2 to Schedule No. BV-6.
[3]: Schedule No. BV-5, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: BlueChip Economic Indicators, March, 2019 This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Schedule No. BV-6.

Schedule No. BV-7

Overall After-Tax DCF Cost of Capital of the Full Sample

Panel A: Simple DCF Method (Quarterly)

Company	2nd Quarter, 2019 S&P Bond Rating	2nd Quarter, 2019 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	Natural's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Atmos Energy	A	-	8.7%	0.77	-	0.00	3.2%	0.23	27.0%	7.2%
Chesapeake Utilities	A	-	11.2%	0.70	-	0.00	3.2%	0.30	27.0%	8.5%
New Jersey Resources	A	-	9.6%	0.75	-	0.00	3.2%	0.25	27.0%	7.8%
NiSource Inc.	BBB	BBB	8.5%	0.52	3.6%	0.04	3.6%	0.44	27.0%	5.7%
Northwest Natural	A	-	9.8%	0.70	-	0.00	3.2%	0.30	27.0%	7.6%
ONE Gas Inc.	A	-	9.0%	0.75	-	0.00	3.2%	0.25	27.0%	7.3%
South Jersey Inds.	BBB	-	17.3%	0.50	-	0.00	3.6%	0.50	27.0%	9.9%
Southwest Gas	BBB	-	10.0%	0.66	-	0.00	3.6%	0.34	27.0%	7.5%
Spire Inc.	A	A	7.5%	0.59	3.2%	0.03	3.2%	0.37	27.0%	5.4%
Amer. States Water	A	-	10.5%	0.86	-	0.00	3.2%	0.14	27.0%	9.3%
Amer. Water Works	A	-	9.3%	0.70	-	0.00	3.2%	0.30	27.0%	7.2%
California Water	A	-	9.9%	0.73	-	0.00	3.2%	0.27	27.0%	7.9%
Middlesex Water	A	A	5.0%	0.81	3.2%	0.00	3.2%	0.19	27.0%	4.5%
York Water Co. (The)	A	-	13.6%	0.82	-	0.00	3.2%	0.18	27.0%	11.6%
Simple Full Sample Average			10.0%	0.70	3.3%	0.01	3.3%	0.29	27.0%	7.7%
Simple Gas Sample Average			10.2%	0.66	3.4%	0.01	3.3%	0.33	27.0%	7.4%
Simple Water Sample Average			9.6%	0.78	3.2%	0.00	3.2%	0.22	27.0%	8.1%

Sources and Notes:

[1]: Bloomberg as of August 31, 2019.

[2]: Preferred ratings were assumed equal to debt rating

[3]: Schedule No. BV-6; Panel A, [6].

[4]: Schedule No. BV-4, [1].

[5]: Workpaper #2 to Schedule No. BV-11, Panel C.

[6]: Schedule No. BV-4, [2].

[7]: Workpaper #2 to Schedule No. BV-11, Panel B.

[8]: Schedule No. BV-4, [3].

[9]: Provided by Northwest Natural.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 150 basis points

Schedule No. BV-7

Overall After-Tax DCF Cost of Capital of the Full Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	2nd Quarter, 2019 S&P Bond Rating	2nd Quarter, 2019 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	Natural's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Atmos Energy	A	-	6.4%	0.77	-	0.00	3.2%	0.23	27.0%	5.5%
Chesapeake Utilities	A	-	6.6%	0.70	-	0.00	3.2%	0.30	27.0%	5.3%
New Jersey Resources	A	-	7.4%	0.75	-	0.00	3.2%	0.25	27.0%	6.2%
NiSource Inc.	BBB	BBB	7.2%	0.52	3.6%	0.04	3.6%	0.44	27.0%	5.0%
Northwest Natural	A	-	7.4%	0.70	-	0.00	3.2%	0.30	27.0%	5.9%
ONE Gas Inc.	A	-	6.8%	0.75	-	0.00	3.2%	0.25	27.0%	5.6%
South Jersey Inds.	BBB	-	10.6%	0.50	-	0.00	3.6%	0.50	27.0%	6.6%
Southwest Gas	BBB	-	7.2%	0.66	-	0.00	3.6%	0.34	27.0%	5.6%
Spire Inc.	A	A	7.1%	0.59	3.2%	0.03	3.2%	0.37	27.0%	5.2%
Amer. States Water	A	-	6.0%	0.86	-	0.00	3.2%	0.14	27.0%	5.5%
Amer. Water Works	A	-	6.1%	0.70	-	0.00	3.2%	0.30	27.0%	5.0%
California Water	A	-	6.0%	0.73	-	0.00	3.2%	0.27	27.0%	5.0%
Middlesex Water	A	A	5.6%	0.81	3.2%	0.00	3.2%	0.19	27.0%	5.0%
York Water Co. (The)	A	-	7.1%	0.82	-	0.00	3.2%	0.18	27.0%	6.3%
Multi-Stage Full Sample Average			7.0%	0.70	3.3%	0.01	3.3%	0.29	27.0%	5.5%
Multi-Stage Gas Sample Average			7.4%	0.66	3.4%	0.01	3.3%	0.33	27.0%	5.6%
Multi-Stage Water Sample Average			6.2%	0.78	3.2%	0.00	3.2%	0.22	27.0%	5.3%

Sources and Notes:

[1]: Bloomberg as of August 31, 2019.

[2]: Preferred ratings were assumed equal to debt rating

[3]: Schedule No. BV-6, Panel B, [10].

[4]: Schedule No. BV-4, [1].

[5]: Workpaper #2 to Schedule No. BV-11, Panel C.

[6]: Schedule No. BV-4, [2].

[7]: Workpaper #2 to Schedule No. BV-11, Panel B.

[8]: Schedule No. BV-4, [3].

[9]: Provided by Northwest Natural.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 150 basis points

Schedule No. BV-8

DCF Cost of Equity at Northwest Natural's Proposed Capital Structure

Full Sample

	Overall After - Tax Cost of Capital	Northwest Natural's Representative Regulatory % Debt	Representative Cost of A Rated Utility Debt	Northwest Natural's Representative Income Tax Rate	Northwest Natural's Representative Regulatory % Equity	Estimated Return on Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Simple DCF Quarterly	7.7%	50.0%	3.2%	27.0%	50.0%	13.0%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.5%	50.0%	3.2%	27.0%	50.0%	8.8%
Gas Sample						
Simple DCF Quarterly	7.4%	50.0%	3.2%	27.0%	50.0%	12.5%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.6%	50.0%	3.2%	27.0%	50.0%	9.0%
Water Sample						
Simple DCF Quarterly	8.1%	50.0%	3.2%	27.0%	50.0%	13.9%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.3%	50.0%	3.2%	27.0%	50.0%	8.4%

Sources and Notes:
[1]: Schedule No. BV-7; Panels A-B, [10].
[2]: Provided by Northwest Natural.
[3]: Based on a A rating. Yield from Bloomberg as of August 30, 2019.
[4]: Provided by Northwest Natural.
[5]: Provided by Northwest Natural.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. BV-9 Risk-Free Rates

BCEI Forecast of 10 year U.S. Treasury Yield	**[a]**	**3.10%**
Long-run Average of 20 year U.S. Treasury Yield	[b]	5.02%
Long-run Average of 10 year U.S. Treasury Yield	[c]	4.54%
Maturity Premium	**[d] = [b] - [c]**	**0.50%**
Base Projection of 20 year U.S. Treasury Yield	**[e] = [a] + [d]**	**3.60%**

Sources and Notes:
[a]: Blue Chip Economic Indicators, March 2019. Projection of 2021 Yield.
[b], [c]: Bloomberg as of 8/31/2019, see Workpaper #1 to Schedule No. BV-9.

Schedule No. BV-10

Risk Positioning Cost of Equity of the Full Sample (Using Value Line Betas)

Panel A: Scenario 1 - Long-Term Risk Free Rate of 3.60%, Long-Term Market Risk Premium of 6.91%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Atmos Energy	3.60%	0.60	6.91%	7.7%	8.3%
Chesapeake Utilities	3.60%	0.65	6.91%	8.1%	8.6%
New Jersey Resources	3.60%	0.70	6.91%	8.4%	8.9%
NiSource Inc.	3.60%	0.55	6.91%	7.4%	8.1%
Northwest Natural	3.60%	0.60	6.91%	7.7%	8.3%
ONE Gas Inc.	3.60%	0.65	6.91%	8.1%	8.6%
South Jersey Inds.	3.60%	0.80	6.91%	9.1%	9.4%
Southwest Gas	3.60%	0.70	6.91%	8.4%	8.9%
Spire Inc.	3.60%	0.65	6.91%	8.1%	8.6%
Amer. States Water	3.60%	0.65	6.91%	8.1%	8.6%
Amer. Water Works	3.60%	0.60	6.91%	7.7%	8.3%
California Water	3.60%	0.70	6.91%	8.4%	8.9%
Middlesex Water	3.60%	0.70	6.91%	8.4%	8.9%
York Water Co. (The)	3.60%	0.75	6.91%	8.8%	9.2%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: From Valueline Investment Analyzer as of 08/31/2019.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-10

Risk Positioning Cost of Equity of the Full Sample (Using Value Line Betas)

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.35%, Long-Term Market Risk Premium of 7.91%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Atmos Energy	3.35%	0.60	7.91%	8.1%	8.7%
Chesapeake Utilities	3.35%	0.65	7.91%	8.5%	9.0%
New Jersey Resources	3.35%	0.70	7.91%	8.9%	9.3%
NiSource Inc.	3.35%	0.55	7.91%	7.7%	8.4%
Northwest Natural	3.35%	0.60	7.91%	8.1%	8.7%
ONE Gas Inc.	3.35%	0.65	7.91%	8.5%	9.0%
South Jersey Inds.	3.35%	0.80	7.91%	9.7%	10.0%
Southwest Gas	3.35%	0.70	7.91%	8.9%	9.3%
Spire Inc.	3.35%	0.65	7.91%	8.5%	9.0%
Amer. States Water	3.35%	0.65	7.91%	8.5%	9.0%
Amer. Water Works	3.35%	0.60	7.91%	8.1%	8.7%
California Water	3.35%	0.70	7.91%	8.9%	9.3%
Middlesex Water	3.35%	0.70	7.91%	8.9%	9.3%
York Water Co. (The)	3.35%	0.75	7.91%	9.3%	9.7%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: From Valueline Investment Analyzer as of 08/31/2019.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-11

Overall After-Tax Risk Positioning Cost of Capital of the Full Sample (Using Value Line Betas)

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 3.60%, Long-Term Market Risk Premium of 6.91%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	Northwest Natural's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1.5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Atmos Energy	7.7%	8.3%	0.70	-	0.00	3.2%	0.30	27.0%	6.1%	6.5%
Chesapeake Utilities	8.1%	8.6%	0.73	-	0.00	3.2%	0.27	27.0%	6.5%	6.9%
New Jersey Resources	8.4%	8.9%	0.76	-	0.00	3.2%	0.24	27.0%	6.9%	7.3%
NiSource Inc.	7.4%	8.1%	0.45	3.6%	0.01	3.6%	0.54	27.0%	4.8%	5.1%
Northwest Natural	7.7%	8.3%	0.66	-	0.00	3.2%	0.34	27.0%	5.9%	6.3%
ONE Gas Inc.	8.1%	8.6%	0.70	-	0.00	3.2%	0.30	27.0%	6.4%	6.8%
South Jersey Inds.	9.1%	9.4%	0.60	-	0.00	3.6%	0.40	27.0%	6.5%	6.7%
Southwest Gas	8.4%	8.9%	0.64	-	0.00	3.6%	0.36	27.0%	6.4%	6.7%
Spire Inc.	8.1%	8.6%	0.59	3.2%	0.00	3.2%	0.41	27.0%	5.7%	6.0%
Amer. States Water	8.1%	8.6%	0.79	-	0.00	3.2%	0.21	27.0%	6.9%	7.3%
Amer. Water Works	7.7%	8.3%	0.62	-	0.00	3.2%	0.38	27.0%	5.7%	6.1%
California Water	8.4%	8.9%	0.68	-	0.00	3.2%	0.32	27.0%	6.5%	6.8%
Middlesex Water	8.4%	8.9%	0.77	3.2%	0.00	3.2%	0.23	27.0%	7.0%	7.4%
York Water Co. (The)	8.8%	9.2%	0.79	-	0.00	3.2%	0.21	27.0%	7.4%	7.7%
Full Sample Average	8.2%	8.7%	0.68	3.3%	0.00	3.3%	0.32	27.0%	6.3%	6.7%
Gas Sample Average	8.1%	8.6%	0.65	3.4%	0.00	3.3%	0.35	27.0%	6.1%	6.5%
Water Sample Average	8.3%	8.8%	0.73	3.2%	0.00	3.2%	0.27	27.0%	6.7%	7.0%

Sources and Notes:
[1]: Schedule No. BV-10; Panel A, [4].
[2]: Schedule No. BV-10; Panel A, [5].
[3]: Schedule No. BV-4, [4].
[4]: Workpaper #2 to Schedule No. BV-11, Panel C.
[5]: Schedule No. BV-4, [5].
[6]: Workpaper #2 to Schedule No. BV-11, Panel B.
[7]: Schedule No. BV-4, [6].
[8]: Provided by Northwest Natural.
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. BV-11

Overall After-Tax Risk Positioning Cost of Capital of the Full Sample (Using Value Line Betas)

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 3.35%, Long-Term Market Risk Premium of 7.91%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	Northwest Natural's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1.5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Atmos Energy	8.1%	8.7%	0.70	-	0.00	3.2%	0.30	27.0%	6.4%	6.8%
Chesapeake Utilities	8.5%	9.0%	0.73	-	0.00	3.2%	0.27	27.0%	6.8%	7.2%
New Jersey Resources	8.9%	9.3%	0.76	-	0.00	3.2%	0.24	27.0%	7.3%	7.6%
NiSource Inc.	7.7%	8.4%	0.45	3.6%	0.01	3.6%	0.54	27.0%	4.9%	5.2%
Northwest Natural	8.1%	8.7%	0.66	-	0.00	3.2%	0.34	27.0%	6.1%	6.5%
ONE Gas Inc.	8.5%	9.0%	0.70	-	0.00	3.2%	0.30	27.0%	6.7%	7.0%
South Jersey Inds.	9.7%	10.0%	0.60	-	0.00	3.6%	0.40	27.0%	6.8%	7.0%
Southwest Gas	8.9%	9.3%	0.64	-	0.00	3.6%	0.36	27.0%	6.7%	7.0%
Spire Inc.	8.5%	9.0%	0.59	3.2%	0.00	3.2%	0.41	27.0%	6.0%	6.3%
Amer. States Water	8.5%	9.0%	0.79	-	0.00	3.2%	0.21	27.0%	7.2%	7.6%
Amer. Water Works	8.1%	8.7%	0.62	-	0.00	3.2%	0.38	27.0%	5.9%	6.3%
California Water	8.9%	9.3%	0.68	-	0.00	3.2%	0.32	27.0%	6.8%	7.1%
Middlesex Water	8.9%	9.3%	0.77	3.2%	0.00	3.2%	0.23	27.0%	7.4%	7.7%
York Water Co. (The)	9.3%	9.7%	0.79	-	0.00	3.2%	0.21	27.0%	7.8%	8.1%
Full Sample Average	8.6%	9.1%	0.68	3.3%	0.00	3.3%	0.32	27.0%	6.6%	7.0%
Gas Sample Average	8.5%	9.1%	0.65	3.4%	0.00	3.3%	0.35	27.0%	6.4%	6.7%
Water Sample Average	8.7%	9.2%	0.73	3.2%	0.00	3.2%	0.27	27.0%	7.0%	7.4%

Sources and Notes:
[1]: Schedule No. BV-10; Panel B, [4].
[2]: Schedule No. BV-10; Panel B, [5].
[3]: Schedule No. BV-4, [4].
[4]: Workpaper #2 to Schedule No. BV-11, Panel C.
[5]: Schedule No. BV-4, [5].
[6]: Workpaper #2 to Schedule No. BV-11, Panel B.
[7]: Schedule No. BV-4, [6].
[8]: Provided by Northwest Natural.
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. BV-12

Risk Positioning Cost of Equity at Northwest Natural's Proposed Capital Structure

Using Value Line Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	Northwest Natural's Representative Regulatory % Debt	Representative Cost of A-Rated Utility Debt	Northwest Natural's Representative Income Tax Rate	Northwest Natural's Representative Regulatory % Equity	Estimated Return on Equity (Scenario 1)	Estimated Return on Equity (Scenario 2)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Full Sample								
CAPM using Value Line Betas	6.3%	6.6%	50.0%	3.2%	27.0%	50.0%	10.4%	10.9%
ECAPM (1.50%) using Value Line Betas	6.7%	7.0%	50.0%	3.2%	27.0%	50.0%	11.0%	11.6%
Gas Sample								
CAPM using Value Line Betas	6.1%	6.4%	50.0%	3.2%	27.0%	50.0%	10.0%	10.5%
ECAPM (1.50%) using Value Line Betas	6.5%	6.7%	50.0%	3.2%	27.0%	50.0%	10.6%	11.2%
Water Sample								
CAPM using Value Line Betas	6.7%	7.0%	50.0%	3.2%	27.0%	50.0%	11.1%	11.7%
ECAPM (1.50%) using Value Line Betas	7.0%	7.4%	50.0%	3.2%	27.0%	50.0%	11.8%	12.4%

Sources and Notes:

[1]: Schedule No. BV-11; Panel A, [9] - [10].

[2]: Schedule No. BV-11; Panel B, [9] - [10].

[3]: Provided by Northwest Natural.

[4]: Based on a A rating. Yield from Bloomberg as of August 30, 2019.

[5]: Provided by Northwest Natural.

[6]: Provided by Northwest Natural.

[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6]

[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6]

Scenario 1: Long-Term Risk Free Rate of 3.60%, Long-Term Market Risk Premium of 6.91%.

Scenario 2: Long-Term Risk Free Rate of 3.35%, Long-Term Market Risk Premium of 7.91%.

Schedule No. BV-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Value Line Betas	Debt Beta	5-Year Average Common Equity to Market Value Ratio	5-Year Average Preferred Equity to Market Value Ratio	5-Year Average Debt to Market Value Ratio	Northwest Natural's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Atmos Energy	0.60	0.05	0.70	0.00	0.30	27.0%	0.43	0.47
Chesapeake Utilities	0.65	0.05	0.73	0.00	0.27	27.0%	0.49	0.52
New Jersey Resources	0.70	0.05	0.76	0.00	0.24	27.0%	0.54	0.58
NiSource Inc.	0.55	0.10	0.45	0.01	0.54	27.0%	0.30	0.34
Northwest Natural	0.60	0.05	0.66	0.00	0.34	27.0%	0.41	0.45
ONE Gas Inc.	0.65	0.05	0.70	0.00	0.30	27.0%	0.47	0.51
South Jersey Inds.	0.80	0.10	0.60	0.00	0.40	27.0%	0.52	0.57
Southwest Gas	0.70	0.10	0.64	0.00	0.36	27.0%	0.49	0.53
Spire Inc.	0.65	0.05	0.59	0.00	0.41	27.0%	0.40	0.45
Amer. States Water	0.65	0.05	0.79	0.00	0.21	27.0%	0.53	0.55
Amer. Water Works	0.60	0.05	0.62	0.00	0.38	27.0%	0.39	0.43
California Water	0.70	0.05	0.68	0.00	0.32	27.0%	0.49	0.53
Middlesex Water	0.70	0.05	0.77	0.00	0.23	27.0%	0.55	0.58
York Water Co. (The)	0.75	0.05	0.79	0.00	0.21	27.0%	0.60	0.63
Full Sample Average	0.66	0.06	0.68	0.00	0.32	27%	0.47	0.51
Gas Sample Average	0.66	0.07	0.65	0.00	0.35	27%	0.45	0.49
Water Sample Average	0.68	0.05	0.73	0.00	0.27	27%	0.51	0.55

Sources and Notes:

[1]: Workpaper # 1 to Schedule No. BV-10, [1].
[2]: Workpaper #1 to Schedule No. BV-13, [7].
[3]: Schedule No. BV-4, [4].
[4]: Schedule No. BV-4, [5].
[5]: Schedule No. BV-4, [6].
[6]: Northwest Natural's Representative Tax Rate.
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Schedule No. BV-14

Full Sample Average Asset Beta Relevered at Northwest Natural's Proposed Capital Structure

	Asset Beta	Assumed Debt Beta	Northwest Natural's Representative Regulatory % Debt	Northwest Natural's Representative Income Tax Rate	Northwest Natural's Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Asset Beta Without Taxes	0.47	0.05	50.0%	27.0%	50.0%	0.90
Asset Beta With Taxes	0.51	0.05	50.0%	27.0%	50.0%	0.85
Gas Sample						
Asset Beta Without Taxes	0.45	0.05	50.0%	27.0%	50.0%	0.85
Asset Beta With Taxes	0.49	0.05	50.0%	27.0%	50.0%	0.81
Water Sample						
Asset Beta Without Taxes	0.51	0.05	50.0%	27.0%	50.0%	0.97
Asset Beta With Taxes	0.55	0.05	50.0%	27.0%	50.0%	0.91

Sources and Notes:

[1]: Schedule No. BV-13, [7] - [8].

[2]: Villadsen Testimony.

[3]: Provided by Northwest Natural.

[4]: Northwest Natural's Representative Tax Rate.

[5]: Provided by Northwest Natural.

[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Schedule No. BV-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 3.60%, Long-Term Market Risk Premium of 6.91%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	3.60%	0.90	6.91%	9.8%	9.9%
Asset Beta With Taxes	3.60%	0.85	6.91%	9.4%	9.7%
Gas Sample					
Asset Beta Without Taxes	3.60%	0.85	6.91%	9.5%	9.7%
Asset Beta With Taxes	3.60%	0.81	6.91%	9.2%	9.5%
Water Sample					
Asset Beta Without Taxes	3.60%	0.97	6.91%	10.3%	10.4%
Asset Beta With Taxes	3.60%	0.91	6.91%	9.9%	10.0%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.35%, Long-Term Market Risk Premium of 7.91%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	3.35%	0.90	7.91%	10.4%	10.6%
Asset Beta With Taxes	3.35%	0.85	7.91%	10.0%	10.3%
Gas Sample					
Asset Beta Without Taxes	3.35%	0.85	7.91%	10.1%	10.3%
Asset Beta With Taxes	3.35%	0.81	7.91%	9.8%	10.0%
Water Sample					
Asset Beta Without Taxes	3.35%	0.97	7.91%	11.0%	11.1%
Asset Beta With Taxes	3.35%	0.91	7.91%	10.5%	10.7%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-16, Panel B

Risk Premiums Determined by Relationship Between Authorized ROEs[1] and Long-term Treasury Bond Rates During the Period 1990 - 2019 Excludes Utility Yield Spread Adjustment Natural Gas Distribution Utilities

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.857
Estimate of Intercept (A_0)	8.40%
Estimate of Slope (A_1)	-0.545

Predicted Risk Premium		Exp. Treasury Bond Rate[2]		Est. Cost of Equity
6.44%	+	3.60%	=	10.04%

Sources and Notes:

[1]: Authorized ROE Data from SNL financial as of 07/31/2019.

[2]: Blue Chip consensus forecast 2018 10 year T-bill yield + maturity premium between 10 year and 20 year U.S. Government bonds + utility yield spread adjustment.
See SS1-Regression Results for derivation of regression coefficients A_0 and A_1

Schedule No. BV-16, Panel A

Risk Premiums Determined by Relationship Between Authorized ROEs[1] and Long-term Treasury Bond Rates During the Period 1990 - 2019 Includes Utility Yield Spread Adjustment Natural Gas Distribution Utilities

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.857
Estimate of Intercept (A_0)	8.40%
Estimate of Slope (A_1)	-0.545

Predicted Risk Premium		Exp. Treasury Bond Rate		Est. Cost of Equity for Distribution Natural Gas Utilities
6.58%	+	3.35%	=	9.93%

Sources and Notes:

[1]: Authorized ROE Data from SNL financial as of 07/31/2019.

[2]: Blue Chip consensus forecast 2018 10 year T-bill yield + maturity premium between 10 year and 20 year U.S. Government bonds + utility yield spread adjustment.

See SS1-Regression Results for derivation of regression coefficients A_0 and A_1

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
3M Company	$96,112	$5.76	$166.76	3.45%	3.4%
Abbott Labs.	$147,101	$1.28	$83.58	1.53%	11.8%
AbbVie Inc.	$105,955	$4.28	$72.39	5.91%	4.6%
ABIOMED Inc.	$8,726	$0.00	$192.76	n/a	n/a
Accenture Plc	$124,167	$3.20	$193.09	1.66%	8.7%
Activision Blizzard	$42,184	$0.40	$54.76	0.73%	6.2%
Adobe Inc.	$136,769	$0.00	$277.91	n/a	n/a
Advance Auto Parts	$10,908	$0.24	$155.69	0.15%	18.0%
Advanced Micro Dev.	$33,046	$0.00	$30.05	n/a	n/a
AES Corp.	$10,588	$0.55	$16.09	3.42%	9.0%
Affiliated Managers	$4,358	$1.34	$85.65	1.56%	-0.9%
Aflac Inc.	$38,919	$1.10	$51.97	2.12%	4.5%
Agilent Technologies	$24,170	$0.66	$77.97	0.85%	10.6%
Air Products & Chem.	$48,981	$4.64	$221.55	2.09%	12.2%
Akamai Technologies	$14,581	$0.00	$89.43	n/a	n/a
Alaska Air Group	$7,965	$1.40	$65.00	2.15%	20.6%
Albemarle Corp.	$7,237	$1.47	$68.86	2.13%	11.1%
Alexandria Real Estate	$17,100	$4.00	$153.44	2.61%	8.4%
Alexion Pharmac.	$23,691	$0.00	$106.32	n/a	n/a
Align Techn.	$14,405	$0.00	$186.54	n/a	n/a
Allegion plc	$9,544	$1.08	$101.57	1.06%	7.9%
Allergan plc	$54,343	$2.96	$166.47	1.78%	3.7%
Alliance Data Sys.	$6,654	$2.52	$130.19	1.94%	2.6%
Alliant Energy	$12,615	$1.42	$53.18	2.67%	5.1%
Allstate Corp.	$32,508	$2.00	$107.92	1.85%	10.4%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Alphabet Inc.	$859,727	$0.00	$1,229.93	n/a	n/a
Alphabet Inc. 'A'	$860,661	$0.00	$1,229.84	n/a	n/a
Altria Group	$74,948	$3.36	$40.81	8.23%	6.6%
Amazon.com	$899,821	$0.00	$1,794.16	n/a	n/a
Amcor plc	$11,329	$0.00	$9.66	n/a	n/a
Amer. Airlines	$12,601	$0.40	$27.99	1.43%	13.3%
Amer. Elec. Power	$46,008	$2.84	$93.18	3.05%	6.1%
Amer. Express	$98,001	$1.72	$116.80	1.47%	10.1%
Amer. Int'l Group	$50,359	$1.28	$57.45	2.23%	66.0%
Amer. Tower 'A'	$100,453	$4.25	$225.56	1.88%	15.8%
Amer. Water Works	$22,108	$2.05	$122.83	1.67%	8.2%
Ameren Corp.	$19,335	$2.02	$79.04	2.56%	4.7%
Ameriprise Fin'l	$19,338	$3.88	$145.78	2.66%	n/a
AmerisourceBergen	$17,635	$1.66	$85.12	1.95%	8.1%
AMETEK Inc.	$20,599	$0.56	$89.88	0.62%	6.8%
Amgen	$117,801	$5.95	$196.94	3.02%	11.6%
Amphenol Corp.	$28,032	$1.00	$93.82	1.07%	4.7%
Analog Devices	$42,807	$2.16	$115.33	1.87%	n/a
ANSYS Inc.	$18,409	$0.00	$216.57	n/a	n/a
Anthem Inc.	$65,364	$3.20	$252.09	1.27%	17.8%
Aon plc	$45,778	$1.76	$193.00	0.91%	11.7%
Apache Corp.	$9,685	$1.00	$25.80	3.88%	12.4%
Apartment Investment	$7,859	$1.56	$51.12	3.05%	n/a
Apple Inc.	$1,001,257	$3.18	$217.73	1.46%	9.7%
Applied Materials	$47,752	$0.85	$50.96	1.67%	8.5%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Aptiv PLC	$22,922	$0.88	$87.07	1.01%	9.7%
Archer Daniels Midl'd	$22,822	$1.40	$40.90	3.42%	n/a
Arconic Inc.	$11,947	$0.08	$26.72	0.30%	23.8%
Arista Networks	$18,689	$0.00	$240.06	n/a	n/a
Assurant Inc.	$7,726	$2.40	$126.64	1.90%	n/a
AT&T Inc.	$271,382	$2.07	$37.91	5.46%	3.7%
Atmos Energy	$13,271	$2.24	$112.98	1.98%	6.5%
Autodesk Inc.	$33,667	$0.00	$153.34	n/a	n/a
Automatic Data Proc.	$69,397	$3.46	$159.30	2.17%	16.0%
AutoZone Inc.	$28,494	$0.00	$1,159.37	n/a	n/a
AvalonBay Communities	$29,192	$6.26	$209.06	2.99%	n/a
Avery Dennison	$9,608	$2.44	$112.82	2.16%	8.4%
Baker Hughes a GE co.	$11,976	$0.72	$23.59	3.05%	35.3%
Ball Corp.	$24,649	$0.60	$73.84	0.81%	15.3%
Bank of America	$278,596	$0.72	$29.59	2.43%	8.8%
Bank of New York Mellon	$44,286	$1.24	$46.38	2.67%	2.9%
Baxter Int'l Inc.	$44,624	$0.88	$87.40	1.01%	10.7%
BB&T Corp.	$40,438	$1.80	$52.42	3.43%	10.0%
Becton Dickinson	$69,211	$3.14	$253.55	1.24%	9.9%
Berkshire Hathaway 'B'	$0	$0.00	$208.12	n/a	n/a
Best Buy Co.	$17,911	$2.10	$66.77	3.15%	7.2%
Biogen	$49,150	$0.00	$238.79	n/a	n/a
BlackRock Inc.	$68,614	$13.20	$444.39	2.97%	6.5%
Block (H&R)	$4,773	$1.05	$23.42	4.48%	10.0%
Boeing	$216,326	$8.96	$379.39	2.36%	9.6%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Booking Holdings	$88,035	$0.00	$2,031.57	n/a	n/a
BorgWarner	$7,647	$0.68	$36.77	1.85%	6.2%
Boston Properties	$20,084	$3.90	$130.11	3.00%	6.0%
Boston Scientific	$59,919	$0.00	$43.29	n/a	n/a
Bristol-Myers Squibb	$81,903	$1.64	$50.57	3.24%	6.9%
Broadcom Inc.	$115,675	$10.60	$284.26	3.73%	16.1%
Broadridge Fin'l	$14,692	$2.16	$126.71	1.70%	n/a
Brown-Forman 'B'	$30,706	$0.67	$63.65	1.05%	7.0%
C.H. Robinson	$11,619	$2.00	$84.50	2.37%	5.9%
Cabot Oil & Gas 'A'	$7,602	$0.36	$18.05	1.99%	28.8%
Cadence Design Sys.	$18,748	$0.00	$66.01	n/a	n/a
Campbell Soup	$14,030	$1.40	$46.76	2.99%	-4.0%
Capital One Fin'l	$43,868	$1.60	$92.74	1.73%	n/a
Capri Holdings Ltd.	$4,937	$0.00	$32.19	n/a	n/a
Cardinal Health	$14,310	$1.92	$47.89	4.01%	5.9%
CarMax Inc.	$14,275	$0.00	$84.63	n/a	n/a
Carnival Corp.	$25,496	$2.00	$48.22	4.15%	6.0%
Caterpillar Inc.	$73,204	$4.12	$128.16	3.21%	5.1%
Cboe Global Markets	$13,003	$1.44	$115.56	1.25%	2.7%
CBRE Group	$18,111	$0.00	$53.54	n/a	n/a
CBS Corp. 'B'	$15,896	$0.78	$41.88	1.86%	12.8%
Celanese Corp.	$15,319	$2.48	$122.68	2.02%	5.4%
Celgene Corp.	$70,106	$0.00	$99.37	n/a	n/a
Centene Corp.	$19,208	$0.00	$46.39	n/a	n/a
CenterPoint Energy	$15,087	$1.18	$30.33	3.89%	5.1%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
CenturyLink Inc.	$13,965	$1.00	$12.52	7.99%	10.7%
Cerner Corp.	$21,528	$0.72	$68.44	1.05%	14.3%
CF Industries	$10,948	$1.25	$49.29	2.54%	n/a
Charter Communic.	$94,664	$0.00	$420.35	n/a	n/a
Chevron Corp.	$234,758	$4.79	$124.32	3.85%	4.9%
Chipotle Mex. Grill	$23,069	$0.00	$834.66	n/a	n/a
Chubb Ltd.	$72,288	$3.00	$157.68	1.90%	7.7%
Church & Dwight	$17,971	$0.91	$72.80	1.25%	8.2%
Cigna Corp.	$62,196	$0.04	$161.38	0.02%	12.7%
Cimarex Energy	$5,157	$0.80	$50.71	1.58%	176.2%
Cincinnati Financial	$18,665	$2.24	$113.81	1.97%	5.7%
Cintas Corp.	$25,968	$2.25	$253.78	0.89%	11.5%
Cisco Systems	$212,157	$1.40	$49.60	2.82%	6.8%
Citigroup Inc.	$157,524	$2.04	$69.35	2.94%	10.1%
Citizens Fin'l Group	$16,562	$1.44	$35.88	4.01%	6.0%
Citrix Sys.	$12,585	$1.40	$96.97	1.44%	7.8%
Clorox Co.	$19,382	$4.24	$151.78	2.79%	3.6%
CME Group	$75,697	$3.00	$211.15	1.42%	5.3%
CMS Energy Corp.	$17,837	$1.61	$63.11	2.55%	7.1%
Coca-Cola	$233,073	$1.60	$53.91	2.97%	5.4%
Cognizant Technology	$35,035	$0.80	$61.80	1.29%	5.9%
Colgate-Palmolive	$60,876	$1.72	$70.95	2.42%	1.8%
Comcast Corp.	$212,160	$0.84	$46.36	1.81%	10.9%
Comerica Inc.	$9,887	$2.68	$65.97	4.06%	3.6%
Conagra Brands	$14,412	$0.85	$29.81	2.85%	9.3%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Concho Resources	$14,580	$0.50	$73.23	0.68%	12.0%
ConocoPhillips	$66,575	$1.22	$60.82	2.01%	4.3%
Consol. Edison	$30,504	$3.04	$92.40	3.29%	3.4%
Constellation Brands	$39,721	$3.10	$205.10	1.51%	6.5%
Cooper Cos.	$14,882	$0.06	$302.32	0.02%	16.0%
Copart Inc.	$18,815	$0.00	$82.58	n/a	n/a
Corning Inc.	$21,500	$0.80	$27.76	2.88%	10.4%
Corteva Inc.	$21,821	$0.00	$28.92	n/a	n/a
Costco Wholesale	$126,591	$2.60	$286.36	0.91%	9.1%
Coty Inc.	$7,717	$0.50	$10.17	4.92%	3.0%
Crown Castle Int'l	$58,756	$4.90	$140.58	3.49%	12.5%
CSX Corp.	$56,503	$0.96	$68.62	1.40%	9.4%
Cummins Inc.	$25,567	$5.24	$161.57	3.24%	2.3%
CVS Health	$82,655	$2.00	$64.30	3.11%	3.3%
Danaher Corp.	$104,547	$0.68	$146.47	0.46%	11.1%
Darden Restaurants	$14,856	$3.56	$119.80	2.97%	8.6%
DaVita Inc.	$9,827	$0.00	$60.04	n/a	n/a
Deere & Co.	$51,778	$3.04	$164.07	1.85%	16.3%
Delta Air Lines	$38,160	$1.61	$58.63	2.75%	14.1%
Dentsply Sirona	$11,183	$0.35	$51.13	0.68%	12.8%
Devon Energy	$10,625	$0.36	$26.11	1.38%	20.8%
Diamondback Energy	$15,957	$0.75	$96.82	0.77%	32.5%
Digital Realty Trust	$25,562	$4.48	$125.03	3.58%	n/a
Discover Fin'l Svcs.	$26,753	$1.76	$82.94	2.12%	10.4%
Discovery Communic. 'C'	$13,017	$0.00	$24.37	n/a	n/a

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Discovery Inc.	$13,975	$0.00	$26.23	n/a	n/a
Dish Network 'A'	$16,655	$0.00	$34.54	n/a	n/a
Disney (Walt)	$237,407	$1.76	$132.27	1.33%	-2.5%
Dollar General	$40,311	$1.28	$156.23	0.82%	10.5%
Dollar Tree Inc.	$26,460	$0.00	$111.07	n/a	n/a
Dominion Energy	$64,979	$3.72	$80.84	4.60%	4.6%
Dover Corp.	$14,394	$1.96	$98.91	1.98%	10.4%
Dow Inc.	$35,407	$2.85	$48.21	5.91%	3.2%
DTE Energy	$24,172	$4.04	$132.29	3.05%	4.5%
Duke Energy	$68,789	$3.80	$95.27	3.99%	4.1%
Duke Realty Corp.	$11,971	$0.91	$33.35	2.73%	4.7%
Dupont de Nemours	$51,137	$0.00	$71.60	n/a	n/a
DXC Technology	$8,432	$0.84	$31.82	2.64%	6.7%
E*Trade Fin'l	$10,818	$0.56	$44.91	1.25%	6.0%
Eastman Chemical	$9,911	$2.48	$72.33	3.43%	4.9%
Eaton Corp. plc	$35,494	$2.84	$83.57	3.40%	8.1%
eBay Inc.	$34,017	$0.58	$40.36	1.44%	13.1%
Ecolab Inc.	$56,543	$1.84	$196.06	0.94%	13.6%
Edison Int'l	$23,664	$2.45	$72.74	3.37%	3.9%
Edwards Lifesciences	$44,721	$0.00	$219.66	n/a	n/a
Electronic Arts	$29,508	$0.00	$98.70	n/a	n/a
Emerson Electric	$40,086	$1.99	$64.95	3.06%	6.0%
Entergy Corp.	$22,865	$3.72	$115.21	3.23%	-1.5%
EOG Resources	$47,385	$1.15	$81.00	1.42%	12.4%
Equifax Inc.	$17,088	$1.56	$141.05	1.11%	3.4%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Equinix Inc.	$48,265	$10.22	$566.45	1.80%	n/a
Equity Residential	$31,588	$2.31	$85.17	2.71%	n/a
Essex Property Trust	$21,541	$7.98	$322.82	2.47%	n/a
Everest Re Group Ltd.	$10,686	$5.90	$264.50	2.23%	74.7%
Evergy Inc.	$15,435	$2.04	$66.01	3.09%	4.4%
Eversource Energy	$26,931	$2.20	$83.26	2.64%	5.6%
Exelon Corp.	$46,366	$1.51	$48.45	3.12%	3.8%
Expedia Group	$20,107	$1.36	$134.18	1.01%	13.2%
Expeditors Int'l	$12,683	$1.00	$73.98	1.35%	4.9%
Extra Space Storage	$14,852	$3.64	$115.98	3.14%	n/a
Exxon Mobil Corp.	$306,028	$3.48	$72.08	4.83%	9.7%
F5 Networks	$8,310	$0.00	$137.14	n/a	n/a
Facebook Inc.	$542,660	$0.00	$189.93	n/a	n/a
Fastenal Co.	$18,578	$0.88	$31.86	2.76%	n/a
Federal Rlty. Inv. Trust	$10,044	$4.20	$134.25	3.13%	n/a
FedEx Corp.	$39,776	$2.75	$148.78	1.85%	6.0%
Fidelity Nat'l Info.	$43,384	$1.40	$131.81	1.06%	2.3%
Fifth Third Bancorp	$20,445	$0.96	$27.83	3.45%	13.1%
First Republic Bank	$16,036	$0.76	$95.23	0.80%	11.3%
FirstEnergy Corp.	$25,599	$1.58	$47.39	3.33%	-6.6%
Fiserv Inc.	$41,219	$0.00	$104.08	n/a	n/a
FleetCor Technologies	$25,260	$0.00	$289.10	n/a	n/a
FLIR Systems	$7,198	$0.71	$53.17	1.34%	n/a
Flowserve Corp.	$6,236	$0.76	$47.42	1.60%	14.4%
FMC Corp.	$11,790	$1.70	$89.90	1.89%	8.0%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Ford Motor	$36,308	$0.60	$9.17	6.54%	2.0%
Fortinet Inc.	$13,410	$0.00	$78.23	n/a	n/a
Fortive Corp.	$23,072	$0.28	$68.18	0.41%	10.1%
Fortune Brands Home	$7,429	$0.88	$52.75	1.67%	7.8%
Fox Corp. 'A'	$11,356	$0.00	$32.27	n/a	n/a
Fox Corp. 'B'	$0	$0.00	$32.08	n/a	n/a
Franklin Resources	$14,902	$1.13	$29.34	3.85%	-3.0%
Freep't-McMoRan Inc.	$15,163	$0.20	$10.47	1.91%	0.0%
Gallagher (Arthur J.)	$16,648	$1.72	$88.80	1.94%	10.1%
Gap (The) Inc.	$6,595	$0.97	$17.19	5.64%	4.0%
Garmin Ltd.	$16,252	$2.28	$85.03	2.68%	5.5%
Gartner Inc.	$12,631	$0.00	$143.64	n/a	n/a
Gen'l Dynamics	$54,340	$4.08	$187.37	2.18%	8.8%
Gen'l Electric	$82,209	$0.04	$9.37	0.43%	10.1%
Gen'l Mills	$32,857	$1.98	$54.33	3.64%	6.9%
Gen'l Motors	$53,940	$1.56	$37.37	4.17%	0.0%
Genuine Parts	$14,173	$3.05	$97.50	3.13%	4.8%
Gilead Sciences	$83,571	$2.52	$66.42	3.79%	2.3%
Global Payments	$25,488	$0.04	$161.62	0.02%	16.3%
Globe Life Inc.	$10,302	$0.69	$94.65	0.73%	7.7%
Goldman Sachs	$77,599	$5.00	$213.74	2.34%	2.8%
Grainger (W.W.)	$15,944	$5.76	$292.18	1.97%	9.7%
Halliburton Co.	$18,284	$0.72	$20.44	3.52%	1.3%
Hanesbrands Inc.	$5,239	$0.60	$14.33	4.19%	3.1%
Harley-Davidson	$5,453	$1.50	$35.27	4.25%	n/a

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Hartford Fin'l Svcs.	$21,928	$1.22	$60.44	2.02%	9.1%
Hasbro Inc.	$15,261	$2.72	$117.63	2.31%	13.9%
HCA Healthcare	$43,311	$1.60	$124.28	1.29%	10.2%
HCP Inc.	$16,755	$1.48	$35.01	4.23%	4.0%
Helmerich & Payne	$4,707	$2.84	$43.24	6.57%	154.0%
Henry (Jack) & Assoc.	$11,388	$1.60	$147.69	1.08%	12.0%
Hershey Co.	$32,172	$3.09	$153.94	2.01%	8.7%
Hess Corp.	$19,968	$1.00	$65.67	1.52%	15.0%
Hewlett Packard Ent.	$19,454	$0.45	$14.43	3.12%	8.4%
Hilton Worldwide Hldgs.	$27,555	$0.60	$95.22	0.63%	15.6%
HollyFrontier Corp.	$8,756	$1.35	$52.63	2.57%	-10.6%
Hologic Inc.	$13,353	$0.00	$49.95	n/a	n/a
Home Depot	$250,020	$6.16	$224.67	2.74%	8.5%
Honeywell Int'l	$119,992	$3.28	$168.31	1.95%	6.7%
Hormel Foods	$22,927	$0.88	$42.94	2.05%	5.0%
Horton D.R.	$18,809	$0.62	$51.58	1.20%	13.0%
Host Hotels & Resorts	$12,787	$0.81	$17.24	4.70%	5.0%
HP Inc.	$27,786	$0.68	$18.47	3.68%	4.8%
Humana Inc.	$37,610	$2.25	$277.28	0.81%	13.2%
Hunt (J.B.)	$12,076	$1.08	$114.15	0.95%	9.1%
Huntington Bancshs.	$15,018	$0.61	$14.40	4.24%	6.0%
Huntington Ingalls	$9,044	$3.44	$214.82	1.60%	-2.6%
IDEX Corp.	$12,641	$2.00	$164.34	1.22%	13.0%
IDEXX Labs.	$23,574	$0.00	$274.17	n/a	n/a
IHS Markit	$26,904	$0.00	$67.36	n/a	n/a

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Illinois Tool Works	$50,424	$4.28	$155.06	2.76%	4.1%
Illumina Inc.	$45,170	$0.00	$309.57	n/a	n/a
Incyte Corp.	$16,785	$0.00	$81.21	n/a	n/a
Ingersoll-Rand	$29,948	$2.12	$123.15	1.72%	11.1%
Intel Corp.	$228,455	$1.26	$50.72	2.48%	8.5%
Intercontinental Exch.	$52,470	$1.10	$92.33	1.19%	8.8%
Interpublic Group	$8,238	$1.00	$21.16	4.73%	6.2%
Int'l Business Mach.	$126,654	$6.54	$141.88	4.61%	2.2%
Int'l Flavors & Frag.	$13,118	$3.04	$120.17	2.53%	3.8%
Int'l Paper	$16,055	$2.00	$40.70	4.91%	n/a
Intuit Inc.	$70,025	$2.12	$269.18	0.79%	14.1%
Intuitive Surgical	$60,993	$0.00	$531.16	n/a	n/a
Invesco Ltd.	$8,010	$1.24	$16.87	7.35%	2.6%
IPG Photonics	$7,289	$0.00	$133.08	n/a	n/a
IQVIA Holdings	$30,138	$0.00	$155.60	n/a	n/a
Iron Mountain	$9,229	$2.44	$32.00	7.63%	n/a
Jacobs Engineering	$12,531	$0.68	$91.79	0.74%	15.6%
Jefferies Fin'l Group	$5,715	$0.50	$19.46	2.57%	n/a
Johnson & Johnson	$343,759	$3.80	$131.65	2.89%	6.5%
Johnson Ctrls. Int'l plc	$35,035	$1.04	$43.91	2.37%	n/a
JPMorgan Chase	$381,716	$3.60	$118.90	3.03%	11.3%
Juniper Networks	$8,223	$0.78	$23.85	3.27%	2.1%
Kansas City South'n	$13,214	$1.44	$132.04	1.09%	14.5%
Kellogg	$21,735	$2.30	$63.73	3.61%	0.8%
KeyCorp	$18,106	$0.74	$17.77	4.16%	4.6%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Keysight Technologies	$18,782	$0.00	$98.77	n/a	n/a
Kimberly-Clark	$46,166	$4.12	$135.04	3.05%	5.8%
Kimco Realty	$8,521	$1.14	$20.27	5.62%	6.6%
Kinder Morgan Inc.	$46,811	$1.00	$20.92	4.78%	6.5%
KLA Corp.	$25,410	$3.40	$155.50	2.19%	14.6%
Kohl's Corp.	$7,765	$2.82	$49.02	5.75%	8.0%
Kraft Heinz Co.	$34,343	$1.64	$28.14	5.83%	-8.3%
Kroger Co.	$20,630	$0.64	$25.68	2.49%	4.9%
L Brands	$5,208	$1.20	$18.87	6.36%	6.1%
L3Harris Technologies	$25,378	$3.00	$211.98	1.42%	21.3%
Laboratory Corp.	$16,735	$0.00	$172.69	n/a	n/a
Lam Research	$34,210	$4.60	$235.31	1.95%	12.7%
Lamb Weston Holdings	$10,778	$0.80	$73.52	1.09%	7.2%
Lauder (Estee)	$69,793	$1.92	$191.91	1.00%	11.4%
Leggett & Platt	$5,427	$1.60	$40.81	3.92%	n/a
Leidos Hldgs.	$12,581	$1.36	$86.33	1.58%	10.4%
Lennar Corp.	$17,328	$0.16	$54.10	0.30%	9.5%
Lilly (Eli)	$110,397	$2.58	$116.16	2.22%	9.3%
Lincoln Nat'l Corp.	$12,225	$1.56	$60.73	2.57%	11.2%
Linde plc	$105,153	$3.88	$194.11	2.00%	11.5%
LKQ Corp.	$9,876	$0.00	$31.79	n/a	n/a
Lockheed Martin	$111,104	$9.20	$388.25	2.37%	14.5%
Loews Corp.	$15,448	$0.25	$50.97	0.49%	20.7%
Lowe's Cos.	$86,811	$2.20	$110.96	1.98%	14.8%
LyondellBasell Inds.	$32,813	$4.20	$88.29	4.76%	3.6%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
M&T Bank Corp.	$21,061	$4.00	$156.30	2.56%	6.2%
Macerich Comp. (The)	$4,566	$3.06	$32.42	9.44%	6.7%
Macy's Inc.	$4,856	$1.51	$15.41	9.80%	-14.8%
Marathon Oil Corp.	$10,484	$0.20	$13.18	1.52%	44.7%
Marathon Petroleum	$35,587	$2.12	$55.10	3.85%	8.2%
MarketAxess Holdings	$12,940	$2.04	$338.18	0.60%	14.7%
Marriott Int'l	$42,669	$1.92	$126.97	1.51%	7.1%
Marsh & McLennan	$51,792	$1.84	$100.90	1.82%	8.8%
Martin Marietta	$16,777	$2.22	$266.41	0.83%	16.2%
Masco Corp.	$11,798	$0.54	$40.63	1.33%	7.9%
MasterCard Inc.	$280,325	$1.32	$271.17	0.49%	17.0%
Maxim Integrated	$15,931	$1.92	$56.95	3.37%	7.7%
McCormick & Co.	$21,208	$2.34	$160.14	1.46%	9.3%
McDonald's Corp.	$159,869	$4.80	$209.39	2.29%	6.7%
McKesson Corp.	$26,955	$1.64	$146.82	1.12%	7.3%
Medtronic plc	$148,842	$2.16	$111.18	1.94%	7.5%
Merck & Co.	$215,534	$2.20	$85.16	2.58%	9.5%
MetLife Inc.	$44,793	$1.78	$47.44	3.75%	6.6%
Mettler-Toledo Int'l	$17,475	$0.00	$709.18	n/a	n/a
MGM Resorts Int'l	$15,295	$0.52	$28.85	1.80%	32.7%
Microchip Technology	$22,016	$1.50	$90.45	1.66%	5.4%
Micron Technology	$55,001	$0.00	$49.16	n/a	n/a
Microsoft Corp.	$1,081,443	$1.84	$139.44	1.32%	14.5%
Mid-America Apartment	$14,779	$3.84	$129.05	2.98%	n/a
Mohawk Inds.	$8,990	$0.00	$123.39	n/a	n/a

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Molson Coors Brewing	$11,762	$2.28	$56.26	4.05%	-1.8%
Mondelez Int'l	$79,863	$1.14	$54.65	2.09%	5.8%
Monster Beverage	$32,030	$0.00	$58.35	n/a	n/a
Moody's Corp.	$40,967	$2.00	$214.08	0.93%	11.0%
Morgan Stanley	$73,021	$1.40	$43.67	3.21%	6.6%
Mosaic Company	$8,099	$0.22	$20.69	1.06%	4.1%
Motorola Solutions	$27,641	$2.46	$166.21	1.48%	10.3%
MSCI Inc.	$19,936	$2.77	$225.73	1.23%	n/a
Mylan N.V.	$10,833	$0.00	$21.00	n/a	n/a
Nasdaq Inc.	$16,817	$1.88	$100.68	1.87%	5.8%
National Oilwell Varco	$8,833	$0.20	$22.89	0.87%	n/a
Nektar Therapeutics	$3,538	$0.00	$20.15	n/a	n/a
NetApp Inc.	$13,009	$1.92	$54.10	3.55%	7.2%
Netflix Inc.	$125,484	$0.00	$270.75	n/a	n/a
Newell Brands	$7,566	$0.92	$17.70	5.20%	-14.0%
Newmont Goldcorp	$32,296	$0.56	$39.84	1.41%	8.8%
News Corp. 'A'	$8,162	$0.20	$13.94	1.43%	18.3%
News Corp. 'B'	$8,366	$0.20	$14.32	1.40%	18.3%
NextEra Energy	$107,727	$5.33	$225.72	2.36%	8.0%
Nielsen Hldgs. plc	$8,049	$1.40	$22.38	6.26%	-2.0%
NIKE Inc. 'B'	$137,952	$0.88	$86.68	1.02%	16.4%
NiSource Inc.	$10,989	$0.80	$29.48	2.71%	4.7%
Noble Energy	$11,254	$0.48	$23.15	2.07%	15.5%
Nordstrom Inc.	$4,980	$1.48	$32.15	4.60%	3.7%
Norfolk Southern	$48,098	$3.76	$180.49	2.08%	11.8%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Northern Trust Corp.	$20,582	$2.80	$94.27	2.97%	-2.4%
Northrop Grumman	$63,588	$5.28	$368.18	1.43%	7.9%
Norwegian Cruise Line	$11,588	$0.00	$53.67	n/a	n/a
NRG Energy	$10,033	$0.12	$39.07	0.31%	n/a
Nucor Corp.	$15,982	$1.60	$52.62	3.04%	-3.9%
NVIDIA Corp.	$107,757	$0.64	$172.69	0.37%	12.5%
Occidental Petroleum	$34,265	$3.17	$45.70	6.94%	-8.9%
Omnicom Group	$17,076	$2.70	$77.87	3.47%	4.7%
ONEOK Inc.	$31,010	$3.75	$75.77	4.95%	15.2%
Oracle Corp.	$175,908	$0.96	$53.47	1.80%	10.0%
O'Reilly Automotive	$29,904	$0.00	$398.86	n/a	n/a
PACCAR Inc.	$24,369	$3.30	$70.32	4.69%	-1.3%
Packaging Corp.	$9,785	$3.16	$102.84	3.07%	1.2%
Parker-Hannifin	$22,818	$3.52	$177.04	1.99%	7.2%
Paychex Inc.	$29,651	$2.60	$82.54	3.15%	9.1%
PayPal Holdings	$124,903	$0.00	$104.64	n/a	n/a
Pentair plc	$6,322	$0.72	$36.63	1.97%	6.9%
People's United Fin'l	$6,356	$0.71	$15.91	4.46%	n/a
PepsiCo Inc.	$189,537	$3.82	$134.71	2.84%	4.8%
PerkinElmer Inc.	$9,563	$0.28	$86.56	0.32%	14.6%
Perrigo Co. plc	$7,388	$0.84	$55.24	1.52%	16.6%
Pfizer Inc.	$203,069	$1.44	$36.69	3.92%	9.1%
Philip Morris Int'l	$111,568	$4.68	$71.20	6.57%	5.7%
Phillips 66	$46,236	$3.80	$103.27	3.68%	-4.3%
Pinnacle West Capital	$10,810	$3.04	$97.17	3.13%	5.0%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Pioneer Natural Res.	$22,717	$1.50	$134.34	1.12%	46.1%
PNC Financial Serv.	$63,027	$4.60	$140.88	3.27%	5.0%
PPG Inds.	$28,518	$2.04	$119.26	1.71%	8.9%
PPL Corp.	$22,767	$1.66	$31.68	5.24%	n/a
Price (T. Rowe) Group	$27,320	$3.12	$114.34	2.73%	3.2%
Principal Fin'l Group	$15,852	$2.20	$56.56	3.89%	6.8%
Procter & Gamble	$305,329	$2.98	$122.24	2.44%	7.3%
Progressive Corp.	$44,263	$0.40	$76.01	0.53%	5.0%
Prologis	$53,530	$2.20	$84.35	2.61%	n/a
Prudential Fin'l	$35,869	$4.00	$89.08	4.49%	7.9%
Public Serv. Enterprise	$31,107	$1.92	$61.80	3.11%	3.7%
Public Storage	$43,601	$8.20	$247.80	3.31%	8.0%
PulteGroup Inc.	$9,751	$0.46	$35.68	1.29%	3.8%
PVH Corp.	$6,458	$0.15	$86.11	0.17%	6.2%
Qorvo Inc.	$8,868	$0.00	$75.98	n/a	n/a
Qualcomm Inc.	$95,284	$2.48	$76.44	3.24%	n/a
Quanta Services	$5,385	$0.16	$37.59	0.43%	12.5%
Quest Diagnostics	$14,272	$2.12	$107.42	1.97%	5.6%
Ralph Lauren	$7,400	$2.75	$92.97	2.96%	7.4%
Raymond James Fin'l	$11,894	$1.40	$84.20	1.66%	9.0%
Raytheon Co.	$55,414	$3.77	$194.93	1.93%	12.3%
Realty Income Corp.	$22,969	$2.83	$75.89	3.73%	5.7%
Regency Centers Corp.	$11,418	$2.34	$67.73	3.45%	n/a
Regeneron Pharmac.	$31,414	$0.00	$295.87	n/a	n/a
Regions Financial	$16,182	$0.62	$15.96	3.88%	9.6%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Republic Services	$30,372	$1.62	$87.48	1.85%	9.1%
ResMed Inc.	$19,138	$1.56	$134.53	1.16%	18.1%
Robert Half Int'l	$6,422	$1.28	$55.08	2.32%	6.6%
Rockwell Automation	$19,072	$3.91	$162.06	2.41%	5.3%
Rollins Inc.	$11,383	$0.42	$34.55	1.22%	n/a
Roper Tech.	$37,080	$1.85	$359.50	0.51%	7.1%
Ross Stores	$39,335	$1.07	$104.75	1.02%	10.5%
Royal Caribbean	$23,563	$3.12	$111.68	2.79%	11.3%
S&P Global	$63,233	$2.44	$252.78	0.97%	n/a
salesforce.com	$119,808	$0.00	$155.20	n/a	n/a
SBA Communications	$28,409	$1.48	$256.77	0.58%	3.0%
Schein (Henry)	$9,335	$0.00	$62.85	n/a	n/a
Schlumberger Ltd.	$52,222	$2.00	$37.30	5.36%	15.0%
Schwab (Charles)	$56,161	$0.68	$42.78	1.59%	4.0%
Seagate Technology	$14,246	$2.52	$52.40	4.81%	11.4%
Sealed Air	$6,384	$0.64	$41.26	1.55%	9.5%
Sempra Energy	$38,582	$4.04	$142.22	2.84%	11.9%
Sherwin-Williams	$50,721	$5.03	$550.54	0.91%	14.2%
Simon Property Group	$47,779	$8.65	$155.04	5.58%	n/a
Skyworks Solutions	$13,603	$1.76	$79.75	2.21%	15.0%
SL Green Realty	$6,926	$3.52	$81.37	4.33%	n/a
Smith (A.O.)	$7,972	$0.88	$47.48	1.85%	6.4%
Smucker (J.M.)	$12,276	$3.52	$107.81	3.27%	3.3%
Snap-on Inc.	$8,565	$4.25	$155.71	2.73%	8.2%
Southern Co.	$63,822	$2.52	$61.11	4.12%	1.4%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Southwest Airlines	$29,606	$0.72	$54.49	1.32%	12.5%
Stanley Black & Decker	$21,705	$2.76	$141.11	1.96%	7.7%
Starbucks Corp.	$110,467	$1.68	$90.07	1.87%	13.6%
State Street Corp.	$22,764	$2.08	$60.11	3.46%	-9.4%
Stryker Corp.	$82,695	$2.08	$221.20	0.94%	10.4%
SunTrust Banks	$30,231	$2.24	$67.48	3.32%	n/a
SVB Fin'l Group	$11,141	$0.00	$216.58	n/a	n/a
Symantec Corp.	$14,796	$0.30	$23.88	1.26%	9.5%
Synchrony Financial	$22,770	$0.88	$33.86	2.60%	11.0%
Synopsys Inc.	$20,621	$0.00	$135.72	n/a	n/a
Sysco Corp.	$40,204	$1.56	$78.24	1.99%	10.5%
Take-Two Interactive	$14,771	$0.00	$130.56	n/a	n/a
Tapestry Inc.	$7,331	$1.35	$25.14	5.37%	4.3%
Target Corp.	$55,158	$2.64	$106.67	2.47%	9.2%
TE Connectivity	$31,750	$1.84	$93.18	1.97%	10.4%
TechnipFMC	$10,716	$0.52	$24.39	2.13%	36.6%
Teleflex Inc.	$15,798	$1.36	$343.80	0.40%	13.2%
Texas Instruments	$120,400	$3.08	$126.67	2.43%	10.0%
Textron Inc.	$11,832	$0.08	$50.93	0.16%	9.5%
Thermo Fisher Sci.	$118,241	$0.76	$296.33	0.26%	11.4%
Tiffany & Co.	$11,034	$2.35	$91.30	2.57%	8.5%
TJX Companies	$68,256	$0.92	$54.81	1.68%	8.5%
T-Mobile US	$69,211	$0.00	$80.59	n/a	n/a
Total System Svcs.	$23,586	$0.00	$133.27	n/a	n/a
Tractor Supply	$11,024	$1.48	$90.39	1.64%	11.5%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
TransDigm Group	$28,311	$0.00	$527.26	n/a	n/a
Travelers Cos.	$38,249	$3.28	$146.28	2.24%	10.6%
TripAdvisor Inc.	$5,611	$0.00	$39.13	n/a	n/a
Twitter Inc.	$33,159	$0.00	$43.23	n/a	n/a
Tyson Foods 'A'	$32,182	$1.55	$87.39	1.77%	6.2%
U.S. Bancorp	$88,415	$1.70	$55.44	3.07%	5.8%
UDR Inc.	$13,290	$1.37	$47.91	2.86%	n/a
Ulta Beauty	$13,300	$0.00	$228.75	n/a	n/a
Under Armour 'A'	$9,120	$0.00	$19.66	n/a	n/a
Under Armour 'C'	$8,312	$0.00	$17.98	n/a	n/a
Union Pacific	$117,803	$3.88	$166.38	2.33%	12.0%
United Airlines Hldgs.	$23,046	$0.00	$89.09	n/a	n/a
United Parcel Serv.	$102,276	$4.02	$120.70	3.33%	7.5%
United Rentals	$9,687	$0.00	$126.44	n/a	n/a
United Technologies	$118,665	$2.94	$135.57	2.17%	8.7%
UnitedHealth Group	$220,742	$4.32	$232.89	1.85%	13.7%
Universal Health `B'	$13,274	$0.80	$150.12	0.53%	8.7%
Unum Group	$6,195	$1.14	$29.45	3.87%	6.0%
V.F. Corp.	$34,643	$1.72	$85.67	2.01%	6.7%
Valero Energy	$34,641	$3.70	$82.85	4.47%	4.0%
Varian Medical Sys.	$10,552	$0.00	$117.53	n/a	n/a
Ventas Inc.	$25,770	$3.23	$72.21	4.47%	9.7%
VeriSign Inc.	$22,653	$0.00	$190.69	n/a	n/a
Verisk Analytics	$26,007	$1.00	$158.42	0.63%	9.0%
Verizon Communic.	$248,063	$2.46	$60.29	4.08%	2.9%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Vertex Pharmac.	$45,210	$0.00	$178.12	n/a	n/a
Viacom Inc. 'B'	$10,177	$0.80	$24.94	3.21%	2.9%
Visa Inc.	$349,457	$1.12	$174.06	0.64%	15.9%
Vornado R'lty Trust	$11,979	$2.64	$62.62	4.22%	2.8%
Vulcan Materials	$19,874	$1.24	$149.80	0.83%	18.8%
Wabtec Corp.	$13,880	$0.48	$74.03	0.65%	n/a
Walgreens Boots	$49,285	$1.83	$55.00	3.33%	1.7%
Walmart Inc.	$333,412	$2.13	$116.98	1.82%	7.0%
Waste Management	$48,623	$2.05	$115.28	1.78%	8.6%
Waters Corp.	$15,465	$0.00	$228.70	n/a	n/a
WEC Energy Group	$29,487	$2.47	$93.70	2.64%	6.1%
WellCare Health Plans	$13,586	$0.00	$269.90	n/a	n/a
Wells Fargo	$216,162	$2.04	$48.63	4.19%	8.0%
Welltower Inc.	$32,380	$3.54	$88.80	3.99%	n/a
Western Digital	$18,482	$2.00	$60.68	3.30%	-13.8%
Western Union	$9,672	$0.80	$22.51	3.55%	3.7%
WestRock Co.	$9,235	$1.82	$35.91	5.07%	-3.3%
Weyerhaeuser Co.	$20,701	$1.36	$27.64	4.92%	8.0%
Whirlpool Corp.	$9,360	$4.80	$148.59	3.23%	4.6%
Williams Cos.	$30,045	$1.52	$24.71	6.15%	8.8%
Willis Towers Wat. plc	$25,564	$2.60	$196.37	1.32%	10.0%
Wynn Resorts	$11,996	$4.00	$108.75	3.68%	13.6%
Xcel Energy Inc.	$33,085	$1.67	$64.62	2.58%	5.1%

Schedule No. BV-17: Estimation of S&P 500 Cost of Equity - DDM

Company Name	Market Cap ($Millions)	VL Indicated Annual Dividend ($)	VL Stock Price ($)	Annual Dividend Yield, calculated	**Avera Method**
[1]	[2]	[3]	[4]	[5] = [3] / [4]	**[6]**
Market Cap Weighted Average				**2.41%**	**9.14%**
Xerox Holdings	$6,668	$1.00	$29.64	3.37%	9.1%
Xilinx Inc.	$26,011	$1.48	$96.55	1.53%	15.7%
Xylem Inc.	$14,039	$0.96	$77.48	1.24%	13.4%
Yum! Brands	$34,686	$1.74	$112.30	1.55%	14.6%
Zimmer Biomet Hldgs.	$28,616	$0.98	$142.02	0.69%	5.9%
Zions Bancorp.	$7,888	$1.36	$44.51	3.06%	1.0%
Zoetis Inc.	$59,379	$0.66	$125.62	0.53%	11.1%

Sources and Notes:
[1] - [4]: Value Line Investment Analyzer as of 9/9/2019.
[6]: Thomson Reuters as of 10/1/2019.

Method		Dividend Yield	Projected Growth	Market Cost of Equity	Risk Free Rate	Market Risk Premium
		[1]	[2]	[3] = [1] + [2]	[4]	[5] = [3] - [4]
Avera	[a]	2.41%	9.14%	11.55%	2.54%	9.02%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Joe Karney

DISTRIBUTION SYSTEM AND STORAGE FACILITY PROJECTS EXHIBIT 400

December 30, 2019

EXHIBIT 400 – DIRECT TESTIMONY - DISTRIBUTION SYSTEM AND STORAGE FACILITY PROJECTS

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is Joe Karney. I am the Engineering Senior Director and Chief Engineer for NW Natural. I am responsible for design, construction, operation, and maintenance of the gas distribution system and utility storage plants, and operations support services including work management functions, mapping and compliance.

Q. Please describe your education and employment background.

A. I graduated from the University of Illinois at Urbana-Champaign with a Bachelor of Science in Mechanical Engineering, and I am a registered Professional Engineer in the State of Oregon.

Before being promoted to my current position at NW Natural in February 2019, I was the Engineering Director for the Company. Prior to holding that position, I was the Senior Manager of Code Compliance for the Company, and managed the regulatory compliance department and represented the Company during safety audits performed by the Public Utility Commission of Oregon ("Commission"). I also reviewed and ensured Company compliance with pending regulatory changes from the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration ("PHMSA"). Previously, I managed the Company's Construction and System Operations groups. I started my career at the Company with the Integrity Management group and worked on the

development and implementation of the Transmission Integrity Management Program ("TIMP") and the Distribution Integrity Management Program ("DIMP"). Before joining NW Natural, I worked as an Integrity Management Engineer for Colonial Pipeline Company for four years.

Q. What is the purpose of your testimony?

A. I provide an overview of the Company's major distribution system and storage facility projects within NW Natural's physical system completed since its last rate case (UG 344) through the end of this rate case. Most of the major projects addressed in my testimony have been acknowledged by the Commission in the Company's most recent Integrated Resource Plan ("IRP") proceedings (LC 71 and LC 64), specifically the Sandy Feeder Reinforcement Project, the Hood River Reinforcement Project, the South Oregon City Reinforcement Project, the Happy Valley Reinforcement Project, the Kuebler Boulevard Reinforcement Project and the Mist Large Dehydration System. Another project that I address in my testimony is the Mist Instrument and Controls Project (Phase 2), which NW Natural initially included in its last rate case (UG 344) but later removed from its request in that case because it was not completed by October 31, 2018.[1] The other project addressed in my testimony, OR 212 257th to US 26, is a public works project that is being required by the Oregon Department of Transportation ("ODOT").

[1] As part of the Stipulation filed on August 6, 2018 in UG 344, NW Natural agreed that only capital projects completed by October 31, 2018 (with the exception of a portion of the capital additions related to customer acquisitions) would be included in rates.

I also discuss the Company's ongoing plans for safety-driven system projects. These projects are discussed in the Company's 2019 Safety Project Plan, filed in docket UM 1900. The Company's safety-related projects address seismic risk, the most recent significant PHMSA pipeline safety regulation being published, and the installation of excess flow valves ("EFVs").

II. MAJOR DISTRIBUTION SYSTEM AND STORAGE FACILITY PROJECTS

Q. Please provide a brief description of the significant distribution system and storage facility projects that are included for recovery in this case.

A. The Company is requesting recovery for the following significant projects:

- **Sandy Feeder Reinforcement Project.** The Sandy Feeder Reinforcement Project is a system reinforcement project that is designed to improve distribution system pressures and reliability for firm service customers in Sandy, Oregon and adjacent areas. The Company expects this project to be completed by October 2020.
- **Hood River Reinforcement Project.** The Hood River Reinforcement Project is a system reinforcement project that is designed to improve distribution system pressures and reliability for firm service customers in the Hood River area of the Columbia River Gorge-Oregon load center. The Company expects this project to be completed by June 2020.
- **South Oregon City Reinforcement Project.** The South Oregon City Reinforcement Project is a system reinforcement project that is designed to support distribution system pressures and reliability for firm service customers

in the Oregon City area of the Portland load center. The Company expects this project to be completed by June 2020.

- **Happy Valley Reinforcement Project.** The Happy Valley Reinforcement Project is a system reinforcement project that is designed to support distribution system pressures and reliability for firm service customers in the Happy Valley area of the Portland load center. The Company expects this project to be completed by March 2020.
- **Kuebler Boulevard Reinforcement Project.** The Kuebler Boulevard Reinforcement Project is a system reinforcement project that is designed to support high pressure distribution system pressures and reliability for firm service customers in the south Salem area. The Company expects this project to be completed in 2021.
- **Mist Large Dehydration System Project.** The Mist Large Dehydration System Project replaces the large dehydration system at Mist. The Company expects this project to be completed by October 2020.
- **Mist Instrument and Controls Project (Phase 2).** The Mist Instrument and Controls Project (Phase 2) involves the replacement of failing, functionally-reduced, and end-of-life flow transmitters, moisture analyzers and ultrasonic flow transmitters at Mist. The Company expects this project to be completed by October 2020.
- **OR 212 257th to US 26 ODOT Project.** The Company is being required by ODOT to relocate a portion of its high pressure distribution system that

provides delivery to the Sandy region in connection with an ODOT public works improvement project. The Company expects this project to be completed by April 2020.

My testimony will describe each of these projects in greater detail.

Sandy Feeder Reinforcement Project

Q. Please generally describe the Sandy Feeder pipeline and the Sandy Feeder Reinforcement Project.

A. The Sandy Feeder pipeline is a 3-inch wrapped steel pipeline installed in 1965 that runs along Oregon Route 212 and U.S. Route 26 and that operates at the maximum allowable operating pressure ("MAOP") of 400 pounds per square inch gauge ("psig"). It serves Sandy, Oregon and the surrounding area. The Sandy Feeder Reinforcement Project replaces a 3.5-mile section of the pipeline with an 8-inch wrapped steel high pressure pipeline and a new district regulator station at the end of that pipeline.

Q. Did the Company include the Sandy Feeder Reinforcement Project in its 2018 IRP Action Plan?

A. Yes.

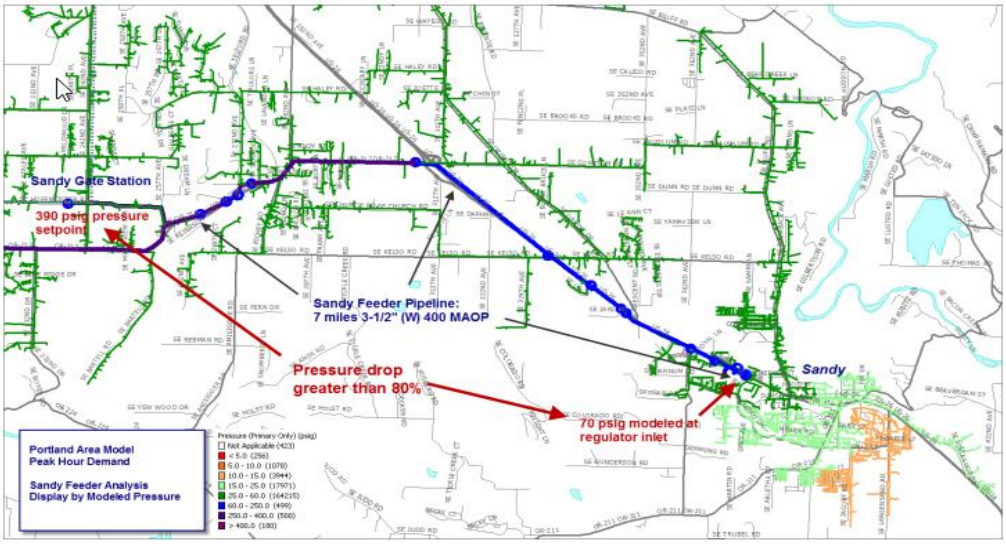
Q. Did the Commission acknowledge the Sandy Feeder Reinforcement Project as part of the Company's 2018 IRP Action Plan?

A. Yes. In Order No. 19-073 entered in LC 71 on March 4, 2019 (the "2018 IRP Order"), the Commission adopted Staff's recommendation to acknowledge the Sandy Feeder Reinforcement Project.

Q. Why is the Company conducting the Sandy Feeder Reinforcement Project?

A. NW Natural observed pressure drops exceeding 80% (or approximately 96% of the maximum flow rate capacity) during non-peak conditions in January 2017, which greatly exceeds the 40% pressure drop criteria for high pressure pipelines. Furthermore, as shown in Figure 1 below, NW Natural's Synergi modeling[2] indicates that customer outages during simulated extreme cold weather[3] will occur absent implementation of a remediating solution.

Figure 1. Map of Sandy Feeder Pipeline



This level of pressure drop jeopardizes the Company's ability to reliably serve customers in the Sandy area. In addition, modeling indicates that many firm

[2] Synergi is an advanced hydraulic modeling software that allows operators to model large complex integrated multi-pressure pipeline systems. The modeling platform used to monitor gas systems – Synergi – is industry standard (used by 96% of large local distribution companies in the United States) and is extensively utilized by NW Natural and other natural gas utilities. Synergi software has been used by the industry for over 40 years to help operators make design, planning, and operating decisions based on its calculations. The Synergi models of NW Natural's distribution system are built using pipe size, customer load information, and SCADA inputs (flow, metering, and pressures) located throughout NW Natural's system.

[3] Synergi model figures are "as filed" in LC 71. Staff based its recommendations in LC 71 to acknowledge these projects based on actual experienced pressure recordings.

service customers will experience outages under extreme cold weather conditions. Systemic growth in the Sandy area has resulted in current customer demand that currently exceeds the capacity of the existing pipeline.

Q. How did the Company decide on the scope of the Sandy Feeder Reinforcement Project?

A. The Company decided to replace the Sandy Feeder pipeline because this pipeline has no flow limiting points that could be replaced to increase capacity. Further, the Sandy Feeder pipeline already is operating at 400 psig MAOP and cannot be uprated to increase pipeline capacity.

Q. Did the Company consider alternative projects to address the pressure drop in the Sandy area?

A. Yes. The Company compared the benefit volume from the Sandy Feeder Reinforcement Project with other alternatives. For the Sandy Feeder Reinforcement Project, the Company calculated the benefit volume as the net therms required to restore pressure drop on the existing pipeline to 30% pressure drop. The Company created a high level design for a satellite liquefied natural gas ("LNG") facility for peak shaving, which is sized to match the benefit volume from the Sandy Feeder Reinforcement Project. The resulting satellite LNG facility design for Sandy had a higher estimated cost than the Sandy Feeder Reinforcement Project.

The Company's alternative analysis also examined the possibility of acquiring interruptible customer contracts that would match or exceed the project

benefit therms and defer pipeline construction. NW Natural performed an analysis of existing firm customers within the Sandy distribution system to identify if sufficient volumes could be recovered from firm customers by contracting with them to become interruptible. There was not sufficient firm demand available on peak to replace the pipeline project benefit volume. For these reasons, the Company selected the Sandy Feeder Reinforcement Project as the best alternative for its 2018 IRP Action Plan.

Q. What is the status and timing of the Sandy Feeder Reinforcement Project?

A. The Sandy Feeder Reinforcement Project currently is in the planning phase. The Company recently issued a Request for Proposals ("RFP") for engineering design and surveying services to a group of consultants. Construction is expected to begin in June 2020. NW Natural expects the Sandy Feeder Reinforcement Project to be in service by October 2020.

Q. Has the scope of the Sandy Feeder Reinforcement Project changed from the scope addressed in the Company's 2018 IRP?

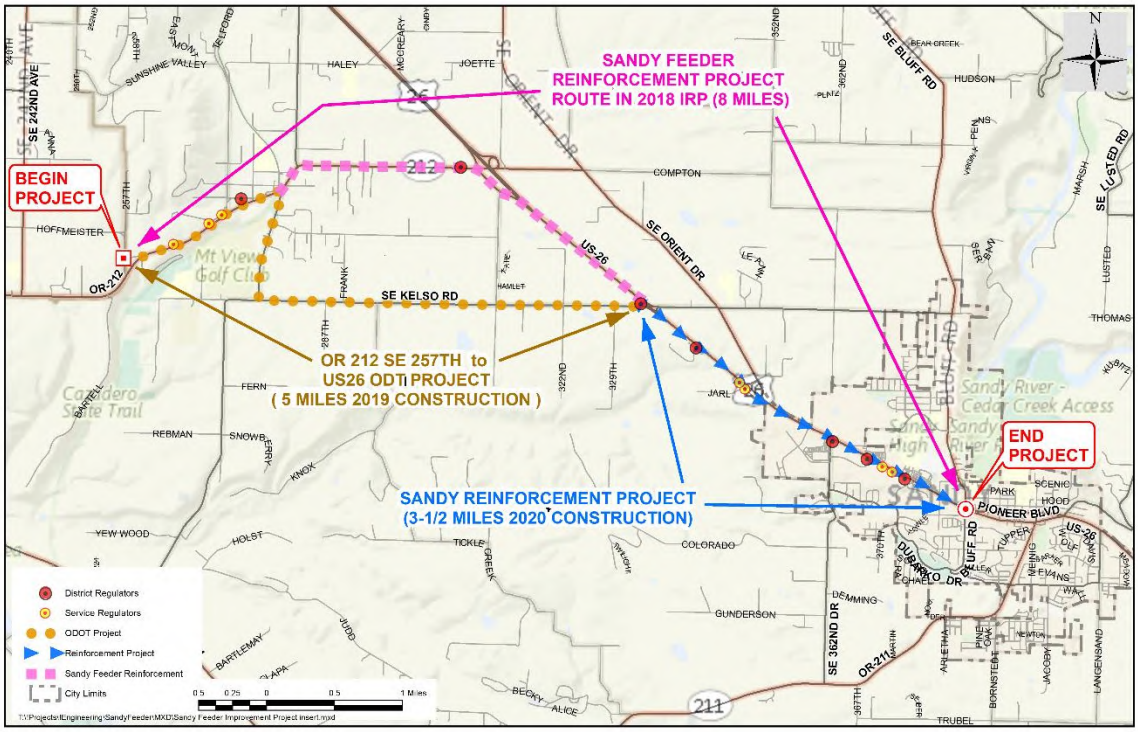
A. Yes. In its 2018 IRP, the scope of the project reflected the replacement of 8 miles of pipeline, whereas now the Sandy Feeder Reinforcement Project replaces 3.5 miles of pipeline.

Q. Why was the scope of the Sandy Feeder Reinforcement Project reduced in length?

A. ODOT is working on a project to widen and regrade Oregon Route 212, which requires the Company to move its existing pipeline along that route. Public

works activities such as this one impact NW Natural regularly. The Company now is addressing an approximately 5-mile portion of the Sandy Feeder Reinforcement Project impacted by the ODOT project under the separate project called "OR 212 257th to US 26 ODOT," which is discussed later in my testimony. The remaining portion of the Sandy Feeder Reinforcement Project, as well as the OR 212 to US 26 ODOT project and the original 2018 IRP project, are shown in Figure 2 below.

Figure 2. Map of Sandy Feeder Reinforcement Project (Updated)



Q. What is the estimated total cost to complete the Sandy Feeder Reinforcement Project?

A. The total cost to complete the Sandy Feeder Reinforcement Project is expected to be $14.9 million.

Hood River Reinforcement Project

Q. Please generally describe the Hood River distribution system and the Hood River Reinforcement Project.

A. The Hood River distribution system serves Hood River, Oregon and its surrounding area. It is supplied solely by the Northwest Pipeline ("NWPL") Hood River Gate Station. The majority of customers within the City of Hood River and the surrounding countryside are fed by one district regulator station, located in the downtown Hood River area. The Hood River Reinforcement Project extends high pressure pipe southwest into Hood River. It consists of the construction of approximately 6,000 feet (1.14 miles) of 4-inch high pressure wrapped steel and includes a district regulator and Class B gas main tie in connection.

Q. Did the Company include the Hood River Reinforcement Project in its 2018 IRP Action Plan?

A. Yes.

Q. Did the Commission acknowledge the Hood River Reinforcement Project as part of the Company's 2018 IRP Action Plan?

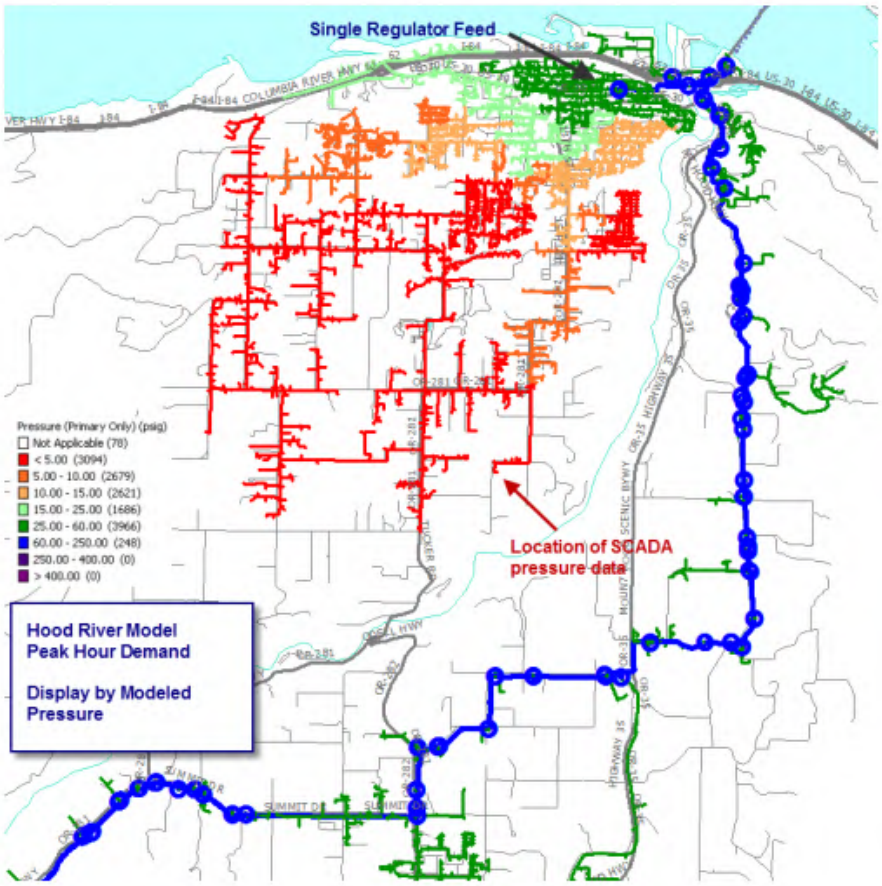
A. Yes. In the 2018 IRP Order, the Commission adopted Staff's recommendation to acknowledge the Hood River Reinforcement Project.

Q. Why is the Company conducting the Hood River Reinforcement Project?

A. The predominantly single district regulation station configuration makes the system more vulnerable to flow limiting points in the Class B pipeline system as customer demand increases. Hood River has experienced significant growth and

its existing gas system configuration is unable to supply customer needs on very cold days. Firm service customers experienced outages in January 2017 under non-peak conditions. Furthermore, as shown in Figure 3 below, modeling indicates that customer outages during simulated extreme cold weather will occur absent implementation of a remediating solution.

Figure 3. Map of Hood River Distribution System



The model indicates that the Company would experience widespread low pressures (orange = 5-10 psig, red = 5 psig or less) and resulting customer outages under peak hour conditions. The experienced pressures in January 2017 significantly violate the Company's system reinforcement criteria for lower

pressure systems, which specifies that 10 psig is the lowest acceptable pressure in a distribution system. System reinforcement actions must be taken to assure safe and reliable service to firm customers in Hood River.

Q. How did the Company decide on the scope of the Hood River Reinforcement Project?

A. The Company carefully examined the Hood River distribution system to determine if there are flow limiting points where pipelines could be replaced to ease cold weather impacts on system pressures. The Company determined that significant portions of the system would have to be replaced for substantial gains in performance to be made. The smaller system ties and replacements with larger pipe diameters already have been done in this system. Further, the Hood River system already is operating at 60 psig MAOP and cannot be uprated to increase system capacity. The Company determined that the Hood River distribution system can only be improved by a high pressure gas main extension with a district regulator to provide an additional source of gas supply to the distribution system.

Q. Did the Company consider alternative projects to address the pressure drop in the Hood River area?

A. Yes. The Company compared the benefit volume of the Hood River Reinforcement Project (modeled therms delivered to customers on peak from this project) with other alternatives. The Company created a high level design for a satellite LNG facility for peak shaving, which is sized to match the benefit volume

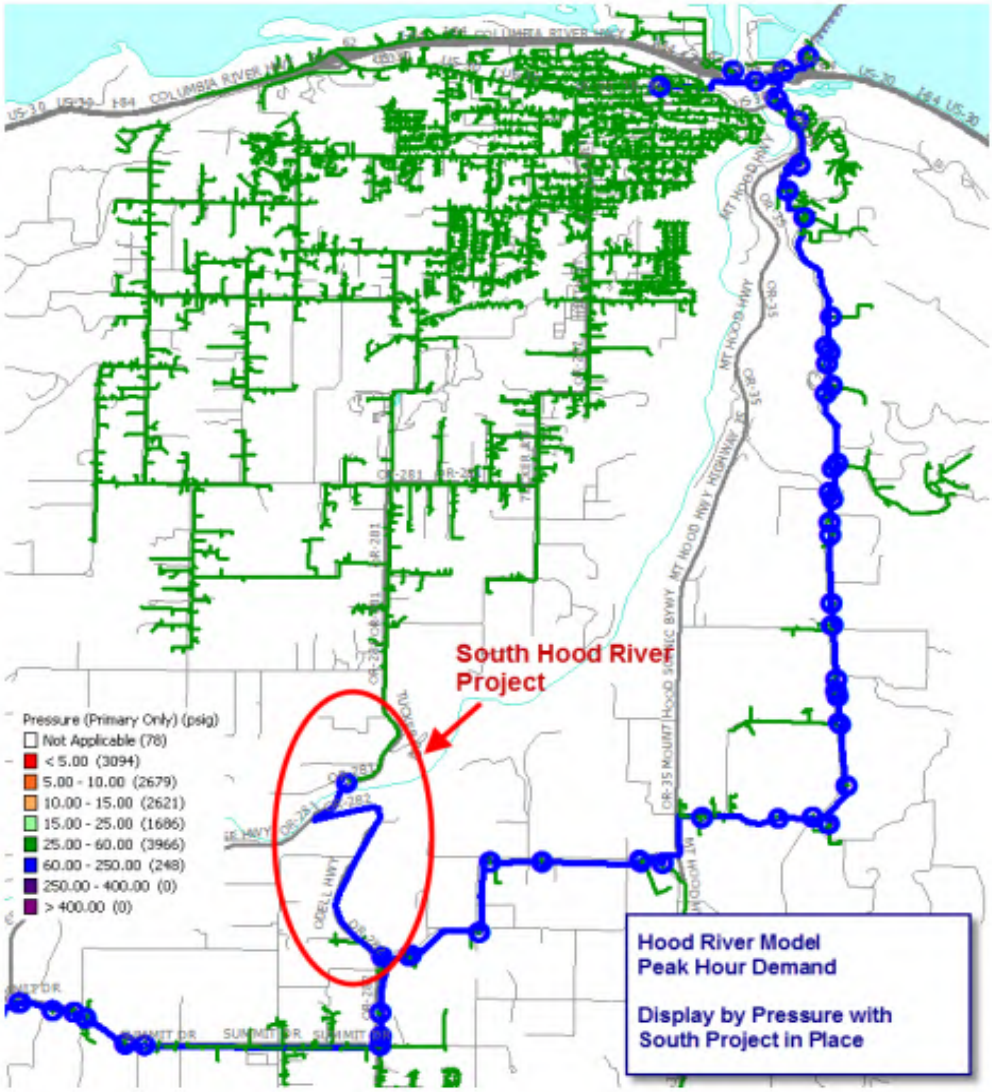
from the Hood River Reinforcement Project. The resulting satellite LNG facility design for Hood River had a higher estimated cost than the Hood River Reinforcement Project.

The Company's alternative analysis also examined the possibility of acquiring interruptible customer contracts that would match or exceed the project benefit therms and defer pipeline construction. NW Natural performed an analysis of existing firm customers within the Hood River distribution system to identify if sufficient volumes could be recovered from firm customers by contracting with them to become interruptible. There was not sufficient firm demand available on peak to replace the pipeline project benefit volume. For these reasons, the Company selected the Hood River Reinforcement Project as the best alternative for its 2018 IRP Action Plan.

Q. Please describe the Hood River Reinforcement Project proposed in the IRP.

A. As shown in Figure 4 below, the high pressure system to the east of Hood River runs from north to south, east of City limits along the east side of the Mt. Hood Highway and the Hood River, and then continues further south to the community of Odell, Oregon. When the Hood River Reinforcement Project was initially proposed in the 2018 IRP, it was believed that the high pressure main extension along the Odell Highway to the south would be the most cost effective pipeline alignment due to its rural nature and likelihood of less pavement restoration.

Figure 4. Map of Hood River Reinforcement Project



Q. Has the Company made any modifications to the route of the Hood River Reinforcement Project?

A. Yes, we have.

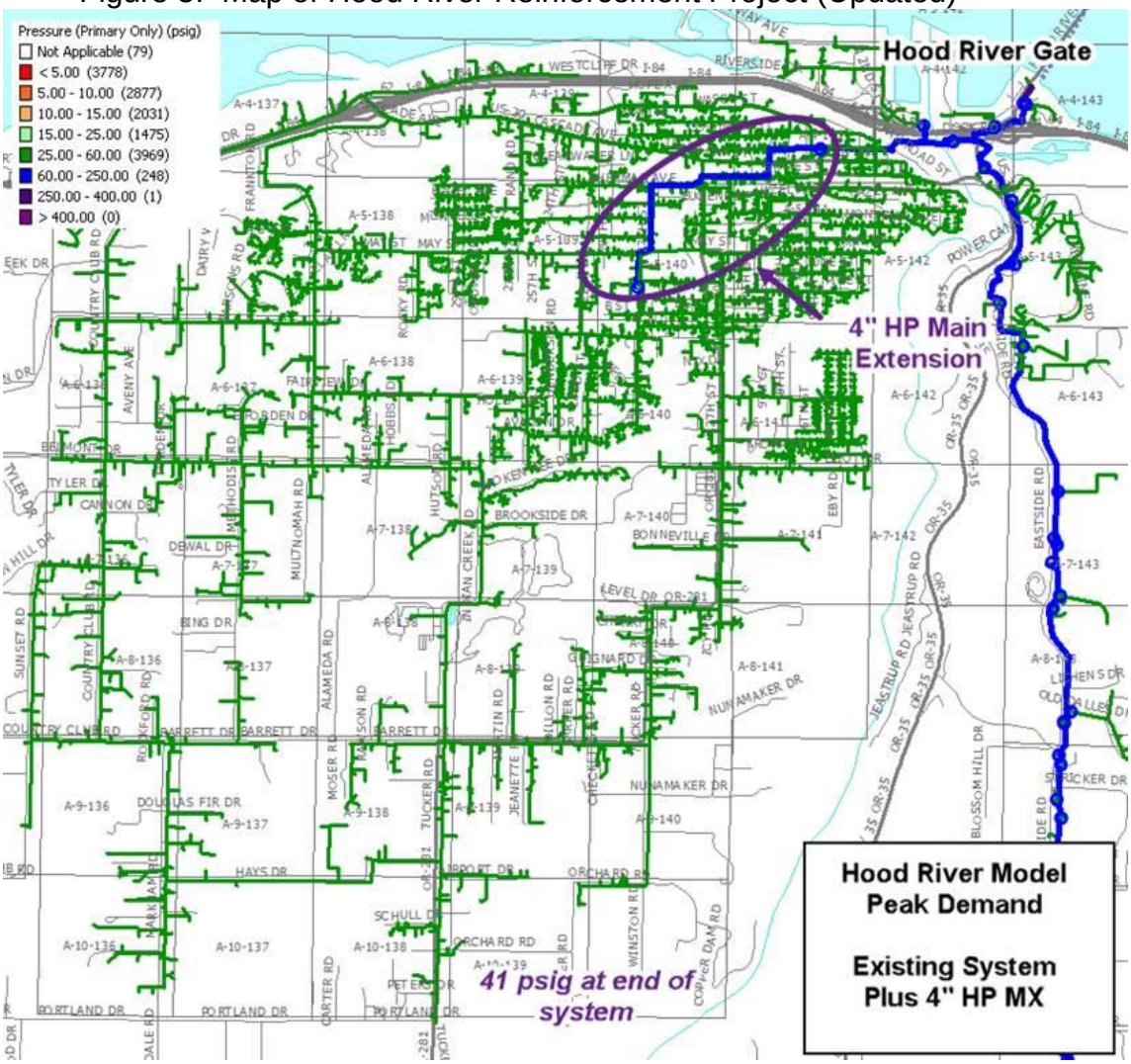
Q. Why did the Company decide to modify the route?

A. The east side high pressure system is separated from the core of the Hood River community by a canyon containing a river and a tall rock plateau. While it was

expected that a feasible route could be taken through the river canyon, the Company, through a professional geologic and geotechnical consulting firm, recently completed a pipeline routing evaluation. That evaluation reviewed available geologic maps, available National Resource Conservation Service maps and well logs obtained from the Oregon Water Resources Department to assess soil conditions likely to be encountered along the southern pipeline route, as well as the northern pipeline route. It identified the potential for a significant amount of large boulder excavation for about 0.6 to 0.75 miles of the southern pipeline route, with boulders as large as passenger cars. As a result, excavating this area would have likely increased the cost of the project significantly.

We then focused on solutions using the high pressure system in the north, within the City of Hood River. Our consultant's pipeline routing evaluation provided an assessment of likely soil conditions in the northern area of the City of Hood River, which demonstrated that the depth to bedrock was favorable for an open trench pipeline installation, without the need to excavate bedrock or the large boulders likely to be encountered in the southern pipeline route. The selected northern pipeline route is about 6,000 feet shorter in length and delivers additional gas supply to the core of the Hood River distribution system. The northern pipeline alignment is believed to be the most cost effective due to its shorter length and the expectation of less bedrock and large boulder excavation. The updated route for the Hood River Reinforcement Project is shown below in Figure 5.

Figure 5. Map of Hood River Reinforcement Project (Updated)



Q. What is the current status of the Hood River Reinforcement Project?

A. Currently, the Company has issued an RFP for engineering services, selected an engineering consultant and is progressing with the design of this pipeline with a goal to deliver final plans and work in right-of-way permits by March 2020. The pipeline is expected to be in service by June 2020.

Q. What was the estimated total cost to complete the Hood River Reinforcement Project before the Company updated the route?

A. The estimate for the original proposed southern route in the IRP was $3.5 million to $7.1 million.

Q. What is the estimated total cost to complete the Hood River Reinforcement Project with the updated route?

A. With the revised scope of work referenced above, the total cost to complete the Hood River Reinforcement Project is expected to be $4.6 million.

South Oregon City Reinforcement Project

Q. Please generally describe the Oregon City distribution system and the South Oregon City Reinforcement Project.

A. The Oregon City distribution system serves Oregon City, Oregon and its surrounding area. It is supplied mainly by the NWPL Oregon City Gate Station. A district regulator under the Oregon City Arch Bridge also brings gas into Oregon City from the Portland high pressure system (400 psig MAOP). Generally speaking, the customers in downtown Oregon City are fed by this regulator and its gas from Portland. The customers on top of the hill and to the west, east and south of downtown are served from the Oregon City Gate Station. The South Oregon City Reinforcement Project consists of constructing a 1.5-mile high pressure pipeline design in south Oregon City.

Q. Did the Company include the South Oregon City Reinforcement Project in its 2018 IRP Action Plan?

A. Yes.

Q. Did the Commission acknowledge the South Oregon City Reinforcement Project as part of the Company's 2018 IRP Action Plan?

A. Yes. In the 2018 IRP Order, the Commission adopted Staff's recommendation to acknowledge the South Oregon City Reinforcement Project.

Q. Why is the Company conducting the South Oregon City Reinforcement Project?

A. The south Oregon City area historically has been a weak area in the Company's distribution system and the increased load associated with firm service customer growth has exceeded the capacity of the existing distribution system. NW Natural has observed distribution pressures well below the 10 psig standard under non-peak conditions in this area of Oregon City. In January 2017, non-peak cold weather events resulted in widespread low pressures and reported outages of 87 customers in south Oregon City. Furthermore, as shown in Figure 6 below, modeling indicates that customer outages during simulated extreme cold weather will occur absent implementation of a remediating solution.

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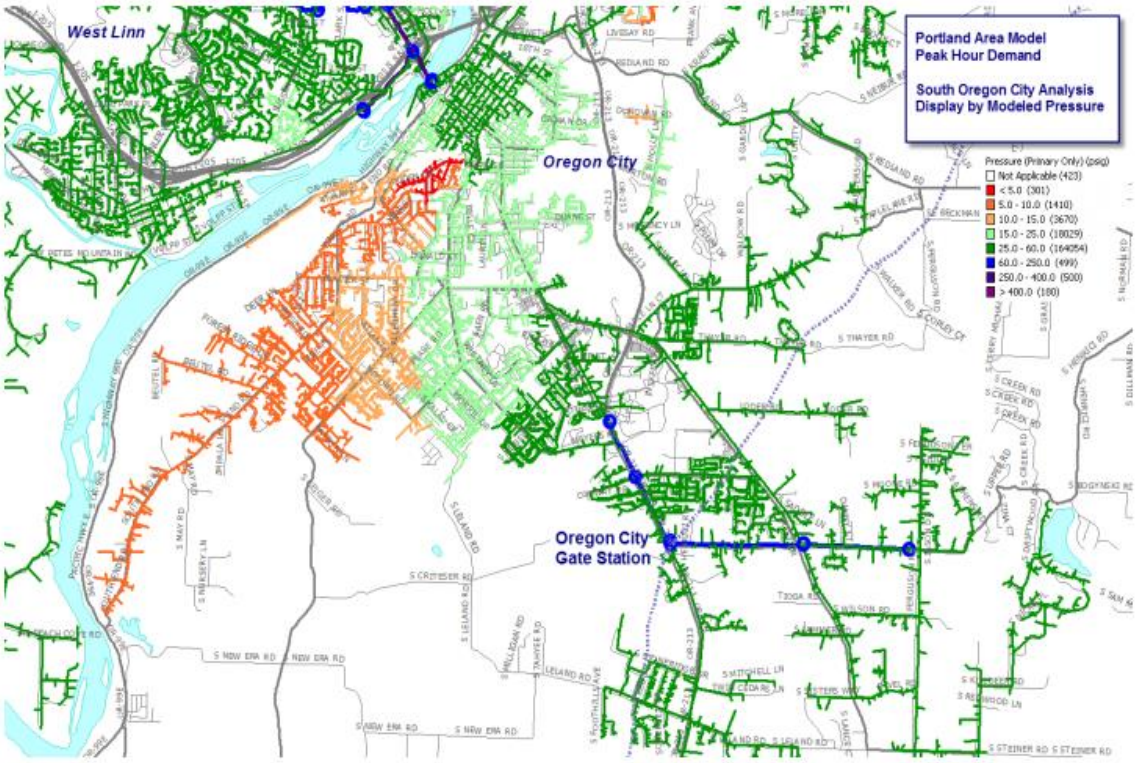
Figure 6. Map of Oregon City Distribution System



The model indicates that the Company would experience widespread low pressures (orange = 5-10 psig, red = 5 psig or less) and resulting customer outages under simulated extreme cold weather conditions. The loss of firm customers in January 2017 significantly violates the Company's system reinforcement criteria for lower pressure systems, which specifies that 10 psig is the lowest acceptable pressure in a distribution system. System reinforcement actions must be taken to assure safe and reliable service to firm customers in south Oregon City.

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Q. How did the Company decide to source the alternate supply for the Oregon City area?

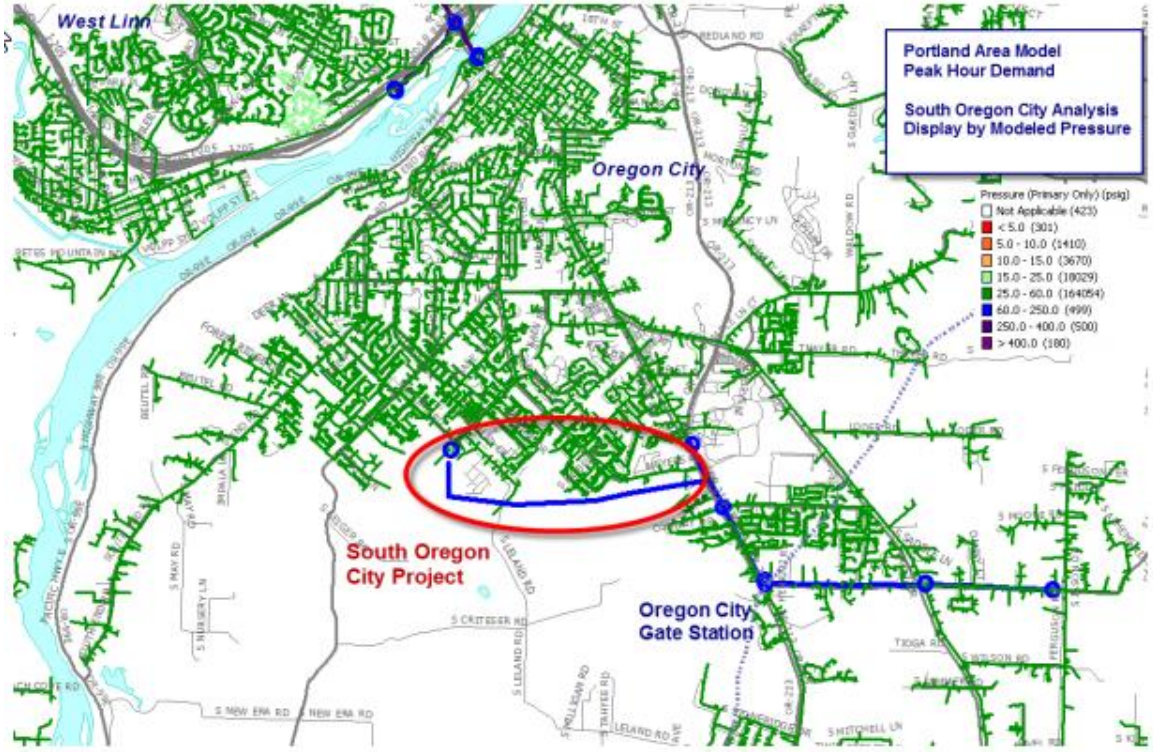
A. The Company carefully examined the Oregon City distribution system to determine if there are pressure limiting points where pipelines could be replaced to ease cold weather impacts on system pressures. The Company determined that significant portions of the system would have to be replaced for substantial gains in performance to be made. The smaller system ties and replacements with larger pipe diameters already have been done in this system. Further, the Oregon City system already is operating at 57 psig MAOP and cannot be uprated to increase system capacity.

NW Natural then shifted its analysis to a new pipeline design and how to get more gas into the weak areas. Any project to bolster this system has to involve high pressure gas. The only two sources of high pressure gas in the Oregon City area are from the Oregon City Gate Station and from the regulator in downtown Oregon City. The downtown regulator is isolated from the weak systems to the south. Oregon City is very much a city divided by topography due to the 100-foot tall basalt cliffs that surround the downtown area. The least cost solution is a pipeline from the Oregon City Gate Station in the south to the area of low pressure.

The Company determined that a 1.5-mile high pressure pipeline design in south Oregon City offers the best solution for addressing the pressure issues in south Oregon City. The South Oregon City Reinforcement Project as proposed in

the 2018 IRP is shown below in Figure 7.

Figure 7. Map of South Oregon City Reinforcement Project



Q. Did the Company consider alternative projects to address the pressure drop in the south Oregon City area?

A. Yes. The Company compared the benefit volume of the South Oregon City Reinforcement Project (modeled therms delivered to customers on peak from this project) with other alternatives. The Company created a high level design for a satellite LNG facility for peak shaving, which is sized to match the benefit volume from the South Oregon City Reinforcement Project. The resulting satellite LNG facility design for Oregon City had a higher estimated cost than the South Oregon City Reinforcement Project.

The Company's alternative analysis also examined the possibility of acquiring interruptible customer contracts that would match or exceed the project benefit therms and defer pipeline construction. NW Natural performed an analysis of existing firm customers within the Oregon City distribution system to identify if sufficient volumes could be recovered from firm customers by contracting with them to become interruptible. There was not sufficient firm demand available on peak to replace the pipeline project benefit volume. For these reasons, the Company selected the South Oregon City Reinforcement Project as the best alternative for its 2018 IRP Action Plan.

Q. Has the Company made any modifications to the route of the South Oregon City Reinforcement Project?

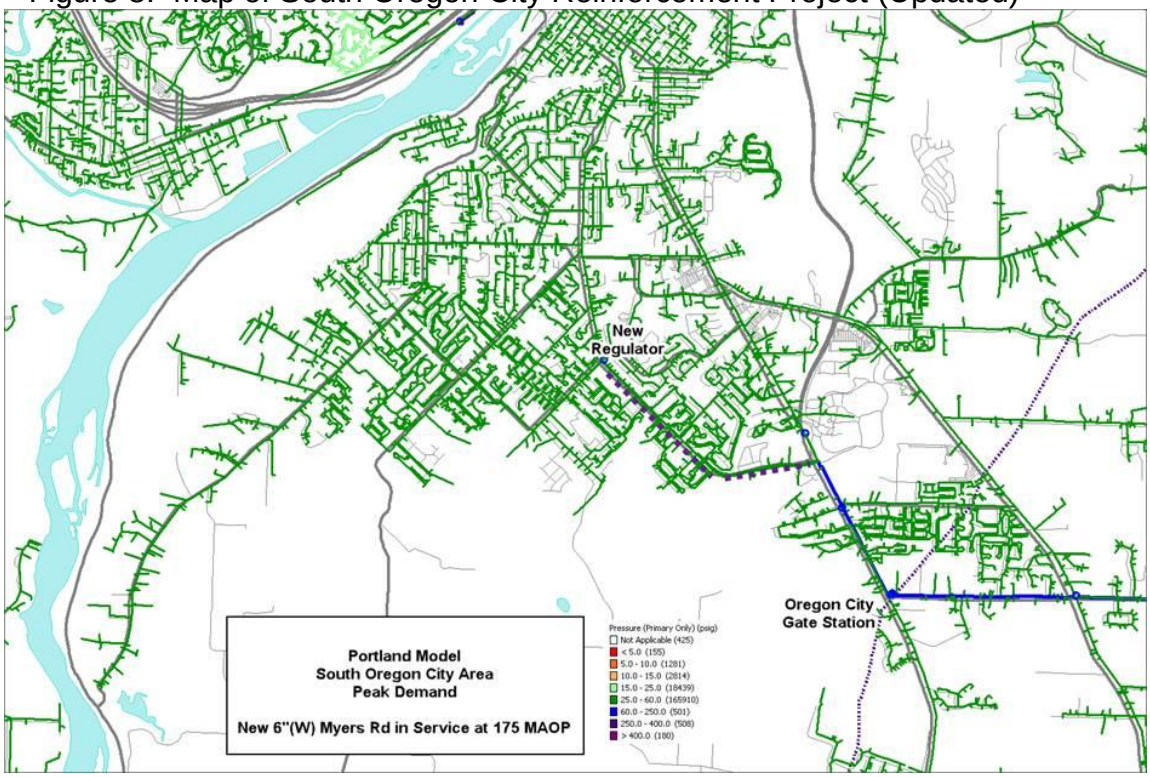
A. Yes, we have.

Q Please explain the modifications to the route.

A. The Company, through a professional geologic and geotechnical consulting firm, recently completed a pipeline routing evaluation to review available geologic maps, available National Resource Conservation Service maps and well logs obtained from the Oregon Water Resources Department to assess soil conditions likely to be encountered along the pipeline route along the Bonneville Power Administration ("BPA") easement in the 2018 IRP Action Plan. The Company determined that the route within the BPA easement presents topographical and geological constraints that could significantly increase project costs. As a result, NW Natural studied and modeled several other pipeline routes for their ability to

deliver gas to the Class B system. After consideration of the positive attributes of an alternate route along Myers Road, the Company has elected to pursue construction of this pipeline along Myers Road, between Oregon Route 213 and Leland Road. The updated version of the South Oregon City Reinforcement Project is shown below in Figure 8.

Figure 8. Map of South Oregon City Reinforcement Project (Updated)



Q. What is the status and timing of the South Oregon City Reinforcement Project?

A. The Company will be issuing an RFP for design surveying services to a group of consultants. The Company expects to construct this pipeline in the second quarter 2020 and to place the pipeline in service in June 2020.

Q. What was the estimated total cost to complete the South Oregon City Reinforcement Project before the Company updated the route?

A. The estimate for the original proposed in the IRP was $4.1 million to $6.2 million.

Q. What is the estimated total cost to complete the South Oregon City Reinforcement Project with the updated route?

A. With the revised scope of work referenced above, the total cost to complete the South Oregon City Reinforcement Project is expected to be $5.8 million.

Happy Valley Reinforcement Project

Q. Please generally describe the Happy Valley distribution system and the Happy Valley Reinforcement Project.

A. The distribution system in the area of Happy Valley, Oregon is an interconnected part of the Company's much larger East Portland system. The Happy Valley system is supplied mainly by gas from the NWPL Southeast and Johnson Creek Gate Stations. The Happy Valley/Sunnyside area has experienced significant growth for many years. As a result, many main extensions and small system reinforcement projects have occurred over time to meet the growing customer demand. The Happy Valley Reinforcement Project consists of the construction of approximately 1.2 miles of 6-inch high pressure wrapped steel pipeline from Oregon Route 212 to Sunnyside Road and the installation of a new district regulator.

Q. Did the Company include the Happy Valley Reinforcement Project in its 2018 IRP Action Plan?

A. Yes.

Q. Did the Commission acknowledge the Happy Valley Reinforcement Project as part of the Company's 2018 IRP Action Plan?

A. Yes. In the 2018 IRP Order, the Commission adopted Staff's recommendation to acknowledge the Happy Valley Reinforcement Project.

Q. Why is the Company conducting the Happy Valley Reinforcement Project?

A. The growing Happy Valley area is one of the weaker areas in the Company's distribution system. The modeled pressure in Happy Valley correlates with the weak pressures experienced in January 2017. Under less than peak weather in January 2017 no outages were experienced, but pressures in the Happy Valley system violated the 10 psig minimum standard. Furthermore, as shown in Figure 9 below, modeling indicates that customer outages during simulated extreme cold weather will occur absent implementation of a remediating solution.

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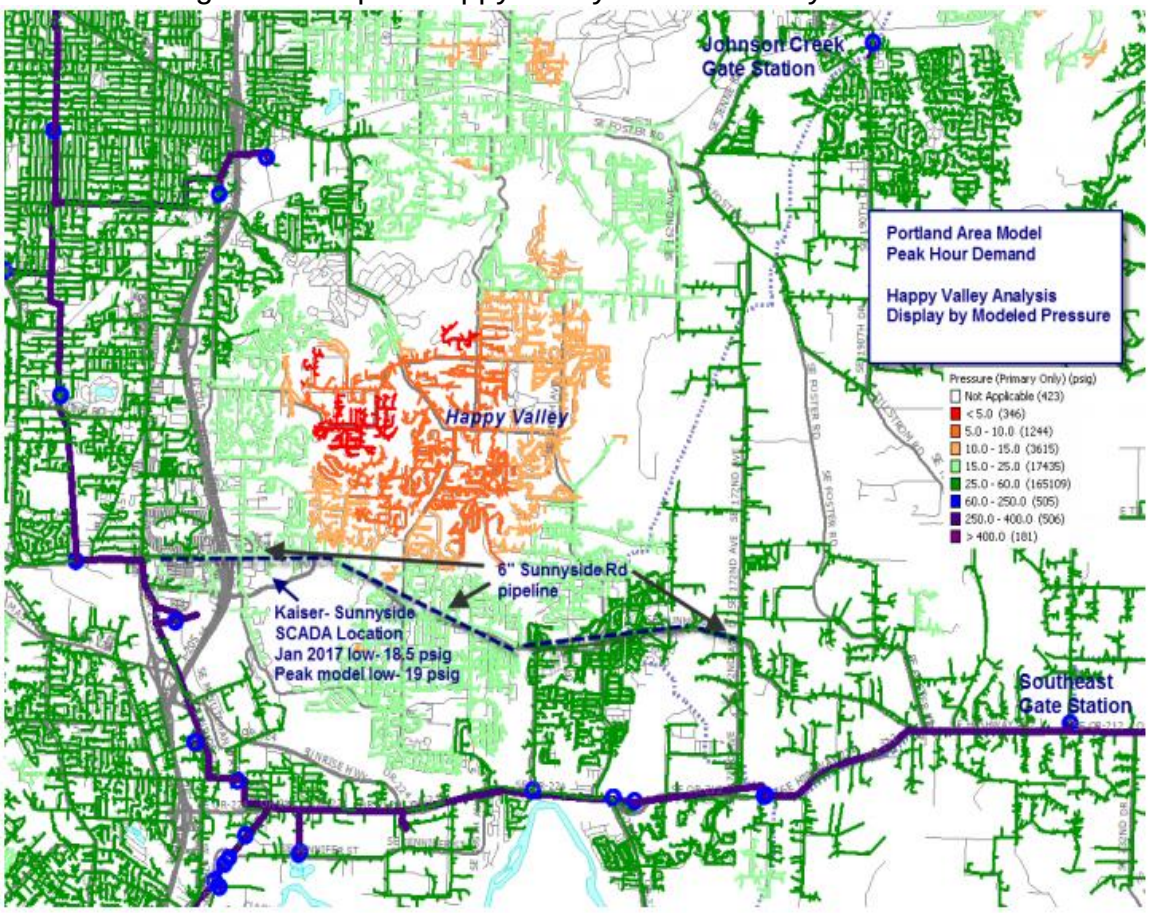
Figure 9. Map of Happy Valley Distribution System



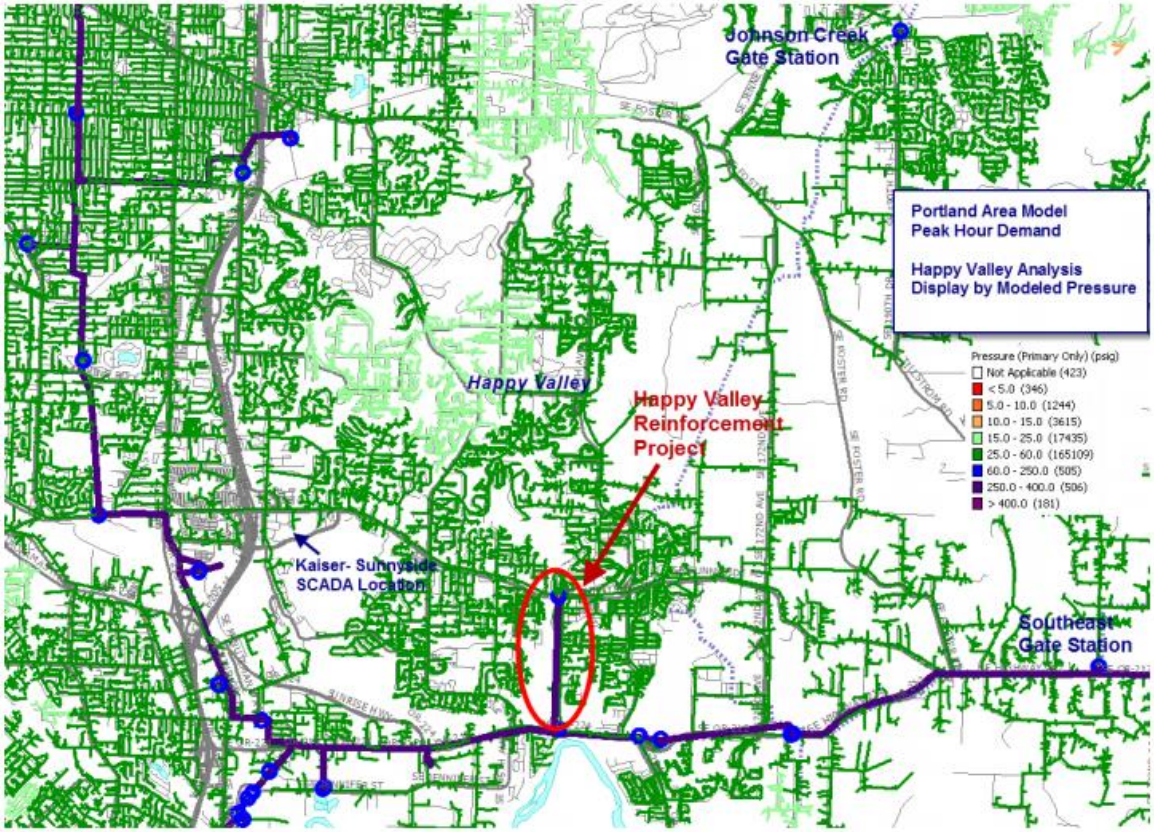
The model indicates that the Company would experience widespread low pressures (orange = 5-10 psig, red = 5 psig or less) and resulting customer outages under simulated extreme cold weather conditions. The observed low pressures from January 2017 violate the Company's system reinforcement criteria for lower pressure systems, which specifies that 10 psig is the lowest acceptable pressure in a distribution system. System reinforcement actions must be taken to assure safe and reliable service to firm customers in Happy Valley.

Q. How did the Company decide on the scope of the Happy Valley Reinforcement Project?

A. The Company carefully examined the Happy Valley distribution system to determine if there are pressure limiting points where pipelines could be replaced to ease cold weather impacts on system pressures. The Company determined that significant portions of the system would have to be replaced for substantial gains in performance to be made. The smaller system ties and replacements with larger pipe diameters have been done in this system. Significant feeder pipelines would have to be built to improve cold weather system performance. Further, the Happy Valley system already is operating at 57 psig MAOP and cannot be uprated to increase system capacity.

NW Natural then shifted its analysis to a new pipeline design and how to get more gas into the weak areas. The area needs an additional source of support, likely from a high pressure source. The Company determined that a 1.2-mile high pressure pipeline design in Happy Valley offers the best solution for addressing the pressure issues. The selected pipeline design remediates the pressure issues, at the lowest expected cost of any other pipeline design. It will have minimal impacts on traffic, the public and the Company's customers, and it will allow for future extension of the pipeline. The Happy Valley Reinforcement Project is shown below in Figure 10.

Figure 10. Map of Happy Valley Reinforcement Project



Q. Did the Company consider alternative projects to address the pressure drop in the Happy Valley area?

A. Yes. The Company compared the benefit volume of the Happy Valley Reinforcement Project (modeled therms delivered to customers on peak from this project) with other alternatives. The Company created a high level design for a satellite LNG facility for peak shaving, which is sized to match the benefit volume from the Happy Valley Reinforcement Project. The resulting satellite LNG facility design for Happy Valley had a higher estimated cost than the Happy Valley Reinforcement Project.

The Company's alternative analysis also examined the possibility of acquiring interruptible customer contracts that would match or exceed the project benefit therms and defer pipeline construction. NW Natural performed an analysis of existing firm customers within the Happy Valley distribution system to identify if sufficient volumes could be recovered from firm customers by contracting with them to become interruptible. There was not sufficient firm demand available on peak to replace the pipeline project benefit volume. For these reasons, the Company selected the Happy Valley Reinforcement Project as the best alternative for its 2018 IRP Action Plan.

Q. What is the status and timing of the Happy Valley Reinforcement Project?

A. The Happy Valley Reinforcement Project currently is in the execution phase. The Company issued an RFP for engineering design and surveying services in May 2019 to a group of consultants. The selected pipeline consultant has completed the pipeline design and work in right-of-way permits is underway for the Happy Valley Reinforcement Project pipeline. The Company started construction of this pipeline in the third quarter 2019, and will complete construction of the pipeline and place it in service in March 2020.

Q. What is the estimated total cost to complete the Happy Valley Reinforcement Project?

A. The total cost to complete the Happy Valley Reinforcement Project is expected to be $4.4 million.

Kuebler Boulevard Reinforcement Project

Q. Please generally describe the south Salem distribution system and the Kuebler Boulevard Reinforcement Project.

A. The distribution system in the southern part of Salem, Oregon is fed by a 225 psig MAOP high pressure pipeline. That high pressure pipeline, in turn, is fed by three different sources: the NWPL Turner Gate Station from the south and Salem Gate Station and Center Street Bridge regulator from the north. The north and south portions of this system are connected by a single 6-inch pipeline. The Kuebler Boulevard Reinforcement Project installs approximately 4 miles of 8-inch high pressure pipeline to create a high pressure loop in the south Salem 225 psig MAOP system.

Q. Did the Company include the Kuebler Boulevard Reinforcement Project in its 2018 IRP Action Plan?

A. Yes.

Q. Did the Commission acknowledge the Kuebler Boulevard Reinforcement Project as part of the Company's 2018 IRP Action Plan?

A. Yes. In the 2018 IRP Order, the Commission adopted Staff's recommendation to acknowledge the Kuebler Boulevard Reinforcement Project.

Q. Why is the Company conducting the Kuebler Boulevard Reinforcement Project?

A. The single 6-inch pipe that connects the south Salem 225 psig MAOP system from the north and the south does not have adequate capacity under cold

weather conditions. Growth to the south and west has increased demand on the Turner Gate Station and the high pressure distribution system to the point where pressure drop criteria are exceeded and regulator inlet pressures are in jeopardy. A pressure of 80 psig was experienced in January 2017 under non-peak conditions at the southwest end of the 225 psig MAOP system. That pressure equates to a pressure drop of over 60% (or approximately 93% of the maximum flow rate capacity). The existing pipeline configuration significantly violates the Company's system reinforcement criteria for high pressure systems, which specifies that 40% is the largest acceptable pressure drop. System reinforcement actions must be taken to assure reliable service to firm customers.

Furthermore, the model for the existing south Salem system (current piping configuration and customers) during simulated extreme cold weather is shown in Figure 11 below. The Company has added arrows to this model to indicate flow directions on the high pressure system to better show how the three gas sources support each other.

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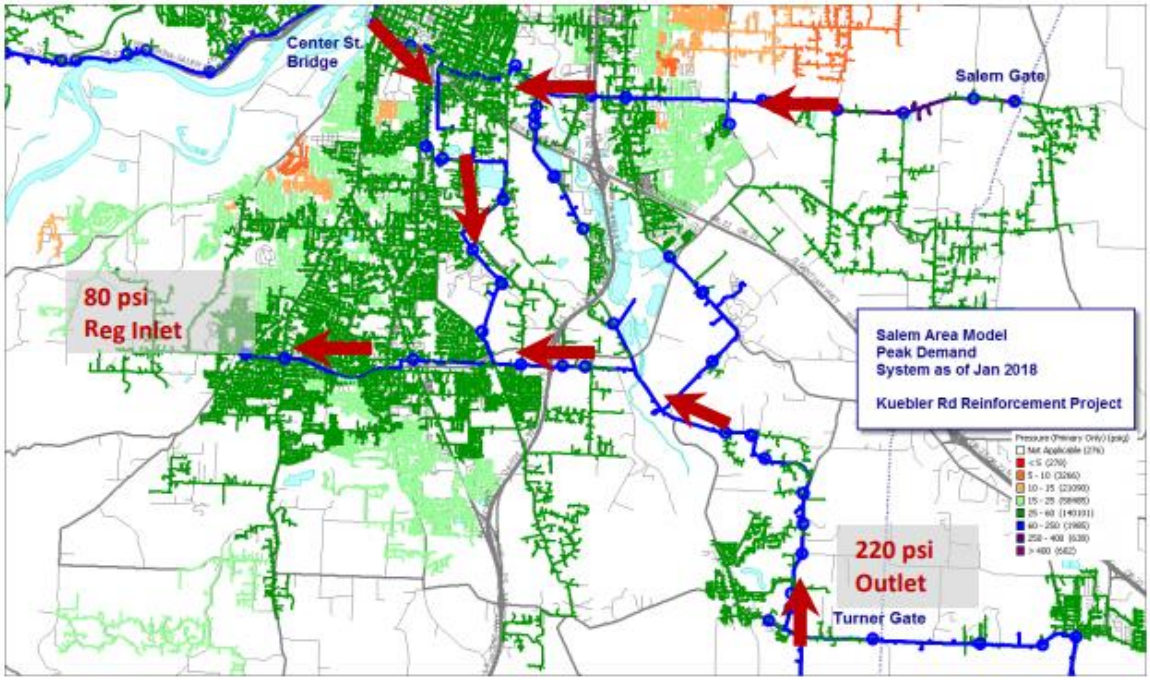
Figure 11. Map of South Salem Distribution System



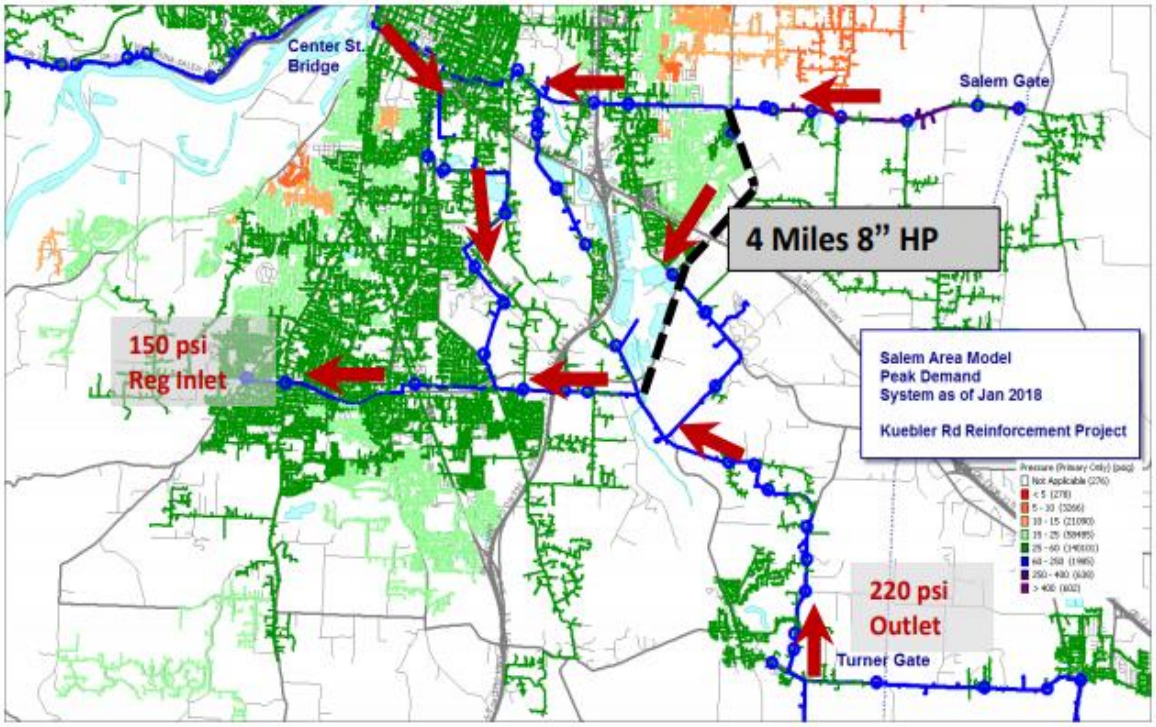
Q. How did the Company decide on the scope of the Kuebler Boulevard Reinforcement Project?

A. Before deciding on the Kuebler Boulevard Reinforcement Project, the Company investigated pressure uprates of these gas pipelines. The Salem high pressure system operates at 225 psig MAOP. Pipeline records indicate that there are many sections of the Salem high pressure system that were installed in the late 1950s and early 1960s that were not designed or pressure tested to allow for service above 225 psig MAOP.

NW Natural then shifted its analysis to a new pipeline design to create a high pressure loop in the Salem 225 psig MAOP system. The Company determined that a 4-mile high pressure pipeline design along Kuebler Boulevard in south Salem offers the best solution for addressing the pressure issues. This

pipeline allows the Salem Gate Station and the Center Street Bridge regulator to contribute significantly more supply to the southern end of the system and reduce demand from the Turner Gate Station. The selected pipeline design remediates the pressure issues, at the lowest expected cost of any other pipeline design, and provides a high pressure loop in the south Salem distribution system that enhances performance and reliability. It will have minimal impacts on traffic, the public and the Company's customers because the route travels through a relatively undeveloped area. The project also eliminates approximately $2 million of otherwise required improvement costs at the Turner Gate Station. The Kuebler Boulevard Reinforcement Project is shown below in Figure 12.

Figure 12. Map of Kuebler Boulevard Reinforcement Project



Q. Did the Company consider alternative projects to address the pressure drop in the south Salem area?

A. Yes. The Company compared the benefit volume of the Kuebler Boulevard Reinforcement Project (net therms required to restore pressure drop on the existing pipeline to 30% pressure drop) with other alternatives. The Company created a high level design for a satellite LNG facility for peak shaving, which is sized to match the pipeline project benefit from the Kuebler Boulevard Reinforcement Project. The resulting satellite LNG facility design for south Salem had a higher estimated cost than the Kuebler Boulevard Reinforcement Project.

The Company's alternative analysis also examined the possibility of acquiring interruptible customer contracts that would match or exceed the project benefit therms and defer pipeline construction. NW Natural performed an analysis of existing firm customers within the south Salem distribution system to identify if sufficient volumes could be recovered from firm customers by contracting with them to become interruptible. There was not sufficient firm demand available on peak to replace the pipeline project benefit volume. For these reasons, the Company selected the Kuebler Boulevard Reinforcement Project as the best alternative for its 2018 IRP Action Plan.

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Q. What is the status and timing of the Kuebler Boulevard Reinforcement Project?

A. The Kuebler Boulevard Reinforcement Project currently is in the planning phase. The Company is drafting an RFP for engineering services to design this pipeline. The Company expects to construct and complete this project in 2021. Factors that will determine timing of construction and completion include, but are not limited to, the following: progression of planning stage including the RFP process, potential environmental permitting, the possible need for easement acquisition, and hiring resources to manage and inspect the project.

Q. What is the estimated total cost to complete the Kuebler Boulevard Reinforcement Project?

A. The total cost to complete the Kuebler Boulevard Reinforcement Project is expected to be $19.7 million.

Mist Large Dehydration System Project

Q. Please generally describe the Mist Large Dehydration System Project.

A. The Mist Large Dehydration System Project replaces the large dehydration system at Mist that went into service in 1998 and has reached end of life. The dehydration system is critical for the withdrawal operation of gas at Mist. Natural gas stored in underground reservoirs usually contains a large amount of water. This water can cause several problems for downstream processes and equipment, such as freezing in pipe or forming hydrates which can plug equipment. NW Natural's pipeline quality specification tariff requires that the

water content should not exceed 7 pounds per million standard cubic feet to prevent such problems. The dehydration system removes the water from the gas so that our storage and distribution system can operate safely.

Q. Did the Company include the Mist Large Dehydration System Project in its 2016 IRP Action Plan?

A. Yes. The Company included the Mist Large Dehydration System Project in its 2016 IRP Action Plan, in conjunction with another relevant alternative. In particular, NW Natural concluded that it should "[r]eplace or repair, depending on relative cost-effectiveness, the large dehydrator at Mist's Miller Station." The Company stated that "[r]eplacement is currently estimated to cost between $6 million and $7 million based on estimates obtained from a third-party engineering consulting firm engaged by [NW Natural]."

Q. Did the Commission acknowledge the Mist Large Dehydration System Project as part of the Company's 2016 IRP Action Plan?

A. Yes. In Order No. 17-059 entered in LC 64 on February 21, 2017, the Commission adopted Staff's recommendation to acknowledge the Company's action to "[r]eplace or repair, depending on relative cost-effectiveness, the large dehydrator at Mist's Miller Station."

Q. Did the Company file an update of its 2016 IRP Action Plan?

A. Yes. In February 2018, the Company filed an update of its 2016 IRP Action Plan. NW Natural informed the Commission that it had recently received the final report from its engineering consultant ("Engineering Report") regarding whether to

repair or replace the large dehydrator, and that we were assessing the recommendations and proposed solutions provided in the Engineering Report. The Engineering Report was conducted during the 2017 injection season and included examinations of service and maintenance records, operability, external structural integrity, age, and cost estimations. The Engineering Report recommended both interim repairs to the dehydration system and replacement of the large dehydrator because it had reached the end of its useful life and was not functioning as designed.

Q. Did the Company attempt interim repairs to the large dehydration system at Mist after it received the Engineering Report?

A. Yes, the Company attempted interim repairs to the large dehydration system (i.e., a shorter-term solution recommended in the Engineering Report in advance of the system replacement), but those repairs were not successful. The Company identified several additional critical issues during its repair efforts, most notably the increasing malfunction of the large dehydrator's regeneration and scrubber systems that would continue if they were not replaced.

Q. Did the Company conduct an RFP as part of its assessment of the recommendations and proposed solutions provided in the Engineering Report?

A. Yes. The Company issued an RFP to prospective contractors for the design and construction of the Large Mist Dehydration System Project. The RFP responses contained pricing substantially higher than the initial estimated cost range that

the Company provided in its 2016 IRP Action Plan. The initial estimate received did not include adequate engineering, project management, or construction labor costs. In addition, material costs have increased in the subsequent four years. The Company evaluated the RFP responses and awarded the contract to the winning RFP bidder in August 2018, at a contract cost of $16.8 million (without the Company's engineering costs or construction overhead and based upon 2018 prices and construction in 2019).

Q. Did the Company update the status of the Mist Large Dehydration System Project in its 2018 IRP Action Plan?

A. Yes. In its 2018 IRP filing, the Company stated that the large dehydration system at Mist had reached end-of-life and was not functioning as designed, and that the Engineering Report concluded that the existing dehydration system should be replaced. The Company commented that an in-depth economic and alternatives analysis was underway.

Q. Did the Company complete that in-depth economic and alternatives analysis?

A. Yes. The Company conducted a Six-Sigma Failure Mode and Effects Analysis ("FMEA") in the third quarter of 2018. The FMEA concluded that replacement of the Mist large dehydration system was necessary as soon as possible for both safety and compliance. It found that the system has performance and operational issues and has a high probability of experiencing a failure impacting safety and/or compliance by 2024. Consequently, the Company concluded that

the replacement of the large dehydrator at Mist through the Mist Large Dehydration System Project was necessary as soon as possible.

Q. Has the Company filed an update of its 2018 IRP Action Plan?

A. Yes. In November 2019, the Company filed an update of its 2018 IRP Action Plan. My testimony reflects the information provided in that update.

Q. What is the status and timing of the Mist Large Dehydration System Project?

A. The Mist Large Dehydration System Project currently is in the execution phase. Design and long-lead equipment procurement processes are ongoing. Construction is planned to start in April 2020. The Company expects the project to be in service by October 2020.

Q. Has the cost of Mist Large Dehydration System Project been further impacted by moving the construction out into 2020?

A. Yes. Expected labor costs in 2020 are higher than labor costs in 2019. Further, materials costs have increased as a result of the tariffs being imposed by the United States and market volatility.

Q. What is the estimated total cost range to complete the Mist Large Dehydration System Project?

A. The total cost to complete the Mist Large Dehydration System Project is expected to be $23.7 million, or approximately $22.2 million on an Oregon-allocated basis. Despite the increase in estimated cost from the initial preliminary estimate in the IRP, the replacement of the dehydrator is still the

least-cost, least-risk option. A calculated portion of the cost of this project has been allocated to Washington.

Mist Instrument and Controls Project (Phase 2)

Q. Please generally describe the Mist Instrument and Controls Project (Phase 2).

A. The Mist Instrument and Controls Project (Phase 2) replaces failing, functionally-reduced and end-of-life flow transmitters, moisture analyzers and ultrasonic flow transmitters with new industry and Company standard units. The new standard units provide greater reliability, better accuracy, improved functionality and less required maintenance. The project also involves updating as-built drawings to facilitate the creation of a master instrument index to aid in maintenance activities and equipment troubleshooting and to maintain compliance with Title 49, Part 192 of the Code of Federal Regulations.

Q. Did the Company include the Mist Instrument and Controls Project (Phase 2) in its last rate case (UG 344)?

A. Yes. The Company included the Mist Instrument and Controls Project (Phase 2) in its last rate case, UG 344.

Q. What was the final disposition of the Mist Instrument and Controls Project (Phase 2) in UG 344?

A. On August 6, 2018, all the parties in UG 344 filed a Stipulation. Paragraph 6 of that Stipulation states: "The Company agrees to file an attestation of a Company officer by October 5, 2018, attesting to whether any projects forecast to cost over $1,000,000 and to be completed by October 31, 2018 will not be complete by this

time. In the event that there are such projects, those projects will be removed from rate base for purposes of calculating the rates pursuant to this Stipulation, and rates adjusted accordingly."

The Company filed that attestation on October 5, 2018. Because the Mist Instrument and Controls Project (Phase 2) was not going to be completed by October 31, 2018, NW Natural identified and removed from rate base the total project cost of $1.238 million.

Q. What is the current status of the Mist Instrument and Controls Project (Phase 2)?

A. The Mist Instrument and Controls Project (Phase 2) currently is in the planning phase. The Company expects the project to be in service by October 2020.

Q. What is the estimated total cost to complete the Mist Instrument and Controls Project (Phase 2)?

A. The total cost to complete the Mist Instrument and Controls Project (Phase 2) is expected to be $1.8 million, or approximately $1.7 million on an Oregon-allocated basis. A calculated portion of the cost of this project has been allocated to Washington.

OR 212 257th to US 26 ODOT Project

Q. Please generally describe the OR 212 257th to US 26 ODOT Project.

A. As I mentioned earlier in my testimony, ODOT is working on a project to widen and regrade Oregon Route 212. Oregon Administrative Rules (OAR) 734-055 requires the Company to relocate the existing gas line located in the public right-

of-way. Specifically, the Company is required to relocate approximately 5 miles of 3.5-inch main. The Company will replace the relocated main with approximately 5 miles of 8-inch wrapped steel high pressure pipeline, along the Richie Road and Kelso Road rights-of-way and away from Oregon Route 212.

Q. What is the status and timing of the OR 212 257th to US 26 ODOT Project?

A. The OR 212 257th to US 26 ODOT Project began the construction phase in July 2019. The Company expects the new 8-inch pipeline to be in service by April 2020. The OR 212 257th to US 26 ODOT Project is shown in Figure 2 that is provided earlier in my testimony.

Q. What is the estimated total cost to complete the OR 212 257th to US 26 ODOT Project?

A. The total cost to complete the OR 212 257th to US 26 ODOT Project is expected to be $15.3 million.

III. SAFETY-RELATED PROJECTS

Q. Is the Company performing safety-related projects?

A. Yes. NW Natural currently is performing several safety-related projects. These projects are also discussed in the Company's 2019 Safety Project Plan, filed in docket UM 1900 on September 30, 2019. The Company's safety-related projects address, among other topics, seismic risk, the most recent significant PHMSA pipeline safety regulation being published, and the installation of EFVs.

Seismic Risk

Q. Please describe NW Natural's plans to address seismic risk.

A. The Company is performing a comprehensive seismic assessment of its transmission and high pressure distribution pipeline system. The seismic assessment will be used to identify, plan and prioritize projects to address seismic resiliency.

Q. Why is NW Natural performing a seismic assessment?

A. In 2011, the Oregon legislature directed the Oregon Seismic Safety Policy Advisory Commission to prepare the Oregon Resiliency Plan ("ORP") with the purpose of identifying recommendations for how Oregon's critical infrastructure—including energy infrastructure—could be made seismically resilient against a Cascadia Subduction Zone earthquake. Upon completion of the ORP in 2013, the Oregon legislature passed Senate Bill 33, which established the Governor's Task Force on Resilience Plan Implementation ("Task Force"). In October 2014, the Task Force issued a report recommending that the Commission (1) require regulated energy providers to conduct seismic assessments of regulated facilities, and (2) allow cost recovery for prudent investments related to assessments and mitigation of vulnerabilities identified during those assessments.[4]

[4] http://www.oregon.gov/oem/Documents/2014_ORTF_report.pdf

In October 2018, Governor Kate Brown presented the "Resiliency 2025" plan, titled "Improving Our Readiness for the Cascadia Earthquake and Tsunami" ("Resiliency 2025 Plan"). The Resiliency 2025 Plan follows the 2013 ORP, and outlines six key strategies for the State of Oregon. Its vision is to "[p]rotect all Oregonians by ensuring we are prepared to survive and recover from the expected 9.0 magnitude Cascadia earthquake and ensuing tsunami." The key strategy of the Resiliency 2025 Plan to improve the energy infrastructure is to "[d]evelop a plan for the Critical Energy Infrastructure Hub to prevent and mitigate catastrophic failure and ensure fuel supplies and alternate energy sources are available to responders and the public."

NW Natural supports Governor Brown's Resiliency 2025 Plan, and has been mindful of the destructive level a Cascadia Subduction Zone earthquake could pose on customers in its service territory. Through its seismic assessment, NW Natural is taking proactive steps to study, understand and act towards building resiliency of its critical energy facilities, in order to deliver safe and reliable service and work towards relatively short restoration timeframes after a major earthquake. So far, the Company has: 1) upgraded several critical facilities to survive a major seismic event and allow for business continuity, 2) improved pipeline safety and seismic resilience through NW Natural's Enhanced Pipeline Safety Programs, and 3) partnered with regional stakeholders to study and improve critical infrastructure performance.

Q. When does the Company expect to complete its seismic assessment?

A. NW Natural completed a pilot study in July 2019 of the transmission and high pressure distribution systems (operating above 60 psig) that examined 94.6 miles of pipe in areas with known seismic risk. Results of the study are being used to identify projects to replace and/or fortify facilities determined to be vulnerable during events such as a Cascadia Subduction Zone earthquake. As identified and prioritized, these projects will be included in future SPPs. Future projects will complement existing mitigation programs related to 49 Code of Federal Regulations, Subpart O – TIMP. Such TIMP-related projects include but are not limited to: installation of automatic shut-off valves ("ASVs") or remote control valves ("RCVs"), elimination of bridge crossings, natural forces mitigation work, system reinforcement, and valve installation.

Following the pilot study, NW Natural has proceeded with examining all remaining 1,259 miles of transmission and high pressure pipelines, which will be completed in 2020, to better understand the relationship between the gas distribution system and the geography/geology within our service territory. Results of the study will be used to prioritize projects and develop programs to address the threat of seismic activity system wide.

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PHMSA Pipeline Safety Regulation

Q. Please describe the most recent significant PHMSA pipeline safety regulation being published.

A. The most recent significant PHMSA pipeline safety regulation is the Underground Storage Facilities interim final rule, published in 2017, and the Safety of Gas Transmission Pipeline Regulations, with part one being issued on October 1, 2019. Both of these PHMSA regulations will have significant impacts on how gas utilities operate their facilities.

Q. Please describe the Underground Storage Facilities rule.

A. This regulation addresses critical safety issues related to downhole facilities, including wells, wellbore tubing, and casing, at underground natural gas storage facilities. This regulation responds to Section 12 of the Protecting our Infrastructure of Pipelines and Enhancing Safety Act of 2016, which was enacted following the serious natural gas leak at the Aliso Canyon facility in California on October 23, 2015. It incorporates by reference the American Petroleum Institute ("API") Recommended Practices ("RP"), API RP 1171, "Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs," issued in September 2015. The Underground Storage Facilities rule brings integrity management techniques, such as risk models, well tubing and casing inspections, and remediation to ensure the safe operation of underground storage facilities.

Q. Please describe the estimated cost of the Underground Storage Facilities rule.

A. The estimated total cost to comply with the Underground Storage Facilities rule in 2019 is $3.1 million. For 2020 and 2021, the estimated costs are $3.7 million. These costs are expected to continue for the life of the facility.

Q. Please describe the Safety of Gas Transmission Pipeline Regulations.

A. This rulemaking contains new records and material validation regulations and expands integrity management requirements in response to the legislative mandates in the 2011 Pipeline Safety Act and National Transportation Safety Board recommendations. More specifically, these PHMSA regulations spell out new requirements for utilities in the following areas:

- Expanded records requirements for the design, construction, and operation of transmission pipelines. The regulations require operators to collect and maintain traceable, verifiable, and complete ("TVC") records for the life of the pipeline.
- MAOP reconfirmation for pipelines with inadequate existing MAOP records.
- Material property verification for existing pipelines without TVC material records.
- Expanded integrity inspections on transmission pipelines beyond High Consequence Areas ("HCA") to include Moderate Consequence Areas ("MCA") and all Class 3 and 4 locations.

- Limitations on Integrity Assessment methods, specifically to direct assessment and the determination of appropriate pipeline threats.

Q. Please describe the estimated cost of the Safety of Gas Transmission Pipeline Regulations.

A. It is too early to estimate the cost impact of this regulation. PHMSA is continuing to issue guidelines and the Company is assessing the operational and financial impact of the regulation at the time of this filing. The Company will update the Commission in its next SPP.

Installation of EFVs

Q. Is NW Natural undertaking any other safety projects?

A. Yes, NW Natural is implementing a pilot program to proactively install EFVs.

Q. What are EFVs and how do they work?

A. An EFV is a device installed in a service line near the point of connection to the gas main. EFVs will "trip" and stop the flow of gas if there is a full line failure, such as a damaged or severed service line.

Q. Why is the installation of EFVs important to increase safety?

A. In the event of a damaged or severed service line, EFVs are effective in mitigating the escape of gas.

Q. How does NW Natural currently approach installation of EFVs?

A. Consistent with federal pipeline safety requirements, NW Natural includes EFVs on all newly installed and fully replaced service lines to single family residences. In addition, the Company installs EFVs on multifamily residences and small

commercial customers served by a single service line with a known customer load not exceeding 5,000 standard cubic feet/hour (50 therms/hour). To date, the Company has installed more than 250,000 EFVs on residential and commercial services. For customers with larger known loads, a shut-off valve, instead of an EFV, is installed on the service. Additionally, NW Natural provides notice to its customers of their right to request EFV installation, and they are currently installed at the requesting customer's cost. The Company provides this notice to customers via its website, annual safety notifications, and new customer welcome packets.

Q. Please describe the Company's pilot program to proactively install EFVs on existing service lines.

A. In 2020, as part of our DIMP, NW Natural will be installing EFV retrofits on service lines based on the likelihood and potential consequence of a damage. Factors included in its analysis are population density, service pipe diameter, service material, business districts, and special buildings. We expect to invest approximately $0.5 million per year as part of our DIMP budget on EFV retrofits in high consequence areas. Over time, we may increase this investment as we evaluate the success of the pilot program.

Q. Is the Company requesting a Safety Cost Recovery Mechanism (SCRM) for the safety initiatives described in your testimony as part of this rate case?

A. No, we are not requesting a SCRM at this time. However, as described in my testimony, there are several significant safety initiatives that could be suitable for

inclusion in a SCRM, consistent with the Commission's Order No. 17-084 in UM 1722. Specifically, the new PHMSA rules, the comprehensive seismic assessment, or an expansion of our EFV pilot could all be the foundation of a SCRM request. Consistent with the guidelines, the Company will request an SCRM within three years of a general rate case.

Q. Will the Company provide additional information to the Commission about these safety-related projects as they move forward?

A. Yes, the Company will keep the Commission and interested stakeholders informed through its SPPs it filed in UM 1900.

IV. CONCLUSION

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Wayne K. Pipes

FACILITIES
EXHIBIT 500

REDACTED VERSION

December 30, 2019

EXHIBIT 500 – DIRECT TESTIMONY – FACILITIES

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is Wayne K. Pipes. I am the Director of Facilities, Security and Emergency Management for NW Natural. I am responsible for facilities, real estate, security and emergency management activities for NW Natural, which includes planning and management of real estate, construction, capital projects, maintenance, security and emergency management for NW Natural's facilities.

Q. Please describe your education and employment background.

A. I have over 37 years of Facilities Management and Construction experience. I have been employed at NW Natural since 2014. Before assuming my current position at NW Natural in 2014, I worked for New Seasons for a year as Director of Design, Construction, and Facilities Management. I also worked for Knowledge Universe for 15 years as Vice President of Facilities and Development, and for Red Lion Hotels for 17 years as Senior Director of Facilities Management.

Q. What is the purpose of your testimony?

A. The primary purpose of my testimony is to describe the Company's move to its new operations center, 250 Taylor, including the decision-making process leading to that move. I also describe three other regional facilities projects that the Company is undertaking over the next two years. Additionally, I describe the Company's security staffing and explain the Company's need to hire additional security personnel.

Q. Please provide a summary of your testimony regarding the new operations center.

A. NW Natural's headquarters serves as our operations center where approximately 600 of the Company's nearly 1,200 employees come to work every day. The Company's employees are our most important resource, and NW Natural prioritizes keeping them safe so that we can continue to operate the utility 24 hours per day, 365 days per year, in order to best serve our customers. To do so, NW Natural's headquarters must be safe and accessible at all times. Critical utility operations, such as our resource management center, gas control center, emergency dispatch customer call center, gas supply and engineering teams, all operate out of this primary facility. Additionally, it also houses all other departments in the Company that operate our day-to-day business, including human resources, audit, purchasing, finance, legal, rates and regulatory, facilities and security, public affairs, environmental management and policy, major accounts services, project management office, business analytics, marketing and corporate communications, business development, strategic planning, and information technology and services.

Over the last decade, there has been a greater awareness and understanding of the seismic concerns and the risk of a major earthquake in the Pacific Northwest. Public and private entities have been working closely together to ensure that we are doing all that we can to keep our communities safe in the event of a major seismic event. Specifically, Governor Kate Brown's Task Force on Resilience Plan Implementation recommended that regulated energy

providers conduct seismic assessments of regulated operations. In concert with these efforts, we assessed the seismic resiliency at our facilities, including our headquarters and regional field service locations. As a result of these assessments, it was clear that several of our facilities, including our current headquarters, were not equipped to be operational after a seismic event.

With our existing lease at One Pacific Square expiring in 2020, the Company made seismic resiliency a top priority when evaluating whether to extend our lease or find a new location because it is essential that we can continue to operate from this facility in the immediate hours, days, and weeks following a major event. After a multi-year process, described fully in my testimony below, the Company decided to find a new location for our operations center, which is designed to be occupiable and fully operational after an earthquake, so that NW Natural is in the best position to be able to provide critical service in the event of an emergency.

The Company's goal throughout the process was to ensure that the needs of NW Natural operations and employees would be met, while balancing the Company's obligation to diligently review all relevant alternatives and make a prudent decision. After undertaking an extensive and deliberative process, I believe we achieved our goal and ultimately selected the least-cost, least-risk option that also met the Company's operational needs for the purpose of providing safe and reliable natural gas service to our customers.

Q. Please provide a summary of your testimony regarding the other facilities projects that the Company expects to develop in the next two years.

A. The other facilities projects include the Warrenton and Lincoln City Resource Center Projects, which are resource center relocation projects that the Company is also undertaking to address seismic and tsunami hazard issues. The Company is also beginning to plan its Central Resource Center Project, which is being developed to address emergency response in Central Portland.

Q. Please summarize your testimony regarding the Company's additional security staffing needs.

A. The Company currently has only one internal NW Natural full-time equivalent position ("FTE") dedicated to security, and the demands placed on this employee have increased significantly over the past several years. Accordingly, the Company identified the need to increase its security staffing to provide additional coverage and better address the Company's physical security and cyber security-related matters.

Q. Have you prepared exhibits to accompany your testimony?

A. Yes. The exhibits to my testimony include:

- Exhibit *NW Natural/501, Pipes* – Headquarters Phase 1 Report
- Exhibit *NW Natural/502, Pipes* – Headquarters Phase 2 Report
- Exhibit *NW Natural/503, Pipes* – Financial Analysis of Four Headquarters Finalists (Summary)
- Exhibit *NW Natural/504, Pipes* –250 Taylor Lease Agreement

II. NEW OPERATIONS CENTER – 250 TAYLOR

Background

Q. Please describe the Company's current headquarters facility.

A. NW Natural's headquarters are currently located at One Pacific Square ("OPS"), in the Old Town neighborhood of Portland, Oregon. The Company has been in this space since the building was constructed in 1983.

Q. What was the initial lease term for OPS?

A. The initial lease was for a 15-year term, with four renewal options of five years apiece. There were also several amendments that were executed over the term of the lease.

Q. Did the Company use all four of the renewal options?

A. Yes. The Company used all four of the five-year renewal options, which would have extended the lease through June 1, 2018.

Q. Did the Company enter into a shorter term lease extension in advance of the June 1, 2018 lease expiration?

A. Yes. In April of 2014, the Company signed a lease amendment that extended its final five-year lease period for an additional two years. This amendment extended the lease term from June 1, 2018 to May 31, 2020.

Q. Why did the Company enter into a shorter term lease extension?

A. At the time that NW Natural entered into its most recent extension of the OPS lease in 2014, the Company was aware of certain disadvantages to remaining in the current location. Specifically, the Company had concerns regarding seismic resiliency at OPS and security incidents that had occurred in the Old Town

neighborhood. To allow for full consideration of all alternatives—including building construction or leasing a new building—the Company determined that a two-year lease extension would provide sufficient time to allow for a careful and thorough evaluation of its options.

Q. What was the Company's first step in evaluating alternatives for a headquarters location?

A. The Company's first step was to form an internal Headquarters ("HQ") Steering Committee in late 2014.

Q. Were you a member of the HQ Steering Committee?

A. Yes. I served on the HQ Steering Committee, along with a team of NW Natural's executives.

Q. What was the role of the HQ Steering Committee?

A. The HQ Steering Committee was formed to provide direction and oversight for the Company's investigation into alternative headquarters options. To fulfill this role, the HQ Steering Committee served as the project manager and made recommendations to the Company's executive committee and Board of Directors concerning significant decisions such as the final selection of the headquarters location and certain project budgets, such as the space design and furniture, fixtures and equipment ("FFE") cost.

Q. Had the Company already decided to move when it formed the HQ Steering Committee?

A. No. At the time the HQ Steering Committee was formed, the Company had no preconceived notions about relocating versus staying at OPS. To the contrary,

the Company formed the HQ Steering Committee to develop a deliberate process and timeline and to oversee the appropriate due diligence needed to reach a decision about our future facility.

NW Natural's Phased Approach to Decision-Making

Q. Please describe the Company's phased approach as it considered alternatives for its headquarters location.

A. The Company's process was split into three distinct phases. During Phase 1, we gathered information regarding potential headquarters locations, developed location and facility selection criteria, and assessed risk factors related to the seismic resilience of OPS and potential alternative locations. In Phase 2, we issued a request for information ("RFI") to the broker, developer and landlord community to solicit a broad range of responses, followed by a request for proposals ("RFP") for the top candidates using the selection criteria identified in Phase 1. Phase 2 culminated in the selection and lease negotiation of the preferred location and facility, 250 Taylor. Phase 3, which is currently underway and nearly complete, is the implementation of the decision to relocate to 250 Taylor—including decisions regarding final interior design, construction bid process, FFE, and physical relocation to the new site. Figure 1, below, shows the key decision points and timing for each phase.

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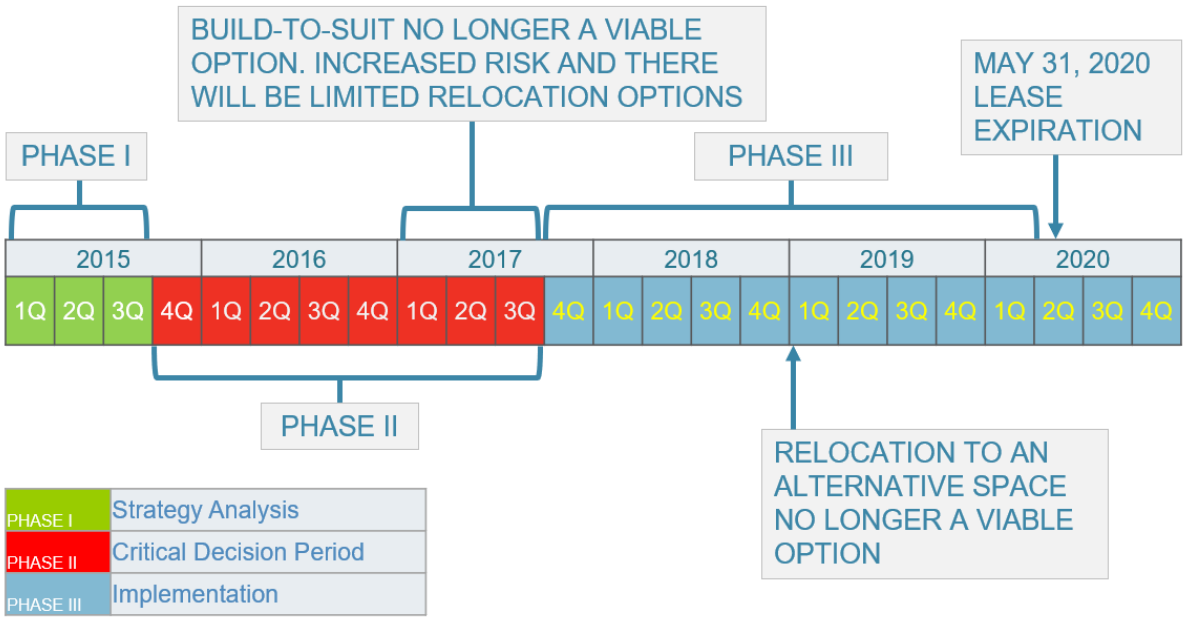
Figure 1.



Q. Did the Company engage outside consultants and subject matter experts throughout its phased process?

A. Yes. For each phase, the Company engaged outside consultants and subject matter experts to provide technical support for the Company.

Q. Please identify the outside consultants and subject matter experts that the Company engaged for each phase, and the scope of work for each consultant.

A. The consultants and subject matter experts the Company directly engaged during the project, as well as a brief description of the scope(s) of work, are listed below.

- Cushman & Wakefield ("Cushman"): Real estate and brokerage services.

- Leland Consulting Group ("Leland"): Strategic analysis, real estate planning, evaluation and optimization services.
- KPFF Consulting Engineers ("KPFF"): Seismic resiliency design and expertise; seismic review of OPS and potential relocation sites submitted in response to RFPs, which included an examination of surrounding buildings and infrastructure for accessibility risks immediately following a seismic event.
- Geo Engineers: Geotechnical seismic assessments that modeled soil liquefaction and lateral spread risks of the finalist sites.
- GBD Architects: Tenant improvements and FFE planning, design, and purchase; built test fits of finalist candidates, provided design services and construction administration for tenant improvements at 250 Taylor.
- Glumac: Mechanical engineering and sustainability design services for tenant improvements.
- Turner Construction: Core and shell construction services; bidding and construction of tenant improvements at 250 Taylor.
- Chipman Relocation & Logistics ("Chipman"): Professional moving planning and implementation; physically move all Company departments to 250 Taylor; removal and disposition assistance of FFE at OPS for salvage.

Phase 1

Q. Please describe Phase 1 of the headquarters project.

A. Phase 1 began in late 2014, with the engagement of our seismic consultant, KPFF, our strategy and planning consultant, Leland, and our real estate broker,

Cushman. These consultants were tasked to develop a process that would arrive at a solution to best meet the needs of NW Natural operations and employees and fulfill the Company's obligation to customers to diligently review all relevant alternatives and make a prudent decision. The scope of work for Phase 1 included three major components: (1) analysis of the risk factors related to the seismic resilience of the OPS building and location; (2) the development and preliminary analysis of building evaluation criteria to guide the Company's decision-making process, which involved surveying key NW Natural stakeholders; and (3) the development of a list of alternative geographic locations for further analysis. Phase 1 was completed in late 2015, and culminated in the Phase 1 Report, which is included as exhibit *NW Natural/501, Pipes.*

Seismic Resiliency

Q. Regarding the first component of Phase 1, why was seismic resiliency the first major issue that the Company addressed?

A. In the past decade or so, there has been increased understanding and heightened awareness about the risk of a Cascadia Subduction Zone earthquake in the Pacific Northwest—which geologists predict may be a 9.0+ magnitude earthquake—and the need to plan for such an event. Moreover, beginning in approximately 2011, the State of Oregon was engaged in planning for the risk of a Cascadia Subduction Zone earthquake to Oregon utilities.

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Q. Please describe the state-level planning that informed the prioritization of seismic issues.

A. In 2011, the Oregon legislature directed the Oregon Seismic Safety Policy Advisory Commission to prepare the Oregon Resiliency Plan ("ORP") with the purpose of identifying recommendations for how Oregon's critical infrastructure—including energy infrastructure—could be made seismically resilient against a Cascadia Subduction Zone earthquake. Upon completion of the ORP in 2013, the Oregon legislature passed Senate Bill 33, which established the Governor's Task Force on Resilience Plan Implementation ("Task Force"). In October 2014, the Task Force issued a report recommending that the Commission (1) require regulated energy providers to conduct seismic assessments of regulated facilities, and (2) allow cost recovery for prudent investments related to assessments and mitigation of vulnerabilities identified during those assessments.

Q. Did the ORP specifically address infrastructure risk?

A. Yes. The ORP noted that much of Oregon's infrastructure had been designed to meet older building codes that are now outdated with respect to seismic risk, and concluded that "the majority of buildings in Oregon have not been designed to resist the shaking from a magnitude 9.0 Cascadia earthquake" and accordingly the "estimated impacts of a Cascadia subduction earthquake in Oregon are catastrophic."[1]

[1] ORP at 13. https://www.oregon.gov/oem/Documents/Oregon_Resilience_Plan_Final.pdf

Q. How have the Oregon building codes related to seismic resiliency changed over the years?

A. The first version of the Uniform Building Code ("UBC") in 1973 classified all of Oregon as seismic zone 2. In 1988, the UBC placed Oregon in seismic zone 2B, a higher risk category. This change required buildings to be designed for a higher seismic force, about a 30 percent increase. In 1991, the UBC again changed the seismic zone for portions of Oregon west of the Cascades to seismic zone 3. This represented a 50 percent increase in seismic force that buildings needed to be designed for under the UBC.

Q. Did NW Natural perform seismic evaluations of its facilities in response to the ORP?

A. Yes. NW Natural hired KPFF to perform seismic evaluations of its facilities. The first evaluation was for OPS in 2015, which is discussed in greater detail below. KPFF later evaluated the Company's resource center facilities—and concluded that none of the resource centers met the current standard for seismic performance, with varying degrees of non-compliance. The Company has used the evaluations to develop a seismic upgrade strategy for the Company's resource centers.[2]

[2] To date, seismic upgrades have been completed at the Company's Sherwood, Salem and Eugene facilities. Planning is currently in process for the Company's Warrenton and Lincoln City facilities and its Vancouver facility.

Q. Please describe KPFF's seismic evaluation of OPS.

A. KPFF performed a seismic evaluation of OPS to better understand the seismic integrity of the building in the event of a major earthquake. KPFF analyzed the building's seismic performance under the current building codes. OPS was further evaluated to determine whether it met the acceptance criteria of the American Society of Civil Engineers standard ASCE 41-13, which is recognized by State and international building codes as the standard for evaluating seismic performance of existing buildings.

Q. Please describe KPFF's conclusions from its seismic evaluation of OPS.

A. [redacted]

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[redacted]

Q. Why does NW Natural need to have its headquarters facility immediately occupiable and fully operational following a major seismic event?

A. In the event of a major seismic event, it is essential that NW Natural be able to operate its key business functions, such as the resource management center, gas control center, emergency dispatch customer call center, operations and engineering in the immediate hours, days, and weeks following a major event. For example, the emergency dispatch customer call center will be essential for

responding to our customers and performing repairs. The gas control center monitors and regulates gas flows throughout NW Natural's system, and emergency dispatch is the command center for responding to emergencies throughout NW Natural's system.

Q. Did the Company eliminate OPS from consideration following this preliminary evaluation of seismic issues?

A. No. However, the Company determined any further consideration of OPS would need to include evaluation of seismic retrofitting to enhance the seismic performance of the building for NW Natural's operational needs. I address that evaluation later in my testimony.

Development and Preliminary Analysis of Evaluation Criteria

Q. With respect to the second component of Phase 1, how did NW Natural develop the evaluation criteria?

A. The Company's consultant, Leland, conducted surveys of key stakeholders at NW Natural about the issues and factors that should influence a location decision for this type of facility. Through these surveys, Leland developed and weighted evaluation criteria to screen potential relocation areas and facilities and compared them against the option of remaining at OPS.

Q. How were the surveys of key stakeholders conducted?

A. In early 2015, Leland, with assistance from Cushman, held a series of meetings with NW Natural's executives and leadership. The HQ Steering Committee also sent out surveys to all NW Natural employees then working at OPS to solicit input directly from the people who would be most impacted by the ultimate

decision. The interviews and surveys asked what our employees liked about the location of OPS and what they would change if they could, about what neighborhood and building amenities were desirable, as well as input regarding adjacency needs for different departments and whether alternative configurations—such as separating departments into different buildings—could be acceptable. Leland evaluated interview responses to understand existing conditions and external factors relevant to establishing an overall vision for the building and location.

Q. What categories of criteria were identified during Phase 1?

A. As a result of the stakeholder surveys, there were certain "must-haves" that the Company would require of any location:

- Robust financial support to demonstrate the prudency of our decisions;
- A space that reflects our culture and identity;
- Better lighting and climate control in the building;
- Improved IT infrastructure; and
- Seismic safety.

In addition to the "must-haves," NW Natural's consultants identified both locational criteria and building criteria that would allow for quantitative and qualitative evaluation of alternatives. The locational criteria included characteristics of a neighborhood relative to other locations, particularly with respect to seismic resiliency, safety, customer needs, and operational excellence. The building criteria focused on building characteristics such as

safety and security, amenities, and flexibility to accommodate growing or decreasing space needs.

Q. After identifying the Phase 1 evaluation criteria, how did the Company decide which neighborhoods to evaluate?

A. The Company considered whether it would remain in the central city area ("Central City") or relocate to Vancouver or one of Portland's suburbs. Central City consists of six different geographic submarkets which included the Pearl District, Old Town, the Central Business District ("CBD"), South Waterfront, Lloyd District, and Central Eastside ("Eastside").

Q. Please describe the Company's analysis regarding potential relocation outside of the Central City.

A. The Company analyzed three factors that could be impacted by relocation outside of the Central City: (1) employee commuting, (2) recruiting and retaining talent, and (3) proximity to business partners and the community.

First, regarding employee commute times, the Company has nearly 1,200 employees, approximately 600 who report to our headquarters on a daily basis. A move outside of the core Portland area would have a significant impact on our employees' daily lives. To analyze the impact of a move outside Portland, the Company plotted the home zip codes for its employees and determined that its employees are geographically dispersed throughout the Portland metro area, and moving to a location outside of the downtown Portland area would result in increased commute times for many of its employees. Not only does this impact daily routines for our employees like childcare and school drop-offs and pick-ups,

but it could ultimately result in retention issues if employees have to commute significantly longer than their current commute.

Second, regarding the impact of location on recruitment and retention, the Company considered industry research demonstrating that current and potential employees favor a central city location with easy access by walking, bicycling, or public transit. Moreover, the Company's own employee survey validated the industry research discussed above. Accordingly, the Company determined that remaining in a central city location would be key to the Company's ability to compete for and retain top talent.

Third, the Company has been part of the fabric of the Portland community for over 160 years. Maintaining a central city location would continue to provide our Company and employees with opportunities for community involvement and community service, which is an important part of the Company's culture and core values. Additionally, many of NW Natural's business partners are located in the central city area, and remaining in the core Portland area and being able to efficiently meet with our partners was an important factor, as well.

In sum, based on the results of the survey of stakeholders and employees and the Company's own research and analysis, the Company decided that a relocation outside the core Portland area was neither feasible nor desired.

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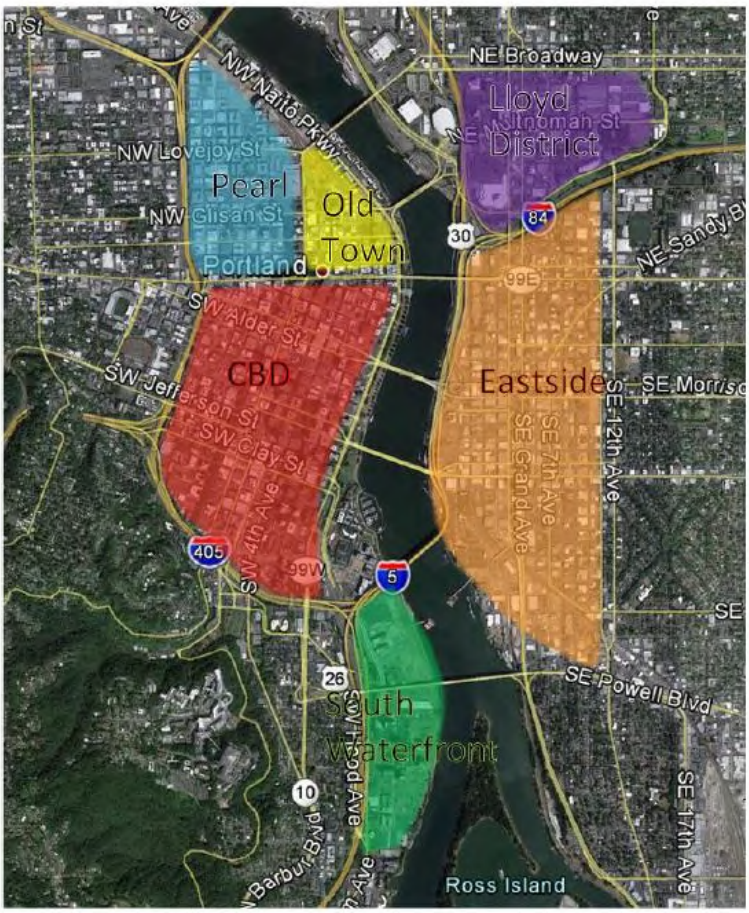
Q. After determining that a move to Vancouver or suburban areas was not feasible or desired, which geographic submarkets did the Company consider?

A. The Company considered six different geographic submarkets in the Central City, as shown in Figure 1.

Figure 1. Portland Central City Submarkets



Q. What were the preliminary conclusions from Phase 1?

A. NW Natural's consultants considered the building and locational criteria and weighting developed through stakeholder surveys and performed a high-level analysis, weighing different location and building options. Based on this analysis,

Leland, as supported by Cushman, drew the following preliminary conclusions:

- Neighborhoods. The consultants recommended that the Pearl District and South Waterfront be removed from further consideration—primarily due to concerns about building safety in the event of a natural disaster (e.g., seismic and flooding). The remaining options within the Central City were considered to all be acceptable—including the CBD, Old Town, the Eastside, and the Lloyd District. The Eastside and Lloyd District preliminarily rated highest for safety reasons (lower seismic risk and lower crime rates). Based on previous security incidents at OPS, NW Natural employees shared concerns regarding employee safety in the Old Town neighborhood. However, the consultants recommended that the Company solicit and consider developer proposals from all geographies in the next phase of its analysis.
- Building Criteria Analysis. NW Natural's consultants evaluated the options of renewing the lease at OPS, relocating to an existing building, or relocating to a new building. Based on the building criteria identified through the stakeholder survey and interview process (including building safety, building amenities, and flexibility to accommodate future space needs), the analysis ranked relocating to a new building to be most preferable (under various leasing and ownership scenarios), followed by renewing the lease at OPS.
- Adjacency/Space. Based on feedback provided during the interviews and the consultants' assessment of NW Natural's work style and culture, splitting business functions into multiple buildings was viewed as suboptimal, but

would have been considered if financial, operational, seismic, or other factors made multiple facilities the best alternative. Through the surveys, the Company found that there is great value and efficiency from having all departments in the same building and that having Company executives in an accessible and physically proximate location to all staff is an important part of NW Natural's culture. This was not to say that having some functions in different buildings would not be possible in some scenarios, but that as an order of priority, solutions that accommodated the entire operation in one facility (which could have included a campus model with multiple adjacent buildings) would be considered first.

- Seismic. Seismic resiliency for the facility is critical for business continuity immediately following a seismic event. Whether in an existing or new building, NW Natural needs to be in a facility that meets or exceeds seismic safety standards. At a minimum, there were some elements of NW Natural's operations, such as the resource management center, gas control center, emergency dispatch customer call center, and operations and engineering that needed to be situated in a facility that exceeded the minimum seismic safety standard, which would allow for continued operation and emergency response capabilities following a major seismic event. The Adjacency/Space evaluation found that it would be operationally suboptimal if these functions were located in a facility separate from the rest of the Company's functions.

Q. How did the results from Phase 1 inform the Company's decision-making in Phase 2?

A. The Company, with the help of its consultants, developed evaluation criteria to screen potential relocation areas and development models to use in subsequent project phases when specific sites, development, and/or remodel alternatives would be considered. Thus the criteria and preliminary conclusions from Phase 1 provided a foundation for a more detailed analysis in Phase 2.

Phase 2

Q. Please describe work performed in Phase 2 of the project.

A. Beginning in 2016, the HQ Steering Committee and the consultants, Cushman, Leland, GBD Architects, KPFF, and Geo Engineers, engaged the development and real estate community to identify potential facility candidates, including OPS. The scope of work for Phase 2 included:

- Workplace strategy analysis to determine current and future space needs;
- Selecting an architecture firm to serve as NW Natural's architect for test fits and space planning;
- Issuing an RFI and RFP to the real estate broker community, potential landlords and developers;
- Evaluating responses to the RFI and RFP against the criteria developed in Phase 1;
- Refining the seismic suitability criteria and evaluating each option seismically;
- Conducting detailed financial analysis of the short-listed options; and

- Negotiating with finalist options to achieve optimal lease terms prior to selection.

The Phase 2 Report is included as exhibit *NW Natural/502, Pipes*.

Q. Please describe the Company's selection process for architectural services.

A. NW Natural, through Cushman, issued a request for qualifications ("RFQ") for architectural services. The scope of services desired for Phase 2 included refinement of workspace strategies, conducting test fits of candidate office locations, coordinating with landlords and developers, and preparing space planning designs for the finalist office locations. An RFQ evaluation committee was formed to review submittals and conduct interviews for four firms that were invited to submit an RFQ. Following consideration of depth of experience, resources available, references, and price proposals, NW Natural selected GBD Architects, which was deemed most qualified to provide the necessary services.

Q. Please describe the workplace strategy analysis and results from that analysis.

A. NW Natural directed Cushman's workplace strategy team to perform a study that would help the Company understand the key factors that might impact space needs, including how to optimize organizational effectiveness, identify key departmental needs and adjacency requirements that would support collaboration and the Company's culture, and develop a space budget to help inform the direction of the Company's real estate strategy. To perform this study, Cushman analyzed the Company's then-current space utilization at OPS,

interviewed department leaders, held several meetings with the HQ Steering Committee, and considered the Company's forecasts for each department employee count. The key findings from this analysis were as follows:

- Overall, there was an inadequate number of conference rooms at OPS and there was a desire for more informal spaces for employee collaboration and meetings;
- There was an opportunity to reduce square footage for storage through an enterprise-wide content management system, which would greatly reduce the need for paper storage;
- There was a desire for the workplace to be flexible and engaging, supporting an atmosphere that creates employee pride and reinforces NW Natural's culture; and
- NW Natural's needs were best met through a single location as opposed to splitting functions across two or more sites.

With an efficient floor plan in a single location, Cushman determined that the total space requirement for the Company in 2020 would be approximately 167,000 square feet.[3]

Q. Please describe the developer and landlord RFI process and results of the RFI.

A. To cast a wide net, Cushman issued an initial RFI in March 2016 ("Initial RFI"). The Initial RFI included the following building requirements: target move-in date

[3] Phase 2 Report at 3.

(May 2020), space need (140,000 to 180,000 square feet), and geographic area (Portland's Central City). The Initial RFI generated 33 responses, including mostly new, yet-to-be-constructed developments, but also some existing buildings. Cushman then issued a second RFI ("Second RFI") to respondents, this time seeking additional information regarding the key criteria identified in Phase 1. The Second RFI yielded 22 responses. After review and evaluation of the responses to the Second RFI, the Company selected 11 sites and invited those respondents to participate in a RFP.

Q. Did the Company express a preference for leased or owned facilities in the RFI?

A. No. The RFI requested information regarding proposed ownership structure, but did not include criteria specific to ownership or leasing.

Q. Please describe the RFP process and results of the RFP.

A. The RFP sought additional details regarding the 11 selected sites, such as preliminary pricing, lease terms, and building details. The Company received seven responses to the RFP, and evaluated these sites against the criteria identified in Phase 1. Certain sites failed to meet the criteria, and were eliminated from further consideration. The Company subsequently carried forward four options for a detailed analysis:

1. OPS (NW Natural's existing headquarters located in Old Town) – Though OPS presented significant seismic related concerns, NW Natural continued to

evaluate OPS for negotiation purposes and to keep under consideration as a benchmark and potential fallback option.

2. Oregon Square (proposed building as part of a multi-block project located in the Lloyd District) – Oregon Square scored highest on qualitative metrics and the lowest for seismic hazard. There were significant concerns, however, about the construction timeline of this project, as well as the developer's inability to commit to critical deal terms.
3. Block 38 (proposed mixed-use building in the CBD, located at the west end of the Morrison Bridge) – This option scored highly on qualitative metrics. There were significant concerns, however, about the site's proximity to the Morrison Bridge, the area's accessibility after a major earthquake, and the fact that the Company would share the building with mixed uses.
4. 250 Taylor (office building to be built in the CBD on SW Taylor between 2nd and 3rd Avenues) – This option scored highly on qualitative metrics, the second lowest seismic hazard and the lowest development risk and provided for single-occupancy (allowing for security and operational control).

Q. Did any of the four finalists propose a financial structure resulting in Company ownership of the building?

A. No. All four finalists proposed a leasing structure.

Q. How did these four options compare financially?

A. 250 Taylor was the least cost option, followed by Oregon Square and OPS. Block 38 was the most expensive option. The range from the least cost to greatest cost was $90.7 million to $99.8 million (present value revenue requirement on a

15-year lease), or about a difference of about $9.1 million. Table 1, below, presents a summary of the financial comparison of the four finalists that was completed during Phase 2.

Table 1. Financial Analysis of Four Headquarters Finalists

FINANCIAL RESULTS	OPS	Block 38	Oregon Square	250 Taylor
15 YR. PVRR Utility Lease Space w/ Parking	**$98,083,971**	**$99,810,113**	**$92,561,013**	**$90,746,877**
15 YR. PVRR delta from least cost option	$7,337,095	$9,063,237	$1,814,137	$0
15 YR. PVRR Ranking	3	4	2	1

NW Natural's financial analysis of these four options is shown in exhibit *NW Natural/503, Pipes.*

Q. How did seismic risk inform the evaluation of these alternatives?

A. Seismic risk was a key driver in the Company's decision-making. Block 38 was rejected in part due to seismic considerations, and [redacted]

Q. [redacted]

A. [redacted]

[redacted]

Q. [redacted]

A. [redacted]

Q. Why was Block 38 eliminated?

A. Block 38 was eliminated because it would potentially be inaccessible following a major earthquake, had the second highest lease costs, and presented security concerns related to occupying a mixed-use building.

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Q. What were the security concerns associated with occupying a mixed-use building?

A. Block 38 included residential apartments on the upper floors of the building. Due to the presence of residential apartments, this type of building is more susceptible to fires that could require the evacuation of the entire facility—including critical functions such as gas control—and could also potentially result in damages to the Company's office space.

Q. After eliminating OPS and Block 38, how did NW Natural proceed?

A. NW Natural initiated negotiations with the two remaining finalists from March through June 2017.

Q. How did the cost of developing 250 Taylor compare to the other finalist, Oregon Square?

A. Based on NW Natural's analysis, the costs for both options were fairly close, though 250 Taylor was slightly less expensive.[5] In subsequent financial analysis of these two finalists, NW Natural estimated the present value revenue requirement for a 15-year lease for 250 Taylor to be $98.06 million, versus $99.67 million for Oregon Square.[6]

Q. Please describe the negotiation process with the developers for Oregon Square and 250 Taylor.

A. The negotiation team worked back and forth with both developers to refine the lease terms, building program, and other details in order to arrive at terms that

[5] Phase 2 Report, Appendix F.
[6] Phase 2 Report, Appendix F.

were best for NW Natural and that indicated a clear winner. We were able to take advantage of low interest rates and our strong financial position to enter into a long-term lease at rates that are below market when compared to similar-type buildings and square footage in the CBD.

Over the course of negotiations, several risks to the project at the Oregon Square site emerged, including:

- The likely phasing of development of the multi-block project, meaning that NW Natural would potentially have several years of adjacent construction;
- This phasing also impacted the efficiency and cost of the shared parking structure; and
- The developer of Oregon Square was unwilling to guarantee in writing several terms that were initially promised—most importantly it would not guarantee a construction timeline that would meet the Company's needs.

Meanwhile, negotiations with the developer of 250 Taylor were productive, resulting in several pricing concessions and design improvements that made it a better financial decision in the end. Further, this building already had its land use entitlements and the developer was committed to breaking ground in 2017 with or without a lease, so it had a very high level of certainty with little risk that the timeline would not be met. After additional seismic research, an evaluation of developer risk, and coordinated financial analysis between internal finance team resources and external brokers, the Company determined that 250 Taylor was the least-cost, least-risk option.

Q. What was the result of the negotiations?

A. The Company eliminated Oregon Square from further consideration, and instead moved forward with the 250 Taylor site. The Company finds that this recommendation represents the lowest cost option and a vast improvement in seismic resiliency and business continuity capabilities over its existing location at OPS.

Q. Please explain further how 250 Taylor meets the Company's criteria.

A. Starting with seismic, 250 Taylor will provide enhanced seismic resiliency and business continuity capabilities, helping the State of Oregon reach its Critical Energy Infrastructure Hub key goal to prevent and mitigate catastrophic failure and ensure fuel supplies and alternate energy sources are available to first responders and the public.[7] Locating the facility in the CBD outside the soil liquefaction and lateral spread zone optimizes emergency response capabilities.

250 Taylor was designed to have dual transformers for back-up power to NW Natural during and after a natural disaster. Getting involved in the project very early in its planning and construction phases was beneficial such that the Company could have 250 Taylor built to higher seismic standards minimizing the

[7] Seismic resiliency remains a key priority for NW Natural and the State of Oregon. Building on the foundation from the ORP, in October 2018, Governor Kate Brown presented the "Resiliency 2025" plan, titled "Improving Our Readiness for the Cascadia Earthquake and Tsunami" ("Resiliency 2025 Plan"). The Resiliency 2025 Plan follows the 2013 ORP, and outlines six key strategies for the State of Oregon. Its vision is to "[p]rotect all Oregonians by ensuring we are prepared to survive and recover from the expected 9.0 magnitude Cascadia earthquake and ensuing tsunami." The key strategy of the Resiliency 2025 Plan to improve the energy infrastructure is to "[d]evelop a plan for the Critical Energy Infrastructure Hub to prevent and mitigate catastrophic failure and ensure fuel supplies and alternate energy sources are available to responders and the public."

cost and including a backup emergency power generator to serve floors with critical functions such as gas control.

The CBD location was important to retaining existing employees and recruiting new talent to NW Natural. The location also keeps the Company rooted in the Portland community and provides easy access to all major forms of regional mass transit for its employees, and its centralized location is convenient for bicycle commuters.

The move to 250 Taylor will provide enhanced physical security with full building control. NW Natural views this as an improvement over OPS. Additionally, the Company anticipates that the proximity of 250 Taylor to the headquarters location for Portland General Electric Company ("PGE") will result in security synergies. Specifically, security staff for both PGE and NW Natural have discussed potential coordination and sharing resources (such as security camera footage) in response to potential security events such as demonstrations or break-ins.

The relocation will also provide the ability to reexamine use of space and Company procedures in order to make process improvements, streamline business functions, and save on space costs. GBD Architects found opportunities to make more efficient use of space in the building; and the Company was fully involved in the space design of 250 Taylor from the beginning. Specifically, the Company reduced the size of personal workspaces from 7 feet by 9 feet (63 square feet) to 6 by 6.5 feet (39 square feet). The Company then had flexibility to create additional formal and informal

collaboration spaces through the space savings realized from reducing personal workspace size—which furthers the Company's workplace strategy.

Additionally, 250 Taylor will be built to Leadership in Energy and Environmental Design ("LEED") gold standards, and will have many enhanced sustainability features, which is consistent with the Company's sustainability goals, including the Company's voluntary goal to create carbon savings equivalent to 30 percent of the Company's 2015 emissions by the year 2035.[8]

Q. Please describe the timing for negotiating and executing the lease for 250 Taylor.

A. The Company began negotiating the lease for 250 Taylor in March 2017 and signed a lease in October 2017. The 250 Taylor lease agreement is provided as exhibit *NW Natural/504, Pipes*.

Q. What are the key lease terms?

A. The essential terms of the lease are as follows:

- The lease is for an initial term of 20 years beginning upon occupancy, which is expected to be on February 17, 2020.
- Beyond the initial term, there are two optional seven-year lease renewals.
- The total building rentable area is 179,685 square feet, of which NW Natural's proportionate share is 100 percent. The office rentable area is 178,851 square feet; the remaining 834 square feet is the storage room that I will discuss later in my testimony.

[8] We are calling this our "Less We Can" initiative and more information about our low carbon pathway can be found at http://www.lesswecan.com.

- The rate for office space is $33.95 per square foot, and the rate for storage is $18.00 per square foot.
- Base annual office space rent for the Test Year, is approximately $6.1 million.
- The lease is subject to a 2.5 percent annual base rent escalation.
- The base lease amount does not include operating costs such as parking, property management, maintenance, utilities, security, custodial, and landscaping.
- The parking garage is designed to accommodate 90 standard-sized vehicles. NW Natural has leased no fewer than 85 striped parking stalls for a rate of $265 per month per stall at move-in. This cost will escalate at a market rate but no more than 3.0 percent annually on a cumulative and compounded basis. As I discuss later, the Company will sublease all but nine parking stalls to its employees.

Q. [redacted]

A. [redacted]

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Phase 3

Q. Please describe Phase 3 of the project.

A. Phase 3 began after the Company executed the lease, and will be on-going until the move-in is complete. Phase 3 consists of three main objectives: overseeing final space design and tenant improvements, procurement of FFE, and the physical relocation to 250 Taylor and lease termination and building turnover of OPS. The Company has tracked 250 Taylor core and shell development throughout the Phase 3 process.

Q. What activities were performed as part of the core and shell development?

A. The Company and its consultants worked to ensure core and shell build-out met agreed to design scope per lease agreement, ensure that critical dates for delivery were met per lease agreement, and managed and oversaw landlord costs and/or credits related to tenant improvement scope of work. The Company was also able to reduce construction costs and its tenant improvement construction schedule by installing mechanical, plumbing and electrical systems conduits, boxes, sleeves, and imbeds prior to concrete being poured on each floor of the building.

Q. What is the status of the core and shell development?

A. Core and shell development is nearing completion at the time of finalizing our rate case filing, and we expect that it will be complete by the end of 2019.

Q. What activities were performed for the interior build out?

A. Utilizing its workplace strategy, the Company worked with GBD Architects to develop a building design plan. Once the design plan was finalized, GBD

Architects developed construction documents that were used for obtaining a building permit and soliciting subcontractor bids. The Company has held weekly design and construction team meetings with GBD Architects, the general contractor, and individual vendors / contractors as required since building construction broke ground. The Company also developed a "Move" project team made up of a project manager and nine working teams to manage the building design process and prepare the business and its employees for the move to 250 Taylor. The Move project team worked to integrate all relevant business requirements and communicate/engage appropriate team members and employees as necessary for implementation. Additionally, the Company managed and oversaw the project schedule, budget, and tenant improvement allowance. Prior to allowing the interior build out to proceed, the Company worked with the general contractor to develop a safety plan and integrate safety training into all construction activities.

Q. What is the status of the interior build-out?

A. Interior build-out is currently proceeding on time and within budget and is expected to be completed in Q1 of 2020.

Q. How is the Company planning to execute the physical move to 250 Taylor?

A. The Company has hired a professional moving company, Chipman, and will move departments over to the new location in four waves over the months of February and March 2020. The Company expects to completely vacate OPS by May 31, 2020.

Costs Associated with 250 Taylor

Q. What types of costs are included with the Company's request for recovery associated with the relocation to 250 Taylor?

A. The Company is seeking recovery for O&M expense associated with the lease (rent) and other O&M expenses associated with 250 Taylor. The other O&M expense includes utilities, property management, building security, custodial service, and common area maintenance costs. Additionally, the Company is requesting recovery for capital costs associated with the Company's investment in leasehold improvements to 250 Taylor.

Lease Expense

Q. When will the Company begin making payments on the lease?

A. Lease payments will begin in June 2020.

Q. What is the amount of annual lease expense?

A. The Test Year lease expense, unadjusted for subleased space and state allocation, is $9.9 million.[9] Test Year lease expense includes costs for office space, storage, property tax, management fee, and an administrative fee. The annual lease amount escalates each year in accordance with the terms of the lease. The Direct Testimony of Tobin Davilla (*NW Natural/900, Davilla*) describes the ratemaking adjustments for subleased space, state allocation, and the allocation of O&M and capital associated with the lease.

[9] The amounts shown in my testimony, unless otherwise indicated, reflect total system amounts, unadjusted for state allocation or capitalization. Please see *NW Natural/904, Davilla/1* for the ratemaking adjustments to these costs based on subleased space, state allocation, and the allocation of O&M and capital.

Q. Please explain the office space component of the lease.

A. The Company will lease 178,851 square feet of office space at 250 Taylor. This total includes 1,456 square feet of first-floor retail space and 7,158 square feet of second-floor office space, both of which will be subleased to other tenants by the Company. The rentable square footage calculations were validated by GBD Architects on behalf of the Company. The total amount of Test Year lease expense for office space is $6.1 million.

Q. Please explain the storage cost component of the lease.

A. The Company will lease 834 square feet of storage space located in the 250 Taylor parking garage. This space, which is made up of multiple rooms in the garage, will be used as storage for utility equipment. It is accounted as a separate component in the lease because the rental rate for this storage area is less than that of the office component on a per square foot basis. The total amount of Test Year lease expense for storage is $15 thousand.

Q. How are property taxes for 250 Taylor reflected in the lease?

A. Per the lease agreement, NW Natural will pay for its share of the property taxes assessed against the land and the building for each tax period. The property taxes are estimated, paid monthly by NW Natural and reconciled in the following year for actual costs incurred. The Company estimates that property tax expense will be roughly $3.47 million in the Test Year.

Q. Please describe the management fee and administrative fee.

A. The management fee covers the overall management of the building and building services for the building owner, and per the lease will be 2.25 percent of all rent

and other revenue received by the landlord. The administrative fee covers the expenses of all property management employees below the level of manager, laborers, contractors and other workers, and is charged on a time and materials basis for work actually performed on the building. The total amount of Test Year Management and Administrative fees is $0.3 million.

Q. Has the Company requested recovery of costs associated with space in 250 Taylor that will not be used by NW Natural?

A. No, it has not. While NW Natural will be responsible for rent for the entirety of 250 Taylor, the Company intends to sublease office space to other entities. NW Natural will sublease a first-floor retail space of 1,456 square feet, as well as 7,158 square feet of office space on the second floor. The space associated with these subleases have been removed from the Company's request for recovery in this case based on the price per square foot of the space. Please see *NW Natural/904, Davilla* for the ratemaking adjustments to reflect the removal of the subleased space from the rate case.

Other O&M Expense

Q. What types of recurring operating costs will the Company incur in connection with the headquarters?

A. The Company will incur costs associated with security, janitorial and landscaping services, as well as utilities, including gas, electric, water and wastewater, and parking. The Company issued an RFP for the security and janitorial services.

Q. Based on the RFP responses and contracts that have been executed for services, what is NW Natural's estimate for annual costs to be incurred in connection with security, janitorial, and landscaping services?

A. The Company estimates that during the Test Year it will incur costs of $0.8 million for these services. Please see *NW Natural/904, Davilla* for the ratemaking adjustments to these costs based on subleased space, state allocation, and the allocation of O&M and capital associated with these services.

Q. Has the Company estimated the costs likely to be incurred for utilities?

A. Yes. The Company engaged Glumac, an engineering services firm, to prepare an estimate of utility costs for 250 Taylor. Glumac constructed an energy model based on the building systems installed at 250 Taylor and completed sensitivity testing to account for weather variability, and control systems performance and effectiveness. Based on the model estimates, the Company expects that during the Test Year it will incur costs at 250 Taylor of $0.2 million for utilities (inclusive of waste disposal and water). Please see *NW Natural/904, Davilla* for the ratemaking adjustments to these costs based on subleased space, state allocation, and the allocation of O&M and capital associated with these costs.

Q. Has the Company estimated the costs likely to be incurred for repairs and maintenance?

A. Yes. The Company engaged Cushman & Wakefield's property management group to assist in developing its estimated repairs and maintenance cost. Based on the estimate the Company expects that during the Test Year it will incur costs at 250 Taylor of $0.2 million. Please see *NW Natural/904, Davilla* for the

ratemaking adjustments to these costs based on subleased space, state allocation, and the allocation of O&M and capital associated with these costs.

Q. Will the Company use the parking available at the 250 Taylor?

A. The Company will sublease all but nine of the 250 Taylor parking stalls to its employees at an unsubsidized monthly rate. Six of the parking stalls will be reserved for utility vehicles, and three will be reserved for visitor parking. The Company will sublease the remaining parking stalls to employees. The Company is only seeking recovery for the nine stalls used by the Company.

Q. Is the Company incurring any parking costs for stalls external of 250 Taylor?

A. Yes. The Company has entered an agreement to lease 60 parking stalls at a nearby garage, known as the "Auditorium Garage." These stalls will be used exclusively by utility vehicles that are too large to fit in the smaller stalls underneath 250 Taylor. The negotiated lease cost for these stalls is $265 per stall per month.

Q. What is the cost of the Company's six stalls at 250 Taylor and 60 stalls at the Auditorium Garage?

A. The cost of these parking stalls in the Test Year will be $0.2 million. Please see *NW Natural/904, Davilla* for the ratemaking adjustments based on the state allocation of these costs.

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Q. Are there any one-time O&M expenses associated with the Company's move to 250 Taylor?

A. Yes. The Company will incur approximately $0.2 million in one-time moving expenses, as well as approximately $0.3 million in one-time OPS vacation and disposition expense, which is necessary to turn control of OPS back to its landlord. Additionally, the Company will incur a one-time expense for a parking subsidy. Because parking at 250 Taylor will be more expensive than the parking at OPS, the Company is easing the transition for its employees by providing a subsidy for the first year so that actual costs to employees will be held at the level for OPS. After the first year, employees will pay the full amount of parking costs.

Q. Have the costs for moving expense, vacation and disposition expense, or parking subsidies been included in the Company's cost recovery request?

A. No, these costs will be borne by the Company's shareholders.

Capital Costs

Q. Please describe the estimated capital costs for 250 Taylor.

A. The Company's estimated capital costs for 250 Taylor total approximately $32.7 million, or $29.2 million on an Oregon-allocated basis.[10] After applying a portion of the gain on the sale of a parking area near OPS,[11] the total capital cost will be $25.9 million, on an Oregon allocated basis. These costs include amounts

[10] See the Direct Testimony and Exhibits of Kyle T. Walker (*NW Natural/1000, Walker* and *NW Natural/1001 – 1014, Walker*) for additional information regarding allocation percentages.
[11] See *In the Matter of Nw. Natural Gas Co., dba NW Natural, Application for Authorization to Sell Real Property Commonly Known as Block 24-Couch's Addition to the City of Portland,* Docket UP 400, Order No. 19-312 (Sept. 24, 2019).

associated with leasehold improvements, technology, FFE, design, consulting, engineering, and permitting.

Q. Has the Company's budget changed over the course of the project?

A. Yes. In the early stages of the project, the Company anticipated the construction cost for its leasehold improvements would be roughly $100.00 per square foot. We now anticipate the baseline leasehold improvement costs will be roughly $151.44 per square foot, excluding utility-specific scope and technology costs such as build-out of a gas control room. The cost difference is largely attributable to increases in the cost of construction materials and the amount of construction activity occurring in Portland.

Q. Has the Company concluded that the updated estimate for leasehold improvements is nonetheless reasonable?

A. Yes. According to Turner Construction, the Portland market cost for standard office tenant improvements in 2019 is averaging roughly $164.00 per square foot, which does not include construction up to the enhanced seismic standard of 250 Taylor nor does it include utility-specific costs.

Q. Has the Company secured any offsets to the capital costs associated with 250 Taylor?

A. Yes, there are two categories of capital offsets. First, the Company negotiated a tenant improvement allowance from the developer in the amount $12,996,697 plus an additional amount of $590,000 for limiting scope on core and shell construction. These amounts will be applied as an offset to the Company's costs for tenant improvements.

Second, the Company in this rate case is applying a portion of the gain on the sale of utility property to the leasehold improvements at 250 Taylor. As described in the Stipulation and Joint Testimony in docket UP 400, which was approved by the Commission in Order No. 19-312, the Company deferred and recorded one half of the net gain from the sale of its Truck Lot (also called "Block 24") that will be applied as an offset to rate base related to leasehold improvements at 250 Taylor. We expect the sale to close in June 2020. The Oregon-allocated amount that has been deferred to apply as an offset is approximately $3.32 million. Customers will receive the full benefit of the Truck Lot sale, as the other one-half of the net gain on sale will be credited back to customers coincident with the Company's next filed Purchased Gas Adjustment.

Q. Are there any costs that the Company has removed from its request for recovery?

A. Yes. The Company reduced the overall capital expenditure amount by $0.5 million to reflect exclusion of certain amenities for common areas and the executive floor. This amount also reflects the exclusion of capital expenditures associated with the tenant improvements in the first-floor retail sublease space.

Q. When will the leasehold improvements be placed in service?

A. Leasehold improvements will be placed into service when the improvements are both used and useful. We anticipate the majority of our leasehold improvements will be placed into service and begin amortizing in February 2020. The improvements will amortize over the 20-year life of the lease.

III. OTHER FACILITIES PROJECTS

Q. Are there also facilities projects that will likely be completed in the next two years?

A. Yes. The Company is currently in various stages of planning and permitting for three resource center projects—Warrenton, Lincoln City, and Central, and expects these projects will likely be completed in 2021 or later.

Q. What is the Warrenton Resource Center Project?

A. The Company will be relocating its Astoria Resource Center to Warrenton, Oregon. The existing Astoria facility requires significant seismic upgrades, is located within the tsunami inundation zone, and requires significant maintenance work. The Company engaged Cushman to identify properties meeting the Company's needs, and there were no existing facilities in the vicinity that met the Company's needs and were also located outside the tsunami inundation zone. Cushman identified an undeveloped property in nearby Warrenton, however, that met the Company's needs and was priced below market. The Warrenton Resource Project is expected to cost $8.7 million and will be in service in October 2021.

Q. What is the Lincoln City Resource Center Relocation Project?

A. The Company will be relocating the Lincoln City Resource Center to a new location within Lincoln City. The Company is proposing the relocation for three reasons: (1) employee safety, as the entrance to the current facility is located on a very busy Highway 101 and creates a significant issue pulling large trucks and equipment on and off the highway, (2) business continuity and seismic resiliency,

as the current building has earthquake readiness issues and is located on a stretch of highway with bridges to the north and south, such that in the event of bridge failures we would be unable to access our equipment and provide emergency services to the community; and (3) structural integrity and maintenance issues, as the current building is over 50-years old and requires repair for a leaking roof, leaking gutters, iron pipe plumbing and a parking lot that floods and is too small. The Lincoln City Resource Project is expected to cost $8.7 million and will be in service in October 2021.

Q. What is the Central Site Project?

A. The objective of the Company's Central Site ("Central") Project is the design and construction of a medium sized emergency response and resource center in the central business area of Portland for business continuity and operational purposes. Until recently, Central had served as a NW Natural resource center. However, the buildings and storage sheds at Central were removed in 2013 to allow room for the since-completed Tri-Met MAX Orange Line. Since that time, the site has been used for Company storage and vehicle parking. The Company has recently identified an operational need for a Central City emergency response and resource center, and determined that a location on the Eastside will best meet the Company's needs. We expect Central to be in service in 2022.

Q. Is the Company seeking cost recovery for the Central project in this case?

A. No, not at this time. The Company expects that the Central project will be completed after the Test Year in this case, and therefore, it is not included in our request for cost recovery.

IV. SECURITY STAFFING

Q. In your role as the Director of Facilities, Security and Emergency Management for NW Natural, do you also manage security staffing for the Company's facilities?

A. Yes. I am responsible for Company-wide security services and staffing. This includes employee and facilities safety, all security policies and procedures, training and security monitoring and alarm systems.

Q. What is NW Natural's strategy for its security staffing?

A. Our strategy is to utilize contracted security services for all basic security guard positions. We currently have only one NW Natural security FTE who is dedicated to the more technical types of work including security vulnerability assessments, staff training, interaction with law enforcement and other utilities, field worker safety, compliance and TSA security reporting requirements and documentation.

Q. Is the Company planning to hire additional security staff?

A. Yes. The Company is planning to add two new FTEs for additional security positions, and one contracted security guard for the Sherwood facility.

Q. Why does NW Natural need to hire additional security staff?

A. Over the past several years, the demands on the Company's security staff member have increased significantly, and the Company has identified the need to hire additional security staff. Additionally, in May 2019, the TSA performed a Corporate Security Review ("CSR") for NW Natural, which recommended additional security tasks and additional security staffing resources. Specifically, the TSA CSR recommended enhanced coverage of roles and responsibilities,

enhanced documentation, and enhanced security inspections, training, and vulnerability assessments.

Q. Is the Company's security staffing enhancement connected to the move to 250 Taylor?

A. No. The Company's assessment of its existing security needs was performed without taking into account a change in headquarters location. NW Natural concluded that it requires additional security staffing, with or without the move to the new headquarters location.

Q. How will the Company meet the need for additional security staffing?

A. The Company plans to add two new FTEs in the role of Security Consultant 2, one of which will be based in the field and the other will be based at 250 Taylor. Additionally, the Company plans to add one contracted security guard for the Sherwood facility.

Q. Why did the Company decide to add two new FTEs instead of just one?

A. The Company determined that it needed to fulfill two discrete needs: (1) one new security FTE needed to be field-based to be available to the Company throughout its service territory, and (2) one new security FTE needed to be headquarters-based to provide back up and support for the lead security staff (Security Consultant 3). The Company could not meet these needs through a single FTE.

Q. Please describe the duties of the new field-based Security Consultant 2.

A. The field-based Security Consultant 2 will fulfill the need for roaming and field work, and will provide preventative and proactive security assessments,

vulnerability assessments, penetrations tests for all NW Natural locations, training and education to employees, and completing required documentation. This position will also establish and manage community partner contacts with local law enforcement agencies, neighboring businesses and other utilities at all NW Natural locations.

Q. Please describe the duties of the new headquarters-based Security Consultant 2.

A. The headquarters-based Security Consultant 2 will provide back up and additional coverage for the Security Consultant 3 position, as well as the other field-based Security Consultant 2 position. This position will oversee all security policies and manuals, support employee security training, connect with internal and external stakeholders and partners to strengthen Company resources for the prevention and effective response to outside threats, and assist with oversight of contracted security guard services.

Q. Please describe the new contracted guard position for the Sherwood facility.

A. The new contracted guard position will provide security services for the Sherwood facility. The Sherwood facility is a large location with multiple access points, large amount of staff, and visitors. It is critical to provide a contracted guard service at this site because it is a critical facility with backup operations functions, and houses key resources, including a data center and LNG trailer.

Q. When does the Company expect to add the new security positions?

A. The Company expects the contracted guard position to begin on January 1, 2020. The field-based Security Consultant 2 will be added February 1, 2020, and the headquarters-based Security Consultant 2 position will be added on March 1, 2020.

Q. Is NW Natural seeking cost recovery for the new security employees and contractors?

A. Yes. The Company is seeking recovery for $200,800 for the two new FTEs, which also includes two Company vehicles, and $103,000 for the contracted security guard service for Sherwood.

Q. Does NW Natural discuss its overall staffing strategy and the incremental FTE recovery request elsewhere in testimony?

A. Yes. NW Natural's broader staffing requests is addressed in detail in the Direct Testimony of Melinda Rogers (*NW Natural/700, Rogers).*

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Wayne K. Pipes

FACILITIES
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November 2015

PREPARED FOR
NW Natural

PREPARED BY

Leland Consulting Group

Cushman & Wakefield

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Introduction

This report provides a summary of the first phase of research and analysis conducted for NW Natural as part of its long-term evaluation of a headquarters office building relocation. To guide that process in a deliberate and methodical manner, NW Natural contracted with Leland Consulting Group, supported by Cushman and Wakefield, to develop a process that will arrive at a headquarters solution that best meets the needs of NW Natural operations and employees while also fulfilling its obligation to ratepayers to diligently review all relevant alternatives and make a prudent decision regarding its real estate expenditures.

The scope of work of Phase 1 included developing a solid base of information to inform the process, surveying key stakeholders at NW Natural as to the issues and factors that should influence a headquarters location decision, developing evaluation criteria to screen potential relocation areas and development models, and developing a focused short list of alternatives for further analysis.[1] Additional Phase 1 research included a high-level financial analysis of alternatives and an assessment of risk factors related to the seismic resilience of the One Pacific Square (OPS) building and selected alternative locations.

Major corporations such as NW Natural relocate or reinvent their corporate headquarters only once every 20 or 30 years, or even longer. The impact of such a decision on company operations, the corporate brand and culture, and the neighborhood where it is located makes such a decision a legacy opportunity. While real estate makes up a relatively small part of NW Natural's financial expenditures, it is the home of its employees, which are its most important asset, and any decision must take into account the long-term impact on customers, too. Creating an engaging, efficient, and quality work environment will pay dividends in employee productivity, recruitment, and retention, which will also facilitate the best possible delivery of services to customers. Such a work environment must be able to be provided not only in normal operations, but especially in times of regional or local business disruption when our customers will be depending on us for continuity of service.

[1] *Note: the lease at One Pacific Square is expected to expire on May 31, 2020. While NW Natural has a five year extension option, the company has chosen to use this 2020 date as the target completion date for decisions related to deciding upon their future headquarters location.*

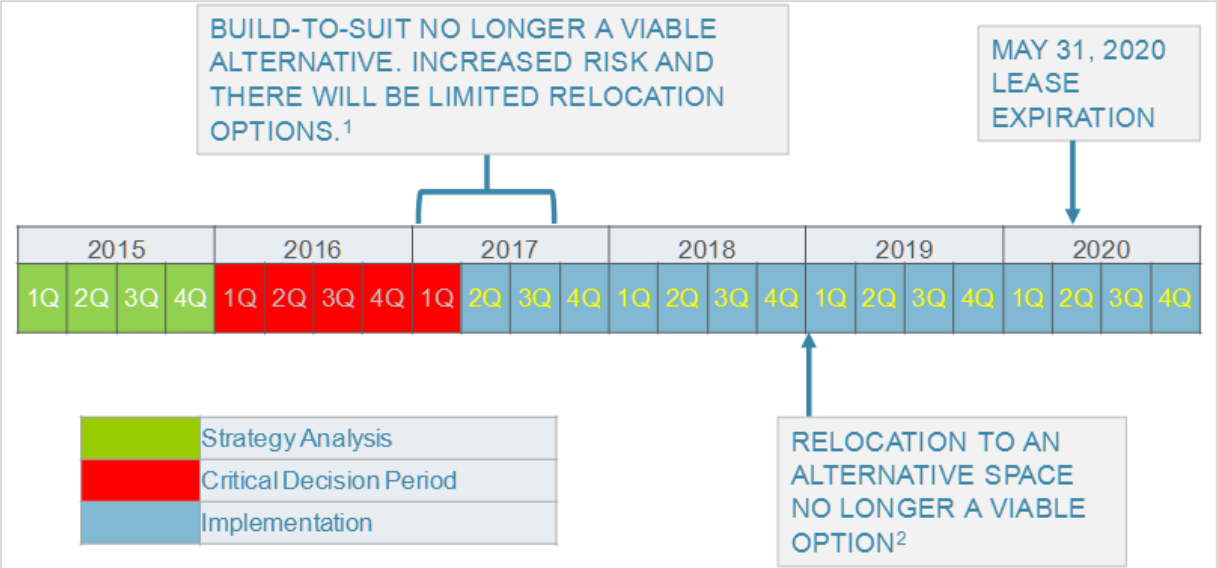
Key Findings

Phase 1 concluded with several key findings:

- The commercial office space market is experiencing unprecedented change, with workplace standards and cost-effective building configurations evolving constantly.
- Maintaining a high-quality, functional workplace in an accessible and well-served location is essential to recruiting and retaining employees.
- While the current building is functional, it has many inefficiencies and the neighborhood is perceived by employees to be unsafe and lacking in amenities. These perceptions were largely confirmed by the objective data analyzed. Addressing those inefficiencies, and safety and operational needs may not be the most cost-effective option.
- Portland's Central Eastside emerged as the most favorable location for a possible relocation. The Central Business District and Old Town/China Town were identified as possible areas, subject to site-specific considerations. The Pearl District and South Waterfront were eliminated from further consideration.
- With all else being equal, alternatives where NW Natural develops on land that it owns is more cost-effective than leasing property.
- Seismic safety emerged as an important criterion in a relocation decision. More work is needed to understand NW Natural's seismic safety needs and possible building standards. NW Natural has noted that there are many functions such as gas control, resource management/dispatch, and other critical functions that need to be operational following a seismic event. While the backup emergency operations center at Sherwood would suffice for other emergency events, NW Natural is continuing to evaluate if this is sufficient following a seismic event, particularly given likely travel restrictions after such an event. A preliminary seismic analysis indicated that OPS would not be functional following a significant seismic event.

Figure 1 shows the timeline for the alternatives analysis leading up to a headquarters decision. The timeline is structured to work backwards from the 2020 lease expiration, noting critical decision points and the latest possible dates for those decisions while maximizing the number of available alternatives at each point in time. If deadlines are missed at points along the timeline, certain alternatives (e.g., building a new building or having a credible threat of relocation to leverage negotiations with the OPS landlord) must be eliminated, limiting NW Natural's available options and most likely increasing costs.

FIGURE 1. ALTERNATIVES ANALYSIS TIMELINE



Notes:

1/ If a build-to-suit building is no longer an alternative, NW Natural will be at the mercy of the market, potentially giving it very few options and limited pricing leverage.

2/ At this time, there are no known existing buildings in Portland that have enough space to accommodate NW Natural's needs.

Scope of Work

The work conducted under this assignment followed a methodical process of developing evaluation criteria, evaluating relocation alternatives against those criteria, and thoroughly documenting the process so that any decisions are informed and prudent. The work began with a Discover phase, which resulted in the development of a resource binder incorporating a range of baseline research and data to inform NW Natural and the OPS Committee, its designated steering committee to guide this process. The resource binder included the following tabbed sections:

- Real estate portfolio: Maps and spreadsheets detailing NW Natural's existing real estate assets.
- Industry trends: Background research on the changes occurring in the workplace, particularly the emergence of open workplace standards for office environments. Key findings from this research included the role that a quality workplace plays in recruiting and retaining younger workers.
- Market trends: Summary information about commercial real estate market conditions in Portland and its Central City submarkets.
- Lunch and learn: Presentation given to the entire officer team to discuss market and economic trends and to generate ideas related to alternative workplace systems, potential evaluation criteria, and other factors.
- Utility peer review: Background and research regarding other utilities both within NW Natural's territory and outside its territory to review developing trends and standards among its peers.

- Stakeholder interviews: Summary of interviews conducted by the consultant team with NW Natural executive officers and other senior leaders to gather insights about operational needs and to develop preliminary evaluation criteria to screen alternatives.
- Space assessment: Information about NW Natural's current use of space at OPS.
- Employee survey: The results of an employee survey regarding workspace needs and preferences.
- Financial analysis: The results of a preliminary financial analysis of different locational and ownership alternatives.
- Seismic assessment: Findings from a preliminary assessment of the likely impacts to operations at OPS as the result of a significant seismic event, including the ability to evacuate OPS safely.

The resource binder supplemented several work sessions with the OPS Committee. On January 5, 2015, the consultant team met with the OPS Committee and other executives to present background information about industry trends and market conditions. On February 11, 2015, the consultant team held a workshop with the OPS Committee to review the background information and develop a preliminary set of evaluation criteria. This included a prioritization exercise to identify the qualitative and quantitative criteria that should be used to screen potential locations and lease/ownership models. With the criteria identified and weighted, the consultant team analyzed the various alternatives to arrive at a short list of priorities that should be analyzed in greater depth in Phase 2.

Evaluation Criteria

Through the work sessions and analyses, seven criteria were developed that were used to analyze and prioritize potential alternatives. The purpose of the criteria was to provide a quantitative and qualitative framework for evaluating the relative strengths and weaknesses of alternatives related to building locations, building features, and ownership/lease models. Each criterion was developed based on the values expressed during the stakeholder interviews as well as the consultant team's recommendations on factors to consider.

The criteria were divided into two categories:

- Locational criteria: These criteria focused on differentiating attributes that applied to the location of a headquarters facility. Locational factors included characteristics of the neighborhood relative to other locations, particularly with respect to employee retention impacts, safety, customer needs, seismic resiliency, and operational excellence.
- Building criteria: These criteria focused on evaluating how different ownership or leasing models might impact the ability for NW Natural to meet its operational needs and create a positive work environment for its employees, all while maintaining cost-effectiveness.

During the workshop of February 11, 2015, the consultant team facilitated a discussion and prioritization exercise to refine these criteria and prioritize them so that the subsequent decisions could be weighted on those factors that are most important to NW Natural. At that workshop, the team also discussed and prioritized evaluation metrics within each criterion. These metrics described the quantitative and qualitative ways that each criterion would be measured so that the outcome would be clear, resulting in a prioritized set of recommendations. It should be noted that there is some overlap

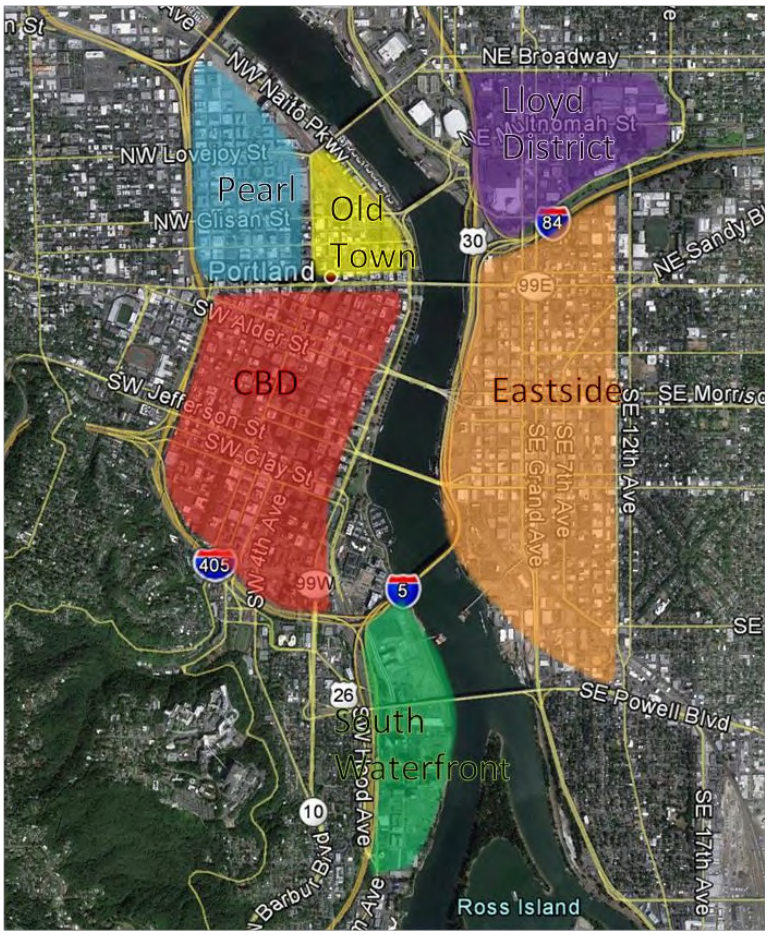
between criteria (e.g., building safety vs. employee safety); there was considerable discussion around these overlaps and the selected weighting reflects how the objectives on one criterion could likely be met by another.

Locational Criteria

Locational criteria were analyzed across six geographic submarkets that were considered for a potential relocation of the headquarters facility. All of the submarkets are in central Portland, reflecting the decision that a relocation outside the central city (e.g., to Vancouver or one of Portland's suburbs) was neither feasible nor desired from either a business operations or customer point of view. As shown in Figure 2, these submarkets include:

- Old Town: Generally located east of Broadway and north of Burnside and the current location of NW Natural's headquarters building.
- Pearl District: North of Burnside and between I-405 and Broadway.
- Central Business District: The downtown core, located inside the I-405 loop south of Burnside.
- South Waterfront: Located to the south of downtown between I-5 and the Willamette River.
- Eastside: A large area incorporating the Central Eastside Industrial District, including the location of NW Natural's Central and Exley sites.
- Lloyd District: Located between I-84 and NE Broadway.

FIGURE 2. CENTRAL CITY SUBMARKETS



The following matrix describes in more detail each criterion, the methodology used to evaluate it, and the relative weighting given to it as a result of the workshop.

Criterion	Evaluation Metric	Weighting
Building Safety and Security **Conditions related to the physical safety and security that are affected by the building's location.**		37%
	Seismic safety: Map specific location or centroid of submarket on Portlandmaps.com and note seismic hazard level. There is a range of seismic hazard levels – greater seismic hazard levels are assumed to require more costly buildings to achieve the same level of seismic resistance and to ensure that the business can be operational following a seismic event. It was also noted that the State of Oregon, as well as the nation, are focused on ensuring that the country's infrastructure and operations, including utility infrastructure, are protected from significant disruption caused by natural disasters.	

	Flood resistance: Map specific location or centroid of submarket on Portlandmaps.com and note presence of site within 100-year floodplain.	
Accessibility to Workforce and Partners/Public **Conditions related to the ease of access by employees and visitors from multiple modes of transportation.**		29%
	Parking: Indexed scoring of each location based on general availability of off-street parking in the neighborhood, prevailing rates for monthly parking, and average parking ratio of existing buildings.	
	Impact on commute: Scoring based on number of employees within 10, 15, 30, and 45-minute drive time to each location from zip code and employee census data.	
	Public transit: Scoring based on presence of frequent-service transit (service every 15 minutes or less), with extra weighting for light rail service. Scoring was adjusted for planned service improvements that will be operational by 2020. It was noted that NW Natural has a commitment to environmental stewardship and as such would like to support public transit and sustainable community options.	
Neighborhood Amenities **Attributes about the surrounding neighborhood that would serve as amenities for employees and visitors.**		19%
	Restaurants and coffee houses: Weighted scoring based on walkscore.com rating for each neighborhood and number of coffee shops and restaurants relative to other submarkets. Adjusted for submarket trends where the number of retailers is likely to be greater in the future than it is today.	
	Proximity to recreation: Rating based on presence of or proximity to hardscape parks (plazas), green spaces (trees and grass), and trails (jogging/biking paths).	
	Services and retail: Weighted scoring based on walkscore.com rating for each neighborhood, number of grocery stores, and after hours gathering locations relative to other submarkets. Adjusted for submarket trends where the number of retailers is likely to be greater in the future than it is today. It was noted that in today's competitive job market, especially for experienced labor, amenities are necessary for attracting and retaining a skilled workforce.	
Employee Safety and Security **Whether the neighborhood surrounding the building is likely to provide a safe**		15%

environment for employees and visitors when outside the building.	
	Personal safety: Mapping of personal crime data by submarket, weighted by population within each area, as reported by City of Portland.
	Property crime: Mapping of property crime data by submarket, weighted by population within each area, as reported by City of Portland.

Building Criteria

Building criteria were analyzed across several alternatives that included ownership, leasing, staying in the existing OPS building, and various combinations of the above. The evaluated alternatives included:

- Stay Put: NW Natural would remain in the existing OPS building, likely with extensive remodeling to bring it up to modern operational and safety standards and commensurate with what could be expected in a long-term lease.
- Relocate to Existing Building(s): Under this alternative, NW Natural would relocate its headquarters to an existing building in one of the target submarkets. There are four variations on this option.
    - Leased space (single unit): In this alternative, NW Natural would relocate as a single unit (maintaining all departments in one facility) into leased space.
    - Rehabbed building: NW Natural would move into an existing building that would be fully rehabbed to accommodate it.
    - Leased space (split functions): In this alternative, NW Natural would split up its operations and enter into multiple leases in separate buildings.
    - Owned space (split functions): In this alternative, NW Natural would split up its operations and relocate into multiple buildings that it would own. It would also be possible to own one building and lease the other under this alternative.
- Relocate to New Buildings: Under these alternatives, NW Natural would relocate into a new building constructed largely to NW Natural's specifications. Any of these alternatives could be modified to reflect a splitting up of staff into multiple facilities. There are four variations on this option:
    - Single tenant lease: NW Natural would relocate as a single unit and be the sole tenant in a new building as a lessee.
    - Multiple tenant lease: NW Natural would relocate as a single unit into a building with multiple tenants.
    - Ownership single tenant: NW Natural would relocate to a new building that it would own and it would be the only tenant.
    - Ownership multiple tenants: NW Natural would relocate to a new building that it would own and it would lease some space in that building to other tenants.

The following matrix describes in more detail each criterion, the methodology used to evaluate it, and the relative weighting given to it as a result of the workshop.

Criterion	Evaluation Metric	Weighting
Building Safety and Security **Conditions related to the ability for the specific building to be made secure.**		49%
	Security and access: Ease and relative cost of provision of building security features such as secured lobby, elevator access control, secured floors, etc.	
Building Amenities **Ability to provide or ease of providing in-building employee and visitor amenities. NW Natural recognizes the importance of amenities in order to attract and retain talented employees.**		31%
	Hospitality center: Whether a hospitality center similar to the one currently provided at the OPS building could be accommodated.	
	Workout/locker room: Whether a workout and locker room could be accommodated.	
	Bicycle parking and amenities: Whether the building could provide high quality bicycle parking and amenities such as a shower and changing room.	
	Employee cafeteria: Relative ease of providing a shared employee cafeteria.	
	Onsite business services: Whether the building could accommodate onsite services such as a restaurant, coffee shop, or retail.	
Flexibility/Future **Whether the building configuration is able to adapt easily in the future to changing tenant or market needs.**		20%
	Accommodating new space needs: Whether the building floorplate or ownership model can easily accommodate growing or shrinking space needs.	

"Parking lot" Criteria

Several criteria were raised during the process that were deemed important, but were not utilized during the initial round of analysis. These criteria were largely "must haves" and were factors that

would not distinguish one option from another, as they would be specifications that NW Natural would require of any relocation (including remodeling the existing building). The "must have" criteria included:

- Detailed financial analysis: All alternatives will be required to be robustly tested financially and demonstrate their ability to meet prudency standards. Phase 1 did include a preliminary financial analysis to better understand the relationship of alternative factors to financial performance, but a detailed financial analysis that reflects specific building concepts and locations will still need to be conducted in Phase 2 where specific sites, building costs, and space alternatives can be defined.
- Culture and identity: The new space must reflect and reinforce NW Natural's culture and identity. A key element of this philosophy is that the building be modest, reflecting NW Natural's prominent role as a regulated utility.
- Better climate control: Many employees noted that the current building provides unsatisfying indoor air quality levels. Any new building or a remodel should provide improved climate control.
- Better lighting: Like climate control, employees want better lighting, both natural and artificial.
- Environmentally sustainable: Cost-effective green solutions including possibly LEED certification should be considered when feasible.
- Improved IT infrastructure: Communications technology is rapidly changing and any new building or remodel timed for move-in in 2020 will by necessity incorporate improved IT infrastructure (higher speed internet, Wi-Fi, remote accessibility) than currently exists. In addition, the data center would be relocated to a more protected part of a building.
- Seismic safety: Although seismic safety was preliminarily evaluated in Phase 1, additional analysis will be needed in Phase 2 as specific alternatives and sites are considered.

In addition to these "must haves," there were several other criteria that were "wants" but were not suitable for evaluation until specific sites, buildings, and financial impacts can be considered. These include:

- Ingress/egress: Ease of getting to and from the facility by various modes of transportation.
- Functional lobby space: Additional meeting rooms, informal meeting areas, group workspaces to create better and more efficient operations.
- Community stewardship: Reinforcing NW Natural's commitment to the community.

Analysis of alternatives

Upon confirmation of the criteria and the relative weighting that each would have, the consultant team conducted technical and qualitative analyses of each locational and building criteria against the evaluation metrics using the methodologies noted in the above tables. Using a five-point scale to summarize the technical analysis, the following two charts show how each location and building type was rated against the criteria. Thus, there are two levels of weighting: 1) evaluation metrics are weighted within each criterion to come up with an overall rating for each criterion, and 2) the criteria scores were further adjusted based on the weighting noted in the tables above. Because the locational analysis was inherently more quantitative, the ranking scale showed results at five points, from "worse"

to "better." The building criteria were much more qualitative in nature and were generally analyzed relative to staying in the existing OPS building, so the scoring used was a simpler three-point scale from "difficult" to "better." Figure 3 shows the results of the locational criteria analysis, where red circles reflect the lowest composite scores and green circles represent the highest ones. A separate technical memorandum was prepared that describes the technical methodology for each evaluation.

FIGURE 3. LOCATIONAL CRITERIA ANALYSIS

Criteria/Attribute	Old Town/ Chinatown	CBD	Lloyd District	Close-In Eastside	South Waterfront	Pearl
1. Building Safety and Security						
Seismic safety						
Flood resistance						
2. Accessibility to Workforce and Partners/Public						
Parking						
Impact on commute						
Public transit						
4. Neighborhood Amenities						
Restaurants and coffee houses						
Proximity to recreation						
Services and retail						
5. Employee Safety and Security						
Personal safety						
Property crime						
Overall Score						

Worse << < > >> Better

Figure 4 shows the results of the building criteria analysis, using the simpler three-point scale.

FIGURE 4. BUILDING CRITERIA ANALYSIS

Criteria/Attribute	Stay Put	Relocate to Existing Building(s)			Relocate to New Building(s)			
	Extensive Remodel	Leased space (single unit)	Split functions into multiple leased spaces	Split functions into owned property	Single Tenant Lease	Multiple Tenant Lease	Ownership Single Tenant	Ownership Multiple Leases
1. Building Safety and Security								
Security and access	🟢	🟡	🔴	🔴	🟢	🟡	🟢	🔴
3. Building Amenities								
Hospitality center	🟢	🟢	🟡	🟡	🟢	🟢	🟢	🟢
Workout/locker room	🟢	🟡	🔴	🔴	🟢	🟢	🟢	🟢
Bicycle parking and amenities	🟢	🟢	🔴	🔴	🟢	🟢	🟢	🟢
Employee cafeteria	🟡	🔴	🔴	🔴	🟢	🟢	🟢	🟢
Onsite business services	🟡	🟡	🔴	🔴	🟢	🟢	🟢	🟢
6. Flexibility/Future								
Accommodating new space needs	🔴	🟡	🟡	🟡	🟡	🟢	🟡	🟡
Grand Total	🟡	🟡	🔴	🔴	🟢	🟢	🟢	🟢

🔴 Difficult < 🟡 Possible > 🟢 Better

From that analysis, two locational and several building alternatives were eliminated from consideration, as shown in Figure 5.

FIGURE 5. INTERIM DEVELOPMENT ALTERNATIVES RECOMMENDATIONS

Criteria/Attribute	Old Town/ Chinatown	CBD	Lloyd District	Close-In Eastside	South Waterfront	Pearl
Stay Put						
Extensive Remodel/building rehab		×	×	×	×	×
Relocate to Existing Building(s)						
Leased space (single unit)	×			×	×	×
Rehabbed building					×	×
Split functions into multiple leased spaces	×	×	×	×	×	×
Split functions into owned property	×	×	×	×	×	×
Relocate to New Building(s)						
Single Tenant Lease					×	×
Multiple Tenant Lease					×	×
Ownership Single Tenant					×	×
Ownership Multiple Tenants					×	×

= An option that is suitable with the criteria

= An option that possibly meets the needs of the criteria

× = An option that does not fit with the criteria

Locational Analysis

Of the six geographic areas under consideration, South Waterfront and the Pearl District were eliminated from consideration. Both areas received a low aggregate score relative to the other geographies. South Waterfront was eliminated largely due to its location within the 100-year floodplain - since building safety was 37 percent of the weighting, a negative score on this criterion greatly affected the aggregate score. The Pearl District was eliminated in part because of its location in a high seismic hazard zone, but also due to its relative expense and sparse parking availability.

The remaining locations (Old Town, CBD, Lloyd District, and Close-in Eastside) were all deemed suitable, with the Lloyd District and Close-in Eastside receiving higher scores than Old Town and the CBD. The eastside locations received higher scores for a range of reasons – including their somewhat lower seismic risk and lower crime rates. All areas had relatively similar neighborhood amenities, with the exception of Old Town where there were markedly fewer restaurants and coffee houses than in other areas.

Building Criteria Analysis

Based on feedback heard during the interviews and the consultant team's assessment of NW Natural's work style and culture, splitting functions into multiple buildings was not viewed as optimal but would be considered if financial, operational, seismic, or other factors made multiple facilities the best alternative. Our findings were that there is great value and efficiency from having all departments in the same building and that it is part of NW Natural's culture that company executives are accessible and physically proximate to all staff, creating some efficiencies in operations. This is not to say that having some functions in different buildings is not possible in some scenarios, but that as an order of priority, solutions that accommodate the entire operation in one facility (which could include multiple adjacent buildings) be considered first.

Preliminary Financial Analysis

Beyond the two alternatives that were eliminated, we found that there was not much that differentiated one option from another at this early stage of planning. Many of the building criteria such as the inclusion of specific building amenities could be accomplished under virtually any scenario – it is just a matter of cost. In a few cases, there are conceivably higher costs, such as providing security to multiple tenants rather than one, but these were not significant enough to shift the results one way or another. Therefore, in order to provide more insight into potential alternatives, the team conducted a preliminary financial analysis of a range of factors in order to gauge the order-of-magnitude impact those factors might have on a headquarters decision. The financial analysis modeled the impact of variables such as construction costs, space efficiency, land leasing, seismic improvements, parking, tenant improvements, swing space (temporary space during construction), and ownership of land.

While not tailored to a specific site or development program, the analysis provided important insights into how certain variables will impact the financial performance of an option. In general, the analysis was structured to identify the impact on total rent that is attributable to each factor. Most importantly for this early stage of planning, the analysis found that:

- Increasing the seismic standard of a new building contributes a relatively small amount toward total rent costs;

- Overall construction costs, however, account for 70% to 80% of the base rental rate;
- Tenant improvements contribute the second greatest amount toward rent costs;
- Seismic improvements contribute anywhere from 2% to 10% toward rent costs, depending on the level of seismic resiliency assumed in the model;
- The impact of owning your own land is significant, and alternatives where NW Natural owns its own land had lower total rent costs than other alternatives;
- Assumptions around space efficiency are important – while new construction may cost more than renovating NW Natural's existing space, the savings potential from leasing less space overall (due to a more efficient layout in a new building) can more than offset the higher per-square-foot rental rate;

For these reasons, future analysis should focus on:

- Building on land that NW Natural owns, either on the eastside or in China Town;
- Renovating NW Natural's existing OPS space.

In either case, a prudent process will also consider any reasonable option that is brought forward by the development community, which will be discussed later in the Phase 2 outline.

As a result of this analysis, the Interim Development Alternatives Recommendations show in Figure 5 were revised to reflect the elimination of the Lloyd District and CBD areas from consideration, since they would require new construction on leased sites, which were deemed to be the least financially viable alternatives. As mentioned, proposals from these areas will still be considered if they arise, but they will not be prioritized in the Phase 2 analysis. Figure 6 below shows the revised Development Alternatives Recommendations.

FIGURE 6. REVISED DEVELOPMENT ALTERNATIVES RECOMMENDATIONS

Criteria /Attribute	Old Town / Chinatown	CBD	Lloyd District	Close-in Eastside	South Waterfront	Pearl
STAY PUT						
Extensive remodel / building rehab		x	x	x	x	x
RELOCATE TO EXISTING BUILDINGS						
Leased space (single unit)	x			x	x	x
Rehabbed building					x	x
Split functions into multiple leased spaces	x	x	x	x	x	x
Split functions into owned property	x	x	x	x	x	x
RELOCATE TO NEW BUILDING(S)						
Single tenant lease		x	x		x	x
Multiple tenant lease		x	x		x	x
Ownership single tenant		x	x		x	x
Ownership multiple tenants		x	x		x	x

More detailed results from the financial analysis are found in a PowerPoint presentation dated July 23, 2015.

Conclusion and Next Steps

The work conducted to date:

1. Produced a thorough process to ensure that NW Natural reaches a prudent decision regarding its headquarters.
    a. The consultant team facilitated a transparent process of workshops and analyses that started with a wide spectrum of alternatives and logically narrowed down the scope of possibilities to alternatives that best meet NW Natural's needs. All work was thoroughly documented in a resource binder so that future decision makers can review and understand the headquarters decision process.
2. Developed evaluation criteria to screen potential relocation areas and development models. These criteria will continue to be used in subsequent steps when specific sites, development, and/or remodel alternatives are considered as applicable.
    a. Organized into two categories: Locational Criteria and Building Criteria
    b. These criteria were weighted by importance and then analyzed in order to reach a short list of more specific and vetted alternatives for further analysis.
3. Ranked six alternative geographic locations based on the evaluation criteria.
    a. Old Town and Close-In Eastside were ranked as the best fit for NW Natural's needs, largely driven by the ability to build on land already owned by NW Natural.

   b. The Lloyd District and the Central Business District potentially meet NW Natural's needs, but were eliminated due to the impact of leasing on the financial analysis.
   c. South Waterfront and the Pearl District were identified to not meet NW Natural's needs and were ruled out as potential locations.
   d. Nevertheless, when evaluating market options in Phase 2, developer proposals from all geographies will be considered.
4. Analyzed development models to assess their implications on operations. Conclusions from this step include:
   a. Not splitting up employee groups into separate locations was considered very important.
   b. Leasing space in an existing building was not evaluated due to lack of alternatives (there are no existing buildings in Portland with enough available space to accommodate NW Natural's needs).
   c. Owning vs. leasing space will be further evaluated in Phase 2, but occupying a building on land that is owned by NW Natural (where the building could be either owned or leased) is financially preferable.
   d. NW Natural can maximize meeting its objectives by having a new building built to its specifications.
5. Conducted a high-level financial analysis of different development models and geographic locations in order to understand the impact of different factors on total rent costs. Findings from this analysis concluded that:
   a. Seismic costs make up a relatively small percentage of total rent costs, particularly for new construction. However, a retrofit of the existing OPS building would be a significant cost.
   b. Development on land owned by NW Natural is likely to result in the least-cost solution.
   c. Space efficiency gained through new construction is a significant factor to reducing total rent costs.
   d. Leased building options in the CBD and Lloyd District should be removed from consideration at this stage. However ,developer proposals from any area will be considered in Phase 2, but will need to be evaluated financially against all alternatives.
6. Whether in an existing or new building, NW Natural needs to be in a facility that meets current seismic safety standards.
   a. At a minimum, there are some elements of NW Natural's operations that need to be in a facility at an even higher seismic standard. Additionally, due to the seismic assessment of OPS, it may be necessary or preferable to have split operations, where some departments operate out of a building with a higher seismic rating due to differing needs for being operational after an event.
   b. NW Natural completed a study of this issue in order to determine how it might affect a preferred alternative solution, such as soil types, building seismic rating, or whether functions within the headquarters facility could be split (e.g., multiple buildings could be built to different seismic standards depending on the need of different departments).

7. Outlined a process to find and implement the optimal and most prudent real estate solution (described below).

Next Steps

Phase 2 of the process will focus on developing workplace strategies, space needs, and applying the criteria from Phase 1 to specific opportunity sites brought forward through a developer request for interest (RFI) process. Phase 2, from beginning to end, will likely take a good part, if not all, of 2016. Much of the timing associated with this Phase is determined by the NW Natural team's availability to provide feedback and information in the workplace strategy portion, which is essential to defining the specific program that will be incorporated into the RFI and subsequent financial analyses. It is important to note that nearing the completion of Phase 2, when a decision is reached internally and brought forward for executive approval, there will be a natural transition into implementation. That is to say that at the end of Phase 2 the decision process will be completed, allowing for ample time to construct and/or remodel the space.

BEFORE THE

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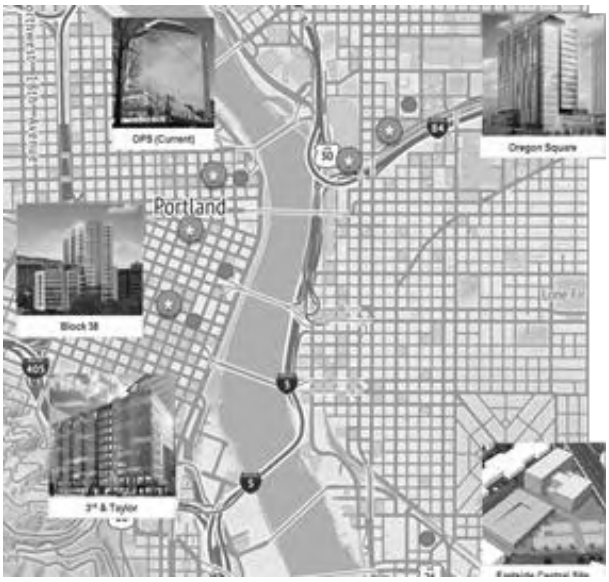
UG 388

NW Natural

Exhibits of Wayne K. Pipes

FACILITIES
EXHIBIT 502

December 30, 2019



Headquarters Relocation: Phase 2 Process Summary

NW Natural

September 2017

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Introduction

In 2015, NW Natural began a process to explore options for its headquarters office, which are currently located at One Pacific Square in downtown Portland. With its current lease expiring in May 2020, it was prudent to embark on a deliberate and strategic process to evaluate all potential options, including moving, building new, and lease renewal.

The Strategy began with a Phase 1 that focused on developing evaluation criteria that would be used to screen broad categories of options (geographical areas) in early stages and specific sites in later stages. At the end of Phase 1, NW Natural had concluded several things: a central city location was preferred (specifically downtown, Old Town, and the Central Eastside, including the Lloyd District), employee safety and security are very important, neighborhood amenities are important, and that seismic resiliency is critical.

In Phase 2, beginning in 2016, the team engaged the development community to identify potential candidates, including the current building at One Pacific Square. Through the Phase 2 process, additional research was conducted (including architectural test fits and seismic suitability studies) to identify options that best met the evaluation criteria while being financially prudent.

This report documents the key steps of Phase 2.

Phase 2 Process

The Phase 2 process took the evaluation criteria and general findings from Phase 1 and applied them to specific sites in order to arrive at a short list of potential options, subsequently arriving at a final option for lease negotiation and execution. The scope of Phase 2 incorporated several unique but interrelated steps:

- Completing a workplace strategy analysis to determine space needs;
- Selecting an architecture firm to serve as NW Natural's architect for test fits and space planning;
- Issuing a request for information (RFI) and request for proposals (RFP) to potential landlords and developers;
- Screening the landlord responses against the criteria;
- Refining the seismic suitability criteria and evaluating each option seismically;
- Conducting detailed financial analyses of the short-listed options;
- Negotiating with finalist options to achieve optimal lease terms prior to selection.

Workplace Strategies

As a precursor to space planning and test fits, NW Natural engaged Cushman & Wakefield's workplace strategies team in March 2016 to review existing space utilization at One Pacific Square (OPS) and develop workplace standards to be used in programming of a new or rehabilitated office environment.

The goals of the study were to:

- Identify key factors that may impact the future workplace strategy and space need;
- Understand the optimal ways of working for NWN in order to achieve organizational effectiveness and success; and how the future workplace should support those work practices;
- Identify key departmental needs and adjacency requirements that support collaboration and the NWN culture;
- Develop a space budget based on a range of recommended space allocation assumptions; and
- Inform the direction of the future real estate strategy.

Research to support this work involved several meetings with the steering committee, a tour of NW Natural's existing office space, and more than 15 interviews with department leaders to better understand departmental head count forecasts, adjacency needs, and support space requirements. These findings were combined with headcount growth projections to arrive at a high-level total

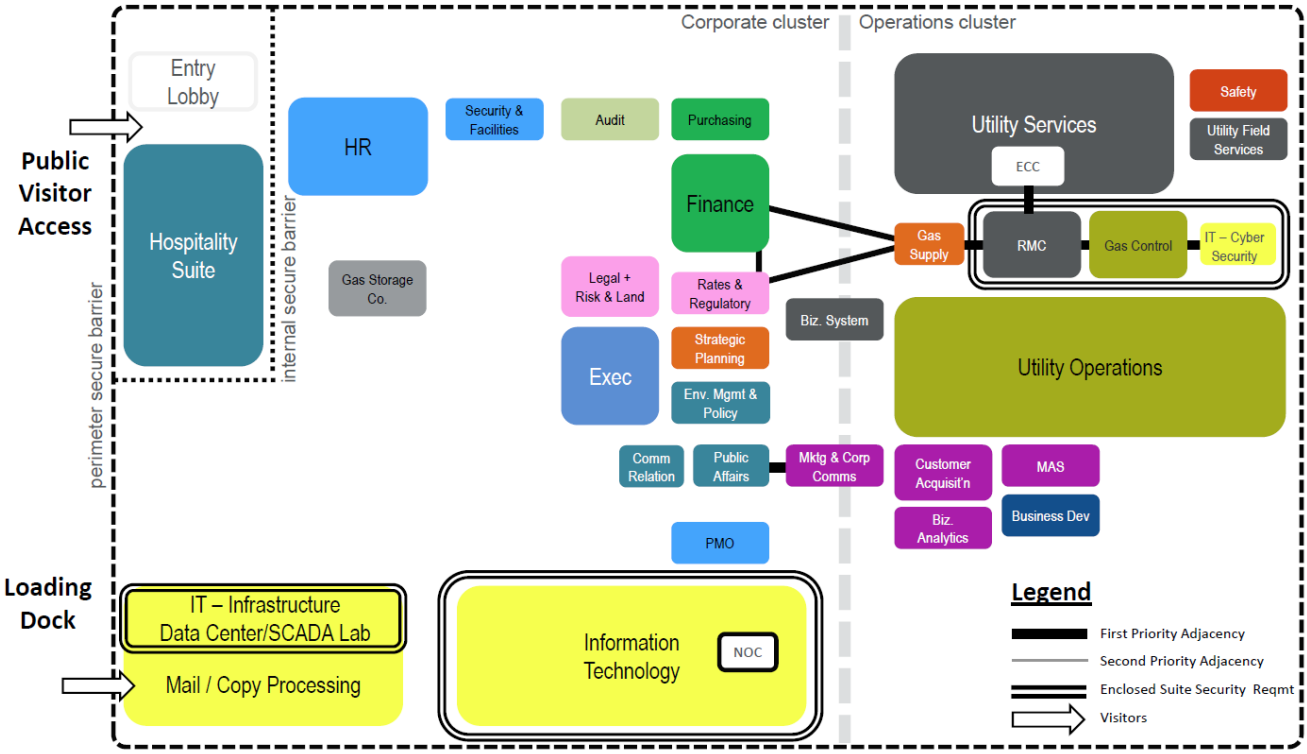
space requirement and adjacency considerations. This space program incorporated recommendations on space types and sizes that would modernize NW Natural's environment and meet the future needs of its workforce. Some of the key findings from this analysis included:

- Overall, there is an inadequate number of **conference rooms** at OPS and there is a desire for more **informal spaces** for employee collaboration and non-confidential meetings;
- There is an opportunity to **reduce square footage for storage** through an enterprise-wide content management system;
- There is a desire for the workplace to be **flexible and engaging**, supporting an atmosphere that creates employee pride and reinforces NW Natural's culture; and
- NW Natural's needs are best met through a **single location** as opposed to splitting functions across two or more sites.

With an efficient floor plan in a single location, the total space requirement for 2020 would be approximately 167,000 square feet.

The space requirements developed through this effort served as a baseline for conducting initial developer outreach, as will be discussed later in this report.

Figure 1. Adjacency Requirements



Source: Cushman & Wakefield

Following the initial workplace strategies analysis, NW Natural formed a Guiding Principles Subcommittee to refine the initial recommendations and develop more specific space layout guidelines, organizational principles, functional design principles, and standards for individual workstations, private offices, and shared work areas. These standards, described in the appendix, provided further guidance for the test fits of candidate buildings.

Architect Selection

In March 2016, NW Natural (through Cushman & Wakefield) issued a request for qualifications (RFQ) for architectural services. The purpose was to select an architect to provide the following services throughout the headquarters planning process:

- Refinement of workplace strategies and space standards;
- Conduct test fits of candidate office locations;
- Coordinate with landlord/developer architects; and
- Prepare space planning designs and documents for final office location.

A RFQ evaluation committee was formed to review the submittals and conduct interviews for the four firms that were invited to submit. The committee met to establish evaluation criteria and scored the proposals against that criteria, which included factors such as the depth of experience in similarly-scaled projects, their project approach, their resources available, and references. The firms were then asked to submit a price proposal, which was added to the scoring process in May.

Through this process, NW Natural selected GBD Architects, which was deemed most qualified and provided the best balance of value, experience, and approach among the submitting firms. Additionally, the Fee for Services was also negotiated to meet the competing qualified firm's fee.

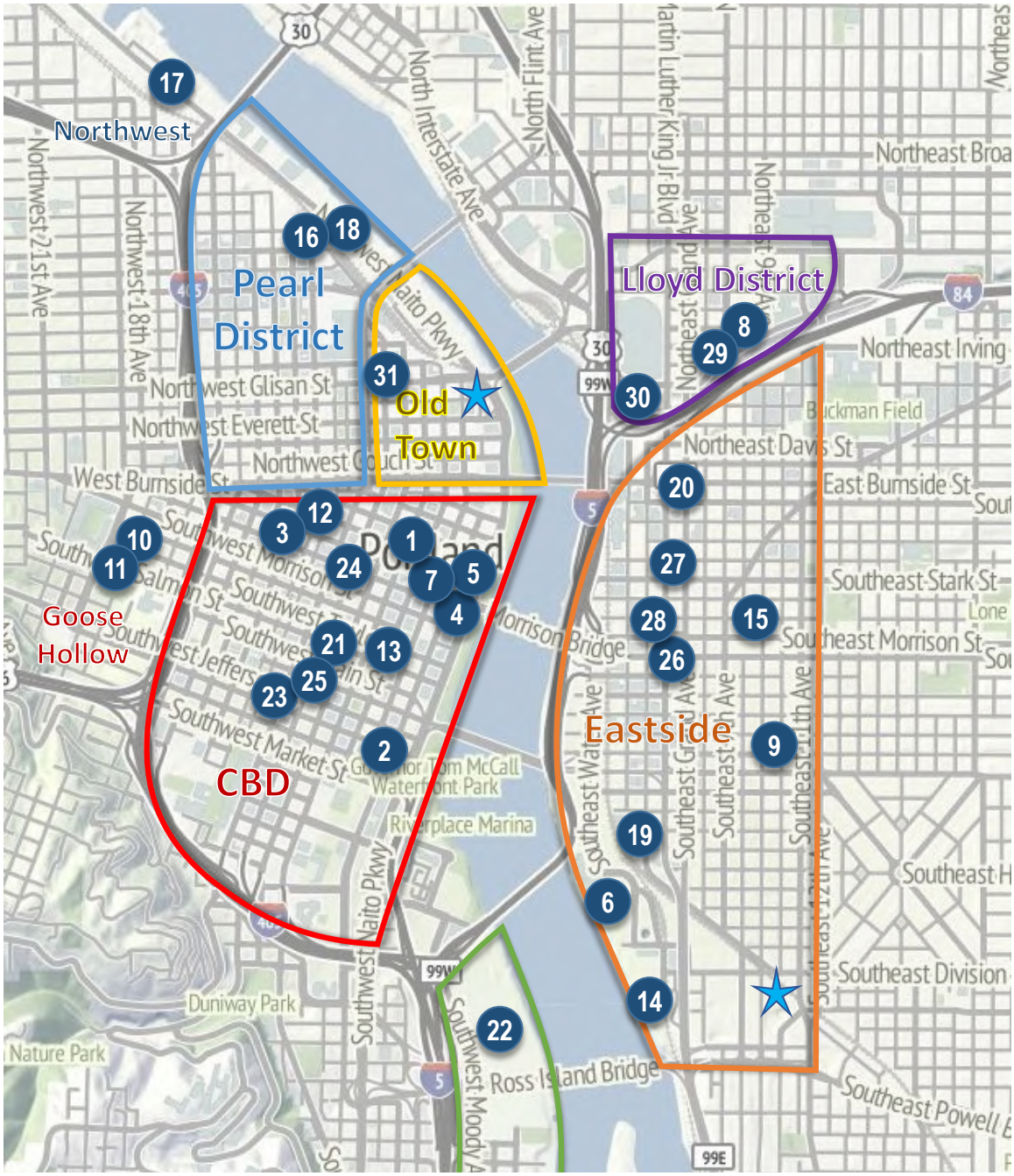
Developer/Site Selection Process

Request for Information / Request for Proposals

With the preliminary geographic focus from Phase 1 complete and a preliminary space need underway, the next step was to introduce the NW Natural headquarters office opportunity to the local marketplace to identify the full range of existing and planned buildings that could conceivably meet NW Natural's needs. To accomplish this, Cushman & Wakefield issued a request for information (RFI) on March 11, 2016 that was distributed to the Portland-area landlord and developer community. In order to cast as a wide a net as possible, the RFI only provided very basic criteria such as the target move-in date (May 2020), space needs (approximately 160,000 square feet), and geographic focus (Portland's Central City, including both west and east sides of the Willamette River).

In total, this initial RFI generated 33 responses, between March and August 2016 (including One Pacific Square and the Central Eastside site) that included mostly new developments, but also several existing buildings. Subsequently, a second RFI was sent to these respondents to gather additional information on critical criteria, including parking, accessibility by public transit, building size, and seismic resilience. As a result of that process, 22 responses were obtained for further consideration and analysis (the other sites declined to resubmit or were not actually able to accommodate the building size).

Figure 2. Map of RFI Response Locations

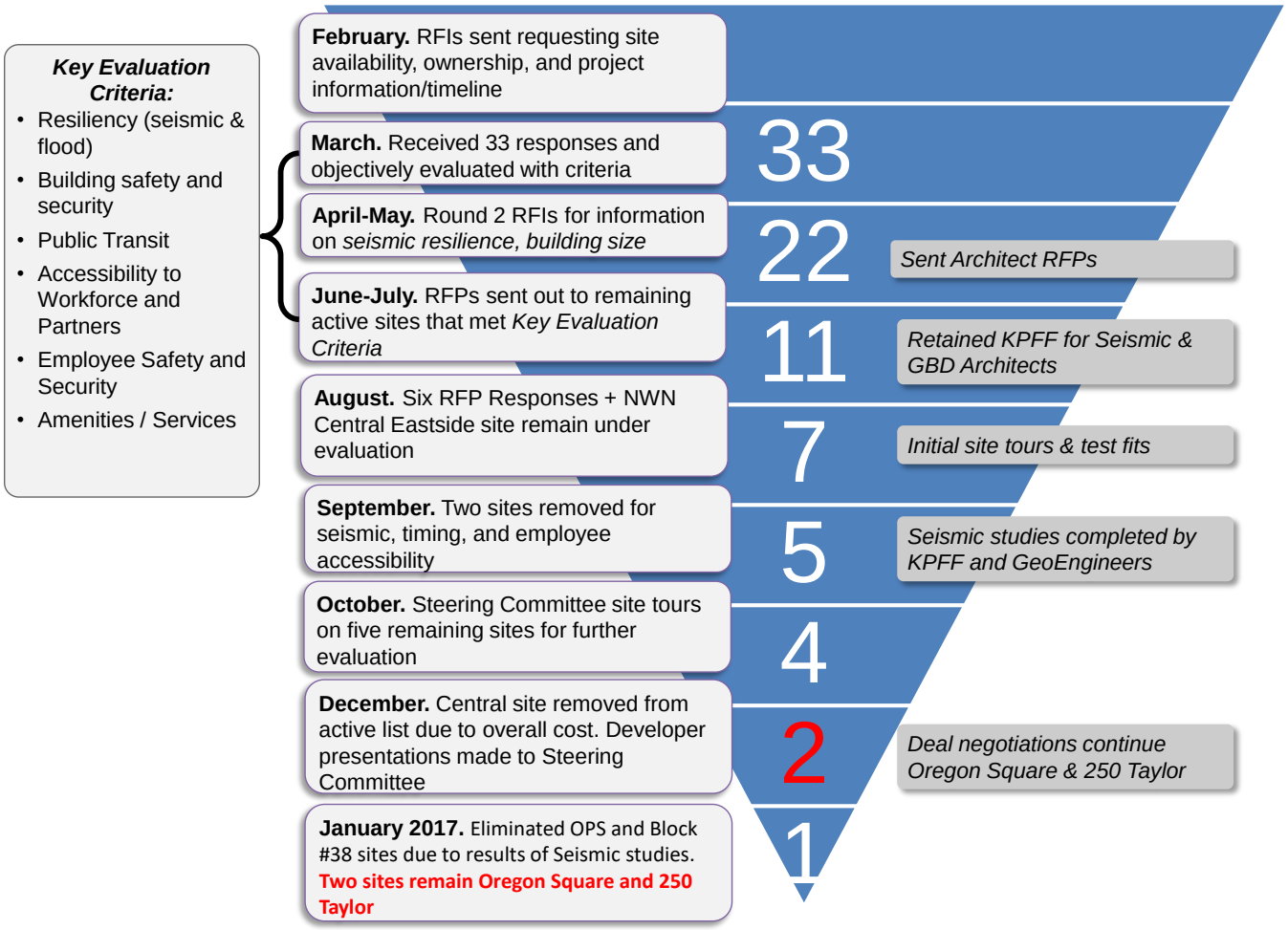


Source: Cushman & Wakefield

The 22 sites were then evaluated and prioritized using the criteria developed in Phase 1. This prioritization resulted in 11 sites for further consideration (10 proposed sites plus NW Natural's owned property in the Central Eastside). To this list of sites, a request for proposals (RFP) was sent that requested additional detail such as preliminary pricing, lease terms, and building details.

NW Natural | HQ Relocation Phase 2 Process Summary

Selection Process Overview (2016-2017)



The RFP was sent to 10 developers for a response due in early August. In addition to these properties, NW Natural's own Central site located in Portland's Central Eastside was carried forward for consideration as a headquarters site. NW Natural received six RFP responses from the following developments:

Property	RFP Sent	Response	Comments
1. One Pacific Square	Yes	Yes	Eliminated due to building seismic requirements and expected accessibility challenges in the neighborhood after a major seismic event
2. 3rd and Taylor	Yes	Yes	Continued to negotiate and reduced rental rates
3. Oregon Square	Yes	Yes	Continued negotiations but eliminated due to long-term construction of the super block, the need for further entitlements to allow for office development, and developer's inability to commit to deal terms.
4. Block 38	Yes	Yes	Eliminated due to high rental rates and potential risk with occupying a mixed-use building
5. U.S. Bancorp	Yes	Yes	Eliminated due to seismic retrofitting
6. 1100 SE MLK	Yes	Yes	Eliminated from further consideration due to distance from public transportation, lack of employee amenities, and safety.
7. Central Site	N/A	N/A	NW Natural-owned site. Eliminated due to its challenging environmental conditions (ongoing remediation needs), the high cost to construct a parking structure necessary to accommodate office development, relative lack of employee amenities in the surrounding area, and overall high cost to build.

Resulting from this phase of the screening, four sites remained:

- One Pacific Square: Although eliminated, it was deemed prudent for negotiation purposes to keep under consideration as a benchmark and potential fallback option.

- Block 38: Scored highly on qualitative metrics. There were concerns about the site's proximity to the Morrison Bridge and the area's accessibility after a major earthquake.
- Oregon Square: The highest ranked on qualitative metrics, lowest seismic hazard
- 3rd and Taylor: Scored highly on qualitative metrics, second lowest seismic hazard, lowest development risk and single-occupancy (allowing for security and operational control)

Test Fits

Over the next couple of months, test fits were conducted for these sites. The test fit process involved GBD Architects working with each developer to lay out the draft development program on each building utilizing the new workplace standards developed earlier. The purpose was to ensure that NW Natural's program could actually fit in each space and to identify key differences in terms of floor layout, departmental adjacencies, growth flexibility, space efficiency, and other factors.

Seismic Analysis

Over the spring and summer of 2016, the Steering Committee identified seismic resiliency as a continuing area of concern, recognizing that as a utility, it is essential that NW Natural remain operational throughout and immediately following a major earthquake, specifically a Cascadia Subduction Zone earthquake, which is a major offshore earthquake that many experts indicate is overdue in the region. While seismic stability was preliminarily considered during Phase 1, it was only done so using very general seismic mapping tools publicly available by the State of Oregon and the City of Portland since the focus of the effort was to narrow down geographic areas, but not identify or eliminate any particular sites. Now that specific sites and buildings were being considered, the committee determined that more detailed seismic analysis was merited.

To screen potential sites for seismic suitability, NW Natural retained GeoEngineers, Inc., a geologic engineering consulting company, to evaluate soil and geologic conditions in order to preliminarily assess the potential for each of the four remaining sites to be impacted by seismic hazards during a large subduction zone seismic event. A key aspect of the analysis was to understand not only the stability of the site itself (which could almost always be mitigated through engineering of the building in a new-build scenario), but also the potential impacts to the surrounding neighborhood. Since liquefaction or lateral spread of the soils surrounding a building could render an entire neighborhood inaccessible following an event (even if NW Natural's own building survived), understanding the seismic suitability of each site's surrounding area was of critical concern. The results of this analysis are detailed in the appendix. The analysis found that the Oregon Square site had the most stable soils and was at the lowest risk of liquefaction and lateral spread, meaning that this site had the lowest risk of access to the site being compromised after an earthquake. The site at 250 Taylor was ranked second in terms of lowest risk, followed by Block 38. NW Natural's current headquarters at One Pacific Square was deemed the highest seismic risk among the remaining sites.

The results of this analysis was factored into the decision to shortlist the final two sites, as described later.

One Pacific Square Seismic Analysis

As an existing building built under now-obsolete building codes, NW Natural's existing building would need to be upgraded to make it operational following a seismic event. While the proposal for One Pacific Square included some seismic upgrades to achieve an operational status, it was difficult to compare it to a newly constructed building on an apples-to-apples basis since there were several seismic upgrades not included in the OPS proposal that would be incorporated in a new-build alternative. There were also significant concerns about the liquefaction and lateral spread in the surrounding neighborhood. Coupled with a high number of unreinforced masonry buildings, the area would potentially be inaccessible after a major earthquake, regardless of the stability of OPS itself.

Revised Developer RFP

Developers of the four sites were then asked to prepare a cost proposal (revised RFP) for each site to start the lease negotiation process. Developer interviews were held to learn more about each team's background, project vision, building specifics (parking, shell design, TI criteria), development timeline, and commitment to sustainability.

There were two site tours completed by Steering Committee members to walk each site for further evaluation. Each attendee was provided a tour booklet with a property description, checklist and summary matrix to score each site relative to one another.

Based on the financial information received in each proposal, a total cost analysis was prepared in order to compare the options. Throughout this process, the qualitative criteria were revisited to confirm the rankings and the additional criterion of developer risk was added. Developer risk incorporates factors that could impact a developer's ability to deliver the project on time such as confirmed financing, entitlements, and developer experience.

With the detailed seismic analysis of OPS and a preliminary financial analysis of each option complete, two sites emerged as higher ranked sites and were recommended to move forward for lease negotiations. These were:

- 3rd and Taylor
- Oregon Square

Based on the concerns noted above, OPS was eliminated from further consideration. Likewise, the total lease costs at Block 38 were the second highest. Combined with the fact that its location was potentially inaccessible after a major seismic event, it was also eliminated at this stage.

Lease Negotiations

NW Natural initiated a negotiation process with each of the two remaining sites. From March through June of 2017, the negotiation team worked back and forth with both developers to refine the lease terms, building program, and other details in order to arrive at terms that were best for NW Natural and that indicated a clear winner.

Oregon Square scored better on the qualitative analysis and was the highest ranked for seismic safety. However, over the course of negotiations, several risks to the project emerged, including:

- The likely phasing of development of the multi-block project, meaning that NW Natural would potentially have several years of adjacent construction;
- This phasing also impacted the efficiency and cost of the shared parking structure;
- The developer was unwilling to guarantee in writing several terms that were initially promised.

Meanwhile, negotiations with the developer of 250 Taylor were productive, resulting in several pricing concessions and design improvements that made it a better financial decision in the end. Further, this building already had its land use entitlements and the developer was committed to breaking ground in 2017 with or without a lease, so it had a very high level of certainty with little risk that the timeline would not be met.

To further mitigate risk, NW Natural crafted its own lease rather than used the developer's template.

Conclusion

The multi-phase process outlined above was deliberative, transparent, and has allowed NW Natural to reach a prudent headquarters decision that:

- Ensures that NW Natural is fully operational following a major seismic event;
- Creates a work environment that supports employee productivity;
- Maintains a transit-served, central-city location that supports NW Natural's efforts to attract the most qualified employees;
- Optimizes lease terms for ratepayers.

Appendices

Appendix A: Architect RFQ

Appendix B: Developer RFI

Appendix C: Developer RFP

Appendix D: Seismic White Paper

Appendix E: Summary of Criteria Scores

Appendix F: Financial Analysis

Matthew C. Johnson
Senior Director

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Matt.Johnson@cushwake.com
cushmanwakefield.com

March 14, 2016

Firstname Surname
Address 1
Address 2
City Postcode
Country

RE: Request for Proposal for Architectural Services

Dear Name,

Cushman & Wakefield of Oregon, Inc. represents Northwest Natural ("NW Natural"), a utility company that currently occupies approximately 170,000 rentable square feet in the One Pacific Square Building, located at 220 NW 2nd Avenue, Portland, Oregon. The NW Natural lease is set to expire May 31, 2020. Through internal discussions between Cushman & Wakefield and our client, we have determined that _____ is one of four (4) firms we believe to be strong candidates to assist with space programming needs and help NW Natural further analyze building and space opportunities in the Portland market.

Project Overview:

The awarded firm will be a design partner to the project team and will work closely with the client, NW Natural, and the brokerage and workplace strategy team, Cushman & Wakefield. This firm will provide preliminary planning services to NW Natural for purposes of developing a real estate strategy. The selection of a firm to provide space planning services may not guaranty the same will deliver additional services as indicated below.

Three general scenarios have been identified as potential real estate strategy options:

1. NW Natural will stay in its current location and renovate occupied floors with potential seismic retrofitting of the building.
2. NW Natural will exit its current location and relocate to an existing building in Portland that can meet a June 1, 2020 timeframe.
3. NW Natural will work with a developer to build a building to house their multiple business lines and operational needs. In this scenario, a developer would have the option to hire the architect, or an alternative architect, to design a new core and shell facility.

Scope of Work:
You are invited to submit a proposal to provide architectural services for this project in (2) phases:

1.0 ***(Pre Lease)****:* **April 2016 – June 2017**

1.1 Meet with Client representative to determine test fit programming data and assess the existing premises.

1.2 Physically inspect the proposed sites as required and review available architectural and engineering documents to become familiar with site conditions, identify deficiencies or remedial scope, and define planning and designing requirements of the Projects.

1.3 Prepare test fits which accommodate the spatial requirements. The test fits shall delineate the locations of full and partial height walls, doors, relites, casework, significant equipment, and furniture.

1.4 Present the test fits to the Client and identify required changes.

1.5 Provide one set of revisions to the test fits.

1.6 Prepare pricing plans (with information on finishes, walls, ceilings, floors, etc.) for the preliminary estimating of project costs.

2.0 (Lease Execution): July 2017 – May 2020

a) Design Development
b) Construction Drawings
c) FF&E Coordination
d) Construction Administration

2.1 Complete Design Development package, indicating all elements of fixed construction and locations of equipment for all areas of the project. Participate in value engineering exercises to meet the designated project budget.

2.2 Develop furniture specifications to bid to furniture dealers chosen by the Client for competitive furniture design and pricing. Lead the overall furniture procurement process.

2.3 Perform preliminary plan check and code compliance review work with the City Building Department and Fire Department, and revise documents as necessary for submission to Client for final review and approval.

2.4 Prepare a complete set of Construction Documents for the project defined by the selected real estate strategy direction. Coordinate with the appropriate design and specialty consultants as required by the scope of the project. Assume mechanical, electrical, plumbing, low voltage, fire protection and access control are design-build.

2.5 Provide general construction observation services including, but not limited to: regular participation in construction meetings, on-site review of major architectural elements, and issuing necessary field clarifications.

2.6 Lead punch walk activities and coordinate with Contractor to obtain field sets of as-built information to be provided to Client.

Proposal Format:

If your firm is interested in participating in this process, we would kindly ask that you respond to the following items with a written proposal along with any data that you believe is relevant to your capabilities and qualifications by April 1, 2016. It is our intention to interview your firm's project team at a time to be determined during the first week of April.

1. General information on your firm (i.e., how long have you been in business, number of architects and designers, etc.)
2. Services and resources available to NW Natural to assist them with analyzing buildings and spaces in the Portland CBD.
3. Qualifications of the team members who would be working directly on the project and past experience on similar projects.
4. General approach to the project including recommendations on phases and timelines.
5. Fees. Please provide NW Natural with a phased approach and a menu of fees associated with each phase of the process in the following format:

   Provide a fee structure to complete the project per phase:
   Phase 1.0 (Pre-Lease): Test fits with pricing detail **$**_____
   Fee to be paid by Landlord at a market rate of $0.15 per RSF
   Phase 2.0 (Lease Execution): DD, CD, FF&E, Construction **$**_____
   We understand that the current scope for Phase 2 is not clearly defined, as such, we are asking for a ROM fee (for phase 2) to inform budgeting efforts. Both the phase 2 scope / fee will be negotiated once a real estate strategy is determined.

   a) Identify mark-up associated with the assignment of engineers or consultants with in your scope
   b) Identify all exclusions, qualifications, or exceptions to your proposal or the Scope of Services noted; specify any non-standard or optional services and indicate associated costs as alternates
   c) Identify reimbursable expenses

Provide the aforementioned information in a 25 page (maximum) PDF file.

Scoring will be based on the following schedule:

Relevant / translatable experience	20%
Individual / Team qualifications	20%
Project Approach	20%
Scope of Services and associated fee	20%
Proven success with development community	15%
References	5%

Contract:

The Client will enter into a contract with the selected architect for Phase 1.0 base scope of services to commence immediately. Phase 2.0 will be evaluated and decided upon as a change order to the base contract upon the finalizing a real estate strategy.

During this architectural and design selection process, please contact Matt Johnson at Cushman & Wakefield, matt.johnson@cushwake.com with any questions in a formal “Request for Information” submittal. Each submitted question and corresponding response will be distributed to all competing firms.

Sincerely,

Matthew Johnson
Senior Director

Matthew C. Johnson
Senior Director

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Matt.Johnson@cushwake.com
cushmanwakefield.com

March 11, 2016

To Whom It May Concern:

On behalf of NW Natural, this letter shall serve as a Request for Information ("RFI") relating to its corporate headquarters. NW Natural is seeking information for potential projects, existing buildings or parcels of land that could accommodate its headquarters operations. Cushman & Wakefield has been retained by NW Natural to uncover and evaluate all potential real estate opportunities for lease or purchase in the Portland Metropolitan Area.

Pertinent information regarding NW Natural's Headquarters:

• Current Location:	One Pacific Square
• Size:	Estimated to be 140,000 to 180,000 RSF
• Lease Expiration:	May 31, 2020
• Location Preference:	CBD, Old Town/NW Triangle, Close-in Eastside, Lloyd District and South Waterfront

Please provide the following information in your response:

1. Site/Building Address

2. Ownership Structure

3. Project Information:
    a. Total building size, if applicable
    b. Scope of project (i.e., office, multifamily, retail, etc.
    c. Size of proposed site
    d. Zoning
    e. Brief description of project

4. Project timing and ability to meet the occupancy date

Submit general information requested above to Cushman & Wakefield along with building images, floor plans, and any additional information that would be helpful in evaluating the proposed project. Initial responses must be submitted via e-mail to matt.johnson@cushwake.com by close of business Friday, March 25th, 2016.

Best Regards,

Matthew C. Johnson
Senior Director

c: Mark A. Carnese, Cushman & Wakefield
Thomas J. Usher, Cushman & Wakefield

Matthew C. Johnson
Senior Director

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Matt.Johnson@cushwake.com
cushmanwakefield.com

[Date]

Via email: [email]

[Contact Name]
[Contact Role]
[Company]
[Address]
[City, State, Zip]

Re: NW NATURAL RFP – [Address]

Dear [Name]:

Thank you for your response to our RFI and your participation in this process. Cushman & Wakefield has been retained as NW Natural's real estate advisor and is authorized to explore all options as it relates to their headquarters. NW Natural's current lease expires May 31, 2020, and they have begun the process to evaluate their long-term tenancy options.

On behalf of NW Natural, we are pleased to present this Request for Proposal ("RFP") that describes our client's requirements.

1.	**Tenant:**	NW Natural
2.	**Landlord:**	Please state the name of the Landlord and Management Company. Please describe the structure of the building ownership.
3.	**Lease Commencement:**	The lease will commence no later than June 1, 2020.
4.	**Term:**	Please propose both a ten (10) and fifteen (15) year lease term.
5.	**Beneficial Occupancy:**	NW Natural shall have ten (10) weeks early access to the space prior to lease commencement, in order to complete the installation of furniture, telecom and other equipment and fixtures.
6.	**Initial Premises:**	NW Natural projects the initial space requirement to be approximately 190,000-210,000 rentable square feet. Please state the location and size of the floors proposed. Please include the RSF as well as the USF calculations. NW Natural will require a review of the floor plate with the proposal. If this is not available please describe, in detail, the rough dimensions of the floor plate as well as timing for completion of the floor plate design.

		All space measurements will need to conform to current BOMA standards.
7.	**Rental Rates:**	Please outline the proposed base rent, including rent abatement, on a rentable square foot basis for the initial term of the extension. The Base Rent should be based on the office floors, exclusive of the storage.
8.	**Rental Adjustments:**	NW Natural will pay its proportionate share of increases in operating expenses (including taxes) over a base year, which shall be the first year of occupancy. Operating expenses and real estate taxes shall be calculated according to Generally Accepted Accounting Principles (GAAP). In no event shall NW Natural be charged for capital improvements. Landlord shall provide a yearly statement of expenses and NW Natural shall have the right to audit such statement. NW Natural requests a three percent (3%) non-cumulative cap on operating expenses. If the building does not have at least ninety-five percent (95%) of the rentable area occupied at any time during the Base Year, the base for Operating Expenses and Property Taxes may be increased to reflect what such costs would have been if they had been calculated on the basis of 95% building occupancy and full Property Tax Assessment. Landlord agrees that Landlord will not collect, or be entitled to collect, Operating Expenses from all of its tenants in an amount which is in excess of one hundred percent (100%) of the Operating Expenses actually paid by Landlord in connection with the operation of the Building and the Real Property. In the event Landlord increases the scope of services provided, the cost of any increased services, shall be added to the Base Year and only increases to the costs of adding such services shall be charged to NW Natural as an escalation. NW Natural will require audit rights within the lease.
9.	**Hold Space:**	NW Natural shall have the right, by giving notice no later than six (6) months prior to the Commencement Date (as hereinafter defined), to increase or reduce the Initial Premises by up to approximately 20,000 RSF (the "Hold Space") on the same terms and conditions as those applicable to that portion of the Initial Premises described above.
10.	**Storage Space:**	NW Natural may require storage space in the building. Please indicate the amount of storage space available, as well as the location and rate.

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11.	**Option Space:**	NW Natural seeks expansion within the building in half and full floor increments on the anniversary of the third, fifth, and seventh years. Please describe how expansion space can be accommodated.
12.	**Right of First Refusal Space:**	NW Natural shall have a Right of First Refusal on any space in the Building which is unencumbered as of the date of the lease, or which becomes available for lease subsequent to the date of the lease ("Refusal Space") at the rental rate and terms consistent with the then current rent. . This assumes a tenant improvement contribution from the Landlord proportionate to the Tenant Improvement Allowance provided to NW Natural under this extension and the remaining term on the lease extension. Please identify any other tenant's existing expansion rights.
13.	**Termination Option:**	NW Natural will require a right to terminate the lease at the end of the 10th year with 270 days prior written notice. The termination penalty will equal the unamortized tenant improvement costs and leasing commissions calculated on a straight line basis. The termination fee will be paid at the date of termination rather than notice date.
14.	**Contraction Option:**	NW Natural shall have the right to reduce its occupancy in the Building (and surrender such space to the Landlord) by up to one floor at any time after the 5th year of the lease term. NW Natural shall notify Landlord of its intent to reduce its occupancy no later than six (6) months prior to the effective date of such surrender and reduction in occupancy. NW Natural shall pay Landlord an amount equal to the unamortized (straight-line year amortization period, no interest) portion of the Tenant Improvement Allowance (as hereinafter defined) for the portion of the Premises so surrendered. Such payment shall be due prior to the end of the calendar month preceding the effective space reduction and surrender date.
15.	**Purchase Option:**	NW Natural will require a right to purchase the Building.

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16.	**Tenant Improvement Allowance:**	Please indicate a tenant improvement allowance for both the 10 and 15 year lease terms. Landlord will provide the Premises to NW Natural in a warm shell condition. Please provide a detailed description with this proposal. If NW Natural's cost of construction exceeds the Tenant Improvement Allowance, NW Natural may request that Landlord finance the excess costs at an interest rate fixed at the time the improvements in question are made at the lower of (i) the "prime rate" as announced by Bank of America, Portland, Oregon office or (ii) the rate payable by Landlord pursuant to any existing institutional mortgage financing then encumbering the Building. Any costs amortized by the Landlord shall be paid by NW Natural as additional rent in equal monthly installments during the Initial Term of the Lease. NW Natural shall have the right to use any portion of the Tenant Improvement Allowance for tenant improvements, architectural/construction management fees, engineering fees, construction fees, built-in and movable furniture, computer networks and telephone systems, demolition, security systems, relocation costs and any other use desired by NW Natural; and/or at NW Natural's election, convert such Tenant Improvement Allowance to rental abatement. NW Natural shall have the option of designating whether NW Natural or Landlord shall be responsible for controlling the tenant improvement construction. There shall be no fee for Landlord's supervision, Landlord's engineers or architects or otherwise in connection with design and construction, regardless of whether Landlord is chosen to be responsible for the tenant improvement construction. Landlord shall provide customary construction warranties for Landlord's work, and if Landlord is designated to control the tenant improvements, Landlord shall provide such warranties for such NW Natural work. Should Landlord be responsible for completing the improvements, then Landlord shall competitively bid the general contractors for the construction within NW Natural's space. NW Natural shall have the right to participate in the selection of a general contractor, including bid review, and the separate right to choose two (2) of the three (3) of the general contractors to submit bids on the project.
17.	**Space Planning and Design:**	Landlord will provide an allowance of fifteen cents ($0.15) per rentable square foot plus reimbursable expenses to NW Natural's architect for this service. Such allowance shall be payable even if NW Natural does not ultimately select the Building.

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18.	**Refurbishment Allowance:**	NW Natural will require work to be done to the Premises every five (5) years. Please provide an allowance for NW Natural at the end of the fifth (5^{th}) year and tenth (10^{th}) year.
19.	**Restoration:**	Subject to Landlord's review and approval of future alterations. NW Natural will have no obligation to restore the leased Premises at the end of the lease term or extensions thereof should it vacate.
20.	**Renewal Option:**	NW Natural shall have three (3) Renewal Options of five (5) years to extend the Term with respect to all of the Premises, or with respect to any or all full floor portion(s) of the Premises by giving written notice to Landlord of its intention to exercise each such option no later than twelve (12) months prior to the expiration of the then-current term. The renewal rental rate will be at 95% of Fair Market Value to be defined in a lease agreement.
21.	**Holdover:**	NW Natural shall have the right to Holdover for up to six (6) months, at the then current lease rate. The Holdover rate will be increased to 125% after that time.
22.	**Arbitration:**	In addition to all of the legal rights and remedies that are available to NW Natural at law or in equity, in the event that any dispute or disagreement between Landlord or NW Natural arises under the Lease or any related document, the matter may, at NW Natural's sole election, be heard by judicial reference conducted in accordance with the State of Oregon Code of Civil procedure and Oregon Evidence Code, or by JAMS dispute arbitration. A decision rendered in any of the above proceedings shall be final and binding on Landlord and judgment thereon may be entered in any court of competent jurisdiction and be non-appealable.
23.	**Right to Assign and Sublease:**	NW Natural will require the continuing right to assign the lease or sublet all or any portion of the premises at any time during the primary term and all extensions thereof, with landlord's consent which shall not be unreasonably withheld or delayed, and to retain 100% of any rentals resulting from the sublease(s) or assignment(s). Subleases to any subsidiaries or affiliates shall not require landlord's consent.
24.	**Use:**	NW Natural shall be permitted to use the Premises for general office Use and any other legally permitted uses compatible with a first-class office building.
25.	**Sustainability:**	Please indicate Landlord's intentions in certifying the building (i.e. LEED, Green Globe, etc.).

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26.	**Parking:**	Parking is very important to NW Natural. Landlord to maximize the amount of on-site parking available and will assist NW Natural in achieving a ratio close to 2.5 per 1,000 RSF both onsite and nearby parking facilities. Please indicate the initial parking rate per stall per month. The parking cost will not increase more than 3% per annum on a cumulative basis. Please also indicate how many reserved stalls, and the associated cost, will be provided to NW Natural.
27.	**Bike Parking:**	Please describe in detail what the Building will provide in the way of secured bike storage, including the proximity of showers and lockers to the bike storage area.
28.	**Exercise Room:**	Please indicate if Landlord is willing to provide a building exercise room as a tenant amenity.
29.	**Building Signage:**	NW Natural shall be permitted Building identity which shall include NW Natural's logo and name prominently displayed on the Building, on any monuments in front of the Building, on the walls of the Building first floor lobby elevator bank, and in all elevators (elevator tags) that have access to the reception and service/delivery floors. The initial cost of NW Natural's signs shall be included as part of the Tenant Improvement Allowance. Maintenance, repair, restoration and removal of such signs shall be included in Operating Expenses. All NW Natural sign rights shall be transferable in whole or in part by NW Natural to a successor and/or permitted assignee. The Building name or address shall not be changed without NW Natural's prior approval. NW Natural will retain all signage rights so long as they maintain 75,000 RSF or more of occupancy.
30.	**Heating, Ventilating & Air Conditioning:**	NW Natural requires HVAC service to begin at 6 a.m. until 6 p.m. during weekdays and 8 a.m. until 1 p.m. local time on Saturdays, at no additional charge. NW Natural shall also be allowed to install supplemental air-conditioning units with a capacity of 40 tons of HVAC for its IT equipment room and other areas, which shall be allowed to operate 24 hours per day, 7 days per week, at no additional charge. Landlord shall not charge for hook-up, installation, or similar fees. Please describe any charges for after-hours HVAC and fan only service. Additional HVAC will be web based computer controlled to allow remote requests for system operation after hours.

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<table>
<tr><td>31.</td><td>Building Antenna:</td><td>NW Natural shall have a preferential right, without rental or other charge, to use a portion of the roof, to the extent reasonably practicable, to install, operate and maintain telecommunications antennas, microwave dishes and other communications equipment. Such use shall be subject to receipt of all required governmental approvals and shall not unreasonably interfere with the Building systems.</td></tr>
<tr><td>32.</td><td>Property Management:</td><td>Please indicate the management company for the Building and the current property management fee structure. Also, indicate if the property management team is on-site.</td></tr>
<tr><td>33.</td><td>Amenities/Building Renovations:</td><td>Please identify any Building amenities that will be available for NW Natural's use or planned for the Building.</td></tr>
<tr><td>34.</td><td>Seismic:</td><td>The premises shall meet the following seismic criteria for both structural and non-structural elements:
<table>
<tr><th></th><th>BSE-1N Seismic Hazard</th><th>BSE-2N Seismic Hazard</th></tr>
<tr><td>Structural Performance Level (100% of building area)</td><td>Immediate Occupancy</td><td>Life Safety</td></tr>
<tr><td>Non-Structural Performance Level (40% to 50% of building area)</td><td>Operational</td><td>(Not Considered)</td></tr>
<tr><td>Non-Structural Performance Level (remainder of building area)</td><td>Position Retention</td><td>(Not Considered)</td></tr>
</table>
Seismic Hazard Levels, Structural Performance Levels, and Non-Structural Performance Levels shall be as defined in ASCE 41-13 “Seismic Evaluation and Retrofit of Existing Buildings.”</td></tr>
<tr><td>35.</td><td>Emergency Generator Power/UPS:</td><td>NW Natural requires emergency power back up for roughly 50% of their occupancy to be fully operational. Please specify what is available. If the building generator is not available, NW Natural requires the right to install a generator for their exclusive use. Describe both power and capacity available.

NW Natural also requires installation of UPS system in premises. Please specify any limitations related to UPS install in the building.</td></tr>
</table>

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36.	**Structural (excluding Seismic) and Mechanical Elements:**	Please confirm that Landlord shall maintain, in a first class manner, weather tight, and in compliance with all appliance laws (including without limitation, the Americans with Disabilities Act), the Building's exterior envelope and any common areas, together with all structural elements of the Building and all HVAC, mechanical, electrical, lighting, plumbing, and life safety systems serving the Premises and any common areas. Base building envelope and roof shall be in watertight, structurally compliant, and in overall good condition and repair. If available, Owner to provide documentation of envelope and roof condition and/or permit Tenant to inspect and evaluate property condition to mitigate issues regarding water intrusion. Please confirm that the Landlord will represent and warrant to Tenant that all of the foregoing shall be in good working order as of Lease commencement and have a remaining useful life of at least the length of the initial Lease Term. Please provide written specifications for the Building's existing electrical system, including voltage service level and number of primary service feeds serving the Building, as well as the maximum live and dead floor loads of the Premises per RSF.
37.	**Most Favored Nation:**	With respect to overtime and above standard charges Tenant shall pay no more than the lowest amount paid by any other tenant of the Building now or in the future.
38.	**Interruption of Services:**	If Building services are interrupted for more than two (2) consecutive days and as a result of such circumstances any portion of the Premises is rendered untenantable (including inability to access the Premises or the Building) then Base Rent and additional rent for operating expenses and real estate taxes shall abate in such interruption and continuing until the Premises is again tenantable.
39.	**Building Services/Hours of Operation:**	Please describe all of the services provided by Landlord and the standard hours of operation for the Building. Identify the after-hours charge for HVAC.
40.	**Non-Disturbance:**	Landlord shall secure and deliver to NW Natural a Non-Disturbance Agreement from the existing Lender at no charge to NW Natural. Any future subordination will be conditioned upon getting a Non-Disturbance agreement.

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41.	**Compliance:**	The Lease shall provide that Landlord shall be responsible for Compliance, at Landlord's sole cost and expense, with all statutes, rules, ordinances, orders, codes and regulations, and legal requirements, and standards issued thereunder, as the same may be enacted and amended from time to time, which are applicable to all or any part of the physical condition and occupancy of the Building or additions thereto.
42.	**Hazardous Materials:**	Landlord shall warrant and represent that there is no asbestos or other hazardous material in the Building. If such is discovered during the term of this Lease or any extensions thereof, Landlord shall immediately remove, or NW Natural may do so if Landlord fails to, and deduct the cost thereof from rental, or, at NW Natural's option, terminate this Lease.
43.	**Americans with Disabilities Act (ADA):**	Landlord shall warrant that the Building (including garages, elevator lobbies, elevator cabs, restrooms, and path of travel through the Building) and all common areas comply with the current American with Disabilities Act.
44.	**Naming Rights:**	NW Natural will be provided with naming rights for the project, assuming NW Natural is leasing a minimum of 75,000 rentable square feet.
45.	**Non-personal Rights:**	All of NW Natural's rights under the Lease (including, without limitation, NW Natural's rights to lease additional space, extend the Initial Term, reduce the Premises and/or elect to cancel the Lease) may be exercised by NW Natural or an assignee of NW Natural, and shall not be personal to NW Natural.
46.	**Disclosure and Brokerage Agreement:**	It is acknowledged that Cushman & Wakefield represents NW Natural in this transaction and both parties consent thereto. In the event a Lease is fully executed between the parties, Cushman & Wakefield shall be paid a market Brokerage Commission by Landlord pursuant to a separate agreement. Landlord agrees to pay to Tenant's broker a fee of five percent (5%) of the full service lease consideration for the first five (5) years of the Initial Term and two and one half percent (2.5%) thereafter. The commission payment will be due and payable upon lease execution.

The terms and conditions set forth above, which are subject to the NW Natural's Executive Committee approval, shall not be binding upon either Landlord or NW Natural until such time as the Lease and any other appropriate documents have been approved by the duly authorized representatives of both Landlord and NW Natural and then duly executed and delivered by both Landlord and NW Natural.

CUSHMAN & WAKEFIELD

Landlord acknowledges that Landlord has been advised that NW Natural is simultaneously presenting requests for proposals to other potential landlords. NW Natural reserves the right at any time to accept any other proposal without further notice to Landlord.

Please deliver your proposal to the undersigned by no later than 5:00pm on Friday, July 22nd, 2016.

In the meantime, please call if you are need any clarification or additional information.

Sincerely,

Matt Johnson
Senior Director

cc: Mark Carnese
Wayne Pipes

LELAND CONSULTING GROUP

Memorandum

Date February 9, 2017
To Wayne Pipes, NW Natural
From Chris Zahas, Leland Consulting Group
CC Matt Johnson, Cushman & Wakefield
Subject Seismic Impacts
Project NW Natural HQ Strategy

NW Natural has spent the past two years implementing a strategic planning process to develop criteria and evaluate options for a new headquarters office building. Based on this process, seismic resiliency emerged as an important factor in selecting an office location. This white paper summarizes the ways that seismic resiliency was evaluated during the process and how it resulted in the elimination of certain building locations as options.

The work to evaluate the seismic risk of potential locations involved several technical research tasks:

- Review of publicly-available seismic risk data and screening of potential geographic districts;
- Evaluation of 30 specific sites against potential seismic hazards;
- Detailed analysis of four short-listed sites; and
- Research and consultation with experts regarding access risk to downtown districts following an earthquake.

PHASE 1 RESEARCH

The Phase 1 process focused on developing evaluation criteria and using them to screen geographic areas in the central city to identify priority areas for a future building. NW Natural and its consultants used publicly-available seismic risk data provided on portlandmaps.com, the City of Portland's online GIS tool.

Generally, this research found that locations in Old Town, the Pearl District, and South Waterfront had the highest seismic risk. Locations in the Central Business District (CBD) varied depending on location, and eastside locations (Lloyd District and Central Eastside) had the lowest seismic risk.

At the conclusion of Phase 1, no geographic areas were eliminated from consideration outright, but several areas were identified for priority in the evaluation going forward.

PHASE 2 RESEARCH

In Phase 2, the headquarters location search moved from the district level to specific opportunity sites that were identified through outreach to landlords and developers. Over the course of Phase 2, these sites were evaluated against the Phase 1 criteria on a site-specific basis. At the same time, the evaluation criteria were refined and expanded based on new information and Oregon's evolving understanding of seismic risk – in particular, the risk from a Cascadia Subduction Zone earthquake, which is a major offshore earthquake that many experts indicate is overdue in the region.

LELAND CONSULTING GROUP

Multiple Site Analysis

NW Natural identified potential headquarters sites through a request for information sent to landlords and developers in March 2016. From this process, 33 sites were presented for consideration. In April and May of 2016, a refined RFI narrowed the list of potential sites to 30 based on size and parking requirements. In order to screen these sites for seismic risk, NW Natural retained KPFF Consulting Engineers to evaluate each of these against several seismic and environmental criteria, including location in a liquefaction zone, the risk of lateral spreading, the presence of groundwater within 20 feet, and whether it is in a known flood hazard area. This research was based in part on KPFF's extensive understanding and history of analysis of properties throughout Portland's central city.

The results of this analysis helped NW Natural prioritize 10 sites to receive detailed RFPs, six of which submitted responses. Over the fall of 2016, two of these sites were further eliminated from consideration for seismic and other reasons, leaving four sites for consideration. The remaining four sites were:

- One Pacific Square – NW Natural's existing headquarters located in Old Town
- Oregon Square – A proposed building located in the Lloyd District
- Block 38 – A proposed mixed-use building located at the west end of the Morrison Bridge
- 250 Taylor – An office building to be built on SW Taylor between 2nd and 3rd avenues

Four Sites Analysis

With four sites remaining, NW Natural desired to understand the seismic risk of each of them. At this stage, they hired GeoEngineers to evaluate each one in order to better understand how subsurface soil conditions could impact NW Natural's ability to be operational following a seismic event. All four buildings were assumed to be able to be operational as structures, but it was still unknown whether there would be external conditions that might make access to these buildings problematic. From this analysis, it was determined that the Oregon Square site had the most stable soils and was at the lowest risk of liquefaction and lateral spread, meaning that this site had the lowest risk of access to the site being compromised after an earthquake. The site at 250 Taylor was ranked second in terms of lowest risk, followed by Block 38. NW Natural's current headquarters at One Pacific Square was deemed the highest seismic risk among the remaining sites.

OPS Seismic Retrofit Cost Estimating

While the proposal for One Pacific Square included some seismic upgrades to achieve an operational status, it was difficult to compare it to a newly constructed building on an apples-to-apples basis since there were several seismic upgrades not included in the OPS proposal that would be incorporated in a new-build alternative, namely retrofitting the building's curtain wall to stay intact after an earthquake.

DISTRICT IMPACTS OF AN EARTHQUAKE

A further level of analysis had to do with gaining a deeper understanding of what would happen to the CBD following a severe earthquake. The project team met with Peter Dusicka, Ph.D. of Portland State University. Dr. Dusicka is an associate professor in the Department of Civil and Environmental Engineering and is an expert on earthquakes. He referenced the experience of Christchurch, New Zealand after a series of earthquakes struck that

city in 2010 and 2011. A significant lesson learned from that city was how the presence of structurally unsound buildings impacted the accessibility to entire districts after an earthquake.

Christchurch, New Zealand Earthquake

On February 22, 2011, Christchurch, New Zealand experienced a magnitude 6.3 earthquake, which followed on the heels of a magnitude 7.1 earthquake in September 2010 and a magnitude 4.7 earthquake in December 2010. The earthquake caused severe damage to Christchurch's CBD, which had numerous unreinforced masonry (URM) and other older buildings. It was estimated that up to half of the CBD's 2,000 buildings would ultimately have to be demolished.

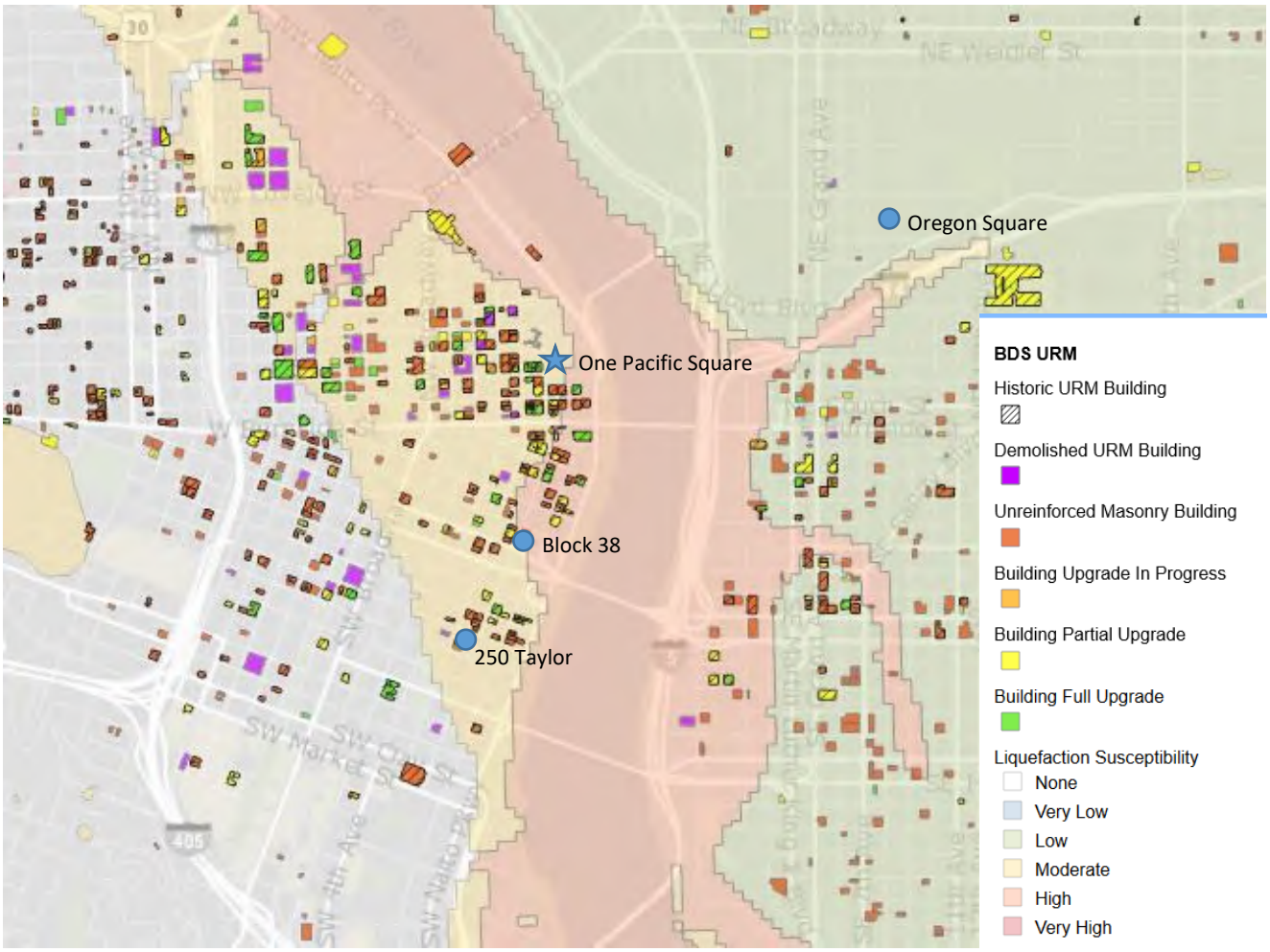
As a result of the extensive damage, the authorities established a cordon around the entire CBD immediately following the earthquake. The cordon had a significant impact on businesses in the CBD, where approximately 50,000 workers were based. The primary reason for the cordon was to ensure the safety of the public and recovery personnel and to allow for recovery and assessment activities to proceed unimpeded. The use of a cordon to restrict access to an entire CBD was unprecedented before this event, but it was credited with providing safety and certainty to property and business owners during the recovery.[1] However, it presented a severe disruption to businesses, where affected businesses were not even allowed to retrieve important papers for a time.

The damage from the Christchurch earthquake was magnified by the presence of soils that were prone to liquefaction in a seismic event and by the presence of many URM buildings. Given the potential severity of a Cascadia Subduction Zone event, it is assumed that similar impacts would be possible in Portland's CBD. With the recent successful experience of using a cordon to restrict access to heavily damaged areas in Christchurch, it is likely that similar tactics would be utilized for heavily impacted areas in Portland should a major earthquake happen here. However, in Portland, the concentration of URM buildings and poor soils is not evenly distributed – there are areas that have few URM buildings and are located on more stable soil.

A map of known URM buildings and soil risk from the City of Portland is as follows:

[1] Chang, S. E., Taylor, J. E., Elwood, K. J., Seville, E., Brunsdon, D., & Gartner, M. (2014). Urban Disaster Recovery in Christchurch: The Central Business District Cordon and Other Critical Decisions. Earthquake Spectra. doi: 10.1193/022413EQS050M. http://earthquakespectra.org/doi/abs/10.1193/022413EQS050M

LELAND CONSULTING GROUP



Note: Existing URM buildings on the 250 Taylor block are planned to be demolished or seismically retrofitted as part of the development.

CONCLUSION

Given the likelihood of a large earthquake in Portland in the next 50 years, the risk that large sections of downtown Portland may be designated as too dangerous for access appears to be a realistic possibility. Therefore, NW Natural has excluded from consideration properties that are on liquefiable soil and are proximate to URM buildings or in districts with a high concentration of such structures. The risk that staff would be denied access to the area, whether the building is standing, or not, presents a risk of a severe disruption to NW Natural's business. Of the four sites under consideration, One Pacific Square has the highest risk of business disruption due to potential neighborhood access challenges.

APPENDIX E: SUMMARY OF CRITERIA SCORES

	OPS	250 Taylor	Block 38	Oregon Square
Seismic (Neighborhood)	Highest Seismic Risk	Second Lowest Seismic Risk	Second Highest Seismic Risk	Lowest Seismic Risk
Seismic (Building)				
Seismic (Risk of reaching seismic)				
Employee Safety				
Public Transit (Bus)				
MAX Access				
Parking Ratio (In Building)				
Parking Access				
Parking Cost				
Impact on Commute (Drive Time)				
Estimated Annual Rental Rate (+OpEx)	TBD	TBD	TBD	TBD
Amenities				
Proximity to Community Partners				
Developer Risk				

NW Natural®

9/18/2017

HQ LEASE FINANCIAL SUMMARY TABLE

Line	ASSUMPTIONS	Oregon Square	250 Taylor	250 Taylor - 20 Year Lease
1	CAPITAL ASSUMPTIONS			
2	Build Out $ / Sq. Ft.	$100.00	$100.00	$100.00
3	Build Out Landlord Allowance $ / Sq. Ft.	($65.00)	($70.00)	($72.50)
4	Furniture, Fixtures & Equip. (F, F & E) $ / Sq. Ft.	$35.00	$35.00	$35.00
5	Future Add'l Refurbishment Allowance $ / Sq. Ft.:			
6	Year 5	----	----	----
7	Year 10	----	----	----
8	O&M ASSUMPTIONS (YR1 $ / SQ. FT.)			
9	Office Lease Expense	$35.75	$35.00	$33.95
10	Storage Lease Expense	$15.00	$18.00	$18.00
11	Tax & Operating Expenses	$11.00	$11.00	$11.00
12	Annual Lease Rate Increase	3.0%	2.5%	2.5%
13	RENTABLE SQ. FT. ASSUMPTIONS[1]			
14	Total Office Sq. Ft.	167,000	172,911	178,851
15	Storage Sq. Ft. (Print Room, Mail Room, or Storage)	4,000	834	834
16	Total Rentable Sq. Ft.	171,000	173,745	179,685
17	Utility Sq. Ft. Usage[2]	168,144	171,765	159,679
18	Gas Storage Sq. Ft. Usage	2,856	1,980	1,980
19	Sublease Sq. Ft. Usage[3]	-	-	18,026
20	Total Sq. Ft Usage	171,000	173,745	179,685

	FINANCIAL RESULTS	Oregon Square	250 Taylor	250 Taylor - 20 Year Lease
21	*15 YR. NWN CAPITAL COSTS*			
22	Initial Build Out[4]	$17,100,000	$17,374,500	$17,968,500
23	Less: Build Out Landlord Allowance	($11,115,000)	($12,162,150)	($13,027,163)
24	Less: Future Add'l Refurbishment Allowance	-	-	-
25	F, F & E	$5,985,000	$6,081,075	$6,288,975
26	Seismic & Other Capital	-	-	-
27	TOTAL NWN CAPITAL COSTS	$11,970,000	$11,293,425	$11,230,313
28	*15 YR. NWN O&M EXPENSE*			
29	Lease Expense	$112,156,100	$108,521,958	$109,151,699
30	Tax & Operating Expense	$34,166,205	$35,375,525	$36,590,778
31	TOTAL O&M EXPENSE	$146,322,305	$143,897,483	$145,742,477
32	PRESENT VALUE REV. REQUIREMENT (PVRR=COST TO CUSTOMERS)			
33	15 YR. PVRR of Total Building	$101,883,488	$98,681,330	$99,040,183
34	Less: Gas Storage Allocation	($1,725,382)	($1,143,528)	($1,109,575)
35	Less: Sublease Allocation[3]	-	-	($10,101,613)
36	15 YR. PVRR Utility Building Lease Space	**$100,158,106**	**$97,537,802**	**$87,828,995**
37	Add: Company Vehicle Parking Expense[5]	$1,128,607	$2,136,292	$2,136,292
38	Add: Employee Vehicle Parking Expense[5]	$6,884,502	$6,884,502	$6,884,502
39	Add: Truck Lot Proceeds[6]	($8,500,000)	($8,500,000)	($8,500,000)
40	15 YR. PVRR Utility Lease Space w/ Parking	**$99,671,214**	**$98,058,595**	**$88,349,789**

43 GLOBAL ASSUMPTIONS

44 -All scenarios unless specifically noted otherwise are 15 year leases beginning 6/1/2020

45 -Discount rate for PVRR and Rate of Return assumes the capital structure approved in the last General Oregon Rate Case (50% LTD and 50% equity) with a 6.06% LTD rate and a 9.5% return on equity. The Rate of Return (WACC) is therefore assumed at 7.78% before-tax or 6.59% after-tax.

FOOTNOTE

[1]All options include sq. footage for both Gas Storage and future data center.

[2]Difference in utliity sq. ft. needed in the two 250 Taylor options reflect new assumptions which assumes NWN rents entire buildilng (+11k), reduced RSF from 15 year proposal (-4k), and allowed for better floor optimization allow potential to sublease entire floor (-18k)

[3]Assumes subleasing potential 18,026 sq. ft. of space.

[4]Data Center capital expense not included in any scenario.

[5]Assumes all company vehicle expense and $140/month of employee parking expense

[6]Assumes Sale of Truck Lot in $8M-$9M range, all of which assumed to be net of book value.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Wayne K. Pipes

FACILITIES
EXHIBIT 503

December 30, 2019

HQ LEASE FINANCIAL SUMMARY TABLE

Line	ASSUMPTIONS	OPS	Block 38	Oregon Square	250 Taylor
1	CAPITAL ASSUMPTIONS				
2	Build Out $ / Sq. Ft.	$100.00	$100.00	$100.00	$100.00
3	Build Out Landlord Allowance $ / Sq. Ft.	($75.00)	($75.00)	($65.00)	($70.00)
4	Furniture, Fixtures & Equip. (F, F & E) $ / Sq. Ft.	$31.94	$35.00	$35.00	$35.00
5	Future Add'l Refurbishment Allowance $ / Sq. Ft.:				
6	Year 5	----	($5.00)	----	----
7	Year 10	($5.00)	($5.00)	----	----
8	O&M ASSUMPTIONS (YR1 $ / SQ. FT.)				
9	Office Lease Expense	$36.03	$39.74	$35.75	$35.00
10	Storage Lease Expense	$18.00	----	$15.00	$18.00
11	Tax & Operating Expenses	----	$11.00	$11.00	$11.00
12	Annual Lease Rate Increase	3.0%	3.0%	3.0%	2.5%
13	RENTABLE SQ. FT. ASSUMPTIONS[1]				
14	Total Office Sq. Ft.	179,400	171,000	167,000	172,911
15	Storage Sq. Ft. (Print Room, Mail Room, or Storage)	8,000	----	4,000	834
16	Total Rentable Sq. Ft.	187,400	171,000	171,000	173,745
17	Utility Sq. Ft. Usage[c]	185,684	168,644	168,144	171,765
18	Gas Storage Sq. Ft. Usage	1,716	2,356	2,856	1,980
19	Sublease Sq. Ft. Usage[3]	-	-	-	-
20	Total Sq. Ft Usage	187,400	171,000	171,000	173,745

	FINANCIAL RESULTS	OPS	Block 38	Oregon Square	250 Taylor
21	*15 YR. NWN CAPITAL COSTS*				
22	Initial Build Out[4]	$17,940,000	$17,100,000	$17,100,000	$17,374,500
23	Less: Build Out Landlord Allowance	($13,455,000)	($12,825,000)	($11,115,000)	($12,162,150)
24	Less: Future Add'l Refurbishment Allowance	($937,000)	($1,710,000)	-	-
25	F, F & E	$5,985,000	$5,985,000	$5,985,000	$6,081,075
26	Seismic & Other Capital	$12,205,800	-	-	-
27	TOTAL NWN CAPITAL COSTS	$21,738,800	$8,550,000	$11,970,000	$11,293,425
28	*15 YR. NWN O&M EXPENSE*				
29	Lease Expense	$122,897,568	$126,389,663	$112,156,100	$108,521,958
30	Tax & Operating Expense	$7,735,506	$34,984,557	$34,166,205	$35,375,525
31	TOTAL O&M EXPENSE	$130,633,074	$161,374,220	$146,322,305	$143,897,483
32	PRESENT VALUE REV. REQUIREMENT (PVRR=COST TO CUSTOMERS)				
33	15 YR. PVRR of Total Building[5]	$98,862,305	$108,024,888	$101,883,488	$98,681,330
34	Less: Gas Storage Allocation	($778,334)	($1,488,343)	($1,725,382)	($1,143,528)
35	Less: Sublease Allocation[3]	-	-	-	-
36	15 YR. PVRR Utility Building Lease Space	**$98,083,971**	**$106,536,545**	**$100,158,106**	**$97,537,802**
37	Add: Company Vehicle Parking Expense	-	$1,773,568	$902,907	$1,709,075
38	Add: Truck Lot Proceeds[6]	-	($8,500,000)	($8,500,000)	($8,500,000)
39	15 YR. PVRR Utility Lease Space w/ Parking	**$98,083,971**	**$99,810,113**	**$92,561,013**	**$90,746,877**
40	15 YR. PVRR delta from least cost option	$7,337,095	$9,063,237	$1,814,137	$0
41	15 YR. PVRR Ranking	3	4	2	1

42 GLOBAL ASSUMPTIONS

43 -All scenarios unless specifically noted otherwise are 15 year leases beginning 6/1/2020.

44 -Discount rate for PVRR and Rate of Return assumes the capital structure approved in the last General Oregon Rate Case (50% LTD and 50% equity) with a 6.06% LTD rate and a 9.5% return on equity. The Rate of Return (WACC) is therefore assumed at 7.78% before-tax or 6.59% after-tax.

FOOTNOTE

[1]All options include sq. footage for both Gas Storage and future data center.

[2]Difference in utliity sq. ft. needed in the two 250 Taylor options reflect new assumptions which assumes NWN rents entire building (+11k), reduced RSF from 15 year proposal (-4k), and allowed for better floor optimization allow potential to sublease entire floor (-18k)

[3]Assumes subleasing potential 18,026 sq. ft. of space.

[4]Data Center capital expense not included in any scenario.

[5]PVRR for OPS includes benefit of 12 mo. free rent; 250 Taylor options include benefit of 4 mo. free rent at OPS monthly lease amount.

[6]Assumes Sale of Truck Lot in $8M-$9M range, all of which assumed to be net of book value.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Wayne K. Pipes

FACILITIES
EXHIBIT 504

December 30, 2019

LEASE AGREEMENT

BETWEEN

THIRD AND TAYLOR OFFICE OWNER, LLC

("Landlord")

and

NORTHWEST NATURAL GAS COMPANY

("Tenant")

Table of Contents

ARTICLE 1
BASIC LEASE TERMS

1.1 Terms. Reference in this Lease Agreement ("Lease") to any of the terms listed below shall be deemed to incorporate and be a reference to the data or definition set forth next to such term in this Article.

(a) Landlord: Third and Taylor Office Owner, LLC, a Delaware limited liability company

(b) Landlord's Address – For Notices:

Third and Taylor Office Owner, LLC
c/o Rockwood Capital, LLC
50 California Street, 30th Floor
San Francisco, California 94111
Attn: Asset Manager
Attn: Legal Counsel

With a copy sent to:

Paul Hastings LLP
101 California Street, 48th Floor
San Francisco, California 94111
Attn: Stephen I. Berkman, Esq.

(c) Tenant: Northwest Natural Gas Company, an Oregon corporation

(d) Tenant's Address – For Notices:

NW Natural
220 NW 2nd Avenue
Portland, OR 97209
Attn: Manager, Risk & Land

With a copy sent to:

NW Natural
220 NW 2nd Avenue
Portland, OR 97209
Attn: General Counsel

With an additional copy sent to:

NW Natural
220 NW 2nd Avenue
Portland, OR 97209
Attn: Facilities Manager

(e) Tenant's Address – For Billing:

NW Natural
220 NW 2nd Avenue
Portland, OR 97209
Attn: Manager, Risk & Land

(f) Address of Premises: 250 Taylor Street

(g) Building: See Section 2.1

(h) Premises: See Section 2.1

(i) Execution Date: The last date appearing adjacent to the parties' signatures below

(j) Commencement Date: See Section 3.1

(k) Turnover Date: See Exhibit L

(l) Extension Options: See Section 3.2

(m) Land: See Section 2.1 and Exhibit B

(n) Term: See Article 3

(o) Landlord's Work: See Section 2.1 and Exhibit E

(p) Tenant's Work: See Exhibit L

(q) Substantial Completion of Landlord's Work: See Exhibit E

(r) Permitted Use of Premises: See Article 7

(s) Premises Base Rent: See Section 4.1 and Exhibit I

(t) Additional Rent: See Section 4.1

(u) Rent: Premises Base Rent, Storage Base Rent and Additional Rent

(v) Base Rent during Extension Option(s): See Section 3.2(b)

(w) Premises Rentable Area: 178,851 square feet.

(x) Building Rentable Area: 179,685 square feet.

(y) Tenant's Proportionate Share: One hundred percent (100%).

(z) Rentable Area: Landlord and Tenant hereby stipulate and agree that the Rentable Area of the Premises, Storage Space and the Building are set forth in the Basic Lease Terms. The Rentable Area shall not be subject to recalculation.

(aa) Lease Year: The first twelve (12) full calendar months beginning with the Rent Commencement Date and each succeeding twelve (12) month period. The first Lease Year also includes the period, if any, from the Commencement Date until the Rent Commencement Date and from the Rent Commencement Date (if the Rent Commencement Date is not the first day of a calendar month) to the first day of the following calendar month.

(bb) Laws: Laws, ordinances, rules and regulations, orders and other requirements of any government authority now in force or which may hereafter be in force, including, but not limited to, building and zoning laws, the Americans with Disabilities Act (as amended) and health, energy, and fire codes of state, local and federal governments, agencies, and boards (collectively "Laws").

(cc) Controllable Operating Cost: Any Operating Cost that is within the reasonable control of Landlord, but specifically excluding costs of all utilities, capital expenditures under Section 5.4, insurance, security to the extent that Landlord provides security services in accordance with Section 6.5, Real Estate Taxes, any other Tenant directed services, and the costs associated with the repair, replacement or maintenance of the Building Generator (as defined below) and the Electrical Distribution System (as defined below).

(dd) Common Areas: The Building common entrances, lobbies, elevators, stairways and accessways, Rooftop Terrace (as such term is defined below), loading docks, ramps, drives and platforms and any passageways and serviceways thereto, loading and unloading areas, trash areas, the Parking Garage (as such term is defined below), roadways, sidewalks, walkways, parkways, driveways, landscaped areas, bike parking, and similar areas and facilities.

(ee) Comparable Market Area: The Central Portland submarkets known as of the Execution Date as Downtown, Pearl, West End and Close-in Eastside.

(ff) Storage Space Rentable Area: 834 square feet.

(gg) Storage Base Rent: See Section 2.3

(hh) Normal Business Hours: Monday through Friday, 7:30 am – 6:00 pm and Saturday 8:00 am – 1:00 pm.

(ii) Business Day: Any 24-hour day other than a Saturday, Sunday or federal or state legal holiday in the State of Oregon.

(jj) Affiliate: With respect to any Person, any other Person that directly or indirectly controls, is controlled by or is under common control with the Person in question. For purposes of this Lease, "control" shall mean the possession, directly or indirectly, of the power to direct or cause the direction of the day-to-day management or policies of the controlled Person by ownership interest, contract, or otherwise. For purposes of this Lease, "Person" shall mean

any natural person, corporation, firm, limited liability company, partnership or other entity. For avoidance of doubt, "Affiliate" includes, without limitation: (a) any company of which the Person is a wholly owned subsidiary, and (b) the entities listed in Exhibit D.

(kk) Base Building Systems: All base building systems that are included within Landlord's Work and include, but are not limited to: (i) the main electrical Building service (including the Electrical Distribution System), (ii) the main Building heating, ventilation and air conditioning ("HVAC") system, (iii) the mechanical system of the Building, (iv) the main plumbing system of the Building, (v) Building elevators, (vi) main Building security system, (vii) the main Building telecommunications facilities, (viii) the Building life-safety system, (ix) the Building sprinkler system, (x) the pipes, conduits, wires and appurtenant equipment serving but not located within the Premises, and (xi) the Building Generator. For avoidance of doubt Base Building Systems do not include: (a) Alterations, improvements or other items constructed as a part of Tenant's Work, (b) the distribution within the Premises of the electrical, HVAC, plumbing, security system, telecommunication facilities and Building life-safety system, from the Premises' point of connection at the terminus of Landlord's Work and (c) the portion of the Building sprinkler system that is part of Landlord's Work and is located within the Premises.

(ll) Base Building Services: The services provided by the Base Building Systems; provided, however, that the Building Generator is expressly excluded from the Base Building Services.

(mm) Permitted Transferee: Any Non NW Natural Surviving Entity, Transferee Affiliate or Asset Purchaser (each as defined in Section 18.1) with respect to which the requirements of Section 18.1 are satisfied.

(nn) Tangible Net Worth: Total equity less intangible assets determined as of the applicable determination date by the Person's most recent and available year-end fiscal period financial reports that have been prepared in accordance with the generally accepted accounting principles ("GAAP") and audited or otherwise certified in a manner reasonably acceptable to Landlord. For avoidance of doubt, Northwest Natural Gas Company's Tangible Net Worth as of the Execution Date is $811,132,765 determined: (i) as to its total equity ($850,497,000), by its most recent 10-K filing (filed 2/27/2017) and (ii) as to its intangible assets ($39,364,235), by its most recent FERC FORM 2 filing (filed 5/1/2017).

1.2 Exhibits. The Exhibits listed below are attached and are incorporated in this Lease by this reference.

(a) Exhibit A - Premises

(b) Exhibit B - Land

(c) Exhibit C - Commencement Certificate

(d) Exhibit D - Currently Existing Tenant Affiliates

(e) Exhibit E - Landlord's Work

(f) Exhibit F - Permit Submittal Plans

(g) Exhibit G - Base Building Specifications

(h) Exhibit H - Intentionally Deleted

(i) Exhibit I - Premises Base Rent

(j) Exhibit J - Rules and Regulations

(k) Exhibit K - Form of Estoppel Certificate

(l) Exhibit L - Work Letter

ARTICLE 2
DESCRIPTION OF PREMISES

2.1 Premises. Landlord leases to Tenant the portion of the building (the "Building") to be constructed by Landlord on the real property (the "Land") described in Exhibit B (collectively, the "Premises"). The Premises is depicted in Exhibit A. The Premises consist of all of the Building except for the Common Areas. Landlord's obligation to construct the Building and related obligations are set forth in and are defined in Exhibit E as "Landlord's Work". Tenant's obligation to construct the initial improvements to the Premises and related obligations are set forth in and are defined in Exhibit L as "Tenant's Work".

2.2 Common Areas. Tenant shall have the use and enjoyment of the Common Areas and the appurtenances and the benefits of any appurtenant easements and rights of way benefiting the Land or the Building 24 hours a day 365/366 days per year (subject to (a) Landlord's right to temporarily close the Common Areas for repairs and/or maintenance or (b) an emergency situation that prevents Tenant's use) in accordance with all Laws and all matters of record affecting the Land and the Building recorded in the official records of Multnomah County (the "Official Records"). So long as Tenant leases the entirety of the Building, Tenant shall have exclusive use of the Common Areas for the purposes for which they were intended, including, without limitation, for adequate and unobstructed pedestrian and vehicular traffic, access, ingress and egress to, from, and between the streets adjoining the Building. The use of such appurtenances and the Common Areas shall be without payment of any fee or other charge being made therefor except the sums expressly provided to be paid by Tenant under this Lease. So long as Tenant leases the entirety of the Building, Landlord shall make no material changes to the Common Areas without Tenant's reasonable approval except (i) to the extent necessary to comply with Laws, (ii) with respect to health and/or safety concerns that pose a risk to persons or property or (iii) to the Rooftop Terrace in accordance with the terms of Article 28. If at any time, Tenant shall not lease the entirety of the Building, Landlord reserves the right from time to time in its reasonable discretion to change or modify the size, use, shape, location or nature of all or any portion of the Common Areas, all without liability to Tenant; provided that no changes shall be made to the Common Areas that would materially interfere with Tenant's access to or use of the Premises.

2.3 Storage Space. The Premises include the storage space depicted and to be located as shown on Exhibit A (the "Storage Space"). The leasing of the Storage Space shall be on the same terms and conditions of this Lease except: (i) monthly base rent for the Storage Space shall be Eighteen and 00/100 Dollars ($18.00) per square foot on an annual basis ($1.50 per square foot on a monthly basis) (the "Storage Base Rent"), (ii) no Operating Costs or Real Estate Taxes shall be payable in connection with the Storage Space and (iii) no Tenant's Work Allowance (as such term is defined herein) shall be payable in connection with the Storage Space.

ARTICLE 3
TERM

3.1 Term. The term of this Lease shall begin (the "Commencement Date") on the later of: (i) Substantial Completion of Landlord's Work in accordance with the requirements of Exhibit E with all Common Areas open and available for Tenant's uninterrupted and unimpeded use, subject to completion of typical punch list items, and (ii) the earlier of (a) the date that is seven (7) months after Tenant Delivery Status (as such term is defined in Exhibit E) or (b) the date that Tenant first conducts active business operations in any portion of the Premises, and ends on the date that is the later of (y) 240 full calendar months after the Commencement Date or (z) May 31, 2040 (the "Initial Term"), unless Tenant exercises one or more Extension Options (as such term is defined below) under Section 3.2 or the Term ends earlier under this Lease. As used herein, "Term" means the Initial Term and any additional period of time resulting from Tenant's exercise of one or more Extension Options. If the Commencement Date would not be a Business Day, then the Commencement Date shall be the next Business Day. Within sixty (60) days of the Commencement Date, Landlord and Tenant shall execute and deliver a certificate in the form set forth in Exhibit C (the "Commencement Certificate"). Should any item of the Commencement Certificate not be definitively determined as of the sixtieth (60^{th}) day after the Commencement Date, Landlord and Tenant shall proceed to execute the Commencement Certificate as to such matters that have been definitively determined and shall execute an additional certificate in substantially the same form as Exhibit C upon the final determination of any item that had not been determined within sixty (60) days of the Commencement Date. Upon the request of either Landlord or Tenant, the Commencement Certificate shall include any other item that could not or was not definitively established until the completion of the Building or depended on the determination of any item set forth in the Commencement Certificate.

3.2 Extension Options.

(a) Tenant shall have the right to extend this Lease as to the entire Premises for two (2) successive additional periods of seven (7) years (each an "Extension Option") commencing on the expiration of the Initial Term or the immediately preceding Extension Option term, as the case may be, upon the same terms and conditions of this Lease. To exercise an Extension Option, (i) there shall be no Tenant Default (as defined below) continuing at the time Tenant exercises the Extension Option, (ii) Tenant must give written notice (the "Extension Exercise Notice") to Landlord that Tenant is irrevocably exercising the Extension Option at least eighteen (18) months before the Term expires and (iii) Tenant shall not have subleased more than five (5) full floors of the Premises at both (x) the time that Tenant exercises the Extension

Option and (y) immediately prior to the effectiveness of the Extension Option; provided that if Tenant has subleased more than two (2) full floors and not more than five (5) full floors of the Premises as of the exercise of the Extension Option, then in order to exercise the Extension Option, Tenant shall have as of the date that Tenant exercises the Extension Option a corporate credit rating which is equal to or greater than A- according to Standard & Poor's or an equivalent rating from another recognized rating agency. If Tenant does not maintain such credit rating as of the date of exercise of the Extension Option, then Tenant may still exercise the Extension Option provided that Tenant deposits with Landlord a Letter of Credit (as defined below) to be held pursuant to the terms of Article 39 within thirty (30) days following Tenant's delivery of the Exercise Extension Notice. Any remaining Extension Option will expire if Tenant does not timely exercise the preceding Extension Option. Upon Tenant giving Landlord timely notice of exercise and complying with the foregoing provisions of this Section 3.2 (including providing evidence of its credit rating or the Letter of Credit if required), the Term of this Lease shall be deemed to be automatically extended to include the Extension Option period on the terms and conditions set forth in this Section 3.2. If Tenant timely exercises an Extension Option, the parties shall execute an amendment to this Lease memorializing the terms of the Extension Option within thirty (30) days after the Base Rent for the Extension Option term is determined under Section 3.2(b) below. The parties shall be bound to the Extension Option, however, notwithstanding any failure to execute such an amendment.

(b) Base Rent for each Extension Option term shall be the Market Rent (as such term is defined below) for the Extension Option term. If the parties are unable to agree on Market Rent within sixty (60) days after Tenant gives Landlord its notice exercising the Extension Option (the "Notice Date"), then each party shall appoint a disinterested, independent appraiser who is a member of the American Institute of Real Estate Appraisers (an "Appraiser") and has at least five (5) years' experience appraising rental properties in the Comparable Market Area by 5:00 p.m. as of the end of such sixty (60) day period. If the Appraisers are unable to reach agreement about Market Rent within ninety (90) days after the Notice Date, then the Appraisers shall cooperate to select a mutually agreeable third appraiser with the same qualifications as set forth above (the "Third Appraiser"). If the Appraisers are unable to select the Third Appraiser within thirty (30) days, then either party may apply to the senior judge of Multnomah County Circuit Court who shall make the selection. Once the Third Appraiser is selected, each Appraiser shall submit a determination of Market Rent to the Third Appraiser within thirty (30) days thereafter. The Third Appraiser shall determine Market Rent (applying the definition stated above) for the initial Lease Year of the applicable Extension Option term, plus market standard increases during the remainder of such Extension Option term, within thirty (30) days based solely on the materials submitted by the Appraisers and the Third Appraiser shall select as Market Rent either the determination of Market Rent submitted by Tenant or the determination of Market Rent submitted by Landlord and shall not select any other amount as Market Rent hereunder. Each party shall bear the expense of retaining its Appraiser. The fees and expenses of the Third Appraiser and other expenses related to selecting the Third Appraiser shall be borne equally by the parties. The Third Appraiser's determination of Market Rent shall be final and binding on the parties. Judgment upon the determination of Market Rent rendered by the Third Appraiser may be entered in any court having jurisdiction. "Market Rent" means the prevailing market rental rate during the initial Lease Year of the applicable Extension Option term and annual rent increases that a willing tenant would pay and a willing landlord would accept in an arm's length bona fide negotiation for office space of comparable quality, design

and location in the Comparable Market Area for an amount of space comparable to the amount then leased by Tenant taking into account the single tenant nature of the Premises (provided that if there are fewer than three (3) such comparable leaseholds in the Comparable Market Area then the market area shall be expanded to include other appropriate comparable market area(s)), taking into consideration all relevant factors including, without limitation, any concessions or inducements (e.g., rent abatement, tenant improvement and other allowances) then being offered by landlords to prospective tenants (or by prospective tenants to landlords) for comparable space, definition of "rentable area" applicable to the comparable spaces, distinction between gross and net rentals, services provided and creditworthiness of tenant.

(c) Each Extension Option is personal to Northwest Natural Gas Company or a Permitted Transferee and may not be assigned, voluntarily or involuntarily, to any other Person.

3.3 Limitation of Commencement Date. Notwithstanding anything to the contrary herein, the Initial Term shall not commence earlier than June 1, 2019 for any reason whatsoever.

3.4 Delivery of Executed Lease and Related Documents. If Landlord fails to deliver to Tenant one (1) fully executed original of this Lease within ten (10) days after Tenant delivers to Landlord two (2) duplicate originals of this Lease executed by Tenant, then Tenant may, if Tenant so elects, withdraw its execution and delivery of this Lease by giving Landlord written notice of withdrawal, which shall be effective on the date it is given. Upon such withdrawal, this Lease shall be null and void and of no further force and neither party shall have any rights against the other under this Lease. Nothing in this Section 3.4 shall be construed to in any way limit the nature or extent of Landlord's covenants or duties under other provisions of this Lease.

ARTICLE 4
RENT

4.1 Rent. Tenant shall pay to Landlord the Premises Base Rent beginning on the Rent Commencement Date (as defined below) at the time and in the amounts as set forth in Exhibit I and the Storage Base Rent in accordance with and as set forth in Section 2.3. As used herein, "Rent Commencement Date" means the later of: (y) the Commencement Date or (z) June 1, 2020. As used herein, "Base Rent" means Premises Base Rent and Storage Base Rent. The Operating Costs, together with any and all other amounts payable by Tenant to Landlord pursuant to the terms of this Lease, including without limitation any and all other sums that may become due by reason of any default of Tenant or failure on Tenant's part to comply with the agreements, terms, covenants and conditions of this Lease to be performed by Tenant, are hereinafter collectively referred to as "Additional Rent". Base Rent and estimated Operating Costs shall be due and payable in twelve (12) equal installments on the first day of each calendar month throughout the Term. Tenant hereby agrees to pay such Rent to Landlord at Landlord's address as provided herein (or such other address as Landlord designates from time to time) monthly in advance. Tenant shall pay all Rent and other sums of money which are due and payable by Tenant to Landlord at the times and in the manner provided in this Lease, without demand, set off, adjustment, deduction, counterclaim or abatement (except as

specifically provided to the contrary herein). If the Commencement Date is other than the first day of a calendar month or if this Lease terminates on a day other than the last day of a calendar month, then the installments of Base Rent, Additional Rent and/or Operating Costs for such month or months shall be prorated on a daily basis and the installment or installments so prorated shall be paid in advance.

4.2 Late Charges. Any Rent or other amounts payable to Landlord under this Lease, if not paid by the fifth (5^{th}) day of the month with respect to Base Rent, or within five (5) days after the due date specified on any invoice from Landlord for any other amounts payable hereunder, shall incur a late charge of five percent (5%) of the total overdue amount (the "Late Charge") for Landlord's administrative expense in processing such delinquent payment and in addition thereto shall bear interest at the lesser of (i) twelve percent (12%) per annum or (ii) the maximum rate allowed by applicable Laws (the "Default Rate"), from and after the due date for such payment. Tenant agrees that the Late Charge represents a fair and reasonable estimate of the cost Landlord will incur by reason of Tenant's late payment. Accepting any Late Charge shall not constitute a waiver by Landlord of Tenant's default with respect to any overdue amount nor prevent Landlord from exercising any other rights or remedies available to Landlord. Notwithstanding the foregoing, Tenant shall not be required to pay the Late Charge for the first late payment of Rent during any Lease Year provided the overdue amount is received by Landlord within five (5) Business Days following written notice that such amount is due.

ARTICLE 5
OPERATING COSTS, CAPITAL EXPENDITURES, AND REAL ESTATE TAXES

5.1 Operating Costs. From and after the Rent Commencement Date, Tenant shall pay to Landlord as Additional Rent Tenant's Proportionate Share of Operating Costs.

For the purposes of this Lease, "Operating Costs" shall mean all expenses, costs and disbursements, computed on a cash basis, incurred or paid by Landlord in connection with the management, operation, repair, replacement and maintenance of the Land and Building, including but not limited to, the following:

(a) The cost of all repairs, replacements, maintenance and operation of the Common Areas, all exterior lighting and the snowplowing of all walks, driveways and ramps to the Parking Garage, including the cost of ordinary materials and supplies consumed in connection with any such maintenance, repair, replacement and operation that in accordance with GAAP would not be capitalized;

(b) The management fee for Landlord or Landlord's managing agent, which fee shall not exceed two and one-quarter percent (2.25%) of all Rent plus any other revenues received by Landlord for operation of the Building during such time as Tenant leases all of the Building Rentable Area and is not subleasing more than two (2) full floors of the Premises;

(c) Wages, salaries and other costs of all on site and off site employees, agents, contractors, laborers or other workers at or below the level of general manager or senior

property manager engaged either full time or part time in the operation, maintenance, management or access control of the Building and/or the Land allocated to the Building based on the percentage of time each such Person devotes to the Building and/or the Land;

(d) Premiums incurred by Landlord for insurance coverage maintained by Landlord that is required by this Lease or that is customarily carried by operators of comparable buildings in the Comparable Market Area, including, without limitation, coverage for earthquake and similar perils which coverage shall include reasonable and customary deductibles;

(e) Service costs for elevators within the Building to the extent such costs are not covered by warranty;

(f) Cost of repair, replacement, maintenance and operation of the Building and the Base Building Systems and utility lines contained therein;

(g) The cost of refuse removal and janitorial services;

(h) Cost of supplies and materials used in connection with the operation, repair, and maintenance of the Premises, including, without limitation, bathroom and cleaning supplies, light bulbs, ballasts, fuses, and other electrical supplies, paper and paper goods;

(i) Acquisition and/or installation costs for capital expenditures to the extent capital expenditures are a recoverable Operating Cost pursuant to Section 5.4;

(j) Costs incurred in connection with complying with all Laws applicable to the Land and Building;

(k) During such time as Tenant is not the sole tenant of the Building, the costs of all utilities for the Common Areas;

(l) The costs associated with the installation, maintenance, replacement, repair and restoration of the Building Exterior Sign and Building Interior Signs;

(m) The costs for operation and maintenance of the bicycle parking areas and locker rooms; and

(n) Costs incurred by Landlord in connection with the encroachment of any electrical vaults (the "Electrical Vaults") into areas outside of the Project (as defined below).

Notwithstanding the generality of the preceding text, the following items shall be excluded or deducted, as the case may be, from the calculation of Tenant's Proportionate Share of Operating Costs:

(1) Leasing commissions, fees and costs, advertising and promotional expenses and other costs incurred in procuring tenants or in selling the Building;

(2) Legal fees except those incurred directly in connection with Landlord's operation and maintenance of the Building;

(3) Costs of renovating or otherwise improving or decorating space for any tenant or other occupant of the Building, including Tenant, or relocating any tenant;

(4) Financing costs including interest and principal amortization of debts and the costs of providing the same, but specifically excluding to the extent that financing costs are permitted by Section 5.4 hereof;

(5) Depreciation;

(6) Rental on ground leases or other underlying leases and the costs of providing the same;

(7) Wages, bonuses and other compensation of employees above the most senior executive responsible for management of the Land and Building on a day to day basis;

(8) Any liabilities, costs or expenses associated with or incurred in connection with the removal, enclosure, encapsulation or other handling of asbestos or other hazardous or toxic materials or substances and the cost of defending against claims in regard to the existence or release of Hazardous Substances (as defined below) at the Building (except with respect to those costs for which Tenant is otherwise responsible pursuant to the express terms of this Lease);

(9) Costs of any items for which Landlord is reimbursed by insurance;

(10) Increased insurance or Real Estate Taxes assessed specifically to any tenant of the Building or for which Landlord is entitled to reimbursement from any other tenant;

(11) Charges for electricity, water, or other utilities, services or goods and applicable taxes for which Tenant or any other tenant, occupant, person or other party is obligated to reimburse Landlord or to pay to third parties;

(12) Cost of any HVAC, janitorial or other services provided to tenants other than Tenant on an extra cost basis after regular business hours;

(13) Cost of installing, operating and maintaining any specialty service that is not within the Premises, such as an observatory, broadcasting facilities, child or daycare, luncheon club or athletic or recreation club;

(14) Intentionally deleted;

(15) Cost of any work or service performed on an extra cost basis for any tenant in the Building to a materially greater extent or in a materially more favorable manner than furnished generally to the tenants and other occupants;

(16) Cost of any work or services performed for any facility other than the Building;

(17) Any cost representing an amount paid to a Person related to Landlord that is in excess of the amount which would have been paid in the absence of such relationship;

(18) Any cost of painting or decorating any interior parts of the Building other than Common Areas;

(19) Any cost associated with operating an on-or off-site management office for the Building to the extent the size thereof exceeds customary management offices for a similarly-sized Class "A" office building in the Comparable Market Area;

(20) Landlord's general overhead and any other expense not directly attributable to operation and management of the Building (e.g., the activities of Landlord's officers and executives or professional development expenditures);

(21) Cost of initial cleaning and rubbish removal from the Building to be performed before final completion of the Building or any tenant space;

(22) Cost of initial landscaping of the Building;

(23) Costs of any mitigation fees, impact fees, subsidies, tap-in fees, connection fees or similar one time charges or costs (however characterized), imposed or incurred in connection with the initial construction or subsequent expansion of the Building;

(24) Any fees, costs or expenditures incurred in connection with negotiations, disputes and claims of other tenants or occupants of the Building;

(25) Cost of any capital expenditure (as such term is defined in Section 5.4) of any type or kind, except to the extent Landlord is expressly allowed to recover such capital expenditure cost under Section 5.4;

(26) Lease payments for rental equipment (other than equipment for which depreciation is properly charged as an expense) that would constitute a capital expenditure if the equipment were purchased;

(27) Late fees or charges incurred by Landlord due to late payment of expenses;

(28) Cost of acquiring, securing, cleaning or maintaining sculptures, paintings and other works of art;

(29) Real Estate Taxes or taxes on Landlord's business (such as income, excess profits, franchise, capital gains, etc.);

(30) Costs and expenses incurred in connection with compliance with or the contesting or settlement of any claimed violation of Laws;

(31) Costs incurred in connection with remedying violations of Laws in effect as of the Execution Date with respect to items constructed as a part of Landlord's Work;

(32) Charitable or political contributions; and

(33) All other items for which another party compensates or pays so that Landlord shall not recover any item of cost more than once nor shall Landlord recover costs in excess of the actual amount for Operating Costs actually incurred by Landlord.

5.2 Estimated Operating Costs. Landlord shall reasonably estimate the Operating Costs for each Lease Year wholly or partially included within the Term and shall use reasonable efforts to send notice of the estimate to Tenant within thirty (30) days after the Term begins for the first Lease Year and thereafter not more than thirty (30) days after commencement of each subsequent Lease Year. If Tenant requests, Landlord will give Tenant reasonably detailed documentation supporting Landlord's estimate. During each Lease Year included in the Term for which Tenant is to pay Operating Costs, Tenant shall pay, as Additional Rent, one twelfth ($1/12^{th}$) of the applicable estimate each month to Landlord together with the Base Rent. If Landlord does not give Tenant an estimate within the time period stated above, then Tenant shall continue to make estimated payments based upon the preceding year's estimate and within thirty (30) days after receipt of the new estimate for the current Lease Year, Tenant shall commence payment of the new estimated monthly amount and shall pay in a lump sum any retroactive amounts due from the beginning of the new Lease Year. Notwithstanding anything in this Article 5 to the contrary, the amount of Controllable Operating Costs charged to and payable by Tenant in any Lease Year shall not exceed the Controllable Operating Costs for the initial Lease Year increased by four percent (4%) annually on a cumulative and compounded basis for each subsequent Lease Year through and including the applicable Lease Year for which the calculation is determined. There shall be no cap on Controllable Operating Costs for the initial Lease Year. The monthly charge for estimated Operating Costs shall be prorated for any partial month by dividing the Operating Cost charge by three hundred sixty-five (365) and multiplying the result by the number of days in the partial month for which Operating Costs are owed.

5.3 Verification of Operating Costs. Landlord shall use commercially reasonable efforts to submit to Tenant not later than one hundred fifty (150) days after the expiration of each Lease Year included in the Term, a written statement (a "Reconciliation Statement") in sufficient detail for verification by Tenant, containing the amount of actual Operating Costs for such Lease Year broken down by component expenses, the amount of Tenant's Proportionate Share of the Operating Cost increase (capped, if applicable), and the amount if any Tenant owes Landlord or the amount Landlord owes Tenant as a refund for such year. Landlord's books and records pertaining to the calculation of Operating Costs for the current or previous Lease Year may be audited, at Tenant's expense, by an Authorized Representative of Tenant for a period of one hundred eighty (180) days following the delivery of a Reconciliation Statement (or any statement revising the same); provided, that Tenant shall give Landlord not less than ten (10) Business Days' prior written notice of any such audit. For purposes hereof, an "Authorized Representative" of Tenant shall mean a bona fide employee of Tenant, any national accounting firm, or any other party reasonably approved in writing by Landlord, in each case who is not representing, and agrees not to represent, any other tenant or subtenant in the Land regarding Additional Rent and is not working on a contingency basis. In

no event shall an Authorized Representative of Tenant include the owner of any office building in the Comparable Market Area or any Affiliate of such owner. Prior to the commencement of any audit, Tenant shall cause its Authorized Representative to agree in writing for the benefit of Landlord that such Authorized Representative will keep the results of the audit confidential and that such representative will not disclose or divulge the results of such audit except to Tenant and Landlord and except in connection with any dispute between Landlord and Tenant relating to Operating Costs. Such audit shall be conducted during Normal Business Hours at Landlord's office in Portland, Oregon where Landlord's books and records are maintained or by delivery of electronic copies to Tenant. Tenant shall cause a written audit report to be prepared by its Authorized Representative following any such audit and shall provide Landlord with a copy of such report promptly after receipt thereof by Tenant. If Landlord's calculation of estimated Operating Costs for the audited Lease Year is incorrect, then Tenant shall be entitled to a prompt refund of any overpayment or Tenant shall promptly pay to Landlord the amount of any underpayment, as the case may be. Tenant agrees to pay the cost of such certification and the investigation with respect thereto unless it is determined that the Operating Costs stated in the Reconciliation Statement were overstated in Landlord's favor by three percent (3%) or more, in which case Landlord shall pay the reasonable cost of same, not to exceed Ten Thousand Dollars ($10,000.00). Tenant waives the right to dispute or contest, and shall have no right to dispute or contest, any matter relating to the calculation of Operating Costs (and waives the right to inspect Landlord's records with respect thereto) with respect to each Lease Year during the Term for which a Reconciliation Statement is given to Tenant if no claim or dispute with respect thereto is asserted by Tenant in writing to Landlord within one hundred eighty (180) days of delivery to Tenant of the original or most recent Reconciliation Statement with respect thereto.

5.4 Capital Expenditures. If, during the Term, Landlord shall make a capital expenditure for which Landlord shall be entitled to reimbursement as an Operating Cost as set forth below, then Tenant shall pay Tenant's Proportionate Share of the Annual Amortization of such capital expenditure. "Annual Amortization" shall be determined by amortizing the capital expenditure calculated as though such amounts are financed by Landlord at an interest rate of eight percent (8%) per annum over the useful life of the capital expenditure determined by Landlord under GAAP. With respect to capital expenditures, Tenant shall commence payment as Additional Rent of one twelfth ($1/12^{th}$) of the annual amount shown in Landlord's notice with the next and each succeeding installment of Base Rent becoming due during the Term (including any extensions thereof).

For purposes of this Lease, "capital expenditure" means any items that, under GAAP, are properly classified as capital expenditures. Landlord shall only be entitled to include within Operating Costs the costs of capital expenditures if such capital expenditure is (A) required to the extent due to (i) the installation, use, or operation of any Alterations or other modification to the Premises, Land and/or Building made by Tenant; (ii) the installation, use, or operation of Tenant's property or fixtures; (iii) the moving of Tenant's property or fixtures in or out of the Premises or in and about the Land and/or Building or (iv) the acts, omissions, or negligence of any Tenant Parties (as defined below), (B) acquired to cause, in Landlord's good faith judgment, an immediate (i.e., commencing within the first year after completion of such repairs, replacements or improvements or installation of such equipment) reduction in other Operating Costs or (C) incurred due to any new Laws first enacted or made applicable after the Turnover Date.

5.5 Tenant's Proportionate Share. "Tenant's Proportionate Share" equals the ratio of Rentable Area of the Premises (exclusive of the Storage Space) to the total Rentable Area of the Building (exclusive of the Storage Space), which as of the Commencement Date shall be one hundred percent (100%).

5.6 Real Estate Taxes. "Real Estate Taxes" means all taxes, assessments and governmental charges attributable to the Building and/or Land, whether or not directly paid by Landlord, including, without limitation, general real estate taxes and assessments levied against the Building and Land, community improvement district charges and fees and business improvement district charges and fees (and any other similar neighborhood or district tax) that are assessed and attributable to a Lease Year. Real Estate Taxes shall exclude, without limitation, any income, franchise, gross receipts, corporation, capital levy, excess profits, inheritance, gift, estate, payroll or stamp tax, which at any time may be assessed against or become a lien upon all or any part of the Premises or this leasehold. In addition, Real Estate Taxes shall exclude any liens or taxes, penalties or interest that are levied or assessed against the Premises for any time prior to the Term. If at any time during the Term the Laws concerning the methods of real property taxation prevailing at the commencement of the Term are changed so that a tax or excise on rents, gross receipts or any other such tax, however described, is levied or assessed against Landlord as a substitute in whole or in part for any Real Estate Taxes, the substitute tax or excise on rents shall be deemed to be Real Estate Taxes payable by Tenant.

5.7 Separate Tax Parcel. Landlord will cause the Land to be separately assessed and maintained so that Real Estate Tax bills shall issue solely with respect to the Real Estate Taxes applicable only to the Land and Building.

5.8 Payment of Real Estate Taxes. From and after the Rent Commencement Date, Tenant shall pay as Additional Rent Tenant's Proportionate Share of Real Estate Taxes assessed against the Land and Building for each tax period or portion thereof included within the Term and which during the Term are levied or imposed upon or become a lien or liens upon the Premises or any part thereof. For avoidance of doubt, Tenant has no obligation to pay Real Estate Taxes that relate to any portion of the Term prior to the Rent Commencement Date. Landlord shall provide verification of any computation of Tenant's Proportionate Share of Real Estate Taxes upon request by Tenant. Real Estate Taxes for the tax years in which the Term commences and expires shall be apportioned between Landlord and Tenant by dividing the amount of Real Estate Taxes by three hundred sixty-five (365) and multiplying the result by the number of days falling within the Term. Tenant shall pay Tenant's Proportionate Share of Real Estate Taxes as Additional Rent on a monthly basis based on one twelfth ($1/12^{th}$) of Landlord's reasonable estimate of the actual Real Estate Taxes to be assessed against the Land and the Building relating to the applicable Lease Year. Payment of Real Estate Taxes shall be verified and reconciled in the same manner as Operating Costs as set forth in Section 5.3 above.

5.9 Tenant's Right to Contest Real Estate Taxes. Tenant may request of Landlord in writing not more than thirty (30) days prior to the final date by which any appeal of Real Estate Taxes must be filed whether or not Landlord will appeal Real Estate Taxes for the Premises for the tax bill in question. In any calendar year during the Term, if Landlord elects not to appeal Real Estate Taxes for the Premises, Tenant shall have the right to contest any

Real Estate Taxes levied against all or any portion of the Premises, at Tenant's sole cost and expense, provided, however, that Tenant shall keep Landlord reasonably advised as to the course and progress of the contest and the cost thereof and consult with Landlord as to the strategy and tactic it intends to use and is using in pursuing the contest. Tenant's right to contest Real Estate Taxes as set forth in this Section 5.9 shall only be permitted if Landlord does not elect to directly contest the Real Estate Taxes. If Tenant elects to exercise the option to appeal pursuant to this Section 5.9, then Tenant shall provide Landlord with written notice (an "Appeals Notice") at least fifteen (15) days prior to the final date in which the appeal must be filed. Tenant may at any time in its sole discretion direct Landlord to terminate an appeal that Tenant previously elected pursuant to an Appeals Notice. Landlord shall provide any cooperation reasonably requested by Tenant in connection with any such appeal, including filing any documentation or pleading required to be filed by the owner of the property, and Tenant shall pay Landlord's reasonable actual out-of-pocket expenses in connection with such cooperation. Tenant shall be entitled to Tenant's Proportionate Share of any refund obtained by reason of any such proceeding or otherwise whether obtained during or after the expiration of the Term and whether obtained by Landlord or Tenant, except that if the refund shall relate to the year in which the Term commences or expires, the refund shall be apportioned between Landlord and Tenant according to the number of days within the Term.

5.10 Subsequent Assessments. Landlord shall pay, without being entitled to reimbursement from Tenant under this or any other Section of this Lease, any and all one-time assessments, impositions, cost of mitigation, impact fee, connection fee, tap-in fee, similar one-time charge or other charge imposed as a condition of or in connection with development of the initial Building or any expansion of the Building. Landlord shall amortize assessments for which it is entitled to obtain reimbursement from Tenant at an interest rate of eight percent (8%) per annum over the useful life of the improvement determined by Landlord under GAAP. Landlord shall give notice to Tenant of the annual amortized amount. Tenant shall, during the remainder of the Term, pay to Landlord monthly, one twelfth ($1/12^{th}$) of Tenant's Proportionate Share of the amount shown in such notice, payable with the Base Rent payments due and payable under Article 4.

ARTICLE 6
UTILITIES AND SERVICES

6.1 Utilities And Related Services. Landlord shall provide throughout the Term the services described in this Article 6, subject to the terms and conditions of this Lease.

6.2 Costs of Electrical Service; Metered Utilities.

(a) Landlord shall construct the Building so that electrical service to and serving the Premises shall be separately metered.

(b) Landlord shall at all times make electricity available to the Premises (including adequate electrical wiring and facilities for connection to Tenant's lighting fixtures and other equipment) for lighting and power suitable for general office use and otherwise consistent with the Base Building Specifications. Tenant shall not use any electrical equipment

which, in Landlord's reasonable judgment, would exceed the capacity of the electrical equipment serving the Premises.

(c) From and after the Rent Commencement Date, Tenant shall pay directly and not as a part of Operating Costs for all water, gas, heat, light, power, telephone, sewer, sprinkler system charges, trash collection services, and other utilities and services used on or from the Premises, and during such time as Tenant is the sole tenant of the Building, the Common Areas, together with any taxes, penalties, and surcharges or the like pertaining thereto and any maintenance charges for utilities. Any such charges paid by Landlord and assessed against Tenant shall be payable to Landlord and shall be Additional Rent hereunder. In addition, if applicable, to the extent any utility is not separately metered to the Premises, Landlord may, at Tenant's expense, install and shall have access to the Premises to monitor a separate meter (or submeter) to determine the actual use of any utility in the Premises or any shared common area and may make available and share actual whole-project energy and water usage data as necessary to maintain the Building's "green building" certification, if any. If there is no meter or submeter in the Premises, then, upon request, Tenant shall provide monthly utility usage to Landlord in electronic or paper format or provide permission for Landlord to request information regarding Tenant's utility usage directly from the utility company. If Tenant is billed directly by a public utility with respect to Tenant's energy usage at the Premises, then, upon request, Tenant shall provide monthly energy utility usage for the Premises to Landlord for the period of time requested by Landlord (in electronic or paper format) or, at Landlord's option, provide any written authorization or other documentation required for Landlord to request information regarding Tenant's energy usage with respect to the Premises directly from the applicable utility company. Notwithstanding the foregoing, for the period commencing on the Commencement Date through the Rent Commencement Date, Tenant shall either pay directly or reimburse Landlord for (and not as a part of Operating Costs) all utilities and services used on or from portions of the Premises to the extent in excess of amounts required for standard office use, together with any taxes, penalties, and surcharges or the like pertaining thereto and any maintenance charges for such additional utility charges.

(d) Landlord shall use reasonable efforts to enter into an agreement with the adjacent property owner for sharing the costs of encroachment for the Electrical Vaults.

6.3 HVAC. Landlord shall furnish HVAC to the distribution point of the Premises during Normal Business Hours. Upon Tenant's request, Landlord shall furnish HVAC to the distribution point at the Premises at times other than Normal Business Hours and Tenant shall pay Landlord a rate per hour as mutually agreed to by the parties within sixty (60) days of the Execution Date for such service outside of Normal Business Hours, which rate shall not be greater than Twelve and 50/100 Dollars ($12.50) per hour per floor.

6.4 Janitorial Service. Tenant shall provide janitorial service to the Premises so that the Premises are cleaned according to customary service performance standards for first- class office buildings. Tenant will use its commercially reasonable efforts to hire a contractor to recycle all items for the Building. Tenant will be responsible for separating its trash.

6.5 Security Service.

(a) From and after the Commencement Date, Tenant shall be responsible to provide for and pay directly for security services for the Building, including the Common Areas. Landlord and Tenant shall mutually agree on the scope of such security services prior to the Commencement Date, subject to Landlord's reasonable approval not to be unreasonably withheld, conditioned or delayed. If Tenant fails to maintain adequate security, as reasonably determined by Landlord, Landlord may, but shall not be obligated to, (i) obtain additional security which shall be included as an Operating Cost and/or (ii) assume control of the existing security services, in which event Tenant shall execute any such documents reasonably required in order for Landlord to assume control of such security services. If Tenant contracts with a third party to provide security services, such thirty party security service shall be subject to Landlord's approval, which approval Landlord shall not unreasonably withhold, condition or delay. Tenant shall require any third party security service provider to maintain liability insurance with commercially reasonable limits and Tenant shall require that Landlord be named as an additional insured on such liability policy and shall be primary to and not contributory with insurance maintained by Landlord. Tenant shall provide evidence of satisfactory insurance coverage to Landlord in advance of providing such security services for the Building on the Commencement Date.

(b) In no event shall Landlord have any liability whatsoever to Tenant for failure to provide security services and Tenant hereby waives any claim against Landlord for, and expressly assumes the risk of, (i) any unauthorized or criminal entry of third parties into the Premises or the Land, (ii) any damage to persons in or about the Premises or the Land, or (iii) any loss of property in and about the Premises or the Land, by or from any unauthorized or criminal acts of third parties, regardless of any action, inaction, failure, breakdown, malfunction and/or insufficiency of the security services provided by Landlord or any actual or alleged passive or active negligence of Landlord.

6.6 Interruption of Services or Utilities. If Base Building Services are interrupted for more than five (5) consecutive Business Days, and as a result of such circumstances, any portion of the Premises is rendered untenantable (including inability to access the Premises or the Building), unless the cause of the interruption of services is (i) the utility provider, (ii) the actions or omissions of Tenant or (iii) a result of Force Majeure Delay (as defined in Exhibit E), then Tenant shall receive a day for day abatement of Base Rent and any Additional Rent attributable to Operating Costs and Real Estate Taxes as of the first full day that the Premises are rendered untenantable as a result of such interruption. This abatement shall continue until the Premises is again tenantable. The abatement shall only be for the portion of the Premises which is untenantable and is not used by Tenant during the interruption. Notwithstanding the foregoing, Landlord agrees to use commercially reasonable diligent efforts following receipt of the notices required by this Lease to correct any interruption of Building System Services.

6.7 Tenant Security System. Tenant may install keyed, combination or cipher locks on interior doors of the Premises. Tenant may install an electronic security system for the Premises, including, but not limited to, pass card door lock systems and camera surveillance systems. Tenant shall promptly provide Landlord with copies of all keys, keycards, codes and other access devices (and any updates thereto) necessary to permit Landlord to exercise its rights of access and entry to the Premises. The installation of Tenant's security

systems shall be subject to Landlord's prior written approval pursuant to the Work Letter if part of Tenant's Work or if installed subsequently as an Alteration pursuant to Article 10.

6.8 Landlord Access. Notwithstanding anything to the contrary contained in this Section 6.8, Landlord or any Landlord Party (as defined below) may enter the Premises at any time to: (a) examine and inspect the Premises (including to confirm Tenant's compliance with its obligations under this Lease), (b) show the Premises to prospective investors, purchasers, mortgagees, lessors or lessees, (c) make such repairs, alterations, replacements or additions to the Premises (i) which Landlord may elect to perform following Tenant's failure to perform or in the event of an emergency or (ii) for which Landlord is responsible, (d) comply with any Laws and (e) post notices of non-responsibility; provided, however, that Landlord shall, except in case of emergency, afford Tenant such prior notification of an entry into the Premises as shall be reasonably practicable under the circumstances, but not less than one (1) Business Day, unless otherwise agreed to by Tenant. In exercising such rights, Landlord shall use commercially reasonable efforts to not unreasonably interfere with Tenant's access to and use of the Premises ("Landlord's Noninterference Covenant"). Landlord shall be allowed to take into and through the Premises any and all materials that may be required to make any such repairs, additions, alterations or improvements. Subject to Landlord's compliance with Landlord's Noninterference Covenant, any such entries shall be without the abatement of Rent and shall include the right to take such reasonable steps as are required to accomplish the stated purposes. Tenant hereby waives any claims of inconvenience to or interference with Tenant's business, lost profits, any loss of occupancy or quiet enjoyment of the Premises resulting from Landlord's exercise of its rights and remedies under this Section 6.8. In an emergency, Landlord shall have the right to use any means that Landlord may deem proper to open the doors in and to the Premises. Any entry into the Premises in the circumstances and manner described in this Section 6.8 shall not be deemed to be a forcible or unlawful entry into, or a detainer of, the Premises, or an actual or constructive eviction of Tenant from any portion of the Premises.

6.9 Change of Normal Business Hours. Not more than once per Lease Year and with ten (10) Business Days' prior written notice from Tenant to Landlord, Tenant may change the specific hours that Normal Business Hours apply to the Premises so long as the Normal Business Hours do not exceed ten and one-half (10.5) hours Monday through Friday and no more than five (5) hours on the weekend.

ARTICLE 7
USE OF PREMISES

Tenant may use the Premises 24 hours a day – 365/366 days a year (subject to (i) Landlord's right to temporarily close portions of the Building for repairs and/or maintenance or (ii) an emergency situation that prevents Tenant's use) for general office and related purposes, in accordance with all Laws and all matters of record affecting the Land and the Building recorded in the Official Records, including (a) offices, (b) demonstration of Tenant's products and services, (c) training, (d) exercise area for Tenant's employees, (e) customer service, (f) natural gas business and operations center, (g) service and maintenance of Tenant's fleet vehicles in the Parking Garage, subject to all applicable Laws (h) cafeteria and reception area for Tenant's employees and guests, or Tenant may allow part or all of the Premises to remain vacant (the "Permitted Use"). Tenant shall be allowed to serve alcoholic beverages in the Premises and the

Rooftop Terrace so long as either (y) Tenant's liability insurance covers serving alcohol on the Premises and Rooftop Terrace and Tenant provides reasonable evidence to Landlord demonstrating coverage for serving alcohol or (z) if Tenant's liability insurance does not cover serving alcohol on the Premises and Rooftop Terrace, Tenant shall obtain commercially appropriate liquor liability insurance for such events or require its vendor(s) to provide evidence of the same at limits of liability that are reasonably acceptable to Landlord and submitting to Landlord a Certificate of Insurance evidencing "Liquor Liability" coverage and such insurance, whether secured by Tenant or its vendor(s), shall name Landlord as an additional insured and shall be primary to any insurance carried by Landlord. Tenant shall provide evidence of satisfactory insurance coverage to Landlord in advance of any alcohol being served on the Premises. Landlord shall not take any action following the date hereof that will cause the specific uses delineated in this Article 7 to be prohibited or otherwise restricted by any covenant, condition, restriction, easement or other instrument or matter affecting title or use of the Premises or any part thereof.

ARTICLE 8
BUILDING GENERATOR; ELECTRICAL DISTRIBUTION SYSTEM

8.1 Selection of Building Generator. The Permit Submittal Plans include a five hundred (500) kilowatts ("kW") generator to provide back-up power for the Building life safety systems (the "Base Building Generator"). Tenant desires Landlord to consider upsizing the generator to two thousand (2,000) kW so that the generator is capable of additionally providing back-up power to all or a portion of the Premises (the "Enhanced Building Generator"). Landlord agrees to obtain bids for all costs associated to acquire and install (i) the Base Building Generator that is currently a part of the Permit Submittal Plans and all related installations including a five hundred (500) gallon diesel storage tank to fuel the Base Building Generator and (ii) the Enhanced Building Generator and all related installations including a three thousand (3,000) gallon diesel fuel tank to fuel the Enhanced Building Generator. Landlord shall provide the respective final bids for each option to Tenant for Tenant's review. Not later than ten (10) Business Days from Tenant's receipt of both bids from Landlord (including reasonable back-up information that Landlord may have been provided in connection with such bids), Tenant shall elect whether Landlord shall install, as part of Landlord's Work, the Base Building Generator or the Enhanced Building Generator by delivering written notice to Landlord. If Tenant selects the Base Building Generator, Landlord shall construct and install the Base Building Generator as part of Landlord's Work. If Tenant fails to notify Landlord of its selection within such ten (10) Business Day period then Tenant shall be deemed to have selected the Base Building Generator option. If Tenant selects the Enhanced Building Generator (a) Landlord shall construct and install the Enhanced Building Generator as part of Landlord's Work and (b) Tenant shall pay the cost differential between the Base Building Generator bid and the Enhanced Building Generator bid within ten (10) Business Days of Tenant's selection. Notwithstanding the foregoing, if the actual costs of acquiring and installing the Enhanced Building Generator are greater than the amount set forth in the bid for the Enhanced Building Generator, then Tenant shall pay the Upsized Generator Cost Differential (as defined below), which amount shall be paid either by a reduction of Tenant's Work Allowance or by a direct payment to Landlord (at Landlord's election) within ten (10) Business Days of Landlord's request therefor. The additional one thousand five hundred (1,500) kW provided by the Enhanced Building Generator shall be made available to Tenant for distribution within the Premises as Tenant shall elect and as

part of Tenant's Work. The term "Building Generator" means either the Base Building Generator or the Enhanced Building Generator, whichever is actually installed. Landlord shall enter into a commercially reasonable maintenance contract for the Building Generator and Tenant acknowledges and agrees that such maintenance contract shall govern the maintenance and repair of the Building Generator, and, notwithstanding any provision in this Lease to the contrary, Landlord's sole maintenance and repair obligation with respect to the Building Generator shall be to enter into such maintenance contract for the Building Generator. The term "Upsized Generator Cost Differential" means seventy-five percent (75%) of the difference between the actual costs of acquiring and installing the Enhanced Building Generator and the amount of the Enhanced Building Generator bid. Notwithstanding anything contained herein to the contrary, should Tenant request any changes to the Building Generator, all costs associated with such Tenant changes to the Building Generator shall be paid solely by Tenant within ten (10) Business Days of Landlord's request therefor.

8.2 Changes to Electrical Systems. If Tenant's selection of the Enhanced Building Generator requires a change to the electrical distribution or the Base Building Systems, Landlord agrees to obtain bids for all costs associated to acquire and install (i) the electrical distribution required for the Base Building Generator (the "Base Building Electrical Distribution System") and (ii) the electrical distribution required for the Enhanced Building Generator (the "Enhanced Building Electrical Distribution System"). Landlord shall provide the respective final bids for each option to Tenant for Tenant's review. Not later than ten (10) Business Days from Tenant's receipt of both bids from Landlord (including reasonable back-up information that Landlord may have been provided in connection with such bids), Tenant shall elect whether Landlord shall install, as part of Landlord's Work, the Base Building Electrical Distribution System or the Enhanced Building Electrical Distribution System by delivering written notice to Landlord. If Tenant selects the Base Building Electrical Distribution System, Landlord shall construct and install the Base Building Electrical Distribution System as part of Landlord's Work. If Tenant fails to notify Landlord of its selection within such ten (10) Business Day period then Tenant shall be deemed to have selected the Base Building Electrical Distribution System option. If Tenant selects the Enhanced Building Electrical Distribution System (a) Landlord shall construct and install the Enhanced Building Electrical Distribution System as part of Landlord's Work and (b) Tenant shall pay the cost differential between the Base Building Electrical Distribution System bid and the Enhanced Building Electrical Distribution System bid within ten (10) Business Days of Tenant's selection. Notwithstanding the foregoing, if the actual costs of acquiring and installing the Enhanced Building Electrical Distribution System are greater than the amount set forth in the bid for the Enhanced Building Electrical Distribution System, then Tenant shall pay the Upsized Electrical Cost Differential (as defined below), which amount shall be paid either by a reduction of Tenant's Work Allowance or by a direct payment to Landlord (at Landlord's election) within ten (10) Business Days of Landlord's request therefor. The additional electrical distribution provided by the Enhanced Building Electrical Distribution System shall be made available to Tenant for distribution within the Premises as Tenant shall elect and as part of Tenant's Work. The term "Electrical Distribution System" means either the Base Building Electrical Distribution System or the Enhanced Building Electrical Distribution System, whichever is actually installed. The term "Upsized Electrical Cost Differential" means seventy-five percent (75%) of the difference between the actual costs of acquiring and installing the Enhanced Building Electrical Distribution System and the amount of the Enhanced Building Electrical Distribution System

bid. Notwithstanding anything contained herein to the contrary, should Tenant request any changes to the Electrical Distribution System, all costs associated with such Tenant changes to the Electrical Distribution System shall be paid solely by Tenant within ten (10) Business Days of Landlord's request therefor.

8.3 Building Generator Waiver. In no event shall Landlord have any liability whatsoever to Tenant in connection with the Building Generator and Tenant hereby waives any claim against Landlord in any way relating to or arising from the Building Generator, and expressly assumes the risk of any loss of property in and about the Premises or the Land, regardless of any action, inaction, failure, breakdown, malfunction and/or insufficiency of the Building Generator or any actual or alleged passive or active negligence of Landlord, including any claim for loss of service or power to the Building Generator.

8.4 Replacement of Building Generator and Electrical Distribution System. If the Building Generator needs to be replaced during the Term and Tenant has selected the Base Building Generator then the allocation of costs for such replacement shall be governed by the provisions of Article 5 of this Lease. If the Building Generator and/or Electrical Distribution System needs to be replaced during the Term and Tenant has selected the Enhanced Building Generator then Tenant shall pay in advance within ten (10) Business Days of Landlord's estimate of the costs associated with the replacement of the Building Generator and/or the Electrical Distribution System which are in excess of the costs that would be incurred to replace the Base Building Generator with the Enhanced Building Generator and/or the Base Building Electrical Distribution System with the Enhanced Building Electrical Distribution System, in each case as reasonably determined by Landlord, and all other costs shall be governed by the provisions of Article 5 of this Lease. If the costs actually incurred by Landlord exceed Landlord's estimate, Tenant shall pay any additional costs within ten (10) Business Days of Landlord's request therefor. If Tenant has selected the Enhanced Building Generator, Tenant may elect to change the replacement of the Enhanced Building Generator to the Base Building Generator in connection with such replacement by providing written notice to Landlord within ten (10) Business Days of Tenant's receipt of Landlord's estimate of the additional costs to replace. If Tenant elects to change the Enhanced Building Generator to the Base Building Generator in connection with such replacement as described in the preceding sentence then Tenant shall be responsible for any additional costs incurred by Landlord in connection with such change, including, without limitation, any changes that may be required to the Electrical Distribution System.

ARTICLE 9
COMPLIANCE WITH LAWS

9.1 Compliance with Laws.

(a) Tenant, at its sole cost and expense, shall timely take all action required to cause the Premises (except for construction in the Premises performed by Landlord as part of Landlord's Work which Landlord shall be responsible for) and Tenant's use of the Premises to comply in all respects with all Laws, including, without limitation, any Laws requiring any form of improvement or alteration to the Premises. If Tenant obtains knowledge of any failure to comply with applicable Law, Tenant shall give Landlord prompt notice thereof.

(b) Landlord shall comply with all Laws relating to the Common Areas, unless any Landlord's failure to comply with Laws relating to the Common Areas is the result of the misconduct, breach, fault or negligence of Tenant or of any Tenant Party. Landlord shall be permitted to include in Operating Costs any costs or expenses incurred by Landlord under this Section 9.1 to the extent consistent with the terms of this Lease.

9.2 ADA Compliance. Landlord shall be solely responsible at its cost and expense for causing Landlord's Work to comply in all respects with the Americans With Disabilities Act ("ADA") in effect as of the Execution Date for use as a public accommodation, except for any change to the Building or Common Areas necessitated by Tenant's Work or reconfiguration of the interior of the Premises after the same is occupied by Tenant.

9.3 Contesting Legal Requirement. Landlord and Tenant shall each have the right upon giving notice to the other to contest any obligations imposed upon either by this Article 9 and to defer compliance during the pendency of such contest, provided the enforcement of the requirement or Laws is stayed during the contest and the contest will not subject the other party to criminal penalty, civil penalty or fine or materially interfere with Tenant's use and occupancy of the Premises. Each party shall cooperate with the other in the contest and shall execute any documents reasonably required in the furtherance of that purpose. A party contesting the application of Laws under this Article 9 shall not be deemed to be in default (a) until and unless it is determined through the relevant legal process that the party must perform the obligation and it fails to do so by the date upon which all applicable appeal periods have expired or (b) provided enforcement is stayed pending appeal, until all appeals have been finally decided against the party and the party fails to comply with the resulting decision.

ARTICLE 10
ALTERATIONS, ADDITIONS, AND IMPROVEMENTS

10.1 Nonstructural. As used herein: (i) "Alterations" are any alterations, additions or improvements made by or on behalf of Tenant to the Premises but excluding Tenant's Work described in the Work Letter, (ii) "Nonstructural Alterations" are any Alterations to the Premises which are not Structural Alterations, and (iii) "Structural Alterations" are any Alterations to the Premises that Landlord determines in its reasonable discretion affect the roof, exterior, façade, structural elements of the Building or the Base Building Systems. Tenant shall have the right to make Nonstructural Alterations to the Premises, subject to the reasonable approval of Landlord which approval Landlord shall not unreasonably withhold or delay. Notwithstanding the foregoing, if the cost of the Nonstructural Alterations are not expected to exceed in any one instance Fifty Thousand and 00/100 Dollars ($50,000.00) and do not require any building permit or other governmental approval, then in such case Landlord's approval shall not be required. If the cost of the Nonstructural Alterations are not expected to exceed in any one instance Fifty Thousand and 00/100 Dollars ($50,000.00) and require a building permit or other governmental approval (a "Minor Permit Required Nonstructural Alteration"), then in such case Landlord's approval shall be required but shall be subject to the following expedited Landlord review and approval process. Tenant shall provide Landlord email notice to Landlord's designated review party of Tenant's intended Minor Permit Required Nonstructural Alteration and Landlord shall be deemed to have approved the Minor Permit

Required Nonstructural Alteration unless Landlord's reviewing party objects to the same within five (5) Business Days of receipt of Tenant's Minor Permit Required Nonstructural Alteration notice. Any such email correspondence must contain "URGENT – SUBJECT TO DEEMED APPROVAL" in the subject line in all capitalized letters. Landlord and Tenant shall from time to time with not less than ten (10) Business Days' prior written notice designate the respective persons to give and receive Minor Permit Required Nonstructural Alteration email notices and responses. The initial persons to receive such emails on behalf of Landlord are set forth in Article 5 of Exhibit L. Tenant shall provide Landlord not less than ten (10) days' written notice before commencing construction or installation of any Alterations. Tenant's request for Landlord's consent to any proposed Alterations shall include a description of the proposed Alterations and shall be accompanied by materials reasonably sufficient to enable Landlord to evaluate the request. Depending on the nature and extent of the proposed Alterations, it is anticipated that such materials could range from internally prepared diagrams, plans and specifications prepared by licensed architects and engineers, a description of proposed construction means and methods, the identity of any contractor or subcontractor to be employed in the construction of the Alterations, the estimated cost of such work and the estimated time for performance thereof. Tenant's notice requesting consent shall describe the Alterations and the anticipated commencement date thereon so that Landlord may file a notice of nonresponsibility and comply with all applicable Laws. Tenant shall reimburse Landlord for all actual out-of-pocket costs incurred by Landlord in connection with any Alterations, including, without limitation, the costs of any third-party architects, engineers or consultants hired by Landlord to review drawings for Alterations. Notwithstanding the foregoing, Tenant may, without the consent of and without notice to Landlord, install, remove, or move cable/data drops, networks, telephones, and door closures, and may install, remove, or move electrical outlets without the consent of or prior notice to Landlord, but shall notify Landlord following any such installation, removal, or move of electrical outlets.

10.2 Structural. If Tenant desires to make any Structural Alterations to the Premises, Tenant shall first obtain Landlord's written consent in Landlord's sole and absolute discretion.

10.3 Contractor. Landlord's reasonable approval shall be required of any contractor performing Alterations for which Landlord's approval is required. Any contractor utilized by Tenant shall be reputable, bondable by reputable bonding companies, and carry the kinds and amounts of insurance required by Section 10.6 below.

10.4 Compliance with Laws. Tenant in making any Alterations shall cause all work to be done in a good and workmanlike manner using materials equal to or better than those used in the construction of the Premises and shall comply with or cause compliance with all Laws and with any direction given by any public officer pursuant to Laws. Tenant shall obtain or cause to be obtained and maintain in effect, as necessary, all building permits, licenses, and other governmental approvals which may be required in connection with the making of the Alterations. Landlord shall cooperate with Tenant in obtaining them and shall execute any documents reasonably required in furtherance of such purpose at Tenant's sole cost and expense. Neither Landlord's selection or approval of a contractor nor its approval of the plans and specifications for Alterations shall create any responsibility or liability on the part of Landlord for the quality or adequacy of the contractor or for the completeness, design

sufficiency, or compliance of such plans and specifications with all Laws. Landlord shall not be liable to Tenant or any other party in connection with Landlord's approval of any plans, or Landlord's consent to Tenant's performing any Alterations. If any Alterations made by or on behalf of Tenant require Landlord to make any alterations or improvements to any part of the Building in order to comply with any applicable Laws, Tenant shall pay any costs incurred by Landlord in connection with such alterations or improvements.

10.5 Removal of Alterations. At any time during the Term, Tenant may, at its option, remove any Alterations. Tenant shall, at its sole cost, repair any damage to the Premises caused by the removal of any Alterations and restore the Premises to its prior condition.

10.6 Construction Insurance. Tenant shall procure or cause its contractor to procure and maintain in effect during the construction of Alterations, the insurance coverages specified in Section 16.8.

ARTICLE 11
CONDITION, REPAIR, AND MAINTENANCE OF PREMISES

11.1 Intentionally Deleted.

11.2 Tenant's Maintenance. Tenant shall keep and maintain the Premises (but specifically excluding the portions which are the responsibility of Landlord pursuant to Section 11.3) and Tenant's furniture and fixtures at the Premises in good order, condition, and repair comparable to other first class office buildings in the Comparable Market Area, ordinary wear and tear and damage by casualty excepted. To the extent that Tenant were to enter into any contract with a service provider responsible for any maintenance obligations of Tenant, Tenant shall thereafter provide Landlord with copies of all contracts, invoices, billing statements, evidence of payment, and other documents reasonably requested by Landlord in connection with such activities. In the case of any repairs or maintenance of any portion of the Premises, the determination of whether such maintenance obligations are being satisfied in a satisfactory manner shall be determined by Landlord in its reasonable discretion. Landlord shall have the right to revoke some or of all of Tenant's obligations under this Section 11.2 upon thirty (30) days' written notice to Tenant if Tenant fails to perform such obligations in a satisfactory manner as determined by Landlord in its reasonable discretion after written notice from Landlord and a reasonable time period to cure. If Landlord so revokes, Landlord shall perform the obligations, and Landlord's reasonable costs to perform the obligations shall be included within Operating Costs.

11.3 Landlord's Maintenance. Except for any maintenance or repair that Tenant is responsible for under Section 11.2, Landlord shall perform all repairs, replacements and maintenance necessary to keep the Building, the Base Building Systems and the Common Areas in good working order and repair with all Base Building Systems functioning properly and to maintain the Building in a clean, safe and tenantable condition comparable to other first class office buildings in Comparable Market Area. Landlord's maintenance and repair shall include structural portions of the Premises and the Building, including, without limitation, the foundation, floor/ceiling slabs, roof, curtain wall, exterior glass and façade, columns, beams,

shafts (including elevator), the Parking Garage, and the Base Building Systems up to the point of connection of localized distribution to the Premises and all repairs, replacements and maintenance of Landlord's Work required because of defective design or construction of Landlord's Work. Landlord's duties under this Section 11.3 shall be performed at its sole expense, except to the extent Landlord is entitled to recover such costs under Article 5. Notwithstanding this Section 11.3 to the contrary, the maintenance and repair obligations with respect to the Building Generator shall be governed by Article 8 of this Lease.

11.4 Time to Complete Work. All work to be performed by Landlord under this Article 11 shall be completed within a reasonable period of time. .

ARTICLE 12
DAMAGE AND DESTRUCTION

12.1 Repair. If (a) all or part of the Premises or Building are damaged or destroyed or (b) Tenant's access to the Building, Premises, the Parking Garage or any other portion of the Common Areas to which Tenant must have access for the continued use and occupancy of the Premises ("Access") is obstructed or hindered, then, subject to the terms hereof, (1) Landlord shall complete at Landlord's sole cost the (i) repair and restoration of the damage and destruction to the Building to the condition set forth in Exhibit E, which restoration shall not extend to any leasehold improvements in the Premises, furniture, equipment, supplies, trade fixtures or other personal property owned or leased by Tenant, its employees, contractors, invitees or licensees and/or (ii) restoration of Access such that Access is fully restored and (2) Tenant shall complete repair and restoration of the damage and destruction to the Premises to the condition set forth in the Work Letter at Tenant's cost and expense, including, without limitation, all Tenant's Work or other leasehold improvements that were completed at Landlord's cost and expense.

12.2 Termination. Landlord in good faith shall estimate the time required to repair the damage and destruction and restore the Building and the Premises in accordance with Section 12.1 (the "Restoration Estimate Notice"). If Landlord's estimate of the time required for repair set forth in the Restoration Estimate Notice exceeds eighteen (18) months, then Landlord and Tenant shall each have the right to terminate this Lease by giving notice to the other within thirty (30) days after delivery of the Restoration Estimate Notice. If either party exercises its termination right under this Article 12, the Lease shall terminate on the date specified in the termination notice. If the cost of performing such repairs and restoration exceeds the actual proceeds of insurance paid to Landlord on account of such casualty (the "Casualty Proceeds Difference"), or if the Mortgagee under a Mortgage shall require that any insurance proceeds from a casualty loss be paid to such Mortgagee, Landlord may terminate this Lease. Notwithstanding the immediately preceding sentence, Tenant shall have the right to fund the Casualty Proceeds Difference (without claim against Landlord for reimbursement of any kind) in which case Landlord shall (i) deliver notice to Tenant of the estimated amount (the "Estimation Notice") of Casualty Proceeds Difference and (ii) not have the right to terminate the Lease so long as Tenant pays to Landlord the amount set forth in the Estimation Notice within thirty (30) days of Landlord's delivery of the Estimation Notice, provided that if Tenant fails to deliver to Landlord the amount set forth in the Estimation Notice then Landlord may terminate the Lease at any time after such thirty (30) day period. Unless

Landlord or Tenant elects to terminate this Lease as hereinabove provided, this Lease will remain in full force and effect and Landlord shall repair such damage to the extent required in this Article 12 as expeditiously as possible under the circumstances, subject to Force Majeure Delay.

12.3 Delay in Completing Repair. If Landlord does not substantially complete repair and restoration of partial damage or does not restore Access within ninety (90) days following the date set forth in the Restoration Estimate Notice, and as a result the repair period exceeds eighteen (18) months measured from the date of the casualty or loss of Access, Tenant shall have the right to terminate this Lease by giving written notice to Landlord within ten (10) days after expiration of the ninety (90) day period.

12.4 Final Year of Term. If the damage or destruction or loss of Access occurs during the last year of the Term (including any exercised Extension Options), and the time required to repair the damage and destruction and to restore Access exceeds ninety (90) days, either party may terminate this Lease by giving notice to the other party within thirty (30) days following such damage or destruction.

12.5 Abatement. The Rent shall abate in proportion to that part of the Premises that is unfit for occupancy for the purposes permitted under this Lease, and not occupied by Tenant as a result thereof, except to the extent such damage is due to the negligence or willful misconduct of Tenant or the Tenant Parties. The abatement shall consider the nature and extent of interference with Tenant's ability to conduct business in the Premises and the need for Access. The abatement shall continue from the date the damage occurred until (a) Landlord completes the repairs and restoration and (b) Landlord gives notice to Tenant that the repairs and restoration are completed.

ARTICLE 13
CONDEMNATION

13.1 Taking. "Taking" means a taking by condemnation or by the exercise of the power of eminent domain by a public or quasi-public authority or entity, whether or not there is a taking of title, or a conveyance in lieu thereof. If there is a taking of the entire Building, or the entire Premises, this Lease shall terminate as of the earlier of the date title vests or the date Tenant is dispossessed by the Taking authority.

13.2 Termination for Material Interference. If a Taking of part of the Premises or the Building (a) materially interferes with Tenant's ability to conduct its business in the Premises or (b) permanently and completely denies Tenant's access to the Building or Premises, Tenant shall have the right to terminate this Lease by giving Landlord notice of its election within thirty (30) days of the Taking. The Lease shall terminate on the earlier of the date when title vests, the date Tenant is dispossessed by the Taking authority or sixty (60) days following Tenant's notice of termination; provided that such termination shall in no event extinguish or diminish Tenant's rights to a reward for personal property and moving expenses as described in Section 13.4. If a Taking of any portion of the Land, the Building or the Premises shall, in the opinion of Landlord, interfere with Landlord's operation thereof, Landlord may terminate this Lease upon thirty (30) days' written notice to Tenant given at any

time within thirty (30) days following the date of such Taking with such termination to be effective as of the earlier of (i) the date of transfer of title resulting from such Taking or (ii) the date of transfer of possession resulting from such Taking.

13.3 Abatement. If this Lease is not terminated as a result of a Taking: (a) Rent shall abate, from the earlier of the date title vests in the Taking authority or the date Tenant is dispossessed by the Taking authority, in proportion to the part of the Premises subject to the Taking and Tenant's pro rata share shall be proportionally reduced and (b) Landlord, at its sole expense, shall commence the work of repairing and restoring the Building to a complete architectural unit and the work of restoring the remainder of the Premises as nearly as possible to its condition existing immediately prior to the Taking and to restore Tenant's access to the Building and Premises or provide comparable access thereto within a reasonable time.

13.4 Taking Award. All compensation awarded or paid upon a total or partial Taking of the Premises or the Building shall belong to and be the property of Landlord without any participation by Tenant. Nothing herein shall be construed to preclude Tenant from prosecuting any claim directly against the condemning authority for moving expenses, loss of business, for damage to, and cost of removal of, trade fixtures, furniture and other personal property belonging to Tenant, and for the unamortized cost of leasehold improvements to the extent same were installed at Tenant's expense (and not with the proceeds of the Tenant's Work Allowance); provided, however, that no such claim shall diminish or adversely affect Landlord's award. In no event shall Tenant have or assert a claim for the value of any unexpired term of this Lease. Subject to the foregoing provisions of this Article 13, Tenant hereby assigns to Landlord any and all of its right, title and interest in or to any compensation awarded or paid for the fee as a result of any such taking.

13.5 Savings Clause. Landlord and Tenant may exercise any rights of termination even though their respective right, title, or interest may have been taken or divested.

ARTICLE 14
SUBORDINATION, RECOGNITION, ATTORNMENT, AND NON-DISTURBANCE

14.1 Subordination. This Lease is not subordinate to the lien of any first deed of trust or mortgage of the fee interest of the Land, Building and Premises to provide construction or permanent financing and any renewals, modifications or extensions thereof ("Mortgage"), unless a Subordination, Attornment and Non-Disturbance Agreement ("SAND Agreement") is executed, acknowledged and delivered to Tenant by the holder of the Mortgage ("Mortgagee"). The SAND Agreement must be in form suitable for recording, must contain substantially the provisions set forth in Sections 14.1, 14.2, 14.3 and 14.7 and otherwise must be commercially reasonable:

(a) So long as the Lease has not been terminated on account of Tenant's default that has continued beyond applicable cure periods, Mortgagee shall not name or join Tenant as a defendant in any judicial action or proceeding that is commenced pursuant to the exercise of Mortgagee's rights and remedies arising upon a default by Landlord under the

Mortgage, unless (a) applicable law requires Tenant to be made a party thereto as a condition to proceeding against Landlord or in order to prosecute or otherwise fully enforce such rights and remedies, (b) such joinder of Tenant is required for the recovery by Mortgagee of any rent at any time owing by Tenant under the Lease, whether pursuant to the assignment of rents set forth in the Mortgage or otherwise or (c) such joinder is required in order to enforce any right of Mortgagee to enter for the purpose of making any inspection or assessment, or in order to protect the value of Mortgagee's security provided by the Mortgage;

(b) So long as the Lease has not been terminated on account of Tenant's default that has continued beyond applicable cure periods, the possession by Tenant of the Premises and Tenant's rights in the Premises shall not be disturbed, affected or impaired by, nor will the Lease or the Term be terminated or otherwise affected by:

(i) Any suit, action or proceeding upon the Mortgage or the obligation secured thereby, or for the foreclosure of the Mortgage or the enforcement of any rights under the Mortgage or any other documents held by the Mortgagee, or by any judicial sale or execution or other sale of the Premises, or by any deed given in lieu of foreclosure, or by the exercise of any other rights given to the Mortgagee by any other documents or as a matter of law, or

(ii) Any default under the Mortgage or the obligation secured;

(c) All condemnation awards and insurance proceeds paid or payable with respect to the Premises and received by the Mortgagee shall be applied to the repair and restoration of the Premises or disbursed to Tenant as and to the extent provided in this Lease;

(d) Mortgagee acknowledges and agrees that all fixtures, equipment and personal property owned by Tenant located or installed in or on the Premises, regardless of the manner of attachment, shall be and remain the property of Tenant and may be removed by Tenant at any time. In no event (including a default under the Lease or Mortgage) shall Mortgagee have any liens, rights or claims in Tenant's property, and Mortgagee expressly waives all rights of levy, distraint, or execution with respect to that property in accordance with the terms of the Lease;

(e) Any agreement between Mortgagee and Tenant shall bind and inure to the benefit of and be enforceable by the parties thereto and their respective heirs, personal representatives, successors and assigns and, for avoidance of doubt, any foreclosure purchaser;

(f) With respect to the Construction Loan SAND (as defined below) only, if the Mortgagee thereunder succeeds to the interest of Landlord under this Lease, then Tenant shall have the right to terminate this Lease by delivering written notice to such Mortgagee if Tenant Delivery Status (as defined in Exhibit E) is not achieved by December 31, 2022, subject to extension by virtue of Force Majeure Delay and/or Tenant Delay, upon written notice given not later than ten (10) Business Days thereafter. Any such termination shall be subject to a final determination pursuant to the arbitration set forth in Exhibit E that Mortgagee has failed to achieve Tenant Delivery Status if Tenant has delivered a Milestone Achievement Dispute Notice (as defined in Exhibit E) with respect thereto. Upon any such termination of this Lease due to the failure of Tenant Delivery Status to timely occur, the parties shall be relieved from any and

all liability to each other resulting hereunder and Tenant's remedies under Exhibit E shall be Tenant's sole and exclusive remedies for the failure of the Tenant Delivery Milestone to timely occur. Should the Tenant Delivery Milestone be satisfied prior to Tenant's exercise of the foregoing termination right, however, such termination right shall, in such event, expire and be of no further force or effect upon completion of the Tenant Delivery Milestone.

(g) Tenant agrees with Mortgagee that if Mortgagee succeeds to the interest of Landlord under the Lease, Mortgagee shall not be:

(i) Liable for any act or omission of any prior landlord under the Lease, except for defaults of the prior landlord that are continuing on the date Mortgagee succeeds to such interest, and for which Mortgagee was furnished notice and opportunity to cure the same in accordance with the provisions of the Lease prior to taking possession of the Premises;

(ii) Subject to any offsets or defenses which Tenant might have against any prior landlord, except offsets permitted by Article 34 and/or Section 20.5;

(iii) Bound by any construction related obligations of any prior Landlord under the Lease (subject to Section 14.7 hereof and provided that "construction related obligations" shall in no event mean or include Landlord's obligations under Section 11.3);

(iv) Bound by any Rent for more than one (1) month in advance to any prior landlord; or

(v) Liable for any security deposit that Tenant may have paid to any prior landlord, unless such deposit was actually received by Mortgagee in connection with this Lease.

14.2 Mortgagee Provisions. Subject to the terms of the SAND Agreement, Tenant waives the provisions of any Law which may give or purport to give Tenant any right or election to terminate or otherwise adversely affect this Lease and the obligations of Tenant hereunder in the event of any foreclosure proceeding or sale. Tenant agrees to give each Mortgagee a copy of any notice of default served upon Landlord by Tenant by the same means of notice required under Article 21, provided that prior to such notice Tenant has been notified in writing of the address of such Mortgagee (hereafter, a "Notified Party"). Tenant further agrees that if Landlord shall have failed to cure such default within the applicable time period set forth in this Lease, then prior to Tenant pursuing any remedy for such default provided hereunder, at law or in equity, the Notified Party shall have an additional thirty (30) days within which to cure or correct such default (or if such default cannot reasonably be cured or corrected within that time, then such additional time as may be necessary (including to appoint a receiver and to commence and complete foreclosure proceedings) if the Notified Party has commenced within such thirty (30) days and is diligently pursuing the remedies or steps necessary to cure or correct such default).

14.3 Attornment. In the event any proceedings are brought for the foreclosure of, or in the event of exercise of the power of sale under, any Mortgage, or in the event the interests of Landlord under this Lease shall be transferred by reason of deed in lieu of

foreclosure or other legal proceedings, or in the event of termination of any lease under which Landlord may hold title, Tenant shall attorn to the transferee or purchaser at foreclosure or under power of sale, or the lessor of Landlord upon such lease termination, as the case may be (sometimes hereinafter called "such person"), without any deductions or off set whatsoever (other than as permitted or otherwise provided for in the SAND Agreement), and shall recognize and be bound and obligated hereunder to such person as the Landlord under this Lease. Tenant agrees to execute any attornment agreement not in conflict herewith requested by Landlord, the Mortgagee or such person. Tenant's obligation to attorn to such person shall survive the exercise of any such power of sale, foreclosure or other proceeding. Tenant agrees that the institution of any suit, action or other proceeding by any Mortgagee to realize on Landlord's interest in the Premises or the Building pursuant to the powers granted to a Mortgagee under its Mortgage, shall not, by operation of law or otherwise, result in the cancellation or termination of the obligations of Tenant hereunder.

14.4 Holder's Election. If a Mortgagee requires that this Lease have priority over its Mortgage, Tenant shall, upon request of the Mortgagee, execute, acknowledge and deliver to the Mortgagee an agreement acknowledging such priority.

14.5 Timing and Execution by Tenant. Tenant shall execute and deliver to Landlord any SAND Agreement which meets the requirements of this Article 14 within ten (10) Business Days of receipt.

14.6 Landlord's Termination Right. If Landlord delivers to Tenant any SAND Agreement with respect to Landlord's construction loan (the "Construction Loan SAND"), for the performance of Landlord's Work (the "Construction Loan"), whether or not in accordance with the requirements of Sections 14.1, 14.2, 14.3 and 14.7 hereof, and Landlord, Tenant and Mortgagee do not fully execute a SAND Agreement, whether or not in accordance with the requirements of Sections 14.1, 14.2, 14.3 and 14.7 hereof, with respect to the Construction Loan within thirty (30) days from the date of initial delivery of Mortgagee's SAND Agreement to Tenant (the "SAND Execution Period"), then Landlord shall have the right to terminate this Lease, without payment or penalty of any kind, by delivering written notice to Tenant of such termination not more than thirty (30) days following the expiration of the SAND Execution Period.

14.7 Certain Construction Loan SAND Provisions. Tenant shall have no obligation to execute a Construction Loan SAND unless such Construction Loan SAND provides that with respect to the performance of Landlord's Work, Tenant shall retain the remedies set forth in Section 4 of Exhibit E resulting from the failure to achieve any Milestone and Tenant shall expressly retain the right to receive the Tenant's Work Allowance in accordance with the terms of the Lease.

ARTICLE 15
LANDLORD'S WARRANTIES

To induce Tenant to execute this Lease, and in addition to any other express representations and warranties of Landlord contained in this Lease, Landlord warrants and represents to Tenant as of the Execution Date that:

(a) To Landlord's Knowledge (as defined below), based solely on Landlord's existing owner's policy of title insurance, Landlord has good and marketable title to the Land, free and clear of liens or easements upon the Land, except those shown by the public records as of the date of this Lease or imposed by applicable Laws;

(b) To Landlord's Knowledge, the items shown as exceptions to Landlord's existing owner's policy of title insurance do not prohibit, restrict, conflict with or adversely affect (i) Landlord's obligation to perform Landlord's Work or complete construction of the Building or (ii) Tenant's Permitted Use and occupancy of the Premises;

(c) To Landlord's Knowledge, based solely on Landlord's existing ALTA survey of the Land, access to the Building will be by public roadways;

(d) To Landlord's Knowledge, Landlord will be able to obtain a "will-serve" letter with respect to all utilities necessary to serve the Building; and

(e) Landlord has full right and lawful authority to enter into and perform each and every one of Landlord's obligations under this Lease.

As used herein, "Landlord's Knowledge" means the current, actual knowledge of Matthew Friedman, without any specific duty of investigation or inquiry or any personal liability whatsoever with respect to such individual. Landlord represents and warrants to Tenant that Matthew Friedman is knowledgeable about the matters set forth in this Article 15.

ARTICLE 16
INSURANCE; WAIVER OF CLAIM

16.1 Tenant's Liability Insurance. Tenant shall maintain in force during the Term an "Excess General Liability Policy" with excess limits of not less than Ten Million and 00/100 Dollars ($10,000,000.00) for each occurrence and Twenty Million and 00/100 Dollars ($20,000,000.00) general aggregate covering bodily injury to persons, including death, and damage to property. Such excess general liability insurance may be subject to self-insured retention of $500,000.00, which amount may be revised from time to time consistent with industry standards for self-insured retention of utility companies similar to Tenant. Such insurance shall be with insurer(s) rated A VIII or better so long as Tenant is Northwest Natural Gas Company; otherwise such insurance shall be with responsible insurers acceptable to Landlord (whose acceptance shall not be unreasonably withheld or delayed). Such insurance shall provide coverage for Tenant's premises and operations, independent contractors, and contractual liability assumed in Article 17. Tenant shall cause its "Excess General Liability" insurer to name Landlord, its officers, directors, partners, employees, agents and lender as an additional insured under such insurance to the extent of Tenant's insurable contractual liability assumed in Section 17.1. The "Excess General Liability Policy" shall contain a severability of interests provision, a provision that the insurance provided to Landlord as additional insured shall be primary to and not contributory with insurance maintained by Landlord, and a provision that an act or omission of one of the insureds or additional insureds that would void or otherwise reduce coverage shall not reduce or void the coverage as to the other named and additional insureds. A certificate of insurance evidencing that the foregoing insurance is in effect shall be

delivered to Landlord prior to Tenant's occupancy of the Building, and shall be kept current throughout the Term. Such certificate shall: (i) reflect the status of Landlord and Mortgagee as additional insured, and (ii) reflect, if reasonably obtainable by endorsement, the provision of thirty (30) days' advance notice to Landlord and Mortgagee in the event of cancellation except for non-payment of premium in which case ten (10) days' notice shall be given.

16.2 Tenant's Property Insurance. Tenant shall maintain in force during the Term "Excess Property Insurance" insuring against the perils of fire, extended coverage, vandalism, malicious mischief, special extended coverage ("All Risk") and sprinkler leakage or "Special Causes of Loss" form, including "Extra Expense" coverage equal to an amount sufficient to cover Tenant's extra expenses in the event of a covered loss. This "Excess Property Insurance Policy" shall be upon (i) all personal property and trade fixtures owned by Tenant and (ii) Tenant's Work. Such "Excess Property Insurance" may be subject to self-insured retention of $250,000.00, which amount may be revised from time to time consistent with industry standards for self-insured retention of utility companies similar to Tenant. At Tenant's option, Tenant may undertake to maintain deductibles under the property insurance policy and may elect to self-insure some or all of such property to be insured. Any undertaking by Tenant to assume deductibles or self-insure property located at the Building shall not serve to adversely affect Landlord, and Landlord shall be protected against loss or damage to the property to be insured by Tenant pursuant to this Section 16.2 in the same manner as if Tenant had obtained separate insurance on such property as provided herein. For the avoidance of doubt, the waiver of subrogation described in Section 16.7 applies with respect to all losses covered by the "Property Insurance" required in this Section 16.2 as well as to deductibles or self-insurance elected by Tenant.

16.3 Tenant's Automobile Insurance. Tenant shall maintain in force during the Term "Automobile Liability Insurance" for owned, hired and non-owned automobiles with a limit of liability of $1,000,000 or Tenant may provide evidence of qualification for "Self-Insurance" in the State of Oregon reasonably acceptable to Landlord.

16.4 Tenant's Workers' Compensation Insurance. Tenant shall maintain in force during the Term "Workers' Compensation Insurance" as required in the State of Oregon which may include self-insured retention of $500,000.00, which amount may be revised from time to time consistent with industry standards for self-insured retention of utility companies similar to Tenant, or Tenant may provide evidence of qualification for "Self-Insurance" in the State of Oregon reasonably acceptable to Landlord.

16.5 Landlord's Liability Insurance. Landlord, at Landlord's expense, shall purchase and keep in force during the Term a "Commercial General Liability Policy" with limits of not less than Ten Million and 00/100 Dollars ($10,000,000.00) each occurrence and Ten Million and 00/100 Dollars ($10,000,000.00) general aggregate covering bodily injury to persons, including death, and damage to property. Such insurance shall be with responsible insurers with a financial rating comparable to or better than that of Tenant's liability insurer, and shall provide coverage for Landlord's premises and operations, independent contractors, and contractual liability assumed in Article 17. Landlord shall cause its "Commercial General Liability" insurer to name Tenant as an additional insured under such insurance to the extent of Landlord's insurable contractual liability assumed in Article 17. The

insurance policy shall contain a severability of interests provision, a provision that the insurance provided to Tenant as additional insured shall be primary to and not contributory with insurance maintained by Tenant, and a provision that an act or omission of one of the insureds or additional insureds that would void or otherwise reduce coverage shall not reduce or void the coverage as to the other named and additional insureds. A certificate of insurance evidencing that the foregoing insurance is in effect shall be delivered to Tenant prior to Tenant's occupancy of the Building, and shall be kept current throughout the Term. Such certificate shall: (i) reflect the status of Tenant as additional insured, and (ii) reflect, if reasonably obtainable by endorsement, the provision of thirty (30) days' advance notice to Tenant in the event of cancellation except for non-payment of premium in which case ten (10) days' notice shall be given.

16.6 Landlord's Property Insurance. At all times during the Term of this Lease, Landlord shall maintain a standard form property insurance policy with responsible insurers covering the Building and the Premises (but excluding Tenant's Work) against the perils of fire, extended coverage, vandalism, malicious mischief, special extended coverage ("All Risk") and sprinkler leakage or "Special Causes of Loss" form with an "Ordinance or Law Endorsement" to cover the cost of Laws mandating changes to the Building and Premises in connection with restoration after a casualty. Such insurance shall provide coverage for the full replacement value of the Building (including the Premises but excluding Tenant's Work). Proceeds of such insurance shall be used by Landlord to repair or replace the damaged portion of the Building and/or Premises as set forth in Section 12.1 above. Landlord shall use commercially reasonable efforts to collect any sums that are due to Landlord from its insurer.

16.7 Waiver of Recovery and Subrogation. Landlord and Tenant release and relieve the other from any liability it might otherwise have under any provision of this Lease and waive their entire right of recovery for loss or damage to property located within or constituting a part or all of the Building to the extent that the loss or damage either (a) is actually covered and paid by the injured party's property insurance, or (b) if the injured party fails to carry property insurance required under this Article 16, would have been covered by the property insurance the injured party is required to carry under this Article 16, whichever is greater. This waiver applies regardless of the cause or origin of the claim including without limitation loss due to the negligent acts or omissions of Landlord Parties or Tenant Parties, or their respective officers, directors, employees, agents, contractors, invitees, Tenant's assignees or Tenant's subtenants. Each of Landlord and Tenant shall have their respective property insurers endorse the applicable insurance policies to reflect the foregoing waiver of claims, provided however, that the endorsement shall not be required if the applicable policy of insurance permits the named insured to waive rights of subrogation on a blanket basis, in which case the blanket waiver shall be acceptable. For purposes of this Section 16.7, the term "Tenant" shall include any assignee or subtenant of Tenant.

16.8 Construction Insurance.

During the performance of Landlord's Work and Tenant's Work respectively, and at all times otherwise indicated by this Section 16.8, Landlord shall require its general contractor for Landlord's Work, and Tenant shall require its general contractor for Tenant's Work, to procure and maintain in effect the following insurance coverages with an insurance company or

companies rated A- or better and a financial size category of X or better, in the most recent edition of "Best's Insurance Guide" (or such lesser rating as may be approved by Landlord and Tenant in writing) and authorized to do business in the State of Oregon:

(a) "Limits of Liability" required can be complied with by evidencing "Umbrella Liability Insurance" that follows the same terms and conditions required by the "Commercial General Liability" and "Automobile Liability policies";

(b) "Worker's Compensation – Statutory Limits" for the State in which the work is to be performed. Such policy shall contain a waiver of subrogation endorsement in favor of Landlord, Tenant, each of their respective officers, directors, partners, employees and agents, and Mortgagee;

(c) "Employer's Liability Insurance" with a limit of not less than $1,000,000 "Each Accident", $1,000,000 "Disease, Policy Limit", $1,000,000 "Disease, Each Employee";

(d) "Commercial General Liability" and excess liability – at least Ten Million and 00/100 Dollars ($10,000,000.00) each occurrence and Ten Million and 00/100 Dollars ($10,000,000.00) general aggregate, including "Personal Injury", "Contractual" and "Products/Completed Operations Liability" naming the following as additional insureds for on-going and completed operations: Landlord, Tenant, each of their respective officers, directors, partners, employees and agents, and Mortgagee. Coverage must be primary and non-contributing and include the following:

(i) Premises – Operations,

(ii) Elevators and Hoists,

(iii) Independent Contractor,

(iv) Contractual Liability assumed under the construction contract,

(v) Products/Completed Operations – for a period not less than the applicable statute of repose, and

(vi) Explosion, Underground and Collapse (XUC) Coverage;

(e) Automobile Liability – Including Owned, Hired and Non-owned licensed vehicles used in connection with performance of the construction work of at least: One Million and 00/100 Dollars ($1,000,000.00) each occurrence. Such policy shall name Landlord, Tenant, each of their respective officers, directors, partners, employees, agents, and Mortgagee as additional insureds. Coverage must include the following:

(i) Owned vehicles,

(ii) Leased vehicles,

(iii) Hired vehicles, and

(iv) Non-owned vehicles;

(f) Special Coverages – Tenant or its general contractor and Landlord or its general contractor shall carry "Builder's All Risk" insurance;

(g) Landlord's and Tenant's general contractors and their subcontractors and suppliers shall be responsible for insuring their respective owned, hired and non-owned equipment and personal property;

(h) Prior to commencement of construction work, Tenant and Landlord shall furnish the other party with certificates of insurance and pertinent endorsements evidencing the coverage required under this Section 16.8, or upon requesting party's written request a copy of the insurance policies;

(i) During construction of Tenant's Work, Landlord shall give prompt notice to Tenant of all losses, damages, or injuries to any person or to property of Tenant, Landlord or third parties. Landlord shall promptly report to Tenant all such claims of which Landlord has notice, whether related to matters insured or uninsured. No settlement or payment for any claim for loss, injury or damage or other matter as to which Tenant may have an obligation for any payment or reimbursement, shall be made by Landlord without the written approval of Tenant; and

(j) The carrying of any of the insurance required hereunder shall not be interpreted as relieving the insuring party of any responsibility to the other party, and the other party does not waive any rights that it may have against the insuring party and/or its representatives for any expense and damage to persons and property (tangible and intangible) from any cause whatsoever with respect to the insuring party's work.

ARTICLE 17
INDEMNIFICATION

17.1 Tenant. Tenant shall indemnify, defend, reimburse, and hold harmless Landlord and the Landlord Parties from any and all losses, costs, damages, claims, suits, actions, or liabilities, including, without limitation, court costs and reasonable attorneys' and expert witnesses' fees (collectively, "Losses") to the extent: (a) from and after the Commencement Date, incurred in connection with or arising from any cause in or on the Rooftop Terrace and the Premises (including, without limitation, Tenant's installation, placement and removal of Tenant's Work, Alterations, fixtures and/or equipment in, on or about the Rooftop Terrace and the Premises), (b) caused by the negligence or willful misconduct of Tenant or any of its employees, agents, contractors, consultants (including architects) or invitees (collectively, the "Tenant Parties") in, on or about the Premises, Building or Land, (c) from any cause whatsoever with respect to the provision of Building security services, (d) prior to the Commencement Date, incurred in connection with or arising from any activity or work in the Building by Tenant Parties, or (e) caused by Tenant's failure to comply with applicable Laws.

This indemnity does not apply: (x) to Losses to the extent they are caused by the gross negligence or willful misconduct of Landlord and its agents, employees, contractors or invitees as to items (a), (b), (c) and (e) in the paragraph above and to the extent caused by the negligence

or willful misconduct of Landlord and its agents, employees, contractors or invitees as to item (d) in the paragraph above, or (y) to liabilities waived under Section 16.7. The foregoing indemnity is conditioned upon Landlord providing prompt notice to Tenant upon Landlord obtaining knowledge of any claim or occurrence that is likely to give rise to a claim, suit, action or liability falling within the scope of the foregoing indemnity, along with sufficient details that will enable Tenant to make a reasonable investigation of the claim.

17.2 Landlord. Landlord shall indemnify, defend, reimburse, and hold harmless Tenant and the Tenant Parties from any and all Losses: (a) from and after the Commencement Date, to the extent incurred in connection with or arising from the negligence or willful misconduct of Landlord or any of its employees, Landlord Entities (as defined below), agents, contractors, consultants (including architects) or invitees (collectively, the "Landlord Parties") in, on or about the Common Areas, (b) prior to the Commencement Date, to the extent incurred in connection with or arising from any gross negligence or willful misconduct of the Landlord Parties, or (c) as a result of Landlord's failure to comply with applicable Laws.

This indemnity does not apply: (x) to Losses to the extent they are caused by the negligent acts or omissions or willful misconduct of Tenant or any of the Tenant Parties or (y) to liabilities waived under Section 16.7 or (z) to the provision or lack of provision of Building security services should Tenant exercise its right under Section 6.5 to provide Building security services. The foregoing indemnity is conditioned upon Tenant providing prompt notice to Landlord upon Tenant obtaining knowledge of any claim or occurrence that is likely to give rise to a claim, suit, action or liability falling within the scope of the foregoing indemnity, along with sufficient details that will enable Landlord to make a reasonable investigation of the claim.

17.3 Indemnitor and Indemnitee Obligations. If any claim, action or proceeding is made or brought against any party to be indemnified under this Lease (the "Indemnitee"), for which the other party must indemnify (the "Indemnitor") such Indemnitee, then upon demand by such Indemnitee, the Indemnitor, at its sole cost and expense, shall resist or defend such claim, action or proceeding in the Indemnitee's name (if necessary), by attorneys approved by the Indemnitee, which approval shall not be unreasonably withheld. If the Indemnitor fails to diligently defend or if there is a legal conflict or other conflict of interest, then Indemnitee may retain separate counsel at the Indemnitor's expense. Notwithstanding anything herein contained to the contrary, the Indemnitor may direct the Indemnitee to settle any claim, suit or other proceeding provided that (a) such settlement shall involve no obligation on the part of the Indemnitee other than the payment of money, (b) any payments to be made pursuant to such settlement shall be paid in full exclusively by the Indemnitor at the time such settlement is reached, (c) such settlement shall not require the Indemnitee to admit any liability and (d) the Indemnitee shall have received an unconditional release from the other parties to such claim, suit or other proceeding.

17.4 Exemption of Landlord from Liability. Except to the extent caused by the gross negligence or willful misconduct of Landlord or any Landlord Parties, Landlord and the Landlord Parties shall not be liable for, and Tenant waives any claims against Landlord and the Landlord Parties, for any injury or damage (i) to persons employed or otherwise engaged by Tenant or (ii) the property of Tenant on or about the Land, whether such injury or damage is caused by or results from the following or any other cause: (a) fire, steam,

electricity, water, gas or rain; (b) the breakage, leakage, obstruction or other defects of pipes, sprinklers, wires, appliances, plumbing, air conditioning, the Building Generator, the Electrical Distribution System or lighting fixtures or any other cause or (c) any act or omission of any other party.

ARTICLE 18
ASSIGNMENT AND SUBLETTING

18.1 Assignment and Subleasing Without Consent. Without Landlord's consent:

(a) This Lease may be assigned (whether by operation of law or otherwise) or all or any part of the Premises may be sublet at any time to:

(i) the entity with which or into which Tenant may merge and Northwest Natural Gas Company is not the survivor of such merger (the surviving entity referred to herein as the "Non NW Natural Surviving Entity");

(ii) an Affiliate (a "Transferee Affiliate"), provided that both Tenant and the Affiliate (including any entity listed on Exhibit D) shall provide a certification to Landlord (x) that such Affiliate directly or indirectly controls, is controlled by or is under common control with Northwest Natural Gas Company upon the effective date of the assignment or sublease, (y) confirming that the corporate credit rating of Tenant or such Affiliate upon the effective date of the assignment or sublease exceeds the rating required with respect to delivery of a Letter of Credit as described below and (z) confirming that the Tangible Net Worth of such Affiliate upon the effective date of the assignment or sublease satisfies the requirements of subsection (B) below; or

(iii) the purchaser of substantially all of the assets of Tenant ("Asset Purchaser");

provided that, in (i) through (iii) above, (A) any such Permitted Transferee was not formed as a subterfuge to avoid the obligations of this Section 18.1, (B) such Permitted Transferee, or in the case of a sublease to a Transferee Affiliate, Tenant, shall have, as of the effective date of any such assignment, sublease, merger or other transfer, a Tangible Net Worth which is equal to or greater than the Tangible Net Worth of Northwest Natural Gas Company as of the Execution Date, (C) any such assignment or sublease shall be subject and subordinate to all of the terms and provisions of this Lease, and such Permitted Transferee shall assume to the extent there is an actual assignment of the Lease (and for avoidance of doubt, not in the case where the Lease may be deemed to be assigned pursuant to operation of law), in a written document reasonably satisfactory to Landlord and delivered to Landlord no later than ten (10) Business Days after the effective date of such assignment, all the obligations of Tenant under this Lease and (D) except in the case of a merger where Tenant is not the surviving entity, Tenant shall remain fully liable for all obligations to be performed by the "Tenant" under this Lease. In addition to the foregoing requirements in (A) – (D), if the Permitted Transferee, or in the case of a sublease to a Transferee Affiliate, Tenant, does not have on the effective date of the assignment, merger or other transfer a corporate credit rating which is equal to or greater than A- according to Standard & Poor's or

an equivalent rating from another recognized rating agency, then, as a condition to the effectiveness of the transfer of the Lease, Tenant shall be required to deliver to Landlord no later than ten (10) Business Days from the effective date of the assignment, merger or other transfer the Letter of Credit, to be held by Landlord pursuant to the terms of Article 39.

For the avoidance of doubt, no assignment of the Lease shall be deemed to have occurred if Northwest Natural Gas Company is the surviving entity of any merger transaction. Notwithstanding the above, Tenant shall have the absolute right to sublease not more than one thousand five hundred (1,500) square feet to NW Natural Gas Storage, LLC without Landlord's consent and without satisfying the above conditions related to a sublease of the Premises to an Affiliate.

(b) Tenant shall have the right, without Landlord's prior consent but subject to written notice, to sublease up to but not exceeding two (2) full floors of the Building located in the Premises (a "Permitted Sublease") to subtenants, provided that a single subtenant may not occupy and/or sublease more than one (1) floor of the Building at any given time (each, a "Permitted Sublessee"), and provided further that at the time the sublease is entered into (i) Tenant has not subleased more than two (2) full floors of the Premises (including pursuant to a Permitted Sublease) and (ii) the Permitted Sublessee (a) is not a party who would (or whose use would) detract from the character of the Building as a Class "A" office building, such as, without limitation, a dental, medical, social services, medicare, healthcare services or chiropractic office or "public facing" governmental agency (that is an agency that directly interfaces with persons that such agency serves on the Premises), (b) is not a Person who enjoys diplomatic or sovereign immunity or (c) and/or Permitted Sublease would not result in a violation of any term or provision of this Lease or otherwise cause a violation of any Law.

(c) Tenant shall provide Landlord written notice of any assignment or sublease under this Section 18.1 not less than ten (10) Business Days after the completion of such assignment or sublease.

18.2 Assignment With Consent. Except as provided in Section 18.1, Tenant may not directly or indirectly, voluntarily or by operation of law (i) assign this Lease or any interest herein or in the Premises, or mortgage, pledge, encumber, hypothecate or otherwise transfer or sublet the Premises or any part thereof or (ii) permit the use of the Premises by any party other than Tenant, including another tenant of the Building (all of the foregoing are hereinafter sometimes referred to collectively as "Transfer", and any person to whom any Transfer is made or sought to be made is hereinafter sometimes referred to as a "Transferee") without obtaining Landlord's prior written consent to the proposed Transfer in writing, which consent shall not be unreasonably withheld, conditioned or delayed. If Tenant desires to Transfer all or any portion of the Premises, Tenant shall give notice (the "Transfer Notice") thereof to Landlord, which shall be accompanied by: (1) the proposed effective date of the Transfer, which shall not be less than forty-five (45) days nor more than one hundred eighty (180) days after the date of delivery of the Transfer Notice, (2) a description of the portion of the Premises to be transferred (the "Subject Space"), (3) all of the terms of the proposed Transfer and the consideration therefor, including, without limitation, a calculation of the Transfer Premium (as such term is defined below), the name and address of the proposed Transferee, and a copy of all existing and/or proposed documentation pertaining to the proposed Transfer,

including all existing operative documents to be executed to evidence such Transfer or the agreements incidental or related to such Transfer, (4) current financial statements of the proposed Transferee certified by an officer, partner or owner thereof, and (5) any other information reasonably required by Landlord which will enable Landlord to determine the financial responsibility, character, and reputation of the proposed Transferee, nature of such Transferee's business and proposed use of the Subject Space. Landlord will respond to the Transfer Notice within ten (10) Business Days following delivery by Tenant of all of the items described in clauses (1) through (5) above, other than executed copies of the sublease or assignment agreement, as applicable (but including the substantially final form of the sublease or assignment agreement, as applicable). If Landlord fails to timely deliver to Tenant notice of Landlord's consent, or the withholding of consent, to a proposed Transfer, Tenant may send a second (2nd) notice to Landlord, which notice must contain the following inscription, in bold faced lettering: "**SECOND NOTICE DELIVERED PURSUANT TO ARTICLE 18 OF LEASE - FAILURE TO TIMELY RESPOND WITHIN FIVE (5) BUSINESS DAYS SHALL RESULT IN DEEMED APPROVAL OF TRANSFER**." If Landlord fails to deliver notice of Landlord's consent, or the withholding of Landlord's consent, to the Transfer within such five (5) Business Day period, Landlord shall be deemed to have approved the Transfer in question. Landlord's consent or refusal of consent shall be in writing and, if Landlord refuses consent, the reasons for refusal shall be stated with particularity. No Transfer shall be effective until there has been delivered to Landlord (y) a fully executed counterpart of the assignment or sublease, the form of which has been approved by Landlord and (z) a fully executed counterpart of Landlord's commercially reasonable standard Transfer consent documents. Notwithstanding the foregoing, without otherwise limiting the criteria upon which Landlord may withhold its consent to any proposed Transfer, it shall be reasonable for Landlord to withhold its consent to a Transfer if (a) the proposed Transferee is a party who would (or whose use would) detract from the character of the Building as a Class "A" office building, such as, without limitation, a dental, medical, social services, medicare, healthcare services or chiropractic office or a federal governmental office, (b) the proposed Transfer is to a federal governmental subdivision or agency or any Person who enjoys diplomatic or sovereign immunity, (c) the creditworthiness of the proposed Transferee is not reasonably acceptable to Landlord or (d) the Transfer would result in a violation of any term or provision of this Lease or otherwise cause a violation of any Law.

18.3 Effect of Transfer. If the assignment or sublease permits Tenant to recover possession of the Premises from the transferee and again take possession of the Premises as Tenant, Landlord agrees to again recognize Tenant as the "Tenant" under this Lease. Tenant's rights to assign its leasehold interest and to sublet the Premises shall be continuing rights. Accordingly, persons to whom Tenant's leasehold interest is assigned shall have the right to further assign the leasehold interest, and persons to whom the demised premises are sublet shall have the right to sub-sublet to others, subject to the provisions of this Lease.

18.4 No Release upon Assignment. Notwithstanding any assignment or subletting or any acceptance of Rent by Landlord from any Transferee, Tenant shall remain fully liable for the payment of all Rent due and for the performance of all the covenants, terms and conditions contained in this Lease on Tenant's part to be observed and performed, and any default caused by any Transferee or anyone claiming under or through any Transferee shall be deemed to be a default under this Lease by Tenant. Tenant shall indemnify, defend, protect and hold harmless Landlord from and against any and all Losses resulting from

any claims that may be made against Landlord by the Transferee or anyone claiming under or through any Transferee or by any brokers or other persons or entities claiming a commission or similar compensation in connection with the proposed assignment or sublease, irrespective of whether Landlord shall give or decline to give its consent to any proposed Transfer, or if Landlord shall exercise any of its options under this Article 18.

18.5 No Default Exists. Tenant shall not Transfer this Lease or request Landlord's consent to Transfer this Lease so long as Landlord has delivered a notice of default to Tenant and such default remains uncured. If Landlord has delivered such a notice to Tenant under this Lease prior to the effective date of such Transfer, then Landlord's consent thereto, if previously granted, shall at Landlord's election be immediately deemed revoked without further notice to Tenant, and if such Transfer would have been permitted without Landlord's consent, such permission shall be void and without force and effect until such breach or default is cured, and in either such case, any such Transfer in violation of this Section 18.5 shall constitute a Tenant Default hereunder.

18.6 Profit Sharing with Landlord. If Tenant enters into any Transfer, Tenant shall pay to Landlord: (a) in the case of a Transfer that is not a sublease, on the effective date of the Transfer, fifty percent (50%) of all sums and other consideration paid to Tenant by the Transferee for or by reason of such Transfer (including key money, bonus money and any sums paid for services rendered by Tenant to the Transferee in excess of fair market value for such services and sums paid for the sale or rental of Tenant's property, less the then fair market or rental value thereof, as reasonably determined by Landlord) after first deducting the Transaction Costs (as defined below) or (b) in the case of a sublease (including a Permitted Sublease), fifty percent (50%) of any consideration payable under the sublease to Tenant by the Transferee which exceeds on a per square foot basis the Base Rent, Operating Costs and/or other sums due and payable under this Lease accruing during the term of the sublease in respect of the sublet space (together with any sums paid for services rendered by Tenant to the Transferee in excess of fair market value for such services and sums paid for the sale or rental of Tenant's property, less the then fair market or rental value thereof, as reasonably determined by Landlord) after first deducting the monthly amount of Transaction Costs amortized on a straight line basis over the sublease term. The sums payable under this clause shall be paid by Tenant to Landlord monthly as and when due from the subtenant to Tenant. Tenant shall, within sixty (60) days of Landlord's consent to such Transfer, deliver to Landlord a list of Tenant's reasonable and actual third-party brokerage fees, legal fees, amount of free rent, tenant improvement costs and architectural fees paid or to be paid in connection with such transaction and, in the case of any sublease, any actual costs incurred by Tenant in separately demising the sublet space (collectively, "Transaction Costs"), together with a list of all of Tenant's property to be transferred to such Transferee. Tenant shall deliver to Landlord evidence of the payment of such Transaction Costs promptly after the same are paid.

The amount payable under this Section 18.6 with respect to any particular Transfer is sometimes referred to herein as the "Transfer Premium." Landlord or its authorized representatives shall have the right at all reasonable times to audit the books, records and papers of Tenant relating to the determination of whether and how much of a Transfer Premium is due, and shall have the right to make copies thereof.

Notwithstanding the foregoing, any assignment of the Lease or sublease of the Premises pursuant to Section 18.1(a) shall not be subject to a Transfer Premium.

ARTICLE 19
TENANT'S PROPERTY

19.1 Removal of Tenant's Property During Term. Tenant's trade fixtures and personal property (collectively, "Tenant's Property"), however installed or located on the Premises, shall be and remain the property of Tenant and may be removed at any time and from time to time during the Term. Tenant shall repair any damage caused by removal of Tenant's Property.

19.2 Removal of Tenant's Property at End of Term. Upon the expiration or termination of this Lease, Tenant shall remove from the Premises (i) improvements performed by or on behalf of Tenant in accordance with the terms set forth in Section 19.4 below and (ii) all of Tenant's Property. Any of Tenant's Property remaining in the Premises after expiration or termination of the Term shall be deemed abandoned by Tenant. Tenant shall repair any damage caused by removal of Tenant's Property.

19.3 No Lien. In no event (including a default under this Lease) shall Landlord have any lien or other security interest in any of Tenant's Property located in the Premises or elsewhere, and Landlord hereby expressly waives and releases any lien or other security interest however created or arising.

19.4 Surrender. Upon the expiration or earlier termination of this Lease, Tenant shall quit and surrender to Landlord the Premises and every part thereof, and any Alterations, Tenant signage or Tenant's Work not otherwise required to be removed by Tenant, broom clean and in good condition and state of repair, reasonable wear and tear and damage due to casualty or condemnation excepted. Tenant shall remove all Alterations and Tenant's Work that are specific to Tenant's use. Landlord shall identify during the process to approve Tenant's Design Documents of any components of Tenant's Work that Landlord deems to be "Specialty Improvements" that Tenant will be responsible for removing and restoring upon the expiration or earlier termination of this Lease. If Landlord fails to notify Tenant that any Alterations or Tenant's Work are Specialty Improvements, Tenant shall have no obligation to remove such Alterations or portion of Tenant's Work upon the expiration or earlier termination of this Lease. As used in this Lease, "Specialty Improvements" means any installation of any type or quantity that would not be installed by or for a typical tenant using space for general office purposes, and including, but not limited to any of the following: internal stairwells; any modifications to the Common Areas; raised floors; voice, data and other cabling; libraries, any areas requiring floor reinforcement or enhanced systems requirements; and supplemental systems and equipment used in connection therewith. If Tenant shall fail or refuse to remove all of the items required to be removed from the Premises upon the expiration or earlier termination of this Lease for any cause whatsoever or upon Tenant being dispossessed by applicable Laws or otherwise, such items shall be deemed conclusively to be abandoned and may be appropriated, sold, stored, destroyed or otherwise disposed of by Landlord without written notice to Tenant or any other party and without obligation to account for them. Tenant shall pay Landlord on demand any and all expenses incurred by Landlord in the removal of such property, including,

without limitation, the cost of repairing any damage to the Building or the Land caused by the removal of such property and storage charges (if Landlord elects to store such property).

19.5 Survival. The terms and provisions of this Article 19 shall survive the expiration or earlier termination of this Lease.

ARTICLE 20
DEFAULT

20.1 Tenant's Default. Each of the following constitutes a default by Tenant ("Tenant Default"):

(a) If Tenant shall fail to pay when due any installment of Rent or any other charge or assessment against Tenant pursuant to the terms hereof (a "Monetary Default") within ten (10) Business Days after receipt of notice of such Monetary Default from Landlord to Tenant at Tenant's notice addresses set forth in both Sections 1.1(d) and 1.1(e) hereof which notice must contain the following inscription, in bold faced lettering: "**FAILURE TO TIMELY MAKE PAYMENT AS DESCRIBED BELOW WITHIN TEN (10) BUSINESS DAYS WILL CONSTITUTE A DEFAULT UNDER THE LEASE ALLOWING LANDLORD TO TERMINATE THE LEASE**";

(b) If Tenant shall fail to perform any obligation of Tenant or to comply with any provision of this Lease, other than the payment of the Rent or any other charge or assessment payable by Tenant or compliance with the items in clauses (c) through (j) below and shall not cure such failure within thirty (30) days after notice thereof to Tenant which notice must contain the following inscription, in bold faced lettering: "**FAILURE TO TIMELY PERFORM THE LEASE OBLIGATION DESCRIBED BELOW IN ACCORDANCE WITH THE TERMS OF THE LEASE WILL CONSTITUTE A DEFAULT UNDER THE LEASE ALLOWING LANDLORD TO TERMINATE THE LEASE**", and provided that if the nature of such failure is that it cannot reasonably be cured within a thirty (30) day period, Tenant shall not be deemed to be in default if it commences such cure within such period, notifies Landlord within such period that it cannot reasonably complete such cure within thirty (30) days and thereafter diligently proceeds to cure said failure as soon as possible;

(c) If Tenant fails to deliver an estoppel in the time period set forth in Article 25 within five (5) Business Days after receipt of notice of such failure from Landlord to Tenant which notice must contain the following inscription, in bold faced lettering: "**FAILURE TO TIMELY DELIVER THE ESTOPPEL WITHIN FIVE (5) BUSINESS DAYS WILL CONSTITUTE A DEFAULT UNDER THE LEASE ALLOWING LANDLORD TO TERMINATE THE LEASE**";

(d) If Tenant fails to deliver an SAND Agreement in the time period set forth in Article 14 within five (5) Business Days after receipt of notice of such failure from Landlord to Tenant which notice must contain the following inscription, in bold faced lettering: "**FAILURE TO TIMELY DELIVER THE SAND AGREEMENT WITHIN FIVE (5) BUSINESS DAYS WILL CONSTITUTE A DEFAULT UNDER THE LEASE ALLOWING LANDLORD TO TERMINATE THE LEASE**";

(e) If Tenant shall make a general assignment for the benefit of creditors, or shall admit in writing its inability to pay its debts as they become due, or shall file a petition in bankruptcy, or shall be adjudicated as bankrupt or insolvent, or shall file a petition in any proceeding seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under any present or future Laws, or shall file an answer admitting or fail timely to contest the material allegations of a petition filed against it in any such proceeding;

(f) If a proceeding is commenced against Tenant seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under any present or future Laws, and such proceeding shall not have been dismissed within forty-five (45) days after the commencement thereof;

(g) If a receiver or trustee shall be appointed for the Premises or for all or substantially all of the assets of Tenant;

(h) If Tenant Transfers the Lease in violation of Article 18;

(i) If Tenant fails to maintain adequate insurance in accordance with the Terms of this Lease within five (5) Business Days after receipt of notice of such failure from Landlord to Tenant which notice must contain the following inscription, in bold faced lettering: "**FAILURE TO PROVIDE EVIDENCE OF INSURANCE WITHIN FIVE (5) BUSINESS DAYS WILL CONSTITUTE A DEFAULT UNDER THE LEASE ALLOWING LANDLORD TO TERMINATE THE LEASE**"; or

(j) If the LC Provider (as defined below) fails to maintain or replenish a Letter of Credit in accordance with the provisions of Article 39.

20.2 Landlord's Remedies. If a Tenant Default occurs, Landlord may do any one or more of the following, in addition to pursuing its remedies under Laws:

(a) Re-Entry. To the greatest extent allowed by applicable Laws, Landlord or the Landlord Parties may upon and with judicial process immediately or at any time thereafter re-enter the Premises, or any part thereof, and may repossess the Premises, and may remove any persons, fixtures or chattels therefrom, to the end that Landlord may have, hold and enjoy the Premises. In the event of any such retaking of possession of Premises by Landlord, Tenant shall remove all personal property located thereon and upon failure to do so upon demand of Landlord, Landlord may in addition to any other remedies allowed by Laws, remove and store the same in any place selected by Landlord, including but not limited to a public warehouse, at the expense and risk of Tenant. If Tenant shall fail to pay all sums due hereunder together with the cost of storing any such property within thirty (30) days after it has been stored, Landlord may sell any or all of such property at public or private sale and shall apply the proceeds of such sale first, to the cost of such sale; second, to the payment of the charges and expenses for re-entry, removal and storage; third, to the payment of any other sums of money that may be due from Tenant to Landlord under the terms of this Lease; and the balance, if any, to Tenant. Tenant hereby waives all claims for damages that may be caused by Landlord's re-entering and taking possession of the Premises or removing and storing or selling the property of Tenant as

herein provided, and no such re-entry shall be considered or construed to be a forcible entry. RE-ENTRY OR TAKING POSSESSION OF SAID PREMISES BY LANDLORD SHALL NOT BE CONSTRUED AS AN ELECTION ON ITS PART TO TERMINATE THIS LEASE UNLESS A WRITTEN NOTICE OF SUCH INTENTION IS GIVEN TO TENANT.

(b) Continue the Lease. Landlord may elect to continue this Lease in effect, whether or not Tenant shall have abandoned or Landlord shall have re-entered the Premises. If Landlord continues this Lease in effect, Landlord shall be entitled to enforce all Landlord's rights and remedies under this Lease, including the right to recover the Rent as the same may become due hereunder and to recover damages from Tenant in accordance with the provisions of this Section 20.2.

(c) Terminate Lease. Landlord may terminate Tenant's right to possession and use of the Premises and/or terminate this Lease, in which case Tenant shall immediately surrender possession of the Premises to Landlord and shall pay Landlord damages as provided at this Section 20.2.

(d) Monetary Damages and Recovery. Tenant shall have full liability for payment of all damages suffered by Landlord which are proximately caused by any default or breach under this Lease, whether or not such default or breach is declared by Landlord, and such elements of damage and recovery by Landlord from Tenant shall specifically include, but not be limited to:

(i) the worth at the time of award of any unpaid Rent which had been earned at the time of such termination of the Lease or possession; plus

(ii) the worth at the time of award of the amount by which the unpaid Rent which would have been earned after termination of the Lease or possession until the time of award exceeds the amount of such Rent loss that Landlord could have reasonably avoided; plus

(iii) the worth at the time of award of the amount by which the unpaid Rent for the balance of the Term after the time of award exceeds the amount of such Rent loss that Landlord could have reasonably avoided; plus

(iv) the worth at the time of award of any other amount necessary to compensate Landlord for all the detriment proximately caused by Tenant's failure to perform its obligations under this Lease or that in the ordinary course of things would be likely to result therefrom, including but not limited to, all reasonable legal expenses and other related costs incurred by Landlord following a Tenant Default, the unamortized portion of any rent abatement and leasing commission paid or incurred by Landlord related to the then current Term of this Lease which is attributable to the unexpired portion of this Lease (amortized evenly over the then current Term with eight percent (8%) interest); all reasonable costs incurred by Landlord in restoring the Premises to good order and condition, or in remodeling, renovating or otherwise preparing the Premises for reletting; all other costs incurred by Landlord in reletting the Premises, including, without limitation, any reasonable brokerage commissions, legal fees and the value of Landlord's time; and interest, late charges and administrative fees, as herein provided.

The "worth at the time of award" referred to in Paragraphs (a), (b), and (d) above will additionally include interest at the Default Rate. The "worth at the time of award" referred to in Paragraph (c) will be computed by discounting the amount at the discount rate of the Federal Reserve Bank of San Francisco in effect at the time of award, plus one percent (1%).

"Rent" shall be calculated for each month by adding (i) the monthly Base Rent and (ii) one-twelfth ($1/12^{th}$) of the Additional Rent payable by Tenant hereunder during the twelve (12) consecutive month period prior to the month in which the Tenant Default occurred (or one-twelfth ($1/12^{th}$) of the annualized amount of Additional Rent payable by Tenant for the period between the Commencement Date and the last day of the calendar month prior to the month in which the Tenant Default occurred, if such default occurs during the first twelve (12) calendar months of the Term).

Landlord shall not be obligated to relet the Premises to a particular tenant. Landlord at its option may make such physical changes to the Premises as Landlord, in its sole discretion, considers advisable or necessary in connection with any such reletting or proposed reletting. If there is other unleased space in the Building, Landlord shall have no obligation to attempt to relet the Premises prior to leasing such other space in the Building.

(e) Form of Action for Damages. To the extent permitted under Laws, Landlord may sue periodically for damages as they accrue without barring a later action for further damages. All unpaid Rent after its due date shall bear interest from the date due at the Default Rate in addition to any late charges and administration costs related to such delinquency, whether or not a default is declared.

All covenants and agreements to be kept or performed by Tenant under this Lease shall be performed by Tenant at Tenant's sole cost and expense and without any reduction of Rent subject to the terms of this Lease. Upon a Tenant Default, Landlord may, but shall not be obligated to cure such Tenant Default without waiving its right based upon any Tenant Default and without releasing Tenant from any obligations hereunder. Except as may be specifically provided to the contrary in this Lease, Tenant shall pay to Landlord, within fifteen (15) days after delivery by Landlord to Tenant of statements therefor: (i) sums equal to expenditures reasonably made and obligations incurred by Landlord in connection with the remedying by Landlord of a Tenant Default, (ii) sums equal to all losses, costs, liabilities, damages and expenses referred to in this Lease and (iii) sums equal to all expenditures made and obligations incurred by Landlord in collecting or attempting to collect the Rent that is past due or in enforcing or attempting to enforce any rights of Landlord under this Lease or pursuant to Laws, including, without limitation, all reasonable legal fees and other amounts so expended. Tenant's obligations under this Section 20.2 shall survive the expiration or sooner termination of the Term.

20.3 Landlord's Default. Each of the following constitutes a default by Landlord ("Landlord's Default"):

(a) If Landlord shall fail to make any payment required to be made by Landlord under this Lease, as and when due, where such failure continues for a period of thirty (30) days after receipt of written notice thereof from Tenant to Landlord; and

(b) If Landlord shall fail to comply with, perform or observe any of its obligations under this Lease or to correct any breach of any warranty or representation made in Article 15, Article 32, Section 11.1, Section 26.2, or Section 40.11 of this Lease and shall not cure such failure within thirty (30) days after receipt of written notice from Tenant setting forth in reasonable detail the nature and extent of the failure referencing pertinent Lease provisions, and provided that if the nature of such failure is that it cannot reasonably be cured within a thirty (30) day period, Landlord shall not be deemed in default if it commences such cure within the thirty (30) day period, notifies Tenant within such thirty (30) day period that it cannot reasonably complete such cure within thirty (30) days and thereafter diligently proceeds to cure such failure.

20.4 Tenant's Remedies. If a Landlord Default occurs, Tenant may, subject to the remaining provisions of this Lease, pursue any remedy available under applicable Laws for such Landlord Default. Except as may be expressly provided herein, nothing contained in this Lease shall be interpreted to mean that Tenant shall be excused from paying Rent or any other amount due under this Lease in the event of any alleged or actual default by Landlord. Any amounts owing to Tenant and not timely paid by Landlord shall bear interest from the date due at the Default Rate.

20.5 Self-help. If a Landlord Default occurs relating to Landlord's obligation to maintain, repair, or provide items (ii) and (v) of the Base Building Systems in Section 1.1(kk) (the "Covered Self-Help Base Building Services"), and without being obligated to do so and without waiving Landlord's Default, Tenant may notify Landlord of the Landlord Default specifying the nature in reasonable detail of the failure to maintain, repair or provide the Covered Self-Help Base Building Services (including, without limitation, any payments which Tenant believes are necessary) (each, a "Self-Help Notice"). The Self-Help Notice shall contain bold face type on the first page thereof stating the following: **URGENT — THIS IS A SELF-HELP NOTICE PURSUANT TO THE PROVISIONS OF SECTION 20.5 OF THE LEASE: IF LANDLORD FAILS TO RESPOND OR OBJECT TO TENANT'S REQUEST WITHIN FIVE (5) BUSINESS DAYS AFTER RECEIPT OF THIS NOTICE, THEN TENANT SHALL BE ENTITLED TO EXERCISE SELF-HELP RIGHTS**. If within five (5) Business Days of delivery of a Self-Help Notice Landlord has failed to respond to Tenant that Landlord has commenced to cure such default and thereafter does not cure such default within a reasonable amount of time, Tenant may, but shall not be obligated to, proceed to take the required action on behalf of, and for the account of, Landlord (including payment of monetary sums), and Landlord shall promptly reimburse Tenant for all third party reasonable costs and expenses paid or incurred on behalf of Landlord in connection with performing the obligations set forth in the Self-Help Notice. If Tenant undertakes any action pursuant to this Section 20.5, Tenant shall (i) proceed in accordance with all applicable Laws, (ii) retain to effect such actions only such reputable contractors and suppliers as are duly licensed in Portland, Oregon, provided that any and all maintenance or repair of the Building's elevators shall only be performed by Landlord's elevator contractor, (iii) effect such repairs or cause the performance of such other actions in a good and workmanlike manner, (iv) cure any liens in accordance with Article 35, (v) use new or like new materials and (vi) not take any action which would void any warranty with respect to Landlord's Work or the Base Building Systems.

20.6 Survival. The remedies permitted in this Article 20, Landlord's obligation to mitigate damages and the indemnities in Articles 17 and 26 shall survive termination or expiration of this Lease.

ARTICLE 21
NOTICES

All notices, demands or requests which may or are required to be given by one party to the other under this Lease shall be given in writing and delivered personally or sent by United States Certified Mail, postage prepaid, return receipt requested, or nationally recognized overnight air carrier, and addressed to the Landlord's Address or Tenant's Address, as the case may be. Any correspondence or notice to Tenant sent to Tenant at the Premises, or any location other than as designated in this Article 21, shall be null and void and of no force and effect, except where notice to the Premises is required by Laws. Any such notice, demand, request or other communication shall be deemed to have been given on the earlier of (a) the date of receipted delivery, refusal to accept delivery, or when delivery is first attempted but cannot be made due to a change of address for which no notice is given or (b) three (3) Business Days after it shall have been mailed as provided in this Article 21. Either party may change its address upon notice given to the other and legal counsel may deliver notices on behalf of such party.

ARTICLE 22
QUIET ENJOYMENT

Landlord covenants that, so long as this Lease has not been terminated as a result of a Tenant Default, Tenant's peaceable and quiet enjoyment of the Premises shall not be disturbed by Landlord or anyone claiming by or through Landlord.

ARTICLE 23
HOLDING OVER

If Tenant remains in possession after expiration or earlier termination of the Term without prior notice to Landlord as set forth in the last sentence of this Article 23, Tenant shall become a tenant-at-sufferance, and there shall be no renewal or extension of this Lease by operation of law. During the period of any such holding over, all provisions of this Lease shall be and remain in effect except that the monthly rental shall be one hundred twenty-five percent (125%) of the amount of Rent (including any adjustments as provided herein) payable for the last full calendar month of the Term, including renewals or extensions. The inclusion of the preceding sentence in this Lease shall not be construed as Landlord's consent for Tenant to hold over. Landlord hereby expressly reserves the right to require Tenant to surrender possession of the Premises to Landlord as provided in this Lease upon the expiration or earlier termination of this Lease. The provisions of this Article 23 shall not be deemed to limit or constitute a waiver of any other rights or remedies of Landlord provided herein or under applicable Laws. If Tenant fails to surrender the Premises upon the termination or expiration of this Lease, in addition to any other liabilities to Landlord accruing therefrom, Tenant shall protect, defend, indemnify and hold Landlord harmless from all Losses resulting from such failure, including, without limiting the generality of the foregoing, any claims made by any succeeding tenant founded upon such failure to surrender, any consequential damages and any lost profits resulting therefrom.

Notwithstanding the foregoing, Tenant may deliver written notice to Landlord no later than eighteen (18) months prior to the end of the Term that Tenant desires to remain in possession of the Premises for three (3) months after expiration of the Term in which case the Term hereunder shall be extended for such additional three (3) month period on all the terms, covenants and conditions of this Lease, except that the Base Rent payable hereunder for such three (3) month period shall increase by two and one-half percent (2.5%) of the amount of Base Rent payable for the prior full calendar month of the Term. The provisions of this Article 23 shall survive the expiration or earlier termination of this Lease.

ARTICLE 24
MEMORANDUM OF LEASE

This Lease shall not be recorded except as permitted in this Article 24. At the request of either party, the parties shall promptly execute and record, at the cost of the requesting party, a short form memorandum describing the Premises and stating this Lease's Term (including any options to extend), the Commencement Date, any other information the parties agree to include, and such other information as necessary to satisfy the notice of lease statute of the state of Oregon. Tenant may in its discretion and at its expense obtain an owner's policy of title insurance insuring its leasehold estate in the Premises, and Landlord shall reasonably cooperate at Tenant's sole cost and expense as may be reasonably required in order to obtain the issuance of such a policy; provided that, Landlord shall not be required to execute or modify any documents with respect to Tenant's title policy, including, without limitation, any document recorded in the Official Records, any owner's affidavit or other title affidavit, agreement, document or instrument required by a title or escrow company, any tax documents or an amendment or supplement to this Lease.

ARTICLE 25
ESTOPPEL CERTIFICATES

25.1 Landlord Estoppel. Upon request of Tenant at any time and from time to time, Landlord shall execute and deliver to Tenant, within ten (10) Business Days after receipt of the request, a written instrument, duly executed:

(a) Certifying that this Lease has not been amended or modified and is in full force and effect or, if there has been a modification or amendment, that this Lease is in full force and effect as modified or amended, and stating the modifications or amendments;

(b) Specifying the date to which the Rent has been paid;

(c) Stating whether to the actual knowledge of the party executing the instrument, Tenant is in default and, if so, stating the nature of the default; and

(d) Stating the Commencement Date and whether any option to extend the Term has been exercised.

25.2 Tenant Estoppel. Upon request of Landlord at any time and from time to time, Tenant shall execute and deliver to Landlord, any mortgagee or assignee of Landlord's interest in, or purchaser of, the Premises, Building or Land or any part thereof,

within ten (10) Business Days after receipt of the request, a written instrument in substantially the form attached hereto as Exhibit K or in such other commercially reasonable form as may be required by any mortgage, assignee or purchaser. Such certificate shall also include such other information as may reasonably be required by such mortgagee, assignee, purchaser or Landlord. Any such certificate may be relied upon by Landlord, any mortgagee, proposed mortgagee, assignee, purchaser and any other party to whom such certificate is addressed. Failure of Tenant to timely execute and deliver such estoppel certificate or other instruments shall constitute an acceptance of the Premises and an acknowledgment by Tenant that statements included in the form of estoppel certificate delivered by Landlord are true and correct, without exception.

ARTICLE 26
ENVIRONMENTAL PROVISIONS

26.1 Hazardous Substances; Environmental Laws. The term "Hazardous Substance" means those elements or compounds which are contained in the list of Hazardous Substances adopted by the United States Environmental Protection Agency ("EPA") or in any list of toxic pollutants designated by Congress or the EPA or which are defined as hazardous, toxic, polluted, infectious or radioactive by any other federal, state or local statute, law, ordinance, code, rule, regulation, order or decree regulating, relating to or imposing liability (including, without limitation, strict liability) or standards of conduct concerning, any hazardous, toxic or dangerous waste, substance or material, as now or at any time hereinafter in effect (collectively, "Environmental Laws").

26.2 Landlord's Obligations.

(a) Landlord represents and warrants to Tenant as of the Execution Date that:

(i) Landlord has not used, generated, manufactured, produced, stored, released, discharged or disposed of on, under or about the Premises (or off-site of the Premises that might affect the Premises) any Hazardous Substance, other than with respect to remediation related to demolition of the previously existing structures on the Land.

(ii) To Landlord's Knowledge and except as disclosed on Landlord's existing Phase I Environmental Report, (x) no underground storage tanks have been removed from the Premises and (y) no underground storage tanks are located on the Premises, other than an underground storage tank located below floor level in the southeast corner of the basement of the "Temple Building".

(b) Landlord will give prompt written notice to Tenant of:

(i) Any proceeding or inquiry by any governmental authority known to Landlord with respect to the presence of any Hazardous Substance on the Premises (or off-site of the Premises that might affect the Premises) or relating to any loss or injury resulting from any Hazardous Substance not caused by Tenant;

(ii) All claims made or threatened by any third party against Landlord or the Premises relating to any loss or injury resulting from any Hazardous Substance; and

(iii) Landlord's discovery of any occurrence or condition on the Premises (or off-site of the Premises that might affect the Premises) that could cause the Premises or any part thereof to be subject to any restrictions on occupancy or use of the Premises under any Environmental Law.

(c) Neither Landlord nor any Landlord Party will use, generate, manufacture, produce, store, release, discharge or dispose of on, under or about the Premises, Building or the Land, or transport to or from the Premises, Building or the Land, any Hazardous Substance except for such Hazardous Substances as are used, transported or stored as a consequence of constructing or operating the Building, but only so long as Landlord remains in compliance with all Environmental Laws.

(d) Landlord shall protect, indemnify, defend, reimburse, and hold harmless Tenant and its directors, officers, employees, agents, parents, subsidiaries, successors and assigns from any Losses directly or indirectly arising out of or attributable to Landlord's or any Landlord Party's use, generation, manufacture, production, storage, release, threatened release, discharge or disposal of a Hazardous Substance on, under or about the Premises (or off-site on property owned or operated by Landlord that affected the Premises) or a breach of any representation or warranty, covenant or agreement contained in this Section 26.2 including, without limitation, the costs of any required or necessary repairs, cleanup or detoxification of the Premises and the preparation and implementation of any closure, remedial or other required plans.

26.3 Tenant's Obligations. Tenant agrees that:

(a) Neither Tenant nor any Tenant Party will use, generate, manufacture, produce, store, release, discharge or dispose of on, under or about the Premises, Building or the Land, or transport to or from the Premises, Building or the Land, any Hazardous Substance except for such Hazardous Substances as are used, transported or stored as a consequence of using the Premises for those uses permitted under this Lease, but only so long as Tenant remains in compliance with all Environmental Laws.

(b) Tenant shall give prompt written notice to Landlord of:

(i) Any proceeding or inquiry by any governmental authority known to Tenant with respect to the presence of any Hazardous Substance on the Premises; and

(ii) All claims made or threatened by any third party against Tenant or the Premises relating to any loss or injury resulting from any Hazardous Substance; and

(iii) Tenant's discovery of any occurrence or condition on the Premises that could cause the Premises or any part thereof to be subject to any restrictions on occupancy or use of the Premises under any Environmental Law.

(c) Tenant shall protect, indemnify, defend, reimburse, and hold harmless Landlord and the Landlord Parties from any Losses arising out of or attributable to the use, generation, manufacture, production, storage, release, discharge, disposal or presence of a Hazardous Substance on the Premises, Building or the Land caused by Tenant and the Tenant Parties, or a breach of any representation, warranty, covenant or agreement contained in this

Section 26.3 including, without limitation, the costs of any required or necessary repairs, cleanup or detoxification of the Premises, Building or the Land and the preparation and implementation of any closure, remedial or other required plans.

26.4 Expiration or Termination of Lease. This Article 26 shall survive expiration or termination of this Lease.

ARTICLE 27
PARKING PROVISIONS

During the Term, Tenant shall have the exclusive use of the parking garage to be constructed underneath the Building (the "Parking Garage"). The Parking Garage was designed and permitted to accommodate ninety (90) standard-size cars. Landlord acknowledges that Tenant intends to park a certain number of Tenant's service vehicles in the Parking Garage and that such service vehicles are larger than a standard car. Subject to applicable Laws, Tenant shall have the right to reduce the number of parking spaces actually striped in the Parking Garage and to determine the configuration of the parking spaces and striping. Tenant shall pay Landlord a monthly fee for each striped parking space, provided, however, for purposes of determining the monthly parking charge payable to Landlord, there shall be deemed no less than eighty-five (85) parking spaces within the Parking Garage. For example, if: (i) Tenant configures the Parking Garage so that there are eighty (80) striped parking spaces, then Tenant shall nonetheless be charged for eighty-five (85) parking spaces and (ii) Tenant configures the Parking Garage so that there are eighty-eight (88) striped parking spaces, then Tenant shall be charged for eighty-eight (88) parking spaces. The initial monthly charge (i.e. the charge on the Commencement Date) for each parking space during the first Lease Year shall be Two Hundred Sixty-Five and 00/100 Dollars ($265.00) and thereafter may be increased by Landlord in accordance with market increases (the "Parking Charges"). Parking Charges shall be payable by Tenant to Landlord as Additional Rent under this Lease. Notwithstanding anything in this Article 27 to the contrary, the Parking Charges payable by Tenant in any Lease Year shall not exceed the Parking Charges for the initial Lease Year increased by three percent (3%) annually on a cumulative and compounded basis for each subsequent Lease Year through and including the applicable Lease Year for which the calculation is determined. Subject to applicable Laws, Tenant shall have the right to park more cars than actual striped spaces provided that Tenant shall be responsible at its own cost or as a part of Operating Costs for a garage attendant to coordinate the same; provided that Landlord shall receive as Additional Rent fifty percent (50%) of any deemed profits received by Tenant for parking vehicles in excess of the number of striped spaces. Profits shall be calculated based on the number of parked vehicles using such valet system in excess of the striped stalls multiplied by the Parking Charges less the operating costs actually incurred in connection with such valet service.

ARTICLE 28
ROOFTOP TERRACE

Tenant shall have exclusive use of the rooftop deck of the Building (the "Rooftop Terrace"). Tenant's use of the Rooftop Terrace shall at all times be in compliance with applicable Laws, subject to Landlord's reasonable rules or occupancy requirements with respect thereto, and on the terms and conditions set forth herein. Tenant shall not make any

improvements or alterations to the Rooftop Terrace or affix or place graphics, signs and/or insignias, and/or the like, and/or furniture, fixtures, equipment or other items of any kind whatsoever on the Rooftop Terrace (collectively, "Rooftop Terrace Property") without Landlord's consent, and subject to any terms and conditions Landlord may impose on the use and installation thereof, all in Landlord's reasonable discretion; provided that no Landlord approval of any furniture shall be required if such furniture is not visible outside of the Building. Any such Rooftop Terrace Property shall comply with the load requirements of the Rooftop Terrace (it being understood that Tenant shall not place a load upon the Rooftop Terrace that exceeds sixty (60) pounds per square foot of area "live load"). Any such Rooftop Terrace Property must be secured to the Rooftop Terrace, and the method by which any such items are secured to the Rooftop Terrace shall be subject to Landlord's prior written approval. Notwithstanding Landlord's review and approval of the method by which the Rooftop Terrace Property is secured, Tenant shall remain solely liable for any liability arising from Tenant's placement of Rooftop Terrace Property on the Rooftop Terrace, and Landlord shall have no liability in connection therewith. Landlord shall have the right of reasonable access to the Rooftop Terrace, to reasonably landscape and display plants on the Rooftop Terrace, to reasonably place furniture, fixtures and equipment thereon, to repair or maintain the Rooftop Terrace, for health and/or safety concerns which pose a risk to persons or property, and to make any reasonable, desired alterations or modifications to the Rooftop Terrace. Tenant, at its sole cost and expense, shall keep the Rooftop Terrace in a clean condition. Tenant shall remove any Rooftop Terrace Property upon the expiration or earlier termination of this Lease, and shall return the affected portion of the Rooftop Terrace to the condition that the Rooftop Terrace would have been in had no such Rooftop Terrace Property been placed or installed thereon. Tenant agrees not to permit any smoking on the Rooftop Terrace.

ARTICLE 29
RIGHT OF FIRST OFFER

29.1 One Time Right of First Offer. Landlord hereby grants to Tenant a one (1) time right of first offer to purchase the Land and the Building (collectively, the "Project") with respect to Landlord's initial sale of the Project occurring after the date which is two (2) years after the date on which a temporary certificate of occupancy is issued for the Project (the "Lockout Date"), upon the terms and conditions as set forth below; provided, however, that a sale pursuant to such right of first offer shall only be permitted to the extent that Landlord determines in its sole discretion that such sale satisfies the safe harbor from prohibited transactions under Internal Revenue Code Section 857(b)(6)(C).

29.2 Disposition Notice; Offer Notice. So long as Tenant is not in default under this Lease and has not previously defaulted under this Article 29, prior to consummating a sale of all or substantially all of the Project following the Lockout Date, Landlord shall deliver a written notice to Tenant (a "Disposition Notice"). Within thirty (30) days after Tenant's receipt of a Disposition Notice, time being of the essence, Tenant may deliver written notice (an "Offer Notice") to Landlord setting forth Tenant's offer to purchase (the "Offer") the Project, free and clear of liens for all indebtedness, for an all-cash purchase price, determined by Tenant in its sole discretion (such offered price, the "Designated Price"). If Tenant fails to timely deliver an Offer Notice, then Landlord shall have the sole and exclusive right to sell the Project without giving Tenant any further right (and Tenant hereby irrevocably

waives any such right) to purchase the Project and all of Tenant's rights under this Article 29 shall be deemed irrevocably waived and Tenant shall no longer have any further rights to purchase the Project under this Lease.

29.3 Tenant's Election.

(a) Within thirty (30) days after receipt of the Offer Notice (the "Election Period"), time being of the essence, Landlord shall provide written notice to Tenant of its election (the "Election Notice") to either (i) accept the Offer and proceed with the sale of the Project to Tenant, for an amount equal to the Designated Price and otherwise on the terms and conditions set forth in this Article 29 or (ii) reject the Offer and proceed with the sale of the Project, subject to this Article 29. If Landlord makes the election under clause (i) above to accept the Offer, then, within ten (10) days after Tenant's receipt of the Election Notice, Tenant shall deliver a non-refundable deposit to Landlord in an amount equal to five percent (5%) of the Designated Price (the "Deposit"), by wire transfer of immediately available federal funds, which amount shall be applicable to the Designated Price at closing. Failure to make the Deposit within the time period required hereunder will be deemed a withdrawal of the Offer Notice and Landlord shall have the sole and exclusive right to sell the Project without giving Tenant any further right (and Tenant hereby irrevocably waives any such right) to purchase the Project and all of Tenant's rights under this Article 29 shall be deemed irrevocably waived. If Landlord makes the election under clause (i) above to accept the Offer and Tenant makes the Deposit within such time period, then the terms set forth in Section 29.4 below shall apply.

(b) If Landlord (i) delivers an Election Notice stating that it elects to reject the Offer or (ii) does not deliver an Election Notice prior to the end of the Election Period, then Landlord shall have the sole and exclusive right and authority to sell the Project to a third party, subject to the remainder of this Article 29.

(c) If Landlord desires to sell the Project to a third party for a purchase price that is less than ninety percent (90%) of the Designated Price, Landlord shall deliver written notice to Tenant of its desire to sell the Project (a "Supplemental Disposition Notice"), which Supplemental Disposition Notice will include the new Designated Price determined by Landlord in its sole discretion. Within ten (10) days after receipt of a Supplemental Disposition Notice, time being of the essence, Tenant shall provide written notice to Landlord of Tenant's election (the "Supplemental Election Notice") to either (i) purchase the Project for an amount equal to the Designated Price set forth in the Supplemental Disposition Notice and otherwise on the terms and conditions set forth in this Article 29 or (ii) not purchase the Project. If Tenant elects to purchase the Project at such Designated Price, the terms set forth in Section 29.4 shall apply. In order for the Supplemental Election Notice to be effective, Tenant must simultaneously deliver to Landlord the Deposit, by wire transfer of immediately available federal funds, which amount shall be applicable to the Designated Price at closing. If (x) Tenant delivers a Supplemental Election Notice stating that it elects not to purchase hereunder or (y) Tenant fails to deliver either the Supplemental Election Notice or the Deposit within the required time period, time being of the essence, then Landlord shall have the sole and exclusive right to sell the Project without giving Tenant any further right (and Tenant hereby irrevocably waives any such right) to purchase the Project and all of Tenant's rights under this Article 29 shall be deemed irrevocably waived.

29.4 Procedures for Purchase. Landlord and Tenant hereby agree as follows:

(a) During the period commencing on the date of the delivery of the Election Notice (or, if applicable, Supplemental Election Notice) and ending on the ROFO Closing Date (as defined below), the Project shall continue to be operated in the ordinary course of business as if the ROFO Closing were not going to occur.

(b) The sale to Tenant shall be "as is", without any representation or warranty from Landlord.

(c) The closing of the purchase and sale contemplated by this Section 29.4 (the "ROFO Closing") shall occur thirty (30) days after Tenant's receipt of the Election Notice or Supplemental Election Notice, as applicable (the "ROFO Closing Date"), time being of the essence, unless a later date is elected by Landlord not to exceed an additional six (6) month period.

(d) At the ROFO Closing, (i) Landlord shall execute and deliver a customary warranty deed, a bill of sale and an assignment of leases and other third party contracts and (ii) Landlord and Tenant shall execute and deliver any other such documents and take such further action as shall be reasonably necessary or appropriate to consummate the transactions contemplated by this Section 29.4.

(e) At the ROFO Closing, no later than 11:00 a.m. (Pacific Time) on the date that the ROFO Closing is scheduled to occur (the "ROFO Closing Date"), Tenant shall deliver to Landlord, by wire transfer of immediately available funds, the balance of the Designated Price (net of the Deposit). The Designated Price shall be adjusted by (i) operating expenses and revenues as of the ROFO Closing Date, (ii) other customary prorations, calculated in accordance with the applicable local custom where the Project is located as of 12:01 a.m. on the ROFO Closing Date, and (iii) all other actual closing costs, including any transfer taxes, shall be allocated in accordance with local custom, with Landlord paying any closing costs that are customarily allocated to and payable by the seller and Tenant paying any closing costs that are customarily allocated to and payable by the buyer. If any of the items described in this Section 29.4(e) cannot be apportioned on the ROFO Closing Date because of unavailability of information as to the amounts that are to be apportioned or otherwise (or are incorrectly apportioned at the ROFO Closing or subsequent thereto), such items shall be apportioned or reapportioned, as applicable, as soon as practicable after the ROFO Closing or the date such error is discovered; provided, however, that neither Landlord nor Tenant shall have the right to request apportionment or reapportionment of any item at any time following the one (1) year anniversary of the ROFO Closing Date, except that any real estate tax refunds or savings received on account of any tax appeals shall be apportioned or reapportioned, as applicable, as and when received without regard to the one (1) year limitation on requesting apportionment or reapportionment as described above.

(f) Notwithstanding anything set forth herein, all existing loans and guaranties affecting the Project shall be repaid in full and/or discharged and released, as the case

may be, on or prior to the ROFO Closing Date such that the sale to Tenant shall be free and clear of all monetary liens and encumbrances.

(g) As of the ROFO Closing Tenant shall indemnify, defend and hold harmless Landlord and the Landlord Parties from and against any and all Losses relating to the Project arising or accruing from and after the ROFO Closing Date.

(h) All risk of loss from casualty or condemnation events affecting the Project shall shift to Tenant upon delivery of the Election Notice accepting the Offer, and no such casualty or condemnation event shall relieve Tenant from its obligation to consummate the purchase of the Project pursuant to this Article 29; provided, however, that all insurance proceeds and condemnation awards and claims and rights with respect thereto shall be assigned to Tenant at the ROFO Closing and there shall be no adjustments made to the Designated Price on account of such amounts, as applicable.

(i) Other than as expressly set forth in this Section 29.4, there shall be no closing conditions to the consummation of the sale.

(j) Landlord shall be permitted to effectuate an exchange of the Project as part of the sale in accordance with Section 1031 of the Internal Revenue Code or such other provision as may replace Section 1031 following the date hereof.

29.5 Remedies.

(a) The parties acknowledge and agree that if the ROFO Closing fails to occur as provided in this Article 29 (other than as set forth in Section 29.5(b) below), then Landlord shall be entitled to receive the Deposit as agreed upon liquidated damages (and not as a penalty or forfeiture) and as its sole and exclusive remedy at law or in equity, except that Landlord shall have the sole and exclusive right to sell the Project without giving Tenant any further right (and Tenant hereby irrevocably waives any such right) to purchase the Project and all of Tenant's rights under this Article 29 shall be deemed irrevocably waived. Tenant and Landlord hereby agree that Landlord's actual damages would be extremely difficult or impossible to ascertain and the amount of the Deposit is a reasonable estimate of the damages incurred by Landlord as a result of any such failure by Tenant to proceed with the closing on the ROFO Closing Date.

(b) If the ROFO Closing fails to occur because of a default by Landlord in any material respect, then Tenant, as its sole and exclusive remedy, shall have the right to elect either of the following: (x) the prompt return of the Deposit or (y) specific performance of Landlord's obligation to complete the transaction. Any action for specific performance must be commenced within thirty (30) days after the scheduled ROFO Closing Date. Except as specifically set forth in this Section 29.5(b), Tenant does hereby specifically waive any right to pursue any other remedy at law or equity for such default of Landlord, including, without limitation, any right to seek, claim or obtain actual damages, punitive damages, special damages or consequential damages.

29.6 Personal Right. The terms and provisions of this Article 29 are personal to Northwest Natural Gas Company and may not be assigned, voluntarily or

involuntarily (i) to any Person other than to any Permitted Transferee under Section 18.1(a) or (ii) separate and apart from the Lease.

29.7 Other Transfers. The terms and provisions of this Article 29 (i) shall not apply to a sale of the Project or other transfer of the Project to an Affiliate of Landlord, foreclosure by a Mortgagee or acceptance of a deed-in-lieu of foreclosure and (ii) are not binding on any successor landlord obtaining ownership of the Project pursuant to any foreclosure or deed-in-lieu of foreclosure.

ARTICLE 30
PROPERTY MANAGEMENT AND PROVISION OF SERVICES

30.1 Property Management.

Landlord shall consult with Tenant prior to selecting the property manager for the Building, provided that Landlord shall select the property manager for the Building in its sole discretion.

30.2 Tenant's Right to Adjust Provision of Services.

Tenant shall have the reasonable right to designate the level of Building services to be provided to Tenant such as day porter services, janitorial services or security services provided that the cost of such additional services shall not be deemed Controllable Operating Expenses.

ARTICLE 31
TENANT'S COMMUNICATION EQUIPMENT

31.1 Communication Equipment. During the Term of this Lease, Tenant shall have the exclusive (subject to the provisions of Section 31.5) right to install (in accordance with the provisions of Articles 9, 10 and 11 of this Lease), operate and maintain dish, antenna and other communication devices (individually and collectively, "Tenant's Telecommunication Equipment") for its own use and not for sale or rent to third parties, subject to Landlord's approval of the number of devices exceeding five (5), location and method of installation, which approval shall not be unreasonably withheld, conditioned or delayed. If there is only one (1) location on the roof for Tenant's Telecommunication Equipment which provides adequate communications (as determined by Tenant in its reasonable discretion), Tenant shall, subject to compliance with all applicable Laws, be permitted to install the Tenant's Telecommunication Equipment in that location. Tenant shall be solely responsible for obtaining and maintaining, at its sole cost and expense, all necessary governmental and regulatory approvals and any other third party approval and shall promptly provide a copy of the same to Landlord as a condition to Tenant's right to install or remove any Tenant's Telecommunication Equipment. Tenant shall be solely responsible for the cost of installing, operating, maintaining and removing Tenant's Telecommunication Equipment. Tenant's Telecommunication Equipment shall be removed from the Building on or prior to the end of the Term and Tenant shall promptly take all necessary action to repair any damage caused by such removal and to otherwise restore the Building to the condition that existed prior to the installation of the Tenant's Telecommunication Equipment reasonable wear and tear excepted.

31.2 Installation. The installing, maintaining and repairing of Tenant's Telecommunication Equipment shall be performed by Tenant or Tenant's authorized representative or contractors, at Tenant's sole cost and risk. Tenant agrees to be responsible for any damage caused to the roof or any other part of the Building arising from or related to the Tenant's Telecommunication Equipment.

31.3 Compliance. Tenant shall, at its sole cost and expense, and at its sole risk, install, operate and maintain Tenant's Telecommunication Equipment in good and workmanlike manner, and in compliance with all Laws and matters of record now in effect or hereafter promulgated, of the Federal Government, including, without limitation, the Federal Communications Commission (the "FCC"), the Federal Aviation Administration ("FAA") or any successor agency of either the FCC or FAA having jurisdiction over radio or telecommunications. Under this Lease, Landlord and its agents assume no responsibility for the licensing, operation and/or maintenance of Tenant's equipment. Neither Landlord nor any Landlord Party shall be liable to Tenant for any stoppages or shortages of electrical power furnished to Tenant's Telecommunication Equipment because of any act, omission or requirement of the public utility serving the Land and/or Building, and Tenant shall not be entitled to any rental abatement for any such stoppage or shortage of electrical power. Neither Landlord nor any Landlord Party shall have any responsibility or liability for the conduct or safety of any of Tenant's representatives, repair, maintenance and engineering personnel while in or on any part of the roof.

31.4 Equipment. All roof equipment, including, without limitation, utilities and Tenant's Telecommunication Equipment shall be screened from view with an opaque screen or fence architecturally integrated with the Building reasonably approved by Landlord.

31.5 Exclusivity Exceptions. Tenant shall not be permitted to locate any third-party telecommunications equipment on the Building roof, including, but not limited to, cellular communications equipment or wireless equipment for use by parties other than Tenant. Landlord acknowledges that during the first three (3) months after the Commencement Date ("Tenant's Exclusivity Period"), Tenant shall have the reasonable right to adjust and relocate Tenant's Telecommunication Equipment to maximize the effectiveness of signal transmission from Tenant's Telecommunication Equipment. After Tenant's Exclusivity Period, Landlord shall be permitted to locate equipment on the Building's roof, provided that in no event shall any such equipment cause (i) any signal interference or signal blockage including so called "line of sight blockage" with respect to Tenant's Telecommunication Equipment or (ii) any other interference with or interruption of Tenant's Telecommunication Equipment. If Tenant alleges that Landlord's equipment affects Tenant's Telecommunication Equipment as set forth in the foregoing sentence, then Tenant shall deliver written notice to Landlord which notice shall provide specific details regarding the nature of such interruption or interference.

ARTICLE 32
BROKERS

Landlord warrants to Tenant that the only broker that has been retained in connection with this Lease on behalf of Landlord is Melvin Mark Brokerage Company ("Landlord's Broker"). Tenant warrants to Landlord that the only broker that has been retained in connection with this Lease on behalf of Tenant is Cushman & Wakefield ("Tenant's Broker"). Landlord shall be responsible for payment of all commissions, fees and amounts owing to Landlord's Broker and Tenant's Broker ("Tenant's Broker's Commission") in connection with this Lease pursuant to separate written agreements. Landlord shall indemnify and defend Tenant against the claims of any other broker arising from Landlord's acts. Tenant shall indemnify and defend Landlord against the claims of any other broker arising from Tenant's acts.

ARTICLE 33
ARBITRATION; WAIVER OF JURY TRIAL

The parties agree that should any action, claim, controversy, or dispute (each, a "Dispute") arise between them, those Disputes shall be resolved in a court in Portland, Oregon. The parties agree that at the election of either party a Dispute relating to construction in the Building (including, without limitation, the Milestones (as defined in Exhibit E), construction of Landlord's Work and construction of Tenant's Work) may be arbitrated (each, an "Arbitrable Claim"); provided that such Dispute does not relate or arise from any of the other Disputes to be litigated pursuant to the other terms and provisions of this Article 33. An Arbitrable Claim shall be resolved by arbitration in accordance with the then effective arbitration rules of (and by filing a claim with) the American Arbitration Association and the arbitration shall occur in Portland, Oregon. The extent of Arbitrable Claims is meant to be exclusive and limited. Any Dispute that is not expressly mentioned as an Arbitrable Claim shall be resolved in a court in Portland, Oregon. For the avoidance of doubt, any and all Disputes relating to or arising from any failure to pay Rent, breaches of this Lease not expressly mentioned as an Arbitrable Claim, default by either party, or unlawful detainer and/or eviction of Tenant shall be resolved in a court in Portland, Oregon and shall not be arbitrated. Any dispute as to whether a Dispute falls within the limited list of Arbitrable Claims shall be (a) resolved without applying a presumption in favor of arbitration instead presuming the parties intended to resolve all doubts in favor of resolution by a court in Portland, Oregon and (b) adjudicated by a court in Portland, Oregon. Any arbitrator selected in connection with resolution of a Dispute of an Arbitrable Claim must be an attorney with at least ten (10) years of experience in the construction of commercial buildings in the Portland, Oregon area. AS A SPECIFICALLY BARGAINED FOR INDUCEMENT FOR EACH OF THE PARTIES HERETO TO ENTER INTO THIS LEASE (AFTER HAVING THE OPPORTUNITY TO CONSULT WITH COUNSEL), LANDLORD AND TENANT EACH HEREBY WAIVES TRIAL BY JURY IN ANY ACTION, PROCEEDING OR COUNTERCLAIM BROUGHT BY EITHER PARTY AGAINST THE OTHER ON ANY MATTER ARISING OUT OF OR IN ANY WAY CONNECTED WITH THIS LEASE, THE RELATIONSHIP OF LANDLORD AND TENANT, TENANT'S USE OR OCCUPANCY OF THE PREMISES, ANY CLAIM OF INJURY OR DAMAGE, OR ANY STATUTORY REMEDY.

ARTICLE 34
EXCULPATION

34.1 Exculpation. If Landlord fails to perform any covenant, term or condition of this Lease upon Landlord's part to be performed, and if as a consequence of Landlord's default Tenant obtains a final, non-appealable money judgment against Landlord, the judgment shall be satisfied only (a) by offset against Rent, (b) out of the proceeds of sale received upon execution of the judgment and levied thereon against the right, title and interest of Landlord in the Premises, Building, and/or Land, (c) out of rents, issues or other income receivable by Landlord, (d) out of the consideration received by Landlord from the sale or other disposition of all or any part of Landlord's right, title and interest in the Premises, Building, and/or Land or (e) out of insurance or condemnation proceeds receivable or received by Landlord. Nothing contained herein shall limit or affect any right that Tenant might otherwise have to obtain injunctive relief or other remedies or actions against Landlord that do not involve the personal liability of Landlord or of the persons that comprise Landlord to respond in monetary damages from property other than Landlord's interest in the Building, and Land where the Premises are located. In the event of any sale or transfer of the Building and/or assignment of this Lease by Landlord, Landlord shall be released and relieved of Landlord's duties, obligations or liability under any of the covenants and obligations contained in or derived from this Lease so long as the purchaser at such sale or transfer or any subsequent sale or transfer, and/or the assignee of Landlord assigns this Lease, assumes and agrees to carry out any and all of the covenants, duties and obligations of the Landlord under this Lease (the "Assumption"). In any event, Landlord shall not be released or relieved from any covenants or obligations or liability under this Lease arising or incurred prior to the date of the Assumption.

34.2 Limitation of Landlord's Liability. Landlord's partners, joint venturers, members, shareholders, directors, lenders, mortgagees, officers and employees (collectively, the "Landlord Entities") shall have no personal liability for the obligations of Landlord under this Lease. Under no circumstances shall Landlord or any of the Landlord Entities be liable for injury to Tenant's business or for any loss of income or profit therefrom. Notwithstanding anything contained in this Lease to the contrary, Landlord and the Landlord Entities shall in no event be liable to Tenant or any other person for any consequential damages, special or punitive damages, or for loss of business, revenue, income or profits even if caused by the active or passive negligence, or intentional or willful misconduct, of Landlord or any Landlord Entities, and Tenant hereby waives any and all claims for any such damages. Notwithstanding the foregoing, nothing in this Section 34.2 shall limit the liability of any Landlord Entity which acquires the Building and/or the Land under Section 34.1.

34.3 Limitation of Tenant's Liability. Tenant's partners, joint venturers, members, shareholders, directors, lenders, mortgagees, officers and employees (collectively, the "Tenant Partners") shall have no personal liability for the obligations of Tenant under this Lease. Notwithstanding anything contained in this Lease to the contrary, except as set forth in Article 23 hereof, Tenant and the Tenant Partners shall in no event be liable to Landlord or any other person for any consequential, special or punitive damages with respect to the obligations of Tenant under this Lease, even if caused by the active or passive negligence, or intentional or willful misconduct, of Tenant or any Tenant Partner, and Landlord hereby waives any and all claims for any such damages.

34.4 Survival. The provisions of this Article 34 shall survive the expiration or earlier termination of this Lease.

ARTICLE 35
REMOVAL OF LIENS

If Landlord is doing, or is having done, any work in the Premises on behalf of Tenant, and liens are placed against the Premises by any Person entitled to do so by Law and engaged in providing work, services, or materials for or to such work, Landlord has the sole and exclusive obligation to take whatever steps may be appropriate and necessary, at Landlord's sole cost and expense, to discharge, bond or otherwise remove the liens, Tenant having no such obligation whatsoever. Tenant agrees not to suffer or permit any lien of mechanics or materialmen to be placed on the Premises or the Building, and if any such lien does so attach to immediately pay, remove or bond over the same within ten (10) Business Days after Tenant receives notice of the lien pursuant to ORS 87.039. If Tenant does not timely pay, remove or bond over the lien, Landlord may satisfy the lien and the sum paid by Landlord shall constitute Additional Rent due and payable by Tenant along with interest thereon at the Default Rate.

ARTICLE 36
RULES AND REGULATIONS

Tenant shall abide by (and will use reasonable efforts to cause its employees, agents and any others permitted by Tenant to occupy or enter the Premises to abide by) the rules and regulations (the "Rules"). The initial Rules are attached hereto as Exhibit J. The Rules may be reasonably modified by Landlord during the Term and otherwise consistent with the rules and regulations of other comparable single tenant buildings in Portland, Oregon. If there is any conflict between the Rules and the provisions of this Lease, the provisions of this Lease shall prevail.

ARTICLE 37
CONFIDENTIALITY

Except as expressly permitted in this Article 37, neither Landlord, Tenant nor their respective agents, servants or employees will, without the prior written consent of the other party, disclose the terms of this Lease, which such terms, but not the mere existence of this Lease, shall be deemed confidential. The terms and conditions of this Lease will cease being confidential if, and only to the extent that, they become publicly known, except through a breach of this Lease by the receiving party. Each party will secure and protect the terms of this Lease in a manner consistent with the steps taken to protect its own trade secrets and confidential information, but not less than a reasonable degree of care. Either party may disclose the terms of this Lease where the disclosure: (A) is required by Laws or by an order of a court or by a governmental body having jurisdiction (and for avoidance of doubt, specifically including the Oregon Public Utilities Commission and the Washington Utilities and Transportation Commission), or is requested as part of a legal process, (B) is advisable or necessary under any applicable securities laws regarding public disclosure of business information, (C) is reasonably necessary and is to that party's or its Affiliates' employees, officers, directors, attorneys, contractors, accountants, investors, proposed lenders, proposed purchasers, consultants and other advisors, or to Landlord's mortgage lender and its counsel, or the disclosure is otherwise necessary for a party to exercise its rights and perform its obligations under this Lease, so long as in all cases the disclosure is no broader than necessary and the party who receives the disclosure

agrees prior to receiving the disclosure to keep the information confidential or (D) is reasonably necessary for a party to conclude a business transaction (including, without limitation, a sale of the Building or the Land or a Transfer of Tenant's interest in the Lease). If a party is required or requested to disclose the terms of the Lease under item (A) above, that party will provide reasonable notice to the other party of the requirement or request and seek a protective order or other appropriate remedy to protect the confidentiality of the Lease from public disclosure. Each party is responsible for ensuring that the terms of this Lease are kept confidential by the Person receiving the disclosure. Without limiting the generality of this Article 37, neither Landlord nor Tenant may use, including, without limitation, as part of the issuance of any press releases or similar communications, Tenant's or Landlord's, as applicable, trademarks, trade names or other proprietary identifying symbols without the prior written approval of the applicable party, which approval shall be granted or withheld in the applicable party's sole and absolute discretion; provided, however, that (i) Landlord and its Affiliates and managers shall at all times have the right to use photographs and other images of the Building in any manner Landlord or the Landlord Parties deem appropriate or desirable (whether or not Tenant's name or signage on the Building is visible therein) and (ii) the terms of this Article 37 shall not be interpreted to prevent Landlord from marketing the Building or the Land (either in connection with leasing space in, or the sale of, the Building or the Land) or from listing the Building or the Land and Tenant's name in other reports, disclosures and collateral materials (including on any website of any Landlord Parties) in a manner which is consistent with normal practices for other buildings owned by Landlord or its Affiliates. Solely as an example of the foregoing, Landlord's marketing materials may include Tenant's name listed as a tenant of the Building.

ARTICLE 38
SIGNAGE AND NAMING RIGHTS

38.1 Building Exterior Sign. So long as Tenant has not subleased more than two (2) full floors of the Premises, Tenant shall have the right to install at its expense a sign identifying Tenant by its business name and logo on the Building exterior (the "Building Exterior Sign"). The Building Exterior Sign shall be installed in compliance with the requirements of applicable Laws.

38.2 Building Interior Signage. So long as Tenant has not subleased more than two (2) full floors of the Premises, Tenant shall have the right to install at its expense a sign identifying Tenant by its business name and logo in the first floor Building lobby, in the first floor elevator bank, and in all Building elevators that have access to the reception and service floors (collectively, the "Building Interior Signs"). The Building Interior Signs shall be installed in compliance with the requirements of applicable Laws.

38.3 Building Naming Rights. So long as Tenant has not subleased more than two (2) full floors of the Premises, Landlord shall name and refer to the Building as the "NW Natural Building" or "NW Natural Gas Building" or such other name as Tenant shall designate and which is approved by Landlord in Landlord's sole discretion.

38.4 Approvals. Tenant shall be responsible for obtaining all required approvals under applicable Laws for all signs. The installation of Tenant's signage shall be subject to Tenant's receipt of all required governmental permits and approvals and shall

be subject to all applicable Laws and to any covenants, conditions and restrictions affecting the Land and/or the Building. Landlord makes no representation and is not warranting that any specific signage is permitted under applicable Laws.

38.5 Assignment of Signage Rights. The signage rights set forth in this Article 38 may not be assigned, voluntarily or involuntarily, except to a Permitted Transferee that assumes all of Tenant's obligations under the Lease, and only if such Permitted Transferee occupies not less than eight (8) full floors of the Building.

38.6 Signage Generally. The graphics, materials, color, design, lettering, lighting, size, illumination, specifications and exact location of Tenant's signage shall be subject to the prior written approval of Landlord, which approval shall not be unreasonably withheld, conditioned or delayed, and shall be consistent and compatible with the quality and nature of the Land and the Building. Tenant shall be responsible, at its sole cost and expense, for all costs associated with the design, fabrication, permitting, installation, repair, maintenance, replacement, removal of all Tenant's signs and the repair of any damage to the Building resulting from the removal of such signage. Tenant shall not be permitted to transfer any signage or naming rights to any Transferee which will utilize an Objectionable Name. "Objectionable Name" shall mean any name which relates to a Person which is of a character or reputation, or is associated with a political orientation or faction, which is inconsistent with the quality of the Land and/or the Building, or which would otherwise reasonably offend landlords of Class "A" office buildings in the Comparable Market Area. Any signs, notices, logos, pictures, names or advertisements which are installed outside of the Premises and that are not permitted by the terms of this Lease may be removed without notice by Landlord at the sole cost and expense of Tenant. Should Tenant sublease more than two (2) full floors of the Premises Landlord may require Tenant to remove any Tenant signage (including, without limitation, the Building Exterior Sign and the Building Interior Signs) within thirty (30) days of written notice from Landlord to Tenant.

ARTICLE 39
LETTER OF CREDIT

39.1 Form of Letter of Credit; Letter of Credit Amount. Should Tenant be required to provide a letter of credit to Landlord pursuant to the terms of Section 3.2(a) or Section 18.1(a), Tenant shall deliver to Landlord, as protection for the full and faithful performance by Tenant of all of its obligations under this Lease and for all losses and damages Landlord may suffer as a result of any breach or default by Tenant under this Lease, an irrevocable and unconditional negotiable standby letter of credit (the "Letter of Credit"), in a commercially reasonable form and containing the terms required herein, payable in the City of Portland, Oregon and providing for presentation of the Letter of Credit for draw purposes by facsimile, email or overnight delivery, running in favor of Landlord and issued by a bank with a long term issuer credit rating of "A-" or higher by Standard & Poor's or a comparable rating by Moody's or otherwise acceptable to Landlord in its sole discretion. The amount of the Letter of Credit shall be determined according to the credit rating (the "Credit Rating") of the person or entity required to provide the Letter of Credit (as applicable, the "LC Provider") under this Lease as follows: (a) Two Million Five Hundred Thousand and 00/100 Dollars ($2,500,000.00) if the LC Provider has a corporate credit rating which is equal to or greater than BBB+ but less than A-

according to Standard & Poor's or an equivalent rating from another recognized rating agency, (b) Five Million and 00/100 Dollars ($5,000,000.00), if the LC Provider has a corporate credit rating which is less than BBB+ but greater than BB according to Standard & Poor's or an equivalent rating from another recognized rating agency or (c) Seven Million Five Hundred Thousand and 00/100 Dollars ($7,500,000.00) if the LC Provider has a corporate credit rating which is less than or equal to BB according to Standard & Poor's or an equivalent rating from another recognized rating agency (as applicable, and as may be modified in accordance with the terms of this Lease, the "Letter of Credit Amount"). The initial Letter of Credit Amount shall be determined by the Credit Rating of the LC Provider at the time the LC Provider is first required to deliver the Letter of Credit. The Letter of Credit Amount shall be increased or decreased by the LC Provider, as applicable, to reflect the Credit Rating of the LC Provider as of the most recent Credit Rating prior to the commencement of each successive Lease Year thereafter. The issuing bank for the Letter of Credit shall be referred to herein as the "Bank". The Letter of Credit shall (i) be "callable" at sight, irrevocable and unconditional, (ii) be maintained in effect, whether through renewal or extension, for the period from the date that Tenant is required to provide the Letter of Credit and continuing until the date (the "LC Expiration Date") that is ninety (90) days after the expiration of the Term, and Tenant shall deliver a new Letter of Credit or certificate of renewal or extension to Landlord at least thirty (30) days prior to the expiration of the Letter of Credit then held by Landlord, without any action whatsoever on the part of Landlord, (iii) be fully assignable by Landlord, its successors and assigns, (iv) permit partial draws and multiple presentations and drawings and (v) be otherwise subject to the International Standby Practices 1998, International Chamber of Commerce Publication No. 590. Landlord, or its then managing agent, shall have the right to draw down an amount up to the face amount of the Letter of Credit if any of the following shall have occurred or be applicable: (1) such amount is due and owing to Landlord under the terms and conditions of this Lease, (2) Tenant has filed a voluntary petition under the U.S. Bankruptcy Code or any state bankruptcy code (collectively, the "Bankruptcy Code"), (3) an involuntary petition has been filed against Tenant under the Bankruptcy Code, (4) the Bank has notified Landlord that the Letter of Credit will not be renewed or extended through the LC Expiration Date and Tenant has not provided Landlord with a replacement Letter of Credit that satisfies the conditions of this Article 39 within thirty (30) days prior to the expiration thereof or (5) the long term rating of the Bank has been downgraded to BBB or lower (by Standard & Poor's) or Baa2 or lower (by Moody's) and Tenant has failed to deliver a new Letter of Credit from a bank with a long term issuer credit rating of A or higher (by Standard & Poor's) or a comparable rating by Moody's, and otherwise meeting the requirements set forth in this Article 39 within thirty (30) days following notice from Landlord. The Letter of Credit will be honored by the Bank regardless of whether Tenant disputes Landlord's right to draw upon the Letter of Credit. If, in accordance with the terms of this Article 39, Tenant delivers a new Letter of Credit to Landlord in accordance with the terms of this Article 39, which new Letter of Credit shall replace the existing Letter of Credit then held by Landlord hereunder, then Landlord, within five (5) Business Days after receiving the new Letter of Credit, shall return the existing Letter of Credit to Tenant, and Landlord's acceptance of the new Letter of Credit and subsequent return of the existing Letter of Credit shall be deemed to be a contemporaneous exchange.

39.2 Transfer of Letter of Credit by Landlord. The Letter of Credit shall also provide that Landlord, its successors and assigns, may, at any time and without notice to Tenant and without first obtaining Tenant's consent thereto, transfer (one or more

times) all or any portion of its interest in and to the Letter of Credit to another party, person or entity, as a part of the assignment by Landlord of its rights and interests in and to this Lease, either in connection with a sale of the Building or in connection with a financing of the Building; provided, however, any draw upon the Letter of Credit by such transferee shall be made in accordance with the terms of this Article 39 and any proceeds from such draw shall be used or applied by such transferee in accordance with the terms of this Article 39. In the event of a transfer of Landlord's interest in the Building, Landlord shall transfer the Letter of Credit to the transferee and upon transferee's assumption of the obligations under this Lease, Landlord shall, without any further agreement between the parties, be released by Tenant from all liability therefor, and it is agreed that the provisions hereof shall apply to every transfer or assignment of the Letter of Credit to a new landlord. In connection with any such transfer of the Letter of Credit by Landlord, Tenant shall, at Tenant's sole cost and expense, execute and submit to the Bank such applications, documents and instruments as may be necessary to effectuate such transfer, and Tenant shall be responsible for paying the Bank's transfer and processing fees in connection therewith.

39.3 Maintenance of Letter of Credit by Tenant. If, as a result of any drawing by Landlord on the Letter of Credit, the amount of the Letter of Credit shall be less than the Letter of Credit Amount, Tenant shall, within ten (10) Business Days after written notice of deficiency, provide Landlord with additional letter(s) of credit, in an amount equal to the deficiency (or, at Tenant's option, an amendment to the Letter of Credit reinstating the face amount of the Letter of Credit to the Letter of Credit Amount), and any such additional letter(s) of credit shall comply with all of the provisions of this Article 39, and if Tenant fails to comply with the foregoing, notwithstanding anything to the contrary contained in Article 20 of this Lease, the same shall constitute a default by Tenant. Tenant further covenants and warrants that it will neither assign nor encumber the Letter of Credit or any part thereof and that neither Landlord nor its successors or assigns will be bound by any such assignment, encumbrance, attempted assignment or attempted encumbrance. Without limiting the generality of the foregoing, if the Letter of Credit expires earlier than the LC Expiration Date, Landlord will accept a renewal thereof (such renewal letter of credit to be in effect and delivered to Landlord, as applicable, not later than thirty (30) days prior to the expiration of the Letter of Credit), which shall be irrevocable and automatically renewable as above provided through the LC Expiration Date upon substantially the same terms as the expiring Letter of Credit or such other terms as may be acceptable to Landlord in its sole discretion. However, if the Letter of Credit is not timely renewed, or if Tenant fails to maintain the Letter of Credit in the amount and in accordance with the terms set forth in this Article 39, Landlord shall have the right to present the Letter of Credit to the Bank in accordance with the terms of this Article 39, and the proceeds of the Letter of Credit may be applied by Landlord against any Rent payable by Tenant under this Lease that is not paid when due and/or for any and all damages which Landlord is entitled to recover under this Lease or at Law resulting from a default by Tenant. Any unused proceeds shall constitute the property of Landlord and need not be segregated from Landlord's other assets. Landlord agrees to pay to Tenant within thirty (30) days after the LC Expiration Date the amount of any proceeds of the Letter of Credit received by Landlord and not applied against any Rent payable by Tenant under this Lease that was not paid when due or used to pay for any losses and/or for any and all damages which Landlord is entitled to recover under this Lease or at Law resulting from a default; provided, however, that if prior to the LC Expiration Date a voluntary petition is filed by Tenant, or an involuntary petition is filed against Tenant by any of

Tenant's creditors under the Bankruptcy Code, then Landlord shall not be obligated to make such payment in the amount of the unused Letter of Credit proceeds until either all preference issues relating to payments under this Lease have been resolved in such bankruptcy or reorganization case or such bankruptcy or reorganization case has been dismissed. Landlord shall return the Letter of Credit to Tenant within ninety (90) days following the expiration or earlier termination of this Lease.

39.4 Landlord's Right to Draw Upon Letter of Credit. Tenant hereby acknowledges and agrees that Landlord is entering into this Lease in material reliance upon the ability of Landlord to draw upon the Letter of Credit upon the occurrence of any breach or default on the part of Tenant under this Lease. If Tenant shall breach any provision of this Lease or otherwise be in default hereunder, Landlord may, but without obligation to do so, and without notice to Tenant, draw upon the Letter of Credit, in part or in whole, to cure any breach or default of Tenant and/or to compensate Landlord for any and all damages of any kind or nature sustained or which Landlord is entitled to recover under this Lease or at Law resulting from Tenant's breach or default. The use, application or retention of the Letter of Credit, or any portion thereof, by Landlord shall not prevent Landlord from exercising any other right or remedy provided by this Lease or by any applicable Laws, it being intended that Landlord shall not first be required to proceed against the Letter of Credit, and shall not operate as a limitation on any recovery to which Landlord may otherwise be entitled. Tenant agrees not to interfere in any way with payment to Landlord of the proceeds of the Letter of Credit, either prior to or following a "draw" by Landlord of any portion of the Letter of Credit, regardless of whether any dispute exists between Tenant and Landlord as to Landlord's right to draw upon the Letter of Credit. No condition or term of this Lease shall be deemed to render the Letter of Credit conditional to justify the issuer of the Letter of Credit in failing to honor a drawing upon such Letter of Credit in a timely manner. Tenant agrees and acknowledges that (a) the Letter of Credit constitutes a separate and independent contract between Landlord and the Bank, (b) Tenant is not a third party beneficiary of such contract, (c) Tenant has no property interest whatsoever in the Letter of Credit or the proceeds thereof and (d) in the event Tenant becomes a debtor under any chapter of the Bankruptcy Code, neither Tenant, any trustee, nor Tenant's bankruptcy estate shall have any right to restrict or limit Landlord's claim and/or rights to the Letter of Credit and/or the proceeds thereof by application of Section 502(b)(6) of the U. S. Bankruptcy Code or otherwise.

39.5 Letter of Credit Not a Security Deposit. Landlord and Tenant acknowledge and agree that in no event or circumstance shall the Letter of Credit or any renewal thereof or any proceeds thereof be (i) deemed to be or treated as a "security deposit" or (ii) intended to serve as a "security deposit". The parties hereto (A) recite that the Letter of Credit is not intended to serve as a security deposit and any Laws applicable to security deposits in the commercial context ("Security Deposit Laws") shall have no applicability or relevancy thereto and (B) waive any and all rights, duties and obligations either party may now or, in the future, will have relating to or arising from the Security Deposit Laws.

ARTICLE 40
ADDITIONAL PROVISIONS

40.1 Successors. This Lease shall bind and inure to the benefit of Landlord, its successors and assigns, and Tenant and its permitted successors and assigns.

40.2 Severability. If any provision of this Lease is determined to be invalid or unenforceable, then that provision and the remainder of this Lease shall continue in effect and be enforceable to the fullest extent permitted by Law. It is the intention of the parties that if any provision of this Lease is capable of two constructions, one of which would render the provision void, and the other of which would render the provision valid, then the provision shall have the meaning that renders it valid.

40.3 Integration. This Lease contains the entire integrated agreement between the parties as to the Premises, and supersedes any oral statements or representations or prior written matter not contained in this instrument. This Lease shall not be modified except by a written document signed by both parties.

40.4 Governing Law. This Lease shall be governed by and construed and enforced in accordance with the laws of the State of Oregon.

40.5 No Waiver. Failure of either party to complain of any act or omission on the part of the other, no matter how long the same may continue, shall not constitute a waiver of any rights under this Lease. No waiver by either party of any breach of any provisions of this Lease shall be deemed a waiver of a breach of any other provision of this Lease or a consent to any subsequent breach of the same or any other provision. If any action of any party requires the consent or approval of the other, consent or approval given on one occasion shall not be deemed a consent to or approval of that action on any other occasion. No extension of time for performance of any obligation or act shall be deemed an extension of the time for performance of any other obligation or act.

40.6 Construction. Captions are solely for the convenience of the parties and are not a part of this Lease. This Lease shall not be construed as if it had been prepared by one of the parties, but rather as if both parties had prepared it.

40.7 Time. Time is of the essence of every provision of this Lease.

40.8 Cumulative Remedies. The rights and remedies that either party may have under this Lease or at law or in equity, upon any breach, are distinct, separate and cumulative and shall not be deemed inconsistent with each other, and no one of them shall be deemed to be exclusive of any other.

40.9 Protest. If a dispute arises with respect to the performance of any obligation including an obligation to pay money, the party against which the obligation is asserted shall have the right to perform the obligation under protest. Performance of an obligation under protest shall not be regarded as voluntary performance. A party that has performed under protest shall have the right to institute a lawsuit to recover any amount paid or the reasonable cost of otherwise complying with the disputed obligation.

40.10 Execution; Binding Effect. This Lease shall not be effective or binding on the parties until it has been signed by both Landlord and Tenant.

40.11 Authority. Each party represents to the other that the person signing this Lease on its behalf is properly authorized to do so without any further consent or approval required from any other Person or governmental entity, and in the event this Lease is signed by an agent or other third party on behalf of Landlord, written authority to sign on behalf of Landlord in favor of the agent or third party shall be provided to Tenant either prior to or simultaneously with the return to Tenant of a fully executed copy of this Lease.

40.12 Force Majeure. Performance by Landlord or Tenant of their obligations under this Lease shall be extended by the period of delay caused by Force Majeure. "Force Majeure" includes, without limitation, war, natural catastrophe, casualty, strikes, walkouts or other labor disturbance, order of any government, non-customary delays in receipt of permits or any governmental approvals in excess of customary time periods in Portland, Oregon (except with respect to the Permit Milestone), adverse weather conditions, lockouts, fire, earthquake, unknown subsurface conditions, lack of available materials or adequate substitutes therefor, court or regulatory body exercising jurisdiction in an adverse manner over the Land, shortages, blockade, embargo, riot, civil disorder, or any similar cause beyond the reasonable control of the party who is obligated to render performance (but excluding financial inability to perform, however caused). If adverse weather conditions are the basis for a Force Majeure claim for additional time, such claim shall be valid only to the extent documented by data substantiating that weather conditions were (1) abnormal (as defined below) for the period of time, (2) had an adverse effect on the scheduled construction and (3) with respect to Landlord's Work only, had an adverse effect on the scheduled construction by more than ten (10) days in the aggregate. "Abnormal" weather shall, for purposes of this definition, be limited to circumstances in which adverse weather conditions significantly exceed those which have historically been encountered, or may reasonably be expected to be encountered, at the Land. Solely with respect to the determination of whether Landlord satisfies the Permit Milestone (as defined in Exhibit E), Force Majeure shall not include any delays in receipt of permits or any governmental approvals.

40.13 Attorneys' Fees. If legal proceedings are initiated to enforce any term of this Lease, to recover any Rent due under this Lease, for the breach of any covenant or condition of this Lease, or for the restitution of the Premises to Landlord and/or eviction of Tenant, the prevailing party shall be entitled to recover, as an element of its cost of suit and not as damages, reasonable attorneys' fees and costs to be fixed by the court or arbitrator.

40.14 Joint and Several Liability. If Tenant comprises more than one person, corporation, partnership or other entity, the liability hereunder of all such persons, corporations, partnerships or other entities shall be joint and several.

40.15 Financial Statements. Upon Landlord's written request therefor, but not more often than two (2) times per year, Tenant shall promptly furnish to Landlord its financial statements for its most recent fiscal quarter and fiscal year prepared in accordance with GAAP and certified by a firm of nationally recognized certified public accountants as fairly presenting the financial condition of Tenant and the results of its operations for the previous fiscal quarter or previous fiscal year, which statement Landlord agrees to keep confidential and not use except in connection with Landlord's administration and monitoring of

this Lease and any proposed sale, loan or other transactions related to the Building. Notwithstanding the foregoing, for so long as Tenant's (but not any Affiliate of Tenant's) stock is publicly traded on a nationally recognized stock exchange and Tenant's financial statements are publicly filed, the foregoing requirement shall be inapplicable to Tenant.

40.16 Relationship of Parties. Nothing contained in this Lease shall be deemed or construed by the parties hereto or by any third party to create the relationship of principal and agent, partnership, joint venture or any association between Landlord and Tenant, it being expressly understood and agreed that neither the method of computation of Rent nor any act of the parties hereto shall be deemed to create any relationship between Landlord and Tenant other than the relationship of landlord and tenant.

40.17 Application of Payments. Landlord shall have the right to apply payments received from Tenant pursuant to this Lease, regardless of Tenant's designation of such payments, to satisfy any obligations of Tenant hereunder, in such order and amounts as Landlord, in its sole discretion, may elect.

40.18 Tax Status of Beneficial Owner. Tenant recognizes and acknowledges that Landlord and/or certain beneficial owners of Landlord may from time to time qualify as real estate investment trusts pursuant to Sections 856, et seq. of the Internal Revenue Code and that avoiding (a) the loss of such status, (b) the receipt of any income derived under any provision of this Lease that does not constitute "rents from real property" (in the case of real estate investment trusts) and (c) the imposition of income, penalty or similar taxes (each, an "Adverse Event") is of material concern to Landlord and such beneficial owners. In the event that this Lease or any document contemplated hereby could, in the opinion of counsel to Landlord, result in or cause an Adverse Event, Tenant agrees to reasonably cooperate with Landlord in negotiating an amendment or modification thereof and shall at the request of Landlord execute and deliver such documents reasonably required to effect such amendment or modification. Any amendment or modification pursuant to this Section 40.18 shall be structured so that the economic results to Landlord and Tenant are the same as those set forth in this Lease without regard to such amendment or modification and Tenant's rights, interests and obligations under the Lease will not be materially and adversely affected by such amendment or modification. Without limiting any of Landlord's other rights under this Section 40.18, Landlord may waive the receipt of any amount payable to Landlord hereunder and such waiver shall constitute an amendment or modification of this Lease with respect to such payment. Tenant expressly covenants and agrees not to enter into any Transfer which provides for rental or other payment for such use, occupancy, or utilization based in whole or in part on the net income or profits derived by any person from the property leased, used, occupied, or utilized (other than an amount based on a fixed percentage or percentages of receipts or sales), and that any such purported Transfer shall be absolutely void and ineffective as a conveyance of any right or interest in the possession, use, occupancy, or utilization of any part of the Premises.

[SIGNATURE AND NOTARY PAGES FOLLOW]

[SIGNATURE AND NOTARY PAGES]

IN WITNESS WHEREOF, Landlord and Tenant execute this Lease as of the dates set forth below.

LANDLORD:

THIRD AND TAYLOR OFFICE OWNER, LLC,
a Delaware limited liability company

Date: October 10, 2017

By: Walter P Sch
Name: Walter P. Schmidt
Title: Authorized Signatory

TENANT:

NORTHWEST NATURAL GAS COMPANY,
an Oregon corporation

Date: October ___, 2017

By: _____
Name: David Anderson
Title: President

Landlord's Notary Page

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

ACKNOWLEDGMENT

STATE OF ~~CALIFORNIA~~ New York)
:ss.
COUNTY OF Nassau)

On October ___, 2017, before me, Laryn Greenwood, Notary Public, personally appeared Walter P. Schmidt, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacities, and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY of PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Notary Public

LARYN GREENWOOD
Notary Public - State of New York
NO. 01GR6185146
Qualified in Nassau County
My Commission Expires May 14, 2020

[SIGNATURE AND NOTARY PAGES]

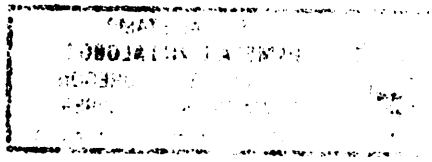
IN WITNESS WHEREOF, Landlord and Tenant execute this Lease as of the dates set forth below.

LANDLORD:

THIRD AND TAYLOR OFFICE OWNER, LLC,
a Delaware limited liability company

Date: October ___, 2017

By: _____
Name: _____
Title: _____



TENANT:

NORTHWEST NATURAL GAS COMPANY,
an Oregon corporation

Date: October 9, 2017

By: _____
Name: David Anderson
Title: President

Tenant's Notary Page

STATE OF OREGON)
) ss.
County of Multnomah)

The foregoing instrument was acknowledged before me this 9th day of October, 2017, by David Anderson, the President & CEO of Northwest Natural Gas Company, an Oregon corporation.

Pamela L. Villalobos
Notary Public
My commission expires: October 8, 2018

OFFICIAL STAMP
PAMELA L VILLALOBOZ
NOTARY PUBLIC - OREGON
COMMISSION NO. 932989
MY COMMISSION EXPIRES OCTOBER 08, 2018

Exhibit A

PREMISES

[SEE ATTACHED]

Exhibit A – Premises
Page 1 of 13 pages

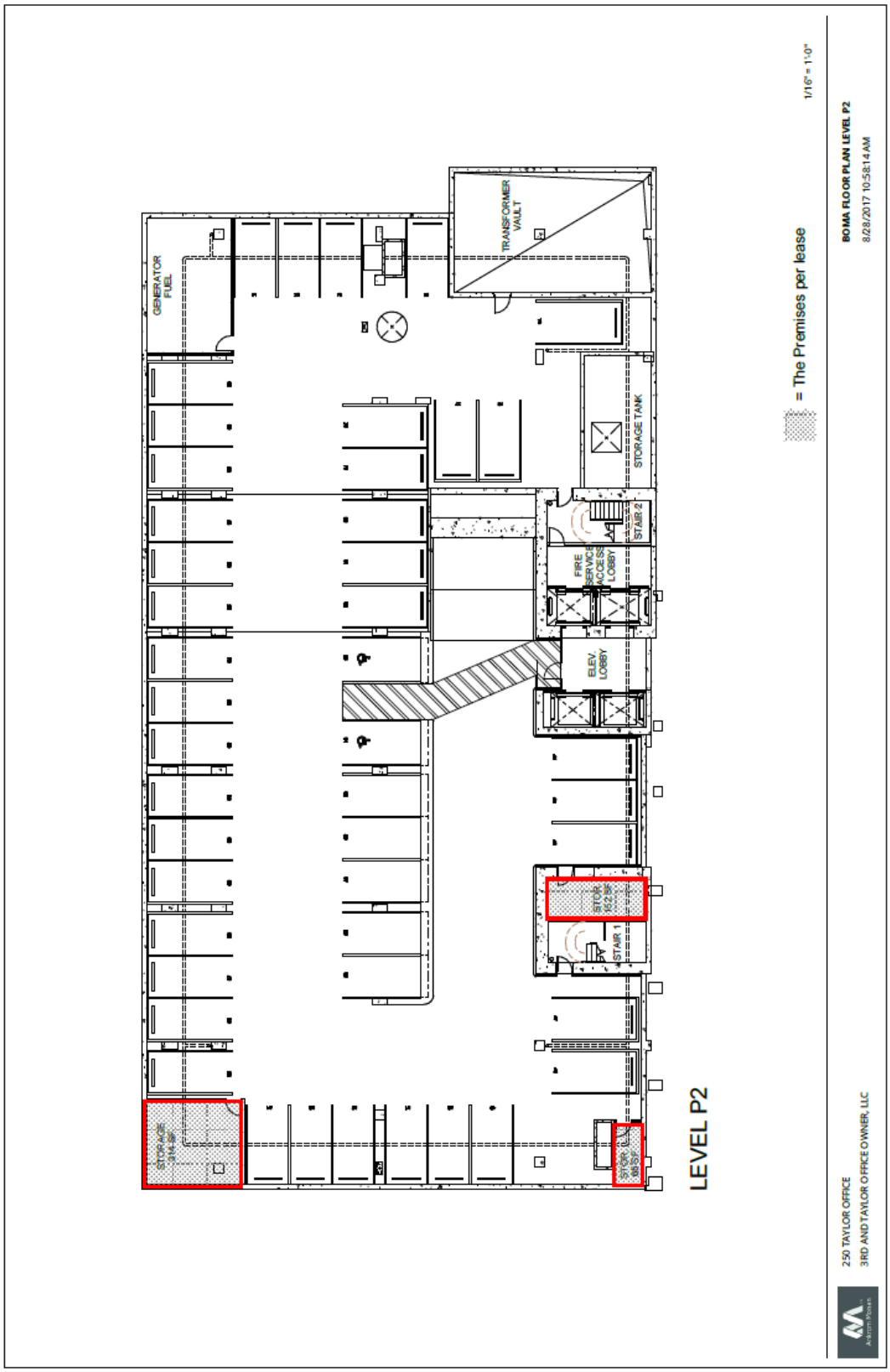
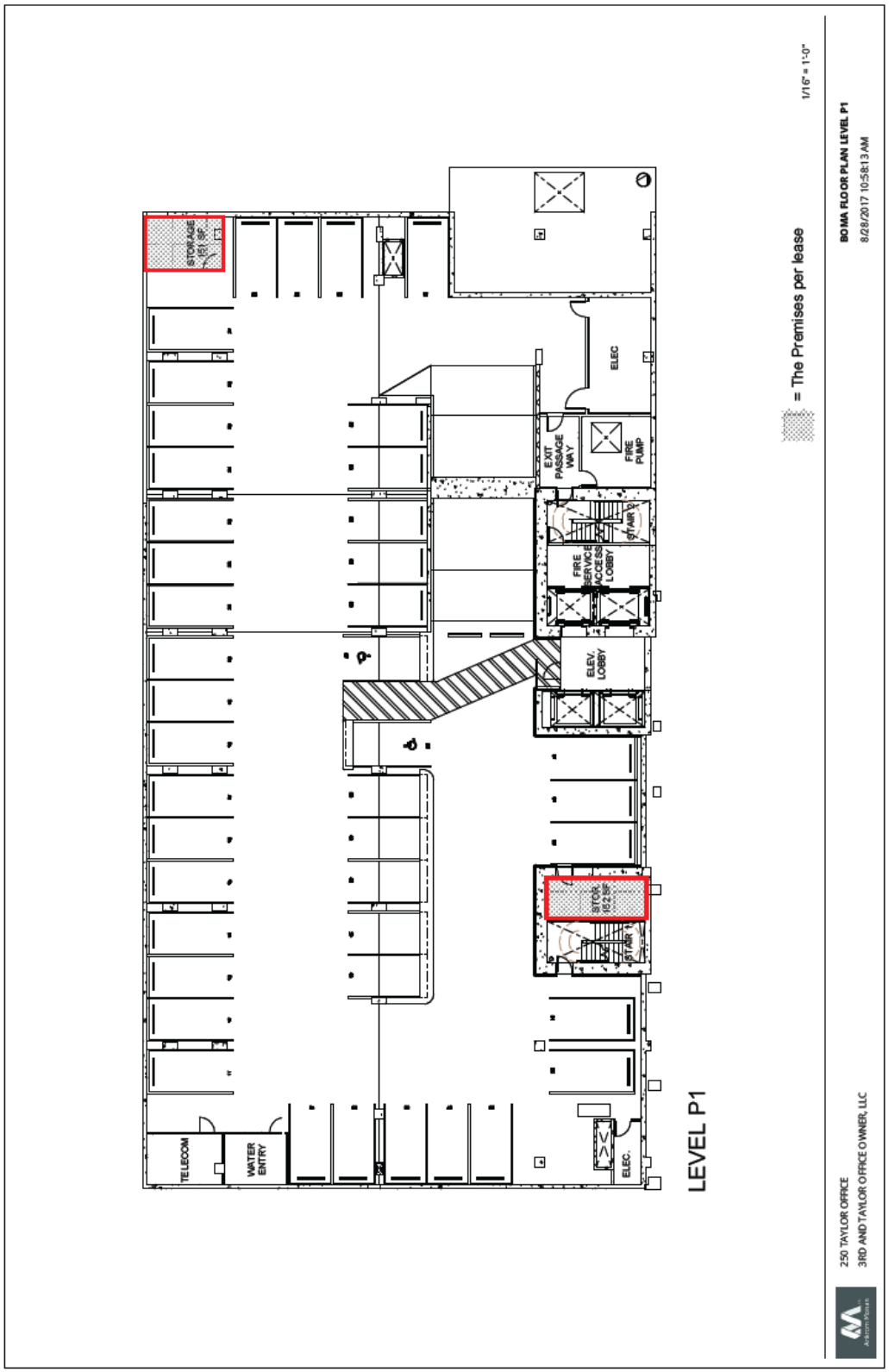
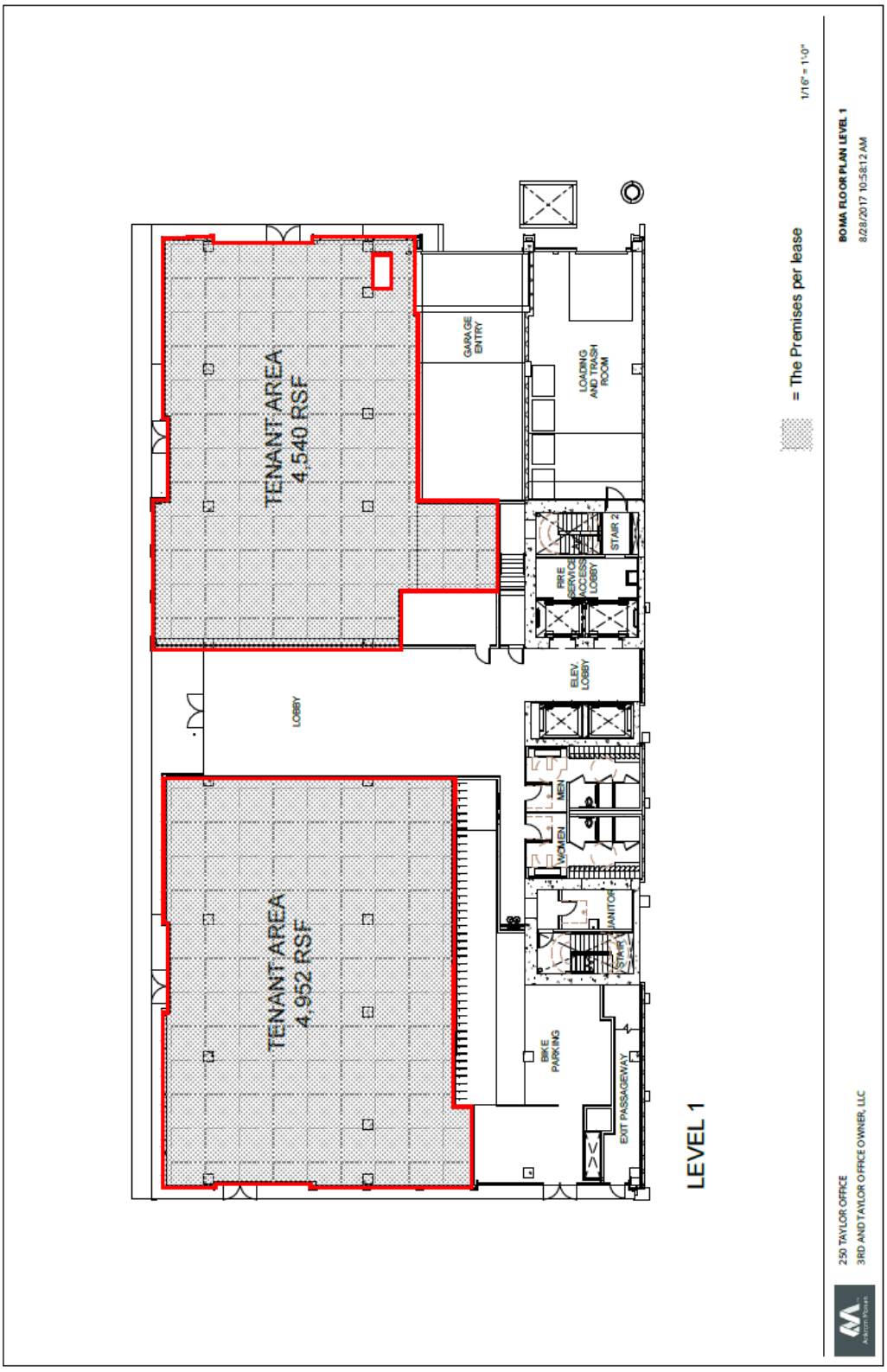
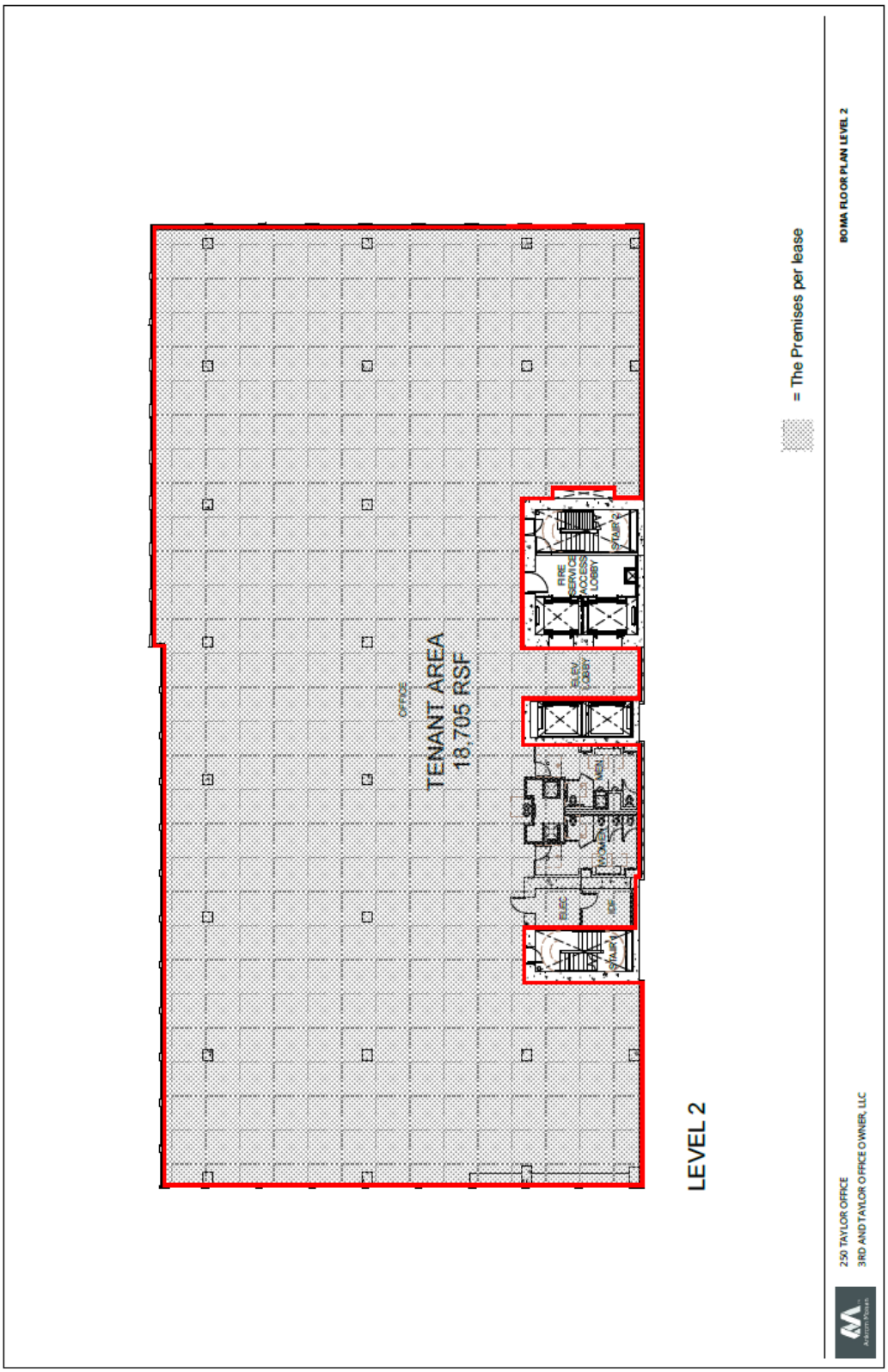
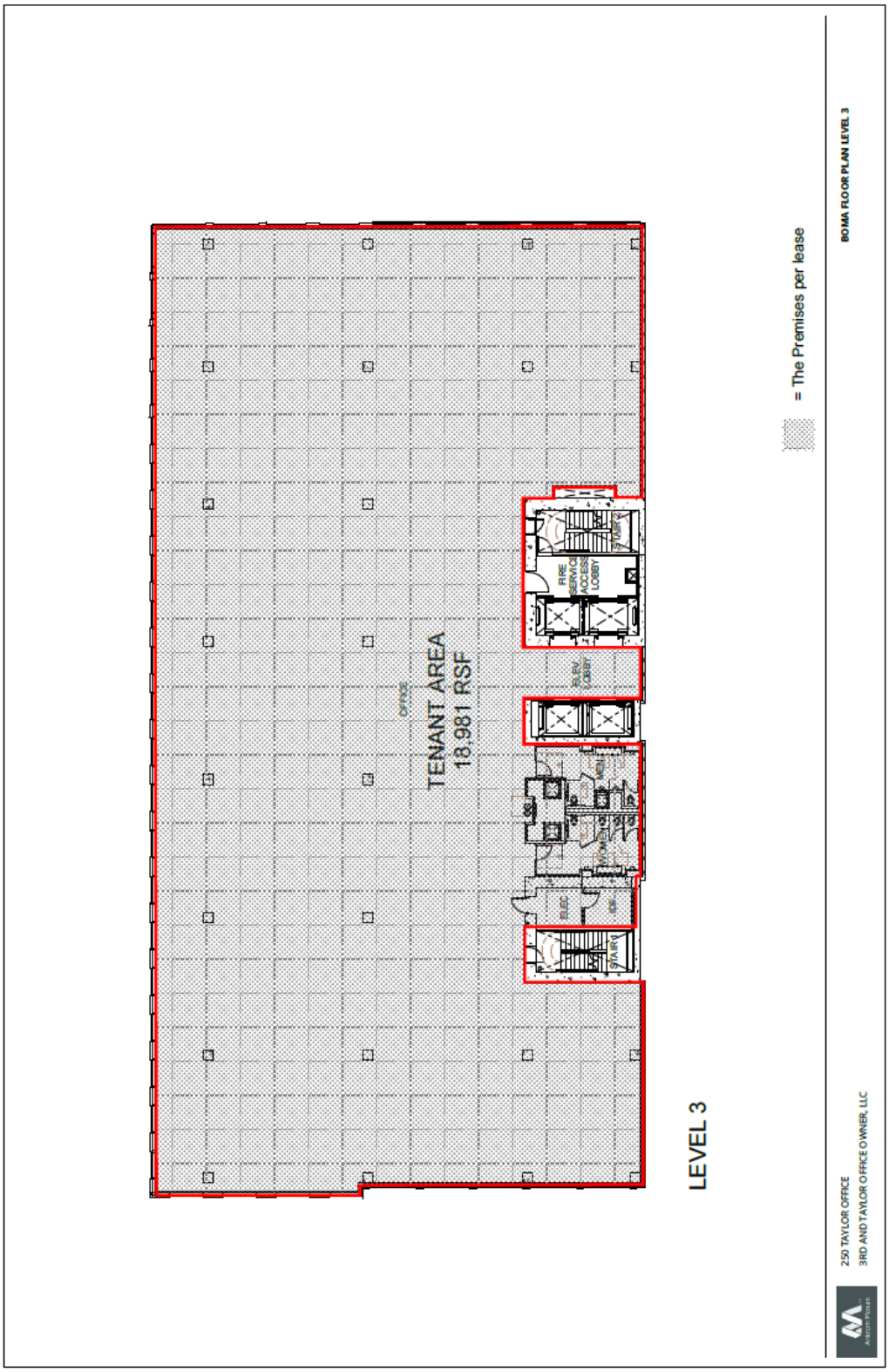


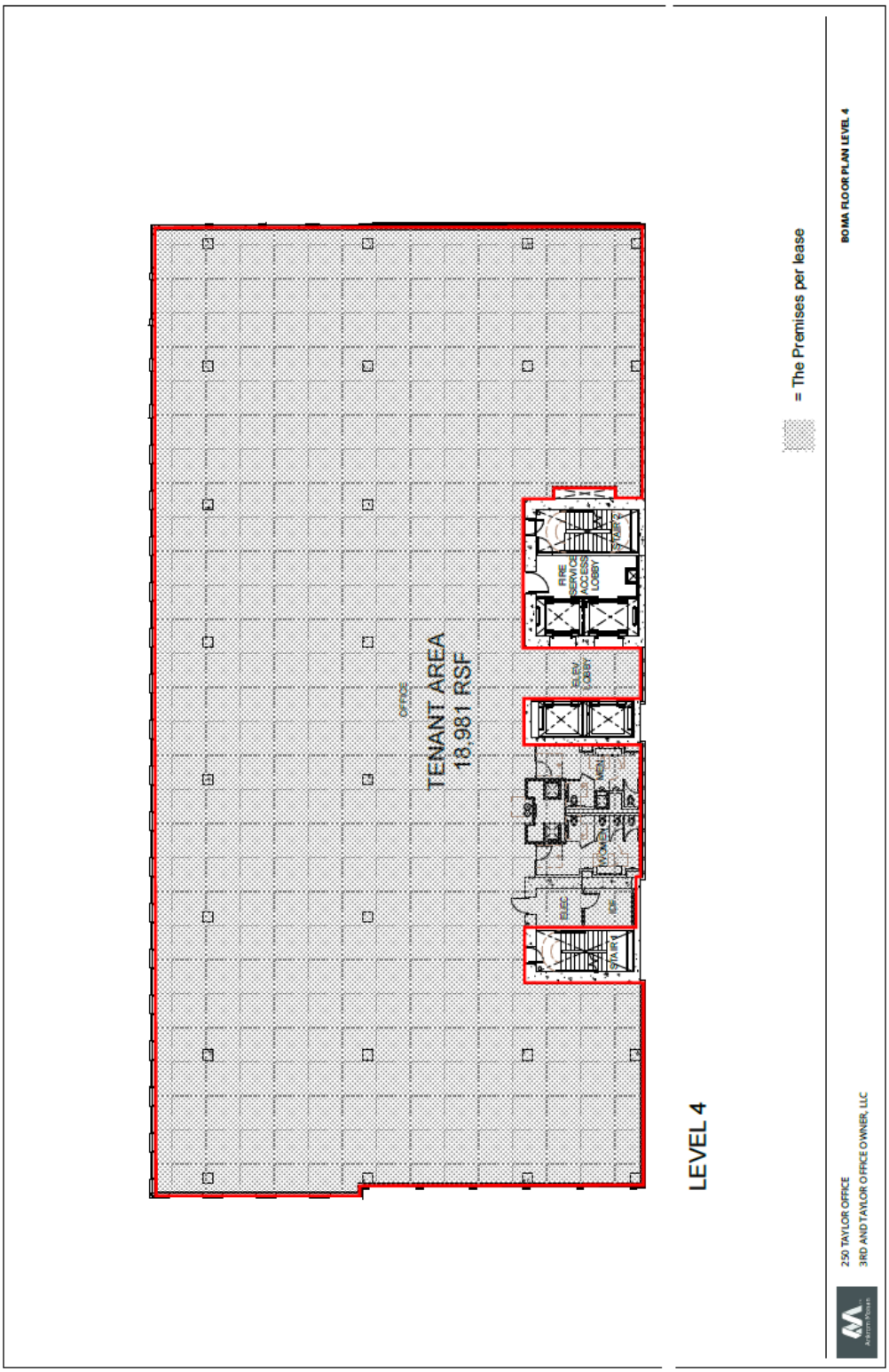
Exhibit A – Premises
Page 2 of 13 pages

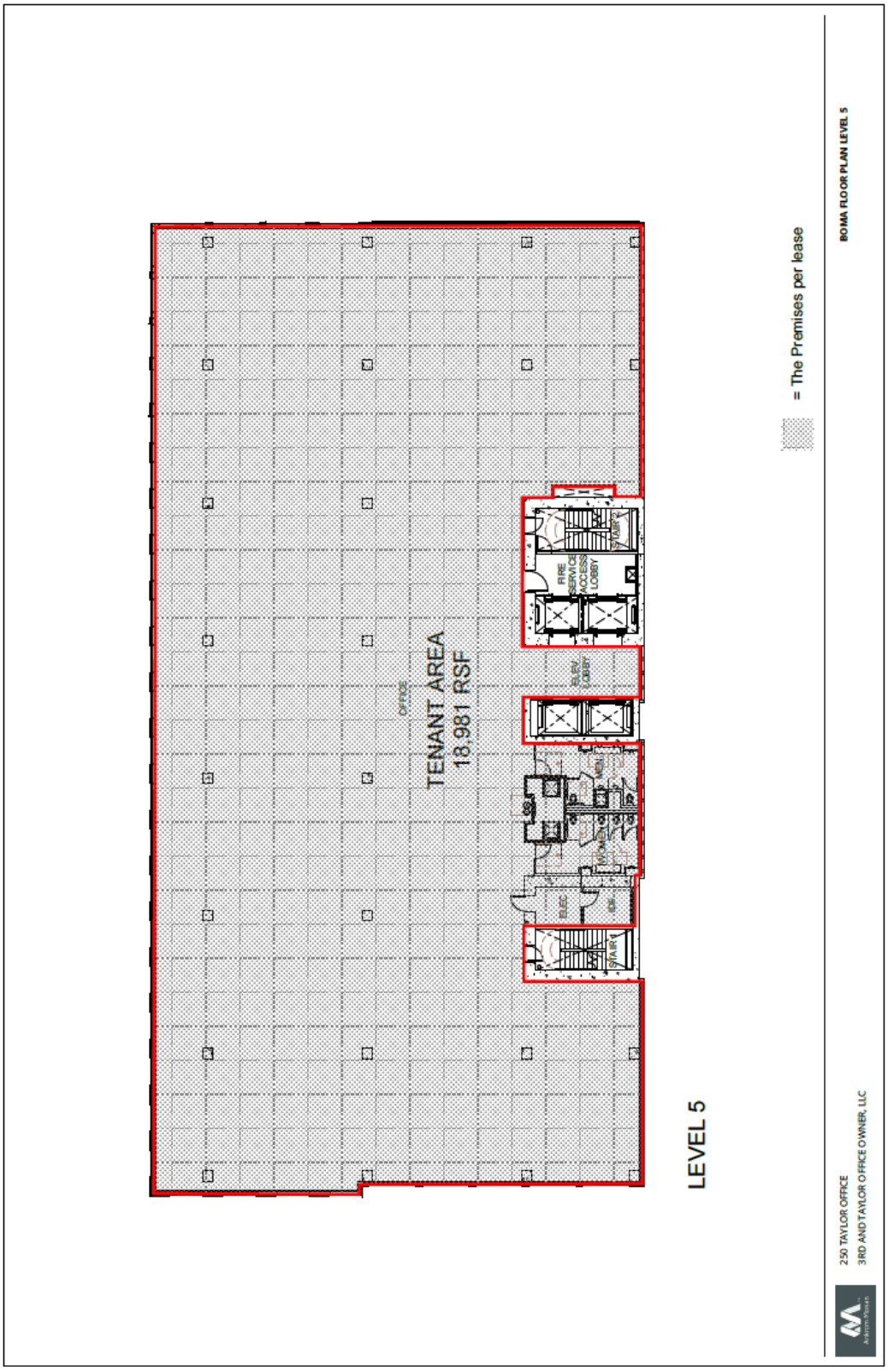


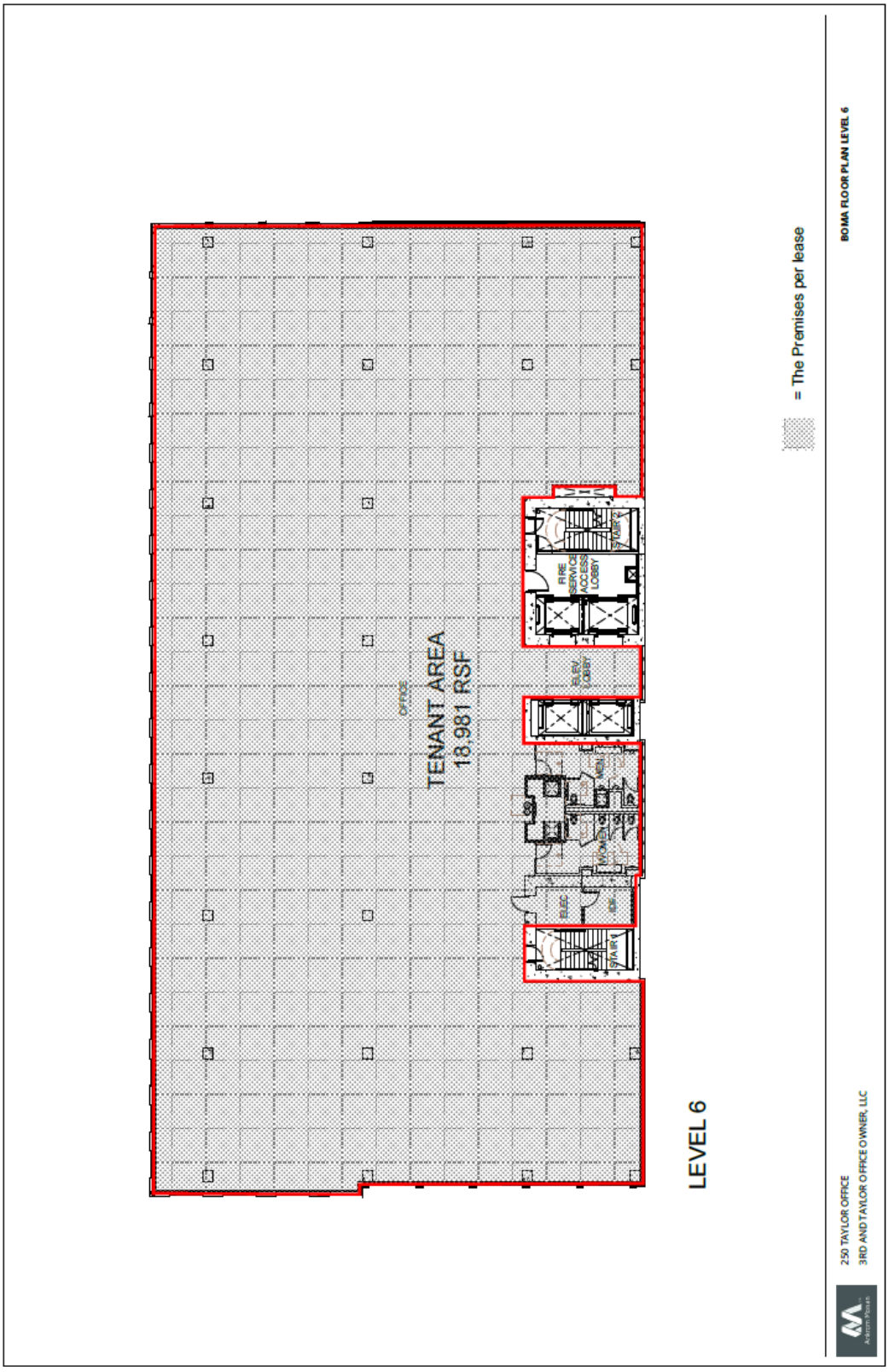

TENANT AREA
4,540 RSF
TENANT AREA
4,952 RSF
GARAGE ENTRY
LOADING AND TRASH ROOM
STAIR 2
FIRE SERVICE ACCESS LOBBY
ELEV. LOBBY
LOBBY
MEN
WOMEN
JANITOR
STAIR 1
BIKE PARKING
EXIT PASSAGEWAY
LEVEL 1
= The Premises per lease
1/16" = 1'-0"
BOMA FLOOR PLAN LEVEL 1
8/28/2017 10:58:12 AM
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC


BOMA FLOOR PLAN LEVEL 2
= The Premises per lease
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC
LEVEL 2
TENANT AREA
18,705 RSF
OFFICE
FIRE SERVICE ACCESS LOBBY
STAIR
ELEV LOBBY
ELEC
WOMEN
MEN

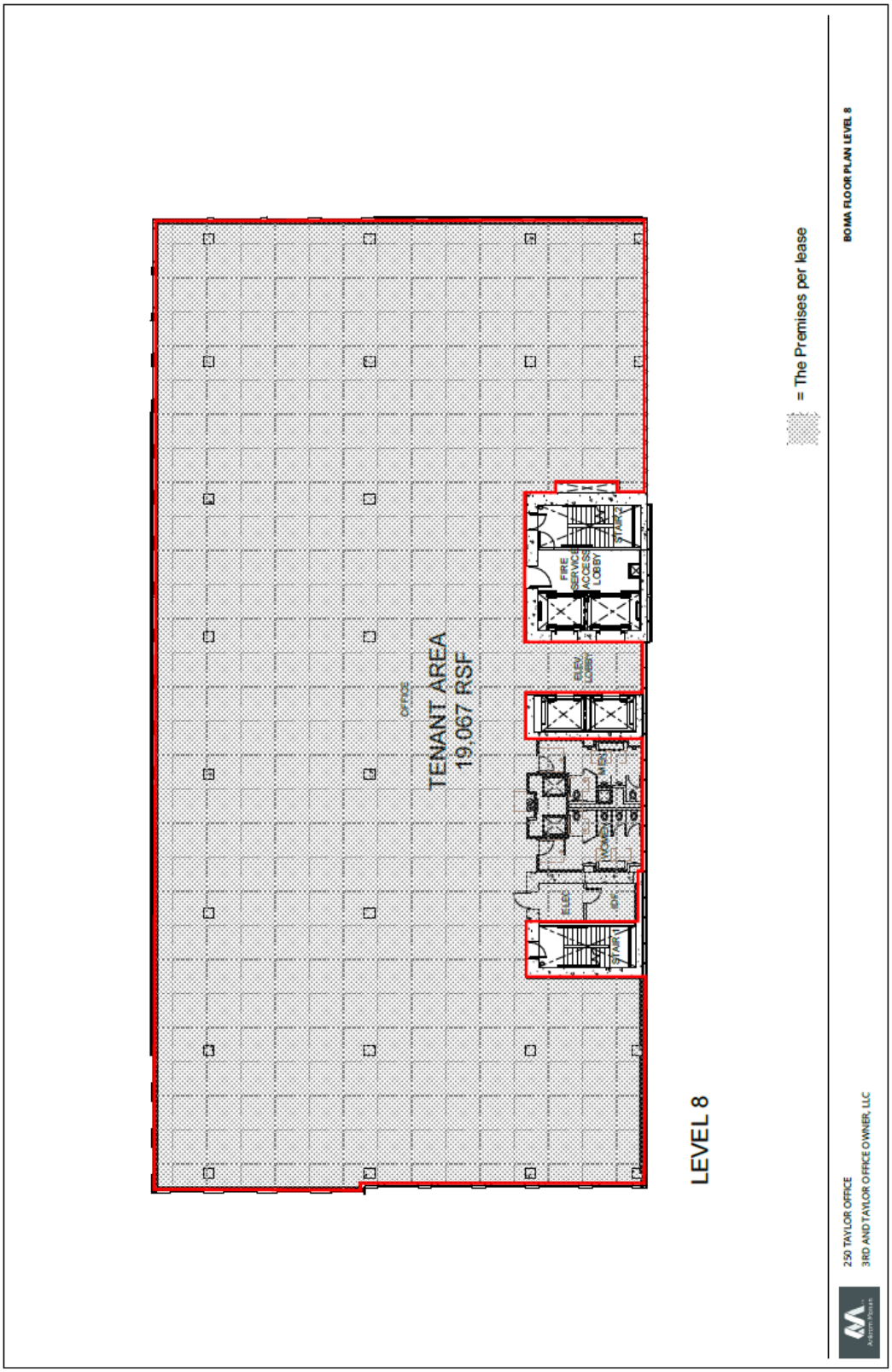

TENANT AREA
18,981 RSF
LEVEL 3
= The Premises per lease
BOMA FLOOR PLAN LEVEL 3
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC

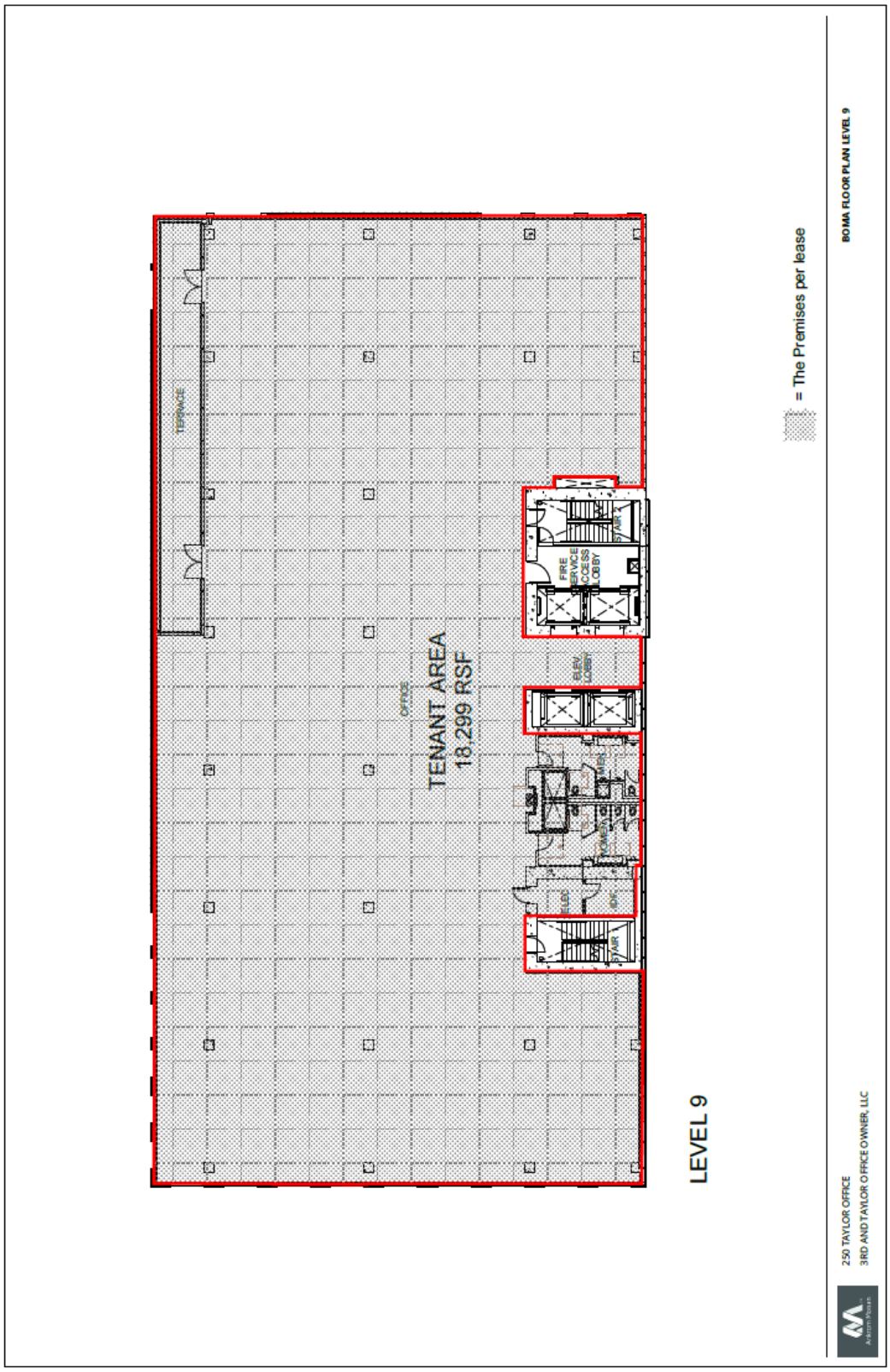

TENANT AREA
18,981 RSF
LEVEL 4
= The Premises per lease
BOMA FLOOR PLAN LEVEL 4
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC

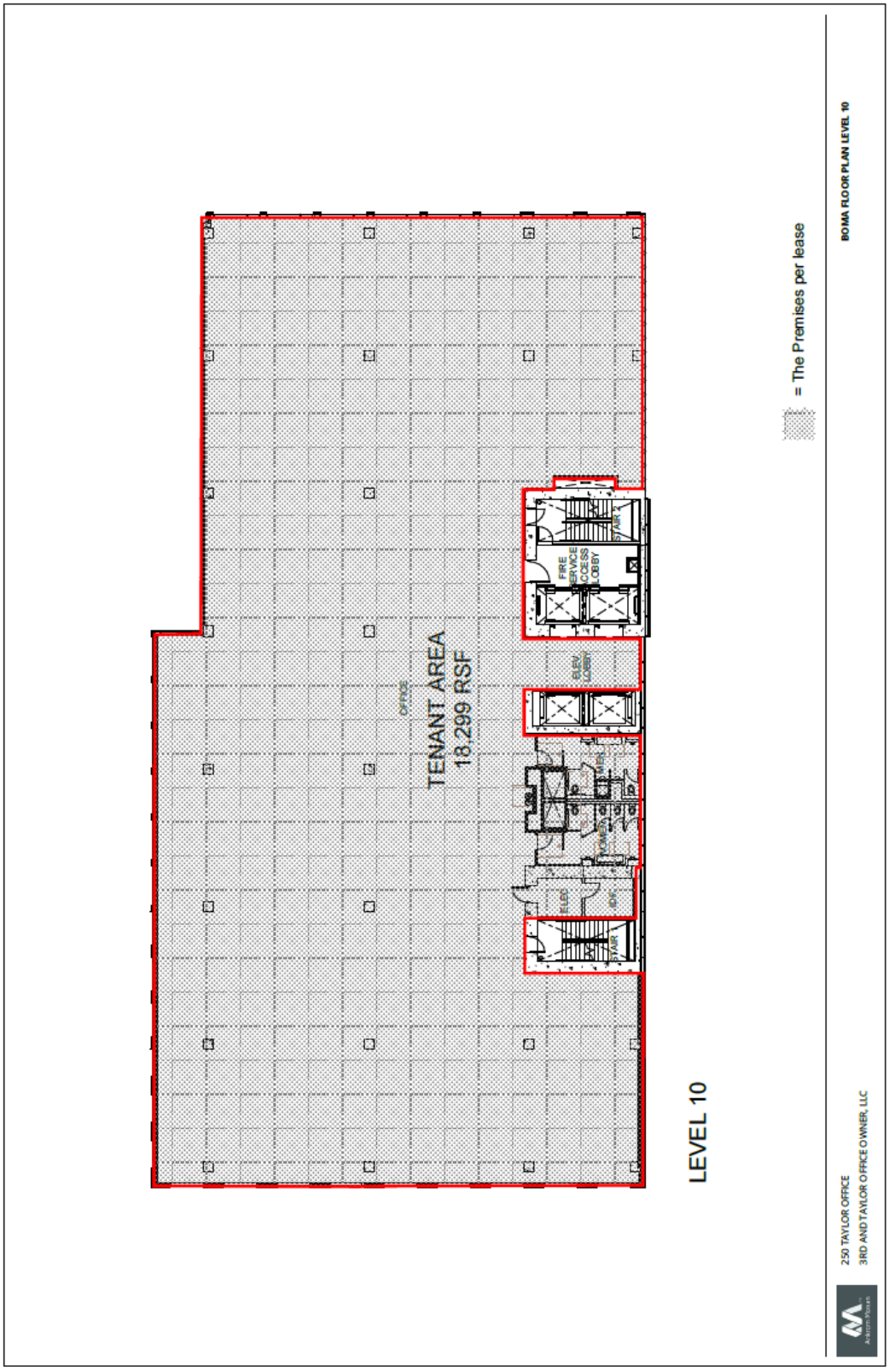

BOMA FLOOR PLAN LEVEL 5
= The Premises per lease
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC
LEVEL 5
TENANT AREA
18,981 RSF
OFFICE
FIRE SERVICE ACCESS LOBBY
ELEV. LOBBY
STAIR
MECH.
ELEC.
IDF
STAIR


TENANT AREA
18,981 RSF
LEVEL 6
= The Premises per lease
BOMA FLOOR PLAN LEVEL 6
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC


TENANT AREA
19,067 RSF
OFFICE
FIRE SERVICE ACCESS LOBBY
STAIR
ELEV LOBBY
WOMEN
ELEC
STAIR
LEVEL 7
= The Premises per lease
BOMA FLOOR PLAN LEVEL 7
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC


TENANT AREA
19,067 RSF
LEVEL 8
= The Premises per lease
BOMA FLOOR PLAN LEVEL 8
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC


TENANT AREA
18,299 RSF
LEVEL 9
= The Premises per lease
BOMA FLOOR PLAN LEVEL 9
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC


BOMA FLOOR PLAN LEVEL 10
= The Premises per lease
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC
LEVEL 10
TENANT AREA
18,299 RSF
OFFICE
FIRE SERVICE ACCESS LOBBY
STAIR
ELEV. LOBBY
MEN
WOMEN
ELEC
JAN
STAIR

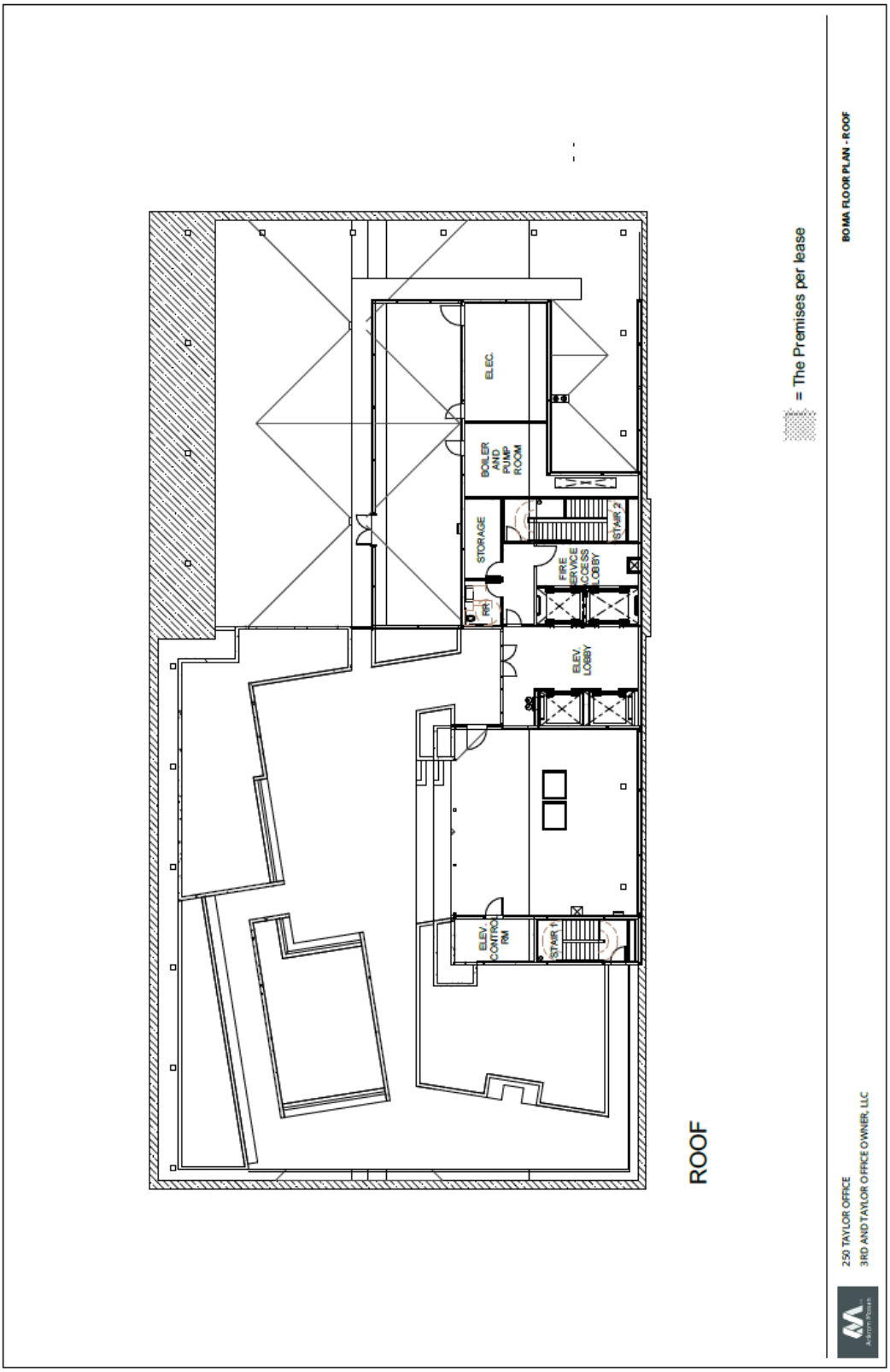

ELEC.
BOILER AND PUMP ROOM
STORAGE
STAIR 2
FIRE SERVICE ACCESS LOBBY
ELEV. LOBBY
ELEV. CONTROL RM
STAIR 1
ROOF
= The Premises per lease
BOMA FLOOR PLAN - ROOF
250 TAYLOR OFFICE
3RD AND TAYLOR OFFICE OWNER, LLC

Exhibit B

LAND

The real property situated in the County of Multnomah, State of Oregon, described as follows:

PARCEL I:

The Easterly 75 feet of Lots 1 and 2, Block 23, Portland, in the City of Portland, County of Multnomah and State of Oregon.

EXCEPTING THEREFROM that portion lying within the boundaries of SW 2nd Avenue.

PARCEL II:

Lots 7 and 8 and the Westerly 20 feet of Lots 1 and 2, Block 23, Portland, in the City of Portland, County of Multnomah and State of Oregon

Exhibit C

COMMENCEMENT CERTIFICATE

This Certificate is entered into this ___ day of _____, 20__ pursuant to that certain Lease Agreement dated October [____], 2017 (the "Lease") by and between THIRD AND TAYLOR OFFICE OWNER, LLC, a Delaware limited liability company, as Landlord and NORTHWEST NATURAL GAS COMPANY, an Oregon corporation, as Tenant.

The undersigned hereby certify to and agree with each other as to the following information in connection with the Lease as set forth below. Capitalized Terms not otherwise defined herein have the meanings set forth in the Lease.

1. The Commencement Date is _____ _____, 20__. Accordingly, the Initial Term of the Lease expires on _____ ___, 20__.

2. The Building Rentable Area is _____ (____) square feet.

3. The Premises Rentable Area is _____ (____) square feet.

4. The Premises Base Rent for the first Lease Year is _____ (____) on an annual basis and _____ (____) on a monthly basis.

5. The Storage Base Rent for the first Lease Year is _____ (____) on an annual basis square feet and _____ (____) on a monthly basis.

6. Tenant's address for Notices is: _____.

7. Tenant's address for Billing is: _____.

IN WITNESS WHEREOF, intending to confirm the above matters, Landlord and Tenant execute this Commencement Certificate as of the date first written above.

LANDLORD:

THIRD AND TAYLOR OFFICE OWNER, LLC
a Delaware limited liability company

Date: _____

By: _____
Name: _____
Title: _____

TENANT:

NORTHWEST NATURAL GAS COMPANY,
an Oregon corporation

Date: _____

By: _____
Name: David Anderson
Title: President

Exhibit D

CURRENTLY EXISTING TENANT AFFILIATES

NNG Financial Corporation
Northwest Energy Corporation
NW Natural Energy, LLC
Northwest Biogas, LLC
KB Pipeline Company
Northwest Energy Sub Corporation
NWN Gas Reserves LLC
NW Natural Gas Storage, LLC
Gill Ranch Storage, LLC
Trail West Holdings, LLC
Trail West Pipeline, LLC

Exhibit E

LANDLORD'S WORK

1. Landlord's Obligation to Construct Building. Landlord shall construct the Building at Landlord's sole cost and expense in accordance with the Final Permitted Plans (as such term is defined below), the Base Building Specifications set forth in Exhibit G and including the Premises Internal Stairs Obligation (as defined below) (collectively, "Landlord's Work"), in compliance with all Laws. Landlord has submitted or has had prepared to be submitted to the City of Portland (the "City") for approval construction drawings to obtain the building permit for shoring, excavation and construction of core and shell for Landlord's Work (the "Building Permit"). Such construction drawings are referenced in Exhibit F (the "Permit Submittal Plans"). Tenant acknowledges and agrees that Tenant shall have no right to change or alter the Permit Submittal Plans and/or the Final Permitted Plans, it being understood and agreed that Landlord shall have the sole right to prepare and modify, as Landlord reasonably deems appropriate or desirable, the Permit Submittal Plans and the Final Permitted Plans, subject to the provisions of Section 2 below. The term "Premises Internal Stairs Obligation" means Landlord's obligation to provide penetrations, embeds, and all associated structural engineering for three (3) communicating stairs within the Premises. The locational and dimensional requirements of the stairs will be identified during the schematic design of Tenant's Work. The penetrations shall be limited to a standard rectangular or square shape.

2. Changes to Plans. Tenant acknowledges that the Permit Submittal Plans may be supplemented to provide further construction details and that if the Building Permit is issued in accordance with the Permit Submittal Plans then such Building Permit shall satisfy the Permit Milestone. As used herein, "Final Permitted Plans" means the Permit Submittal Plans as supplemented and modified as necessary to obtain the Building Permit. Except for revisions to the Permit Submittal Plans that are necessary to obtain the Building Permit (including modifications or revisions that may be required by City officials or inspectors to comply with code rulings or interpretations), Landlord shall not modify the Permit Submittal Plans without Tenant's approval, which approval Tenant shall not unreasonably withhold. Within five (5) Business Days, Tenant shall approve or reasonably disapprove any proposed change to the Permit Submittal Plans submitted to Tenant. If Tenant does not disapprove the proposed revisions to the Permit Submittal Plans within such five (5) Business Day period, then Tenant shall be deemed to have approved the same. If Tenant reasonably disapproves any change, Tenant shall provide to Landlord a statement of Tenant's reasons for disapproval and/or specifying in reasonable detail any required corrections or revisions. Any further revisions to such change after Tenant's initial disapproval shall be approved or disapproved by Tenant within three (3) Business Days after receipt of such revisions or corrections. Notwithstanding the foregoing, Landlord shall not be required to obtain Tenant's consent for any change to the Permit Submittal Plans and/or Final Permitted Plans if such change (1) is required by applicable Laws, (2) is due to concealed or unknown physical conditions that are encountered at the Land, (3) is consistent with the design intent of the Permit Submittal Plans and/or Final Permitted Plans or (4) is a minor "field change", meaning a change that does not, in any material respect, reduce the leaseable area of the Premises or modify the general layout of the Premises, or does not involve the use of materials that will not be at least substantively equal or better in quality to the

materials originally specified in or required by the Permit Submittal Plans and/or Final Permitted Plans.

3. LEED. The Permit Submittal Plans and the Base Building Specifications shall include such elements as are necessary for the Building to meet LEED Gold certification. On or before the Commencement Date, Landlord shall cause Landlord's architect to provide Tenant a certification that the Building (exclusive of Tenant's Work) was designed to meet LEED Gold standards. Landlord shall deliver to Tenant a copy of the LEED Gold certificate within one (1) year after the Commencement Date (or if more than one (1) year is required to obtain the LEED Gold certification, then such additional time as may be necessary if Landlord is diligently pursuing the steps necessary to obtain such LEED Gold certification).

4. Milestones. Landlord acknowledges the critical importance to Tenant of the timely performance of Landlord's Work and therefore Landlord and Tenant establish the following Landlord milestone obligations (each, a "Milestone"):

(a) Issuance of the Building Permit on or before May 1, 2018 (the "Permit Milestone");

(b) Landlord's completion of Tenant Delivery Status (as such term is defined below) on or before November 1, 2019 (the "Tenant Delivery Milestone"); and

(c) Substantial Completion of Landlord's Work (the "Landlord's Work Substantial Completion Milestone"): (i) on or before May 1, 2020 if Landlord meets the Tenant Delivery Milestone or (ii) on or before November 1, 2020 if Landlord does not meet the Tenant Delivery Milestone.

Each Milestone shall be extended due to Force Majeure Delay and Tenant Delay (each as defined below).

On or before each of the Milestones set forth above, Landlord shall provide Tenant written notice that Landlord has either satisfied or not satisfied the applicable Milestone (in each case, the "Milestone Determination Notice"). If Landlord fails to give Tenant a Milestone Determination Notice on or before the applicable Milestone set forth above, then Landlord shall be deemed to have notified Tenant that Landlord has determined it has met the applicable Milestone. Tenant shall have ten (10) Business Days from (i) Tenant's receipt of any Milestone Determination Notice or (ii) if Landlord fails to deliver a Milestone Determination Notice, the date of the applicable Milestone set forth above, to dispute by written notice to Landlord (the "Milestone Achievement Dispute Notice") that Landlord has in fact achieved the applicable Milestone. If Tenant does not timely issue to Landlord a Milestone Achievement Dispute Notice, Tenant shall be deemed to have concurred with Landlord's determination or deemed determination that Landlord met the applicable Milestone. If Tenant timely issues a Milestone Achievement Dispute Notice, the determination of whether Landlord in fact timely achieved the applicable Milestone (including if necessary a determination of the length of time and applicability of any purported Tenant Delay and/or Force Majeure Delay) shall be decided by arbitration pursuant to Article 33 of the Lease; provided, however, that such arbitration determination shall be made on an expedited basis with the arbitration determination made no

later than forty-five (45) days after Tenant issued to Landlord its Milestone Achievement Dispute Notice; provided, further, that if the arbitration is not determined within forty-five (45) days the parties shall continue to use commercially reasonable best efforts to complete the arbitration promptly thereafter. Tenant acknowledges and agrees that its sole and exclusive remedies for the failure of any Milestone to occur shall be as set forth in this Exhibit E, and that such remedies represent fair, reasonable and appropriate remedies in light of the anticipated or actual harm to Tenant caused by Landlord's failure to timely achieve the Milestones hereunder.

If the Permit Milestone is not achieved by May 1, 2018, subject to extension by virtue of Force Majeure Delay and/or Tenant Delay, Tenant shall have the right to terminate the Lease upon written notice given not later than ten (10) Business Days thereafter. Any such termination shall be subject to a final determination pursuant to the arbitration set forth above that Landlord has failed to satisfy the Permit Milestone if Tenant has delivered a Milestone Achievement Dispute Notice with respect thereto. Upon any such termination of this Lease due to the failure of the Permit Milestone to timely occur, Landlord and Tenant shall be relieved from any and all liability to each other resulting hereunder except that Landlord shall pay to Tenant not later than thirty (30) days after Tenant's termination of the Lease as Tenant's sole and exclusive remedy for Tenant's termination of the Lease Tenant's architectural fees incurred by Tenant in connection with this Lease up to but in no event exceeding Three Hundred Thousand and 00/100 Dollars ($300,000.00). Should the Permit Milestone be satisfied prior to Tenant's exercise of the foregoing termination right, however, such termination right shall, in such event, expire and be of no further force or effect upon completion of the Permit Milestone.

If the Tenant Delivery Milestone has not occurred on or before November 1, 2019, subject to extension by virtue of Force Majeure Delay and/or Tenant Delay, and provided Tenant exercises the Current Lease Extension, then Landlord shall reimburse Tenant for the prorated portion of the rent (using the amounts set forth below) owed for the six (6) month extension period which is after the date upon which (x) Tenant has fully vacated the Current Premises and (y) the Rent Commencement Date has occurred under this Lease ("Landlord's Late Delivery Reimbursement Obligation"). For example: if (i) Landlord does not meet the Tenant Delivery Milestone on or before November 1, 2019, (ii) Tenant exercises the Current Lease Extension, (iii) the Rent Commencement Date under this Lease is August 1, 2020 and (iv) Tenant fully vacates the Current Premises on or before August 1, 2020, then Landlord shall reimburse Tenant a total of $1,532,945.84, of which $1,499,217.52 is the base rent and $33,728.32 is the operating expense obligation, for the period August 1, 2020 through and including November 30, 2020. The scheduled base rent obligations under Tenant's Current Lease for the six (6) month extension is Three Hundred Seventy-Four Thousand Eight Hundred Four and 38/100 Dollars ($374,804.38) per month. Tenant's monthly operating expense obligation under Tenant's Current Lease for the six (6) month extension is deemed for the purposes hereof to be $8,432.08. Landlord shall pay Tenant for Landlord's Late Delivery Reimbursement Obligation on a monthly basis within thirty (30) days from Landlord's receipt of an invoice from Tenant for the same. In addition, if Tenant exercises the Current Lease Extension (whether at its own election or at the direction of Landlord) but Landlord does not meet Landlord's Work Substantial Completion Milestone on or before December 1, 2020, then Landlord shall be obligated to reimburse Tenant for its actual damages incurred from and after December 1, 2020 through and including the Rent Commencement Date due to the failure to meet Landlord's Work Substantial Completion Milestone on or before December 1, 2020, subject to extension by virtue of Force Majeure Delay

and Tenant Delay; provided that Landlord shall not be liable to Tenant in any event and under any theory for damages incurred from and after December 1, 2020 in excess of Three Million Seven Hundred Fifty Thousand and 00/100 Dollars ($3,750,000.00).

In the event that Landlord meets the Tenant Delivery Milestone, Tenant does not exercise the Current Lease Extension (whether at its own election or at the direction of Landlord), and Landlord does not meet Landlord's Work Substantial Completion Milestone on or before June 1, 2020, then Landlord shall be obligated to reimburse Tenant for its actual damages incurred from and after June 1, 2020 through and including the Rent Commencement Date due to the failure to meet Landlord's Work Substantial Completion Milestone on or before June 1, 2020, subject to extension by virtue of Force Majeure Delay and Tenant Delay; provided that Landlord shall not be liable to Tenant in any event and under any theory for damages in excess of Three Million Seven Hundred Fifty Thousand and 00/100 Dollars ($3,750,000.00).

5. Definitions for Terms Used in Exhibit E. The following terms have the meanings given below:

(a) The term "Substantial Completion of Landlord's Work" means that all Landlord's Work shall have been substantially completed, subject to typical punch list items, and shall have been inspected and approved by the appropriate authorities as evidenced by a temporary certificate of occupancy or other governmental sign off for the Building, and (i) Tenant has uninterrupted access to the Premises with all elevators described in the Base Building Specifications in full service, (ii) mechanical, plumbing, electrical, conveying and sprinkler systems (installed and tested as per specifications) set forth in the Permit Submittal Plans and as may be further described in the Base Building Specifications shall have been substantially completed such that the appropriate services to be rendered by such systems can be and are being supplied and such systems are fully operational; (iii) the entrance and lobby of the Building shall have been substantially completed and the means of ingress and egress are not materially interfered with by any scaffolding, building materials, or other articles; and (iv) the Parking Garage has been completed and made available to Tenant in accordance with this Lease, in each case of (i) through (iv) subject to typical punch list items.

(b) The term "Tenant Delay" means (i) the failure of Tenant to timely approve or disapprove any matter requiring Tenant's approval relating to the construction of the Building; or (ii) unreasonable (when judged in accordance with industry custom and practice) interference by Tenant, its agents or Tenant Parties with the performance of Landlord's Work and which objectively delays the performance of Landlord's Work. For Landlord to claim Tenant Delay, Landlord shall provide Tenant written notice of its claim of Tenant Delay, which claim shall: (a) identify the number of days of Tenant Delay that Landlord claims, and (b) set forth the specific facts that form the basis of Landlord's claim of Tenant Delay and how these facts impact the critical path of Landlord's Work.

(c) The term "Force Majeure Delay" means any delay resulting from a Force Majeure event.

(d) The term "Current Landlord" means Menlo Properties LLC, or any successor landlord under the Current Lease.

(e) The term "Current Lease" means the certain One Pacific Square Office Lease dated June 11, 1991 by and between Tenant and Pacific Square Associates as the original named landlord, as such lease has been amended from time to time prior to the Execution Date. The term "Current Lease" shall exclude any amendments or modifications thereto following the Execution Date and/or any amendments or modifications that were not disclosed to Landlord prior to the Execution Date.

(f) The term "Tenant Delivery Status" means (i) that the Building has been structurally completed, (ii) the Building's exterior skin systems are complete enough such that the Building can be made weather protected, (iii) Tenant's Contractor (as defined in Exhibit L) has access to all floors for the construction of Tenant's Work, (iv) Tenant's Contractor has use of either a construction lift or at least one Building elevator, (v) Tenant's Contractor has access to utilities sufficient for the construction of Tenant's Work, and (vi) the Building's mechanical, electrical and life safety systems are sufficiently installed such that Tenant's Contractor can construct Tenant's Work.

(g) The term "Current Premises" means the premises leased by Tenant from Current Landlord pursuant to the Current Lease.

(h) The term "Current Lease Extension" means the six (6) month extension of the Current Lease to a termination date of November 30, 2020 to which Tenant is entitled pursuant to the terms of the Current Lease.

6. Tenant's Construction Representative. Tenant hereby appoints Mardilyn Saathoff and Steve Walti to act on its behalf and represent its interests with respect to all matters requiring Tenant action in this Exhibit E. No consent, authorization or other action by Tenant with respect to matters set forth in this Exhibit E shall bind Tenant unless in writing and signed by one of the aforementioned persons. Landlord hereby expressly recognizes and agrees that no other person claiming to act on behalf of Tenant is authorized to do so. If Landlord complies with any request or direction presented to it by anyone else claiming to act on behalf of Tenant, such compliance shall be at Landlord's sole risk and responsibility and shall not in any way alter or diminish the obligations and requirements created and imposed by this Article, and Tenant shall have the right to enforce compliance with this Article without suffering any waiver, dilution or mitigation of any of its rights hereunder.

7. Landlord's Direction to Extend Current Lease. Tenant shall exercise the six (6) month extension of the Current Lease if requested by Landlord to do so by written notice (the "Current Lease Extension Notice") on or before November 18, 2019. If Landlord timely delivers the Current Lease Extension Notice and Tenant fails to timely exercise the six (6) month extension of the Current Lease, then Landlord shall not be liable to Tenant for actual damages resulting from Landlord's failure to meet Landlord's Work Substantial Completion Milestone for the period prior to December 1, 2020 in excess of the amounts described in Landlord's Late Delivery Reimbursement Obligation for the period prior to December 1, 2020.

Exhibit F

PERMIT SUBMITTAL PLANS

"250 Taylor Office GMP Set R2 dated 8/18/17 Volume 1 & 2 dated 8/18/17" prepared by Ankrom Moisan, incorporated herein by this reference as if attached hereto in their entirety.

Exhibit G

BASE BUILDING SPECIFICATIONS

"Third and Taylor Office, Project Manual GMP Set R2 dated 8/18/17" prepared by Ankrom Moisan, incorporated herein by this reference as if attached hereto in their entirety.

Exhibit H

INTENTIONALLY DELETED

Exhibit I

PREMISES BASE RENT

Start	End	SF	Rent PSF	Annual Rent	Monthly Rent
6/1/2020	5/31/2021	178,851	$33.95	$6,071,991.45	$505,999.29
6/1/2021	5/31/2022	178,851	$34.80	$6,223,791.24	$518,649.27
6/1/2022	5/31/2023	178,851	$35.67	$6,379,386.02	$531,615.50
6/1/2023	5/31/2024	178,851	$36.56	$6,538,870.67	$544,905.89
6/1/2024	5/31/2025	178,851	$37.47	$6,702,342.43	$558,528.54
6/1/2025	5/31/2026	178,851	$38.41	$6,869,901.00	$572,491.75
6/1/2026	5/31/2027	178,851	$39.37	$7,041,648.52	$586,804.04
6/1/2027	5/31/2028	178,851	$40.36	$7,217,689.73	$601,474.14
6/1/2028	5/31/2029	178,851	$41.36	$7,398,131.98	$616,511.00
6/1/2029	5/31/2030	178,851	$42.40	$7,583,085.28	$631,923.77
6/1/2030	5/31/2031	178,851	$43.46	$7,772,662.41	$647,721.87
6/1/2031	5/31/2032	178,851	$44.55	$7,966,978.97	$663,914.91
6/1/2032	5/31/2033	178,851	$45.66	$8,166,153.44	$680,512.79
6/1/2033	5/31/2034	178,851	$46.80	$8,370,307.28	$697,525.61
6/1/2034	5/31/2035	178,851	$47.97	$8,579,564.96	$714,963.75
6/1/2035	5/31/2036	178,851	$49.17	$8,794,054.08	$732,837.84
6/1/2036	5/31/2037	178,851	$50.40	$9,013,905.44	$751,158.79
6/1/2037	5/31/2038	178,851	$51.66	$9,239,253.07	$769,937.76
6/1/2038	5/31/2039	178,851	$52.95	$9,470,234.40	$789,186.20
6/1/2039	5/31/2040	178,851	$54.27	$9,706,990.26	$808,915.85

The above chart assumes that the Rent Commencement Date is June 1, 2020. If the Rent Commencement Date is after June 1, 2020, the dates set forth above shall be adjusted to reflect the actual dates.

The Base Rent shall be abated commencing upon (and continuing until the abatement amount is exhausted) the Rent Commencement Date by an amount equal to One Million Four Hundred Ninety-Nine Thousand Two Hundred Seventeen and 52/100 Dollars ($1,499,217.52). Notwithstanding the foregoing, if and to the extent that Substantial Completion of Landlord's Work does not occur on or before February 1, 2020 (as such date may be extended for Force Majeure Delay and Tenant Delay, the "Credit Date Deadline") the foregoing Base Rent credit shall be increased by the amount of One Hundred Thirty-One Thousand One Hundred Ninety-Four and 91/100 Dollars ($131,194.91) per month for the period (calculated on a daily basis) between the Credit Date Deadline and the date of such Substantial Completion of Landlord's Work, not to exceed an additional amount of Five Hundred Twenty-Four Thousand Seven Hundred Seventy-Nine and 64/100 Dollars ($524,779.64), the intent being to provide Tenant with a credit against Base Rent for up to four (4) months total, with the amount of the credit dependent upon the date of Substantial Completion of Landlord's Work.

Exhibit J

RULES AND REGULATIONS

(1) Nothing shall be attached to the outside walls of the Building. Other than Building standard blinds, no curtains, blinds, shades, screens or other obstructions shall be attached to or hung in or used in connection with any exterior window or entry door of the Premises, without the prior consent of Landlord.

(2) No sign, advertisement, notice or other lettering visible from the exterior of the Premises shall be exhibited, inscribed, painted or affixed to any part of the Premises without the prior written consent of Landlord. All lettering on exterior doors shall be inscribed, painted or affixed in a size, color and style acceptable to Landlord.

(3) The grills, louvers, skylights, windows and doors that reflect or admit light and/or air into the Premises or Common Areas shall not be covered or obstructed by Tenant, nor shall any articles be placed on the window sills, radiators or convectors.

(4) All locks or bolts of any kind shall be operable by the Building's Master Key. No locks shall be placed upon any of the doors or windows by Tenant, nor shall any changes be made in locks or the mechanism thereof which shall make such locks inoperable by the Building's Master Key. Tenant shall, upon the termination of its Lease, deliver to Landlord all keys of stores, offices and lavatories, either furnished to or otherwise procured by Tenant and in the event of the loss of any keys furnished by Landlord, Tenant shall pay to Landlord the cost thereof.

(5) Tenant shall keep the entrance door to each portion of the Premises closed at all times.

(6) Landlord reserves the right to inspect all articles to be brought into the Building and to exclude from the Building all articles which violate any of these Rules and Regulations or the Lease.

(7) All hand trucks shall be equipped with rubber tires, side guards and such other safeguards as Landlord may require.

(8) Neither Tenant nor any Tenant Party shall be permitted to have access to the Building's roof (except the designated roof deck), mechanical, electrical or telephone rooms without permission from Landlord, unless the access is specifically allowed per the main body of this Lease or necessary to exercise a right granted to Tenant under the Lease.

(9) Tenant shall store all its trash and recyclables within its Premises. No material shall be disposed of which may result in a violation of any applicable Laws or these Rules and Regulations. All refuse disposal shall be made only though entryways and elevators provided for such purposes.

(10) Tenant shall not deface any part of the Building. No boring, cutting or stringing of wires shall be permitted, except with prior consent of Landlord, and as Landlord may direct.

(11) The water and wash closets, electrical closets, mechanical rooms, fire stairs and other plumbing fixtures shall not be used for any purposes other than those for which they were constructed and no sweepings, rubbish, rags, acids or other substances shall be deposited therein. All damages resulting from any misuse of the fixtures shall be borne by Tenant where either Tenant or a Tenant Party caused the same.

(12) Tenant, before closing and leaving the Premises at any time, shall see that all water faucets, etc. are turned off. All entrance doors in the Premises shall be kept locked by Tenant when the Premises are not in use.

(13) No bicycles, in-line roller skates, vehicles or animals of any kind (except for service animals as defined by ADA) shall be brought into or kept by any Tenant in or about the Premises or the Building (except for the designated bicycle parking area).

(14) Canvassing or soliciting in the Building is prohibited.

(15) Employees of Landlord or Landlord's agents shall not perform any work or do anything outside of the regular duties, unless under special instructions from the office of Landlord or in response to any emergency condition.

(16) Tenant is responsible for the delivery and pick up of all mail from the United States Post Office.

(17) Landlord reserves the right to exclude from the Building during other than Normal Business Hours all persons who do not present a valid Building pass. Tenant shall be responsible for all persons for whom a pass shall be issued at the request of Tenant and shall be liable to Landlord for all acts of such persons.

(18) Tenant shall not use the Premises for any purpose that may be dangerous to persons or property, nor shall Tenant permit in, on or about the Premises or Building items that may be dangerous to persons or property, including, without limitation, firearms or other weapons (excepting, however, firearms or other weapons carried by licensed security guards, which shall in all cases comply with the requirements set forth in the Lease, including insurance) or any explosive or combustible articles.

(19) No smoking shall be permitted in, on or about the Premises, the Building or the Land.

(20) Landlord shall not be responsible to Tenant or to any other Person for the non-observance or violation of these Rules and Regulations. Tenant shall be deemed to have read these Rules and Regulations and to have agreed to abide by them as a condition to its occupancy of the Premises.

(21) All contractors, subcontractors and technicians performing work in the Building shall be subject to Landlord's prior approval, which approval shall not be unreasonably withheld, and shall be required to comply with Landlord's reasonable rules, regulations, policies and procedures, which may be reasonably revised from time to time.

(22) If Landlord provides janitorial service, then: (i) the work of cleaning staff shall not be hindered by Tenant after 5:30 pm, and (ii) Tenant shall provide adequate waste and rubbish receptacles to prevent unreasonable hardship to the cleaning service.

Exhibit K

FORM OF ESTOPPEL CERTIFICATE

The undersigned, as Tenant under that certain Lease Agreement (the "**Lease**") made and entered into as of October [___], 2017, by and between Third and Taylor Office Owner, LLC, a Delaware limited liability company, as Landlord, and the undersigned, as Tenant, for certain Premises located at 250 Taylor Street, Portland, Oregon. Capitalized terms not otherwise defined herein have the meanings ascribed to such terms in the Lease. Tenant hereby certifies as follows:

1. Attached hereto as Exhibit A is a true and correct copy of the Lease and all amendments and modifications thereto. The documents contained in Exhibit A represent the entire agreement between the parties as to the Premises.

2. The undersigned [has][has not] commenced occupancy of the Premises described in the Lease and currently [occupies][does not occupy] the Premises.

3. The Lease is in full force and effect and has not been modified, supplemented or amended in any way except as provided in Exhibit A.

4. Tenant has not assigned the Lease or subleased all or any portion of the Premises nor entered into any license or concession agreements with respect thereto except as follows: _____.

5. Base Rent became payable on _____.

6. The Initial Term expires on _____ and is subject to the following Extension Option(s):_____.

7. To Tenant's actual knowledge, all conditions of the Lease to be performed by Landlord necessary to the enforceability of the Lease have been satisfied and Landlord is not in default thereunder, except as follows: _____.

8. No rental has been paid more than thirty (30) days in advance and no security has been deposited with Landlord except as provided in the Lease, except as follows: _____.

9. As of the date hereof, to Tenant's actual knowledge, there are no existing defenses or offsets that Tenant has which preclude enforcement of the Lease by Landlord.

10. All monthly installments of Base Rent, all Additional Rent and all monthly installments of estimated Operating Costs have been paid when due through _____. The current monthly installment of Base Rent is $_____.

11. Landlord has performed all construction obligations required by the Lease and related to the Premises or the Building in accordance with the terms of the Lease and within the

time periods set forth in the Lease. Landlord has paid in full any required contributions toward work to be performed by Tenant under the Lease, if any.

12. Landlord has satisfied each of the Milestones, except: _____.

13. Tenant's remaining Tenant's Work Allowance is $_____.

14. Tenant has no option, right of first offer, right of first refusal or similar right to purchase the Project (each, a "**Purchase Right**") except _____. [Tenant has received proper notice of and has waived any Purchase Right with respect to Tenant's potential acquisition of the Project pursuant to the Lease and any other agreement.]

The undersigned acknowledges that this Estoppel Certificate may be delivered to Landlord's existing or prospective mortgagee, or a prospective purchaser, and acknowledges that it recognizes that if same is done, said mortgagee, or prospective purchaser will be relying upon the statements contained herein. If Tenant is a corporation, limited liability company, partnership or other legal entity, the individual executing this Estoppel Certificate on behalf of Tenant hereby represents and warrants that such person signing on behalf of Tenant is authorized to do so.

As used herein, to "**Tenant's actual knowledge**" means the current, actual knowledge of [_____], without any specific duty of investigation or inquiry or any personal liability whatsoever with respect to the statements made herein. Tenant represents and warrants to Landlord that [_____] is knowledgeable with respect to the Premises and the Lease.

Executed at _____ on the _____ day of _____ _____.

TENANT:

[_____],
a [_____]

By: _____
Name: _____
Its: _____

EXHIBIT A

LEASE DOCUMENTS

[ATTACHED]

Exhibit L

WORK LETTER

This Work Letter (this "Work Letter") supplements the Lease (the "Lease") dated as of the Execution Date (as defined in the Lease), by and between Third and Taylor Office Owner, LLC, a Delaware limited liability company, as landlord ("Landlord"), and Northwest Natural Gas Company, an Oregon corporation, as tenant ("Tenant"), covering certain premises more particularly described in the Lease (the "Premises"). All terms not defined in this Work Letter shall have the meanings set forth for them, respectively, in the Lease.

ARTICLE 1

BASE BUILDING CONSTRUCTION

1.1 Generally. Landlord shall construct the Building in accordance with Exhibit E of the Lease. Landlord shall deliver to Tenant physical possession of the ground floor and the second floor of the Building (the "Turnover Date") at such time as (i) utilities adequate for construction of Tenant's Work are available and provided to such floors, (ii) Tenant's contractor has reasonable and adequate access to at least one (1) of the following: (x) one (1) Building elevator, (y) one (1) temporary construction lift or (z) temporary stairs (subject to Section 1.2 below) and (iii) such floors are in a condition such that Tenant's contractors can safely commence and continuously pursue construction of Tenant's Work without hindrance (subject to Section 1.2 below) ("Delivery for Commencement of Tenant's Work"). Landlord shall use commercially reasonable efforts to deliver to Tenant a notice (the "Advance Turnover Notice") no less than sixty (60) days prior to the Turnover Date setting forth the then anticipated Turnover Date, subject to Tenant Delay and Force Majeure Delay. Under no circumstances shall Landlord's failure to cause the Turnover Date to be on or after the date set forth in the Advance Turnover Notice be deemed a default of Landlord under the Lease. Landlord shall deliver to Tenant physical possession of the remainder of the Premises (on a floor by floor basis) when Delivery for Commencement of Tenant's Work has occurred with respect to such remaining portion of the Premises.

1.2 Mutual Cooperation. Tenant acknowledges and agrees that Landlord intends to tender possession of portions of the Premises to Tenant for commencement of construction of Tenant's Work prior to Substantial Completion of Landlord's Work. As Landlord may be performing construction of some of Landlord's Work during the period in which Tenant is constructing Tenant's Work pursuant to this Work Letter, Landlord will allow Tenant and Tenant's employees, consultants, contractors and vendors to have access to the Premises prior to Substantial Completion of Landlord's Work in order to allow them to complete Tenant's Work, and thus there will at times be certain "overlap" pursuant to which both Landlord's employees, consultants, contractors and vendors and Tenant's employees, consultants, contractors and vendors may be present and performing work in a portion of a portion of the Premises concurrently. During any such "overlap" period(s) when both parties and/or their respective employees, consultants, contractors and vendors are concurrently performing work in, or accessing, any portion of the Premises, neither party shall unreasonably interfere with or delay the work of the other party and/or its employees, consultants, contractors

and vendors, and both parties shall mutually coordinate and cooperate with each other, and shall cause their respective employees, contractors, vendors and consultants to work in harmony with and to mutually coordinate and cooperate with the other's employees, vendors, contractors and consultants, respectively, to minimize any interference or delay by either party with respect to the other party's work.

1.3 Provisions in Landlord's Construction Contract. Landlord's contract with the general contractor for Landlord's Work shall provide that (i) Tenant's Project Parties (as defined below) are indemnified parties to the same extent that Landlord is an indemnified party under Landlord's contract with the general contractor and (ii) Tenant's Project Parties are additional insureds under the liability insurance policies that the general contractor is to maintain under Landlord's contract with the general contractor to the same extent that Landlord is an additional insured under Landlord's contract with the general contractor.

ARTICLE 2

TENANT'S WORK

2.1 Tenant's Work Allowance. Tenant shall be entitled to a one-time tenant improvement allowance (the "Tenant's Work Allowance") of up to, but not exceeding, Seventy-Two and 50/100 Dollars ($72.50) per rentable square foot of the Premises (excluding the rentable square footage for the Storage Space) in the total amount of Twelve Million Nine Hundred Sixty-Six Thousand Six Hundred Ninety-Seven and 50/100 Dollars ($12,966,697.50) for the costs of the initial design (including, but not limited to, permitting, space planning, and preparation of design documents) and construction of Tenant's improvements which are built by Tenant pursuant to this Work Letter and permanently affixed to the Premises ("Tenant's Work") and for Tenant's moving costs. Tenant's Work Allowance is for the purpose of constructing or improving qualified long-term leasehold property. In no event shall Landlord be obligated to make disbursements on account of Tenant's Work which exceed the Tenant's Work Allowance. All of Tenant's Work for which the Tenant's Work Allowance has been made available shall be deemed Landlord's property. Upon completion of all of Tenant's Work, Tenant shall deliver a notice (the "Completion Notice") to Landlord informing Landlord that all such work has been completed, along with any documentation or invoicing evidencing such completion as may be reasonably requested by Landlord, and a portion of Tenant's Work Allowance that has not been used in connection with Tenant's Work up to Ten and 00/100 Dollars ($10.00) per rentable square foot (excluding the rentable square footage for the Storage Space) in the total amount not to exceed One Million Seven Hundred Eighty-Eight Thousand Five Hundred Ten and 00/100 Dollars ($1,788,510.00) (such portion, the "Unused Allowance") shall be credited against any payments of Premises Base Rent due under the Lease from and after the date of delivery of the Completion Notice until the credit has been applied in full.

2.2 Disbursement of the Tenant's Work Allowance. Except as otherwise set forth in this Work Letter, the Tenant's Work Allowance shall be disbursed pursuant to Section 4.5 hereof for costs paid to the Contractor (as defined below) or others for the design, permitting and completion of construction of Tenant's Work and for the following items and costs (collectively, the "Tenant's Work Allowance Items"): (i) payment of the fees of the Architect and the Engineers (each as defined below); (ii) payment of the actual, reasonable fees

incurred by, and the costs of documents and materials supplied by, Landlord and Landlord's consultants in connection with the review of the Design Documents (as defined below); (iii) the cost of any changes to the Design Documents or Tenant's Work; (iv) the cost of miscellaneous fees relating to the cost of construction of Tenant's Work, including, without limitation, testing and inspection costs; and (v) trash removal costs. No portion of the Tenant's Work Allowance may be applied to the cost of personal property, equipment, trade fixtures or furniture (including, but not limited to, work stations and modular office furniture, regardless of the method of attachment to walls and/or floors). Notwithstanding anything to the contrary set forth herein, Tenant may not apply any portion of Tenant's Work Allowance in excess of Ten and 00/100 Dollars ($10.00) per rentable square foot of the Premises toward low voltage wiring in constructing Tenant's Work and Tenant's moving expenses.

ARTICLE 3

DESIGN DOCUMENTS

3.1 Selection of Architect/Design Documents. Tenant shall retain a reputable architect/space planner reasonably approved by Landlord ("Architect") to prepare the "Final Space Plan," "Final Design Development Documents," and "Final Construction Documents," all as defined herein below and collectively referred to as "Design Documents." Landlord hereby approves GBD Architects as Architect if selected by Tenant. Tenant shall retain reputable engineering consultants reasonably designated or selected by Tenant and approved by Landlord ("Engineers") to prepare Design Documents relating to any structural, mechanical, electrical, plumbing, HVAC, life safety, and sprinkler work of Tenant's Work. All Design Documents shall be subject to Landlord's approval, which approval shall not be unreasonably conditioned, withheld or delayed. Tenant and Architect shall not rely on any drawings supplied by Landlord and shall verify, in the field, all relevant dimensions and conditions relating to the Base Building Specifications and shall be solely responsible for the same. Landlord's review of the Design Documents as set forth in this Section 3 shall be for its own purposes and shall not imply Landlord's review of the same, or obligate Landlord to review the same, for quality, design, compliance with Laws or other like matters. Accordingly, notwithstanding that any Design Documents are reviewed by Landlord or its space planner, architect, engineers and consultants, and notwithstanding any advice or assistance that may be rendered to Tenant by Landlord or Landlord's space planner, architect, engineers, and consultants, Landlord shall have no responsibility or liability whatsoever in connection therewith, including any omissions or errors contained in the Design Documents, and Tenant's waivers and indemnities set forth in the Lease shall specifically apply to the Design Documents.

3.2 Space Plan. Tenant and Architect shall prepare and deliver to Landlord with a request for its approval (in at least ten (10) point type in all capital letters specifying this Section 3.2), which approval shall not be unreasonably withheld or delayed, the proposed space plan for the Premises. Notwithstanding the preceding sentence, Landlord may withhold its consent, in its sole discretion, to any element of the proposed space plan which would (i) adversely affect any guarantees or warranties or (ii) materially affect the systems of the Building, including, without limitation, the HVAC, plumbing and fire protection systems, the Building's equipment, the structural integrity of the Building, and/or the exterior appearance of the Building. Landlord shall notify Tenant of its approval or disapproval (with reasons for such

disapproval specified) of the proposed space plan within ten (10) Business Days after receipt thereof. If Landlord disapproves the proposed space plan, this process shall be repeated until Landlord's approval is obtained; provided, however, that Tenant shall only make such changes to the proposed space plan which address the reasons Landlord specified for its disapproval of the proposed space plan. The approved space plan is hereinafter referred to as the "Final Space Plan."

3.3 Design Development Documents. Tenant shall cause the Architect shall prepare and deliver to Landlord with a request for its approval (in at least ten (10) point type in all capital letters specifying this Section 3.3), which approval shall not be unreasonably withheld or delayed, the proposed design development documents, which shall be the formalization of the Final Space Plan and the initial set of drawings. Notwithstanding the preceding sentence, Landlord may withhold its consent, in its sole discretion, to any element of the proposed design development documents which would (i) adversely affect any guarantees or warranties or (ii) materially affect the systems of the Building, including without limitation, the HVAC, plumbing and fire protection systems, the Building's equipment, the structural integrity of the Building, and/or the exterior appearance of the Building. Landlord shall notify Tenant of its approval or disapproval (with reasons for such disapproval specified) of the proposed design development documents within ten (10) Business Days after receipt thereof. If Landlord disapproves the proposed design development documents, this process shall be repeated until Landlord's approval is obtained; provided, however, that Tenant shall only make such changes to the proposed design development documents which address the reasons Landlord specified for its disapproval of the proposed design development documents. The approved design development drawings are hereinafter referred to as the "Final Design Development Documents."

3.4 Construction Documents. Following completion of the Final Design Development Documents, the Architect and the Engineers shall complete and deliver to Landlord with a request for its approval (in at least ten (10) point type in all capital letters specifying this Section 3.4), which approval shall not be unreasonably conditioned, withheld or delayed, the proposed construction documents for the Premises, in a form which is sufficiently complete to allow subcontractors to bid on the work and to obtain all applicable permits. Notwithstanding the preceding sentence, Landlord may withhold its consent, in its sole discretion, to any element of the proposed construction documents for the Premises which would materially affect the systems of the Building, including, without limitation, the HVAC, plumbing and fire protection systems, the Building's equipment, the structural integrity of the Building, and/or the exterior appearance of the Building. Landlord shall notify Tenant of its approval or disapproval (with reasons for any disapproval specified) of the proposed construction documents within ten (10) Business Days after receipt thereof. If Landlord disapproves the proposed construction documents, this process shall be repeated until Landlord's approval is obtained, although Tenant need only make such changes to the proposed construction documents which address the reasons Landlord specified for its disapproval of the proposed construction documents. The approved proposed construction documents are hereinafter referred to as the "Final Construction Documents."

3.5 Permits. The Final Construction Documents shall have been approved by Landlord prior to the commencement of the construction of Tenant's Work. Following completion of the Final Construction Documents, Tenant shall submit the Final Construction

Documents to the appropriate municipal authorities for all applicable building permits necessary to allow Contractor to commence and fully complete the construction of Tenant's Work (the "Permits"). No changes, modifications or alterations in the Final Space Plan or the Final Construction Documents may be made by Tenant without the prior written consent of Landlord, which consent shall not be unreasonably conditioned, withheld or delayed; provided that Landlord may withhold its consent, in its sole discretion, to any change in the Final Space Plan or the Final Construction Documents if such change would (i) adversely affect any guarantees or warranties or (ii) materially affect the systems of the Building, including, without limitation, the HVAC, plumbing and fire protection systems, the Building's equipment, the structural integrity of the Building, and/or the exterior appearance of the Building.

3.6 Time Deadlines.

(1) Within fifteen (15) days prior to commencement of Tenant's Work, Tenant shall submit to Landlord a proposed construction schedule and customary construction milestones for Tenant's Work ("Approved Plan"). Tenant shall use good faith and commercially reasonable efforts to abide by each of the deadlines and milestones contained in such Approved Plan.

(2) Tenant shall use its commercially reasonable, good faith, efforts to cooperate with the Architect, the Engineers, and Landlord to complete all phases of the Design Documents and the permitting process and to receive the Permits in accordance with the schedule approved by the parties, and, in that regard, shall meet with Landlord as it reasonably requests to discuss Tenant's progress in connection with the same. Landlord agrees to cooperate with Tenant at no cost to Landlord, to the extent necessary to facilitate Tenant's permitting process.

3.7 Approval of Design Documents. Without limiting Landlord's rights in any way, Landlord shall be deemed to have reasonably withheld its approval of any portion of the Design Documents which:

(1) exceeds the capacity of, adversely affects, is incompatible with, or impairs Landlord's ability to maintain, operate, alter, modify or improve the Base Building Systems and/or Landlord reasonably believes will increase the cost of operating or maintaining the Base Building Systems or the Land;

(2) does not conform to applicable Laws, insurance regulations or standards for a fire-resistive office building and/or is not approved by any governmental authority having jurisdiction over the Premises;

(3) affects the exterior appearance of the Building or Common Areas;

(4) violates any agreement which affects the Land or binds Landlord;

(5) Landlord reasonably believes will reduce the market value of the Premises, the Building and/or the Land at the end of the Term;

(6) Landlord reasonably believes will infringe on the architectural integrity of the Building; or

(7) adversely affects any existing guarantees or warranties.

ARTICLE 4

CONSTRUCTION OF TENANT'S WORK

4.1 Contractor. Tenant shall retain a qualified, reputable general contractor reasonably approved by Landlord (the "Contractor"). Tenant hereby waives all claims against Landlord, and Landlord shall have no responsibility or liability to Tenant, on account of any non-performance or any misconduct of Contractor or of any subcontractor of Contractor. Tenant shall use its commercially reasonable efforts to cause Tenant's Work to be completed as promptly as reasonably possible. Tenant's Work shall be constructed in a good and workmanlike manner in accordance with the Final Construction Documents and in compliance with all applicable Laws in effect as of the date of construction.

4.2 Subcontractor's and Engineers. Tenant shall use reputable subcontractors and Engineers for the performance of Tenant's Work.

4.3 Landlord Fees and Reimbursements.

(a) Tenant shall pay a construction supervision and management fee (the "Construction Management Fee") to Landlord in an amount equal to One Hundred Fifty Thousand and 00/100 Dollars ($150,000.00), payable ratably as the Tenant's Work Allowance is disbursed as provided herein. Tenant shall include such ratable portion of the Construction Management Fee in each request disbursing the Tenant's Work Allowance.

(b) In addition to the Construction Management Fee, Tenant shall reimburse Landlord for any third-party costs and expenses reasonably incurred by Landlord in connection with the review and approval of any Tenant's Work relating to or affecting the Base Building Systems, including, but not limited to, the costs of any architects or engineers hired by Landlord to review any space plans, schematic drawings, design development documents and/or construction documents. Such reimbursements shall first be credited against the remaining available balance of the Tenant's Work Allowance, and then be paid to Landlord within thirty (30) days after invoice as Additional Rent if Tenant's Work Allowance is exhausted.

4.4 Construction of Tenant's Work. Prior to Tenant's execution of the construction contract and general conditions between Tenant and its Contractor (the "Contract"), Tenant shall submit the Contract to allow Landlord to confirm that the Contract complies with the requirements set forth in the Lease and this Work Letter prior to Tenant's entering into the Contract. Landlord shall have five (5) Business Days from receipt of the Contract from Tenant to provide any comments to Tenant to be incorporated in the final Contract. Prior to the commencement of the construction of Tenant's Work, and after Tenant has accepted all bids for Tenant's Work, Tenant shall provide Landlord with a detailed breakdown, by trade, of the final costs to be incurred or which have been incurred, in connection with the design and construction of Tenant's Work to be performed by or at the direction of Tenant or the Contractor, which costs

form a basis for the amount of the Contract (the "Construction Budget"), which for the sake of clarity shall include all hard and soft costs for Tenant's Work which are subject to reimbursement from the Tenant's Work Allowance.

(a) Prior to commencing construction of Tenant's Work, Tenant shall deliver to Landlord the following:

(1) The actual commencement date of construction and the estimated date of completion of the work, including fixturization;

(2) Evidence of all insurance required hereunder; and

(3) An executed copy of the Permits.

(b) Contractor Requirements. After receipt of the Permits, Tenant shall cause the Contractor to proceed promptly to commence and complete Tenant's Work. The Contractor and all subcontractors shall be subject to administrative and other supervision by Landlord in their use of the Building subject to the provisions of Section 1.2 of this Work Letter. Tenant shall reimburse Landlord within ten (10) days after demand for the cost of repairing any damage to the Building caused by Tenant, the Contractor or any subcontractor during performance of Tenant's Work. The Contractor and all subcontractors shall conduct their work and employ labor in such manner as to maintain harmonious labor relations and as not to interfere with or delay any work of Landlord's contractors or other contractors in the Building subject to the provisions of Section 1.2 of this Work Letter.

(c) Landlord's General Conditions for Tenant's Work. Tenant's Work shall be constructed in accordance with the Final Construction Documents and all approved change orders. Tenant, Architect, Engineers, Contractor, Contractor's subcontractors and each of their suppliers, materialmen, laborers (collectively, "Tenant's Project Parties") shall abide by all reasonable rules made by Landlord's building manager with respect to the use of parking spaces, freight, loading dock and service elevators, storage of materials, mechanical and electrical systems, trash removal, coordination of work with the contractors of other tenants, and any other matter in connection with this Work Letter, including, without limitation, the construction of Tenant's Work, but all subject to the provisions of Section 1.2 of this Work Letter.

(1) Changes. Any changes in Tenant's Work from the Final Construction Documents ("Changes") shall be subject to Landlord's prior written approval, which approval shall not be unreasonably conditioned, delayed or withheld. Any deviation in construction from the design specifications and criteria set forth herein or from Tenant's plans and specifications as approved by Landlord shall be promptly remedied following notice from Landlord or Landlord's contractor or any government representative. Only new and/or properly recycled first-class materials shall be used in the construction of Tenant's Work, except with the written consent of Landlord, which consent may be withheld in Landlord's sole and absolute discretion.

(2) Trash Removal. During the construction of Tenant's Work, removal of trash generated by Tenant's Work, or otherwise by Tenant, will be done continually

at Tenant's cost and expense. No trash, or other debris, or other waste may be deposited at any time outside the Premises. If so, upon prior written notice, Landlord may remove it at Tenant's expense.

(3) Storage of Tools. Storage of the Contractor's construction materials, tools and equipment shall be confined within the Premises and in areas designated for such purposes by Landlord, and should such materials, tools and equipment be assigned space or spaces outside the Premises they shall be moved to such other space as Landlord shall direct from time to time to avoid interference or delays with other work. In no event shall any debris be stored outside of the Premises.

(d) Requirements of Tenant's Contractor. Tenant's Contractor shall warrant to Tenant that Tenant's Work shall be free from any defects in workmanship and materials for a period of not less than one (1) year from the date of completion thereof. Tenant's Contractor shall be responsible for the replacement or repair, without additional charge, of all work done or furnished in accordance with its contract that shall become defective within one (1) year after the later to occur of (i) completion of the work performed by such contractor or subcontractors and (ii) the Commencement Date. The correction of such work shall include, without additional charge, all additional expenses and damages incurred in connection with such removal or replacement of all or any part of Tenant's Work, and/or repair of the Building and/or Common Areas that may be damaged or disturbed thereby.

(e) Responsibility for Certain Parties. Landlord's approval of any Tenant's Project Party, any work performed by any of them or any documents prepared by any of them shall not be for the benefit of Tenant or any third party, and Landlord shall have no duty to Tenant or to any third parties for the actions or omissions of any Tenant's Project Party. Tenant shall indemnify, defend and hold harmless Landlord against any and all Losses arising from, or in connection with, Tenant's non-payment of any amount arising out of Tenant's Work and/or Tenant's disapproval of all or any portion of any request for payment, or related in any way to Landlord's performance of any ministerial acts reasonably necessary (i) to permit Tenant to complete Tenant's Work and (ii) to enable Tenant to obtain any building permit or certificate of occupancy for the Premises.

(f) Insurance Requirements. Contractor shall procure and maintain in effect the insurance set forth in Section 16.8 of the Lease. The requirements for the foregoing insurance shall not diminish the provisions for indemnification of Landlord by Tenant under Section 4.4 of this Work Letter.

(g) Damage. In the event that Tenant's Work is damaged by any cause during the course of the construction thereof, Tenant shall promptly repair the same at Tenant's sole cost and expense.

(h) Governmental Compliance. Tenant's Work (and the Premises improved thereby) shall comply in all respects with all Laws (including, without limitation, the Americans with Disabilities Act of 1990 (as amended) and all regulations and guidelines promulgated thereunder). Tenant shall be solely responsible for all costs and expenses necessary to ensure such compliance.

(i) Inspection by Landlord. Landlord shall have the right to inspect Tenant's Work at all times to ensure compliance with the terms of this Work Letter; provided however, that Landlord's election not to inspect Tenant's Work shall in no event constitute a waiver of any of Landlord's rights hereunder nor shall Landlord's inspection of Tenant's Work constitute Landlord's approval of the same. Should Landlord disapprove any portion of Tenant's Work because such work is not in compliance with the terms of this Work Letter, Landlord shall notify Tenant in writing of such disapproval and shall specify the items disapproved. Any defects or deviations in, and/or disapproval by Landlord of, Tenant's Work shall be rectified by Tenant at no expense to Landlord; provided however, that in the event Landlord determines that a defect or deviation exists or disapproves of any matter in connection with any portion of Tenant's Work and such defect, deviation or matter might adversely affect the mechanical, electrical, plumbing, HVAC or life-safety systems of the Building, or the structure or exterior appearance of the Building, Landlord may take such action as Landlord deems necessary, at Tenant's expense (and if such cost is not promptly reimbursed by Tenant, Landlord may deduct such cost from the Tenant's Work Allowance) to correct any such defect, deviation and/or matter, including, without limitation, causing the cessation of performance of the construction of Tenant's Work until such time as the defect, deviation and/or matter is corrected to Landlord's reasonable satisfaction.

(j) Meetings. Commencing on the date that is the earlier of (i) six (6) months after Landlord obtains the Building Permit and (ii) when design meetings begin, Tenant shall hold weekly meetings, at a reasonable time, with the Architect and the Contractor regarding the progress of the preparation of the Final Construction Documents and the construction of Tenant's Work, which meetings shall be held at a location approved by Landlord, and Landlord and/or its agents shall receive prior notice of, and shall have the right to attend, all such meetings, and, upon Landlord's request, certain of Tenant's Project Parties shall attend such meetings. In addition, minutes shall be taken by Tenant and/or Tenant's Project Parties at all such meetings, a copy of which minutes shall be promptly delivered to Landlord. Landlord shall be permitted to discuss proposed Changes or the status of the Landlord's Work at all such meetings.

(k) Notices. Landlord shall have the right to post in a conspicuous location on the Premises, as well as record in the County of Multnomah, Oregon, a notice of non-responsibility and other notices permitted by applicable Laws.

(l) Coordination of Work. Subject to the provisions of Section 1.2 of this Work Letter, all work to be performed inside or outside of the Premises shall be reasonably coordinated with Landlord and shall be subject to reasonable scheduling requirements of Landlord, and Tenant shall coordinate all after-hours and weekend work with Landlord.

(m) As-Built Plans. Tenant shall, upon completion of Tenant's Work, submit to Landlord two (2) complete sets of as-built drawings (one (1) reproducible) prepared by the Architect and covering all of Tenant's Work, including architectural, electrical, and plumbing, as-built, plus one (1) copy of the same in "CAD" format.

(n) Provisions in Tenant's Construction Contract. Tenant's contract with the Contractor for Tenant's Work shall provide that (i) Landlord and the Landlord Parties

are indemnified parties to the same extent that Tenant is an indemnified party under Tenant's construction contract with the Contactor and (ii) Landlord and the Landlord Parties are additional insureds under the liability policies that the Contractor is required to maintain under Tenant's construction contract with the Contractor to the same extent that Tenant is an additional insured under Tenant's construction contract with the Contractor.

4.5 Payment of Costs of Tenant's Work. Landlord shall bear and pay the cost of Tenant's Work up to the amount of the Tenant's Work Allowance. Tenant shall bear and pay the cost of Tenant's Work in excess of the Tenant's Work Allowance. Tenant shall use no less than One Million and 00/100 Dollars ($1,000,000.00) nor more than One Million Eight Hundred Thousand and 00/100 Dollars ($1,800,000.00) of the Tenant Improvement Allowance for any floor; provided, however, that as to one floor designated by Tenant, Tenant may use less than One Million and 00/100 Dollars ($1,000,000.00) (but not less than Five Hundred Thousand and 00/100 Dollars ($500,000.00)) for that designated floor if as part of Tenant's Work, Tenant improves such designated floor to a Warm Shell Condition. As used in the immediately preceding sentence, "Warm Shell Condition" means that such floor has electrical, HVAC ducting and plumbing mains throughout such floor with exterior walls in paint ready condition. If the aggregate Construction Budget for the entire Premises exceeds the Tenant's Work Allowance ("TI Excess"), Tenant shall be responsible for payment of such excess (the "Tenant Contribution"), so that the Tenant Contribution will be paid pro rata with any amount of Tenant's Work Allowance that is required to be disbursed. In the event of any Changes or any other revisions, changes, or substitutions shall be made to the Final Construction Documents or the contracts for the construction of Tenant's Work which would increase the Construction Budget, any additional costs which arise in connection with such revisions, changes or substitutions or any other additional costs shall be TI Excess and such amounts shall be paid by Tenant as an addition to the Tenant Contribution and such amount shall be disbursed prior to any further disbursement of the Tenant's Work Allowance. Subject to the terms hereof, including the pro rata payment of the TI Excess by Tenant, Landlord shall disburse to Tenant from the Tenant's Work Allowance the amount set forth on Tenant's application for payment, less a five percent (5%) retention (the aggregate amount of such retentions to be known as the "Final Retention"). Based upon applications for payment prepared, certified, approved and submitted by Tenant, Landlord shall make its payments from the Tenant's Work Allowance to Tenant or to the Contractor in accordance with the following provisions:

(a) Tenant shall submit applications for payment to Landlord in a form reasonably satisfactory to Landlord, certified as correct by an officer of Tenant and by the Architect, for pro rata payment of that portion of the cost of Tenant's Work allocable to labor, materials and equipment incorporated in the Premises through the date of the payment application. Each application for payment shall set forth such information and shall be accompanied by such supporting documentation as shall be reasonably requested by Landlord, including the following:

(1) Fully executed conditional lien releases from the Contractor and subcontractors for the following trades: Final Clean, Casework / Architectural Woodwork, Doors / Frames / Hardware, Glazing, Drywall, Ceramic Tile, Resilient Flooring, Paint, Specialties, Appliance Vendors, Kitchen Equipment, Window Coverings, Fire Protection, Mechanical (Plumbing / HVAC), Electrical / Fire Alarm, and Low Voltage or such other contractors or

material providers required by Landlord's Mortgagee ("Covered Subcontractors") and fully executed unconditional lien releases from the Contractor and Covered Subcontractors covering any prior payment period.

(2) Contractor's worksheets showing percentages of completion.

(3) Contractor's certification as follows:

"There are no known filed mechanics' or materialmen's liens outstanding at the date of this application for payment, all due and payable bills with respect to Tenant's Work have been paid to date or shall be paid from the proceeds of this application for payment, and there is no known basis for the filing of any mechanics' or materialmen's liens against the Premises, Building and/or Land, and, to the best of our knowledge, waivers from all subcontractors and materialmen are valid and constitute an effective waiver of lien under applicable law to the extent of payments that have been made or shall be made concurrently herewith."

(4) Calculation of the approximate percentage of the Premises that has been substantially completed for which a payment of the Tenant's Work Allowance has been requested.

(5) A certificate from Architect to Landlord, in the form of the then applicable standard AIA document, certifying that the construction of Tenant's Work complies with all applicable Laws.

(6) Evidence that all required governmental approvals required for construction of Tenant's Work have been obtained.

(7) Any other materials reasonably requested by Landlord evidencing the work completed, permitting and licensing matters, compliance with Laws, and/or previous progress payments.

(b) On or before the thirtieth (30^{th}) day following submission of the application for payment, Landlord shall make payment to Tenant (so long as Landlord has not delivered notice to Tenant that Tenant is in default) of the amount due from Landlord as determined in accordance with this Section 4.5. Landlord has no obligation to make any payments to material suppliers or subcontractors or to determine whether amounts due them from the Contractor in connection with Tenant's Work have, in fact, been paid.

(c) Notwithstanding anything to the contrary in this Section 4.5, the Tenant's Work Allowance shall be available for disbursement pursuant to the terms hereof only for the first twenty four (24) months after the Turnover Date. Accordingly, if any portion of the Tenant's Work Allowance is not disbursed by Landlord prior to the date that is twenty four (24) months after the Turnover Date (other than by reason of Landlord's breach of its disbursement obligations hereunder), such unused portion shall be credited against the Base Rent as set forth in Section 2.1 of this Work Letter.

4.6 Notice of Completion; Copy of Record Set of Plans. Within thirty (30) days after completion of construction of Tenant's Work, Tenant shall cause a Notice of Completion to be recorded in the Official Records and shall comply with any requirements set forth in Oregon's Construction Lien Act or any successor statute thereto, and shall furnish a copy thereof to Landlord upon such recordation. If Tenant fails to do so, Landlord may execute and file the same on behalf of Tenant as Tenant's agent for such purpose, at Tenant's sole cost and expense. At the conclusion of construction, Tenant shall (i) cause Tenant's Architect and the Contractor to certify to the best of their knowledge that the "record-set" of reproducible as-built drawings (and the CAD files of such drawings) for Tenant's Work delivered to Landlord pursuant to Section 4.4 are true and correct, which certification shall survive the expiration or termination of the Lease, and (ii) deliver to Landlord a copy of all warranties, guaranties, and operating manuals and information relating to the improvements, equipment, and systems installed by Tenant or Contractor in the Premises.

4.7 Evidence of Completion. Within sixty (60) days following final completion of all of Tenant's Work, Tenant shall submit to Landlord:

(a) A statement of Tenant's final construction costs, together with receipted evidence showing payment thereof, reasonably satisfactory to Landlord, and, to the extent not previously delivered, fully executed and acknowledged unconditional lien releases from the Contractor and all Covered Subcontractors, and copies of all invoices from the Contractor.

(b) All evidence reasonably available from governmental authorities showing compliance with any and all other Laws, and all governmental authorities having jurisdiction over the Premises, including, without limitation, a certificate of occupancy, building permit sign-offs, and/or other appropriate authorization for physical occupancy of the Premises.

(c) A certificate executed by the Architect confirming that Tenant's Work has been substantially completed in accordance with the Final Construction Documents.

(d) A written certificate from the Contractor as follows:

> There are no known mechanics' or materialmen's liens outstanding, all due and payable bills with respect to Tenant's Work have been paid, and there is no known basis for the filing of any mechanics' or materialmen's liens against the Premises, Building or Land, and, to the best of our knowledge, waivers from all subcontractors and materialmen are valid and constitute an effective waiver of lien under applicable law. No substandard work exists that materially and adversely affects the mechanical, electrical, plumbing, HVAC, life-safety or other systems of the Building, the curtain wall of the Building, the structure or exterior appearance of the Building.

(e) A certificate from Architect to Landlord, in the form of the then applicable standard AIA document, certifying that the construction of Tenant's Work has been substantially completed.

(f) The as-built plans and specifications referred to above.

A check for the Final Retention payable to Tenant shall be delivered by Landlord to Tenant within thirty (30) days following the completion of the requirements of this Section 4.7.

4.8 Assignment of Rights against Architect and Contractor. If and upon the termination of the Lease as a result of a Tenant Default, Tenant shall assign to Landlord, upon request of Landlord, any and all rights Tenant may have against the Architect and Contractor relating to Tenant's Work, without in any way obligating Landlord to pursue or prosecute such rights.

ARTICLE 5

MISCELLANEOUS

5.1 Tenant's Representative. Tenant has designated Wayne Pipes and Lea Anne Doolittle as its sole representatives with respect to the matters set forth in this Work Letter, who, until further notice from Tenant to Landlord, each such person shall have full authority and responsibility to act by himself or herself on behalf of Tenant as required in this Work Letter.

5.2 Landlord's Representative. Landlord has designated Ken Maheu and Jack Onder as its representatives with respect to the matters set forth in this Work Letter, who, until further notice to Tenant, shall have full authority and responsibility to act on behalf of Landlord as required in this Work Letter.

5.3 Time of the Essence. Time is of the essence in this Work Letter. Unless otherwise indicated, all references herein to a "number of days" shall mean and refer to calendar days.

5.4 Tenant's Lease Default. Notwithstanding any provision to the contrary contained in the Lease, if a Tenant Default occurs, then, in addition to all other rights and remedies granted to Landlord pursuant to the Lease, Landlord shall have the right to withhold payment of all or any portion of the Tenant's Work Allowance and/or Landlord may cause Contractor to cease the construction of the Premises.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Jim Downing

INFORMATION TECHNOLOGY & SERVICES
EXHIBIT 600

December 30, 2019

EXHIBIT 600 - DIRECT TESTIMONY- INFORMATION TECHNOLOGY & SERVICES

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position at Northwest Natural Gas Company dba NW Natural ("NW Natural" or "Company").

A. My name is Jim Downing. My title is Vice President and Chief Information Officer. I am responsible for NW Natural's information technology and services ("IT&S"), including cybersecurity, the information technology ("IT") service desk, and technology-related architecture, infrastructure, network, and applications—all of which enable NW Natural to support our customers and operate successfully.

Q. Please describe your education and employment background.

A. I have an undergraduate degree in Business Science Information Systems and received a Master of Business Administration from Tulane. I have earned my Microsoft Certified Systems Engineer credential and am a Cisco Certified Design Associate. I have been an IT&S professional since 1995. Prior to NW Natural, I worked as a Customer Contact and Help Desk consultant, helped consolidate European Help Desk services for Compaq, and provided IT&S support for major oil and gas companies for 17 years. Recently, I was recognized by Governor Kate Brown for helping to evaluate and create a multi-year IT strategy for the State of Oregon. I joined NW Natural in 2017.

Q. What is the purpose of your testimony?

A. My testimony provides an overview of NW Natural's IT&S environment, strategic vision, increased IT&S staffing needs, and four IT&S projects that

will be completed prior to the rate effective date of this rate case: (1) migrating and modernizing the Company's data centers; (2) replacing the Company's software that manages customer orders and service requests; (3) replacing and upgrading the Company's website; and (4) updating to Microsoft Office 365 E5.

Q. Please summarize your testimony.

A. In my testimony, I describe the Company's:

- Current IT&S Environment and Strategy: Technology systems have become increasingly critical to utility operations. Growing security, customer service, and operational demands require ongoing technological innovation that must be implemented both proactively and strategically. In this context, NW Natural's aging foundational software systems need significant upgrades and replacements.
- Horizon Program: This seven-year strategic initiative will provide a comprehensive IT&S update to increase operational efficiency and improve technological resilience and security. While the Company is not seeking cost recovery for its Horizon program at this time because the underlying projects will not be used and useful during the test year of this rate case, NW Natural believes it is important to provide visibility to our stakeholders at early stages of significant projects. This testimony describes Horizon's critical components, development and implementation strategy, and our progress to-date.

- IT&S Staffing Needs: The Company is hiring14 new full-time equivalent ("FTE") positions to fill a critical gap in the number of IT&S staff, the skillsets necessary to support new technological capabilities, and the ability to effectively respond to growing security needs.
- Data Center Migration and Modernization Project: The Company is relocating, reconfiguring, and upgrading its data centers to ensure stable, secure, and cost-effective resilience in case of disaster events.
- Customer Order Management ("COM") Project: This project replaces an outdated, homegrown software system that encompasses order management and NW Natural's interactions and relationships with current and prospective customers and trade allies (known as a customer relationship management system, or "CRMS"). This outdated system will be replaced by a streamlined, automated process for handling interactions with customers, trading partners (such as equipment suppliers), municipalities, and prospective customers.
- Digital Portal Project: This project will replace NW Natural's out-of-date website in order to accommodate the Company's growing mobile traffic, enable interactions with the Company's Horizon projects, and improve security.
- Microsoft Office 365 E5: NW Natural is upgrading to Microsoft Office 365 E5 to increase cybersecurity, avoid the substantial investment necessary to update the Company's legacy phone system, and reduce

maintenance costs associated with upgrading the current version of Microsoft Office.

II. OVERVIEW OF THE IT&S ENVIRONMENT

Q. Please briefly describe the current IT&S environment.

A. The current IT&S environment is changing rapidly while also becoming increasingly vital to utility operations. From a business perspective, NW Natural relies on the availability of comprehensive, accurate, and timely information and analytics. Similarly, customers have come to expect ready, reliable access to IT&S services such as customer support and bill payment options, with interfaces available and responsive at all times. Yet while NW Natural's business and its customers become increasingly reliant on the opportunities offered by increasing digitization, security concerns and their associated costs grow commensurately.

Today, these complex technology assets are essential to NW Natural's ability to provide safe, reliable, and adequate service to our customers. As a result, a comprehensive strategic vision is essential to plan for, implement, and evaluate technological investments, thus ensuring that the Company's business operations, customer engagement, and reliable provision of service are all adequately supported at reasonable cost to customers.

Q. Please explain how NW Natural is currently situated in this IT&S environment.

A. NW Natural has sought to balance the growing need for technological innovation with the goal of serving customers in a cost-effective manner, both

by preserving and extending the usefulness of existing IT&S platforms and programs and by maintaining a lean staffing profile. However, NW Natural's current IT&S architecture is experiencing substantial ongoing maintenance problems, requiring the Company's limited number of IT&S employees to tend to a growing volume of urgent upgrades. The Company's outdated application portfolio has become both disruptive and inefficient, and is thus overdue for a strategic and comprehensive update. Additionally, as I will describe in my testimony, some of our applications are not only outdated, but are also reaching end-of-life, meaning that the application providers no longer provide updates or support for the applications.

Q. Does NW Natural have an over-arching strategic goal in this increasingly complicated IT&S environment?

A. Yes, a central goal guiding NW Natural's IT&S strategy is reducing complexity for the benefit of our customers. Currently, the Company's IT&S systems are outdated, which leads to increasingly complex solutions when issues arise, burdening our staff and leading to increased risk of system outage. To help streamline NW Natural's IT&S systems, we will consolidate and streamline the number of applications in our portfolio, use off-the-shelf rather than custom-developed software, and rely on a smaller number of reliable software providers to support the IT&S infrastructure.

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III. HORIZON PROGRAM

A. Horizon Overview

Q. Please describe the Horizon program generally.

A. NW Natural's Horizon program is a seven-year, two-phase IT&S initiative to implement necessary upgrades to NW Natural's technology architecture. Each phase ("Horizon 1" and "Horizon 2") involves a significant foundational project to upgrade a major piece of software, using new software tools developed by a single developer.[1]

Horizon 1's keystone project is upgrading the current outdated system that manages the Company's key business functions, such as accounting, operations, human resources, asset management, and field management. This framework for the Company's essential business functions is known as an enterprise resource planning ("ERP") platform, and SAP will no longer support our current platform after 2025.

Horizon 2's central project involves upgrading and replacing NW Natural's 21-year-old Customer Information Systems ("CIS") platform. CIS is the integrated framework that manages essential customer-facing functions, such as billing and customer field services.

Together, NW Natural's ERP and CIS provide the twin frameworks for managing and integrating the Company's essential business and customer-facing functions, making these two platforms foundational pillars of how

[1] The developer is SAP (Systeme, Anwendungen und Produkte in der Datenverarbeitung), a German software company and international leader in enterprise software programs.

NW Natural is able to effectively and efficiently serve customers. In each phase of the Horizon program, these two platform upgrades are accompanied by supporting efforts to move or replace other related applications to align with the new platforms' capabilities.

Q. Is NW Natural currently seeking cost recovery for any Horizon project as part of this rate case?

A. No. At this time, NW Natural does not anticipate that any of the Horizon projects will be completed before the end of the test year of this rate case. As a result, the Company does not request rate recovery for any Horizon-related projects. However, the Company is requesting recovery of the costs associated with one of the Company's 14 new IT&S FTEs who will be supporting Horizon 1's ERP upgrade, as described more fully below.

Despite the relatively minor cost-recovery request associated with the Horizon program in this case, the initiative is mission critical and will entail substantial future investments. As a result, I take this opportunity to provide an overview of the Horizon program and its major components.

B. Horizon Projects

Q. Please describe the Horizon 1 project.

A. The central Horizon 1 project involves upgrading NW Natural's ERP—the backbone software that manages and integrates the Company's essential business functions. NW Natural's existing ERP is an SAP product known as the SAP ERP Central Component ("SAP ECC"). To be clear, SAP is the software developer; ERP is the category of software tool; and SAP ECC is

one type of ERP software. SAP has announced that it will no longer support the existing software beginning in 2025, meaning that there will be no repairs, enhancements, or other maintenance going forward.[2] As a result, the existing ERP software is nearing the end of its useful life, and NW Natural plans to upgrade to a new ERP platform.[3]

Q. Why is NW Natural upgrading the ERP platform now?

A. NW Natural is upgrading to the new ERP now because: (1) the cost to upgrade to the new software is likely to increase substantially as the developer's 2025 deadline approaches; and (2) the current platform does not adequately support NW Natural's range of business needs that are necessary to serve customers.

First, many different companies (including more than 20 utilities) rely on the existing SAP ECC software package, meaning that many different companies are—or soon will be—in the process of finding and installing replacement systems. This replacement effort requires the use of outside consultants to both perform and help oversee the critical upgrade process. Growing competition for these outside consultants means that waiting even one more year could substantially increase the necessary costs. Moreover, given the time required to develop and implement the new solution, it is imperative that NW Natural work to begin this replacement process now.

[2] SAP News, "SAP Committed to Innovation and Choice for SAP Business Suite Applications," (Oct. 14, 2014) (announcing that maintenance for legacy software will be supported "until end of 2025"), available at: https://news.sap.com/2014/10/sap-committed-innovation-choice-sap-business-suite/.

[3] The new ERP software is called SAP S4/HANA.

Second, it is important to proceed with the upgrade to the new ERP platform because the existing ERP software has limited functionality. The existing software requires employees to use multiple applications to complete tasks and to rely heavily on manual entries. For example, many key business and financial reports are very slow to generate, requiring an inordinate amount of time compared to more modern ERP platforms and requiring finance staff to be onsite in off-hours to close accounting books.

Q. How is the new ERP software different?

A. The new ERP software is a secure, modern platform that provides substantial improvements in multiple areas of operation:

- **First,** the platform operates more efficiently because it integrates many more processes, thus allowing employees to use a single central platform instead of multiple disconnected applications.
- **Second,** the platform has greater functionality, enabling more automated processes, reducing application run times, and allowing for increased analytic assessments of Company operations.
- **Third,** the platform is more secure, reducing the risk of cybersecurity breaches, enabling greater privacy controls, and enhancing risk monitoring and reporting capabilities.

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- **Finally,** as the new ERP is integrated with other technical components of the Company's business processes (such as those described in the Horizon 2 program, below), NW Natural's productivity is expected to increase as users maximize the functionality of the new program.

Q. Please describe the Horizon 2 project.

A. Horizon 2 is the second foundational wave of projects, the largest of which involves replacing the 21-year-old CIS—the integrated framework for managing essential customer-facing functions. The new CIS is a utility-specific software program developed by SAP.[4] Additional Horizon 2 projects will support or integrate with the new CIS and will ensure successful transitional operations as the new system is put in place.

Q. Why is NW Natural replacing the existing CIS?

A. The existing CIS was developed and customized for the Company over 20 years ago. As the software has been adapted and updated over the years, it has also become increasingly complex and difficult to maintain—increasing the risk of breakage and thus undermining the Company's ability to reliably provide safe and adequate service.

Moreover, the existing CIS programming language is no longer widely used. Those with experience in the relevant programming language are nearing retirement age, and are difficult to find. As a result, NW Natural is relying on a foundational, aging piece of software architecture, while

[4] The new CIS is known as the SAP Industry-Specific Solution for Utilities (SAP ISU).

struggling to find staff capable of providing the necessary technical support and maintenance.

Q. How is the new CIS platform different?

A. The new CIS platform is a comprehensive sales and information system specifically designed for utilities—combining the benefits of customized design with the robust support of off-the-shelf software. Moreover, by adopting a software solution for CIS from the same developer providing the new ERP platform, NW Natural will be able to implement unified management of customer data. Using a single software provider for both platforms not only has the potential to provide everyday practical benefits such as faster customer service, but will allow for more effective data archiving and disaster recovery capabilities.

C. Horizon Development

Q. Please summarize how NW Natural developed the Horizon program.

A. NW Natural developed the Horizon program with the support of outside experts, industry surveys, and extensive communications (including site visits) with other utilities that have already undertaken—or are in the process of implementing—similar foundational upgrades.

Q. Is NW Natural exploring both on-site and cloud-based solutions for the Horizon projects?

A. Yes, NW Natural is continuing to explore the cost and practicability of deploying both the new ERP and CIS software platforms in the cloud, or possibly implementing a hybrid hosting approach. NW Natural intends to

complete a thorough assessment to determine which approach will provide the greatest customer benefits—with respect to costs and factors such as reliability—and proceed accordingly.

Q. When will the Horizon projects enter service?

A. The Horizon projects are expected to take approximately seven years to develop and enter service. NW Natural currently anticipates that the Horizon 1 project—including the new ERP platform—will be fully deployed in 2022. Horizon 2's CIS upgrade is not expected to begin until after Horizon 1 is completed.

Q. Has NW Natural developed a firm preliminary price estimate for the Horizon program?

A. Not at this time. Due to the Horizon program's complexity and its early stage of development, the Company has not completed the detailed final scoping for the program, which will yield a more reliable price estimate for the program as a whole. The Company will provide updates on the Horizon program and associated costs as progress continues.

Q. What processes or practices will NW Natural adopt to guard against overruns in time and investment in the Horizon projects?

A. To help ensure that the projects proceed on-time and at a reasonable cost, NW Natural will hire an independent outside expert to help obtain software and services at a reasonable price point, and has established a project governance structure, including senior executives, that will track project performance and provide management oversight.

By approaching NW Natural's IT&S needs in a systematic, deliberate, and comprehensive manner, the Horizon program ensures that NW Natural is making prudent and timely investments to ensure the efficiency, resilience, and security of its technological foundation, and will thereby allow the Company to continue to provide safe, adequate, and reliable service to customers.

Q. Do you have anything further to add about the Horizon program?

A. While NW Natural does not seek recovery for Horizon-related projects in this rate case, the Company is currently assessing the financial implications of moving toward cloud-based solutions.

While we believe that many cloud-based solutions will be desirable, the accounting for these subscriptions creates a new type of challenge for our Company that we have not historically faced when purchasing IT&S software. At its core, technology is rapidly changing and we need to adapt to these changes to better serve our customers. The Horizon program will be ongoing for several years and it is likely that we will be seeking a deferral order to defer the expenses associated with cloud-based solutions for later inclusion in rates.

Q. Please explain why NW Natural would request a deferral order rather than seeking recovery of these costs in this rate case.

A. We expect that many of the cloud-based solutions will go live in 2022 —after the Test Year in this rate case, and as a result, these expenses would not ordinarily be reviewed for recovery in this rate case. Unlike much of the

software that we have historically purchased for our Company, cloud-based solutions are not accounted for as capital investments, where the Company would recover the return of and return on the investment over the life of the asset. Rather, these IT&S solutions are subscription-based services that are O&M expenses that we will incur on an annual basis. These cloud-based solutions represent incremental O&M between rate cases that will be "lumpy" in nature as they represent significant incremental O&M expense that the Company has not incurred before (as opposed to O&M increases that are inflationary). The Company anticipates requesting a deferral for these subscription-based cloud solutions that are part of the Horizon Program.

Additionally, during the development of Horizon 1 and 2, we anticipate incurring significant one-time O&M expense associated with the training of our employees for these new cloud-based solutions. These one-time costs would not ordinarily be included in the Company's revenue requirement because the costs do not represent ongoing, annual expense that will be recovered year after year. Accordingly, the Company will likely request to defer these one-time expenses for future recovery in rates.

IV. IT&S STAFFING NEEDS

Q. What is NW Natural's strategy for IT&S staffing?

A. NW Natural's IT&S staffing strategy supports the provision of safe, secure, and reliable service by ensuring that: (1) critical areas of IT&S are not dependent on a single individual employee; (2) there are adequate staff resources to support essential business and customer support functions;

(3) staff have the skillsets to use necessary modern technologies; and (4) staff are equipped to maintain rigorous cybersecurity practices.

Q. Does NW Natural discuss its overall incremental FTE recovery request elsewhere in testimony?

A. Yes, NW Natural's company-wide incremental FTE recovery request is addressed in detail in the Direct Testimony of Melinda Rogers (*NW Natural/700, Rogers*).

Q. Is NW Natural seeking cost recovery for new FTE positions to support IT&S in particular?

A. Yes. NW Natural is seeking cost recovery for 14 new IT&S-related FTEs, which will increase test year salaries and benefits costs by approximately $2.4 million. These FTEs include 4 application positions, 5 network and infrastructure positions, and 5 security positions, as shown in Table 1, below:

Table 1

Department	Role
Applications	Database Administration
Applications	Application Integration Lead
Applications	Open Text/Paymentus Administrator
Applications	ERP Developer
Network & Infrastructure	Network Engineer
Network & Infrastructure	Skype Administrator
Network & Infrastructure	Linux Administrator
Network & Infrastructure	Network Administrator #1
Network & Infrastructure	Network Administrator #2
Security	Security Architect
Security	Security Operations Lead
Security	Industrial Control Systems Security Specialist
Security	Governance/Risk Specialist
Security	Applications Security Specialist

Q. As a general matter, why does NW Natural need new IT&S FTE positions?

A. NW Natural's IT&S division has historically been leanly staffed. While there are over 1,170 NW Natural employees supporting the organization, there are only 83 IT&S-specific, non-contractor FTEs. Thus, the percentage of IT&S FTEs supporting the overall Company FTE pool is only 7.2 percent—below the industry average for mid-size utilities. With the additional 14 FTEs, the Company's ratio of IT&S-to-overall FTEs will still be only 8.52 percent.

NW Natural's lean staffing has become a particular concern for cybersecurity. As a result of careful assessments of our staffing levels and needs, we believe that our existing staffing resources are insufficient to effectively execute the Company's corporate security requirements. This understanding was recently confirmed by the Transportation Security Administration (TSA) in a 2019 report that reviewed the Company's overall security protocols and practices and recommended that NW Natural increase its allocation of resources for both physical and cyber security, including staffing.

Q. Please explain the need for a new Database Administration position.

A. Databases are critical to support all aspects of customer service and business functions, as they provide the means for storing, managing, and retrieving data by the Company's various applications. Much as catalog systems provide the means of locating necessary information in a library, so too are databases essential to locate the information needed by a particular application—a service that must be performed swiftly and accurately to

ensure that the applications themselves can perform equally smoothly. These databases require ongoing maintenance to ensure that the applications they support function properly.

Currently, NW Natural has over 2,000 databases supporting essential customer service and business functions. However, approximately 1.25 FTEs, along with some third-party monitoring and part-time external support, are currently focused on the database management functions. As the Company increasingly relies on technological applications to provide safe and reliable service, the workload required to support the underlying databases has steadily increased. As a result, the existing team has been increasingly focused on addressing critical maintenance such as fixing breakage instead of proactive maintenance. More support is needed to manage the ongoing maintenance to reduce the risk of breakage and data loss. In light of this already large and increasing responsibility, the small existing database management team is overburdened and a new Database Administration position is necessary.

Q. Please explain the need for a new Application Integration Lead position.

A. As new applications are incorporated into NW Natural's application portfolio, the new systems do not always communicate smoothly with existing systems—requiring a "translation" layer to ensure that NW Natural's systems operate smoothly and provide uninterrupted service to customers. This integration process requires dedicated focus in developing, monitoring, and improving the interfaces between applications—including those on-premises

and in the cloud. Today, this critical role is being shared by multiple individuals with other primary responsibilities. The new Application Integration Lead position will manage the effective integration of the Company's software applications, serving a function that is as essential as the development and maintenance of the discrete individual applications. The Application Integration Lead will also coordinate between the technical teams and senior architects, and will work with end-users of the different applications to ensure smooth project implementation.

Q. Please explain the need for a new Open Text/Paymentus Administrator position.

A. The Open Text/Paymentus Administrator position will be responsible for the implementation and ongoing administration of two new software tools, with the majority of the role dedicated to the Open Text application. Open Text is a new application that provides customers with easier-to-read bills and customer notices. NW Natural not only manages approximately 700,000 bills each month, but also must make each customer's bill archive available online. Currently, bills may be difficult to parse as they are entirely black-and-white, with no ability to call out or highlight critical information. The new Open Text application will allow customers to more easily read and understand their bills.

In addition, Paymentus is the new payment processing provider incorporated into the new Digital Portal (described in more detail below). Internal staffing support is needed to ensure that this new application is implemented smoothly and continues to effectively serve customers after

implementation. NW Natural's existing team does not have the capacity to absorb the additional work necessary to support either or both of these new systems.

Q. Please explain the need for a new ERP Developer position.

A. The new ERP Developer position is the first new FTE associated with the Horizon program, described in detail above. This position will help develop and maintain the user interface necessary to ensure that the new ERP will be easy to use and efficient, while also integrating with other applications. We are currently evaluating our next ERP, and we will soon start implementing the ERP. It is important to have a dedicated FTE to this project now so that we have continuity throughout the ERP development. Over time, we expect to hire additional FTEs to support the Horizon program, but we are only seeking recovery of one new FTE in this case.

Q. Please explain the need for a new Network Engineer position.

A. Network Engineers design, build, and implement technology solutions to allow NW Natural to communicate both with its customers and internally. Networks include internet and cellular systems that are essential to safely and reliably provide customer service. At the moment, only one Network Engineer provides all support for both network development and daily support tasks, and is thus significantly over-extended. The new Network Engineer FTE will work with the existing engineer to reduce communications outages, work on capital projects, and improve both security and reliability throughout NW Natural's networked systems.

Q. Please explain the need for a new Skype Administrator position.

A. In 2020, NW Natural will begin using Skype for its phone services, instead of performing a more costly upgrade to the legacy Avaya phone system. Skype will provide NW Natural's primary communications system and will improve communication and collaboration with both internal and external parties. Skype will also allow us to discontinue WebEx as our platform for video conferencing and related communications. However, there is currently no individual responsible for supporting Skype. It is essential for the system's success that we add this position to ensure that the Skype systems operate smoothly, thereby allowing NW Natural to work efficiently to serve its customers.

Q. Please explain the need for a new Linux Administrator position.

A. NW Natural has identified the Linux operating system as necessary to many of the Company's strategic goals. Linux is highly secure and stable, and— thanks to its flexibility— is often selected as the operating system for large database systems. However, the Linux system is also highly complex and requires a unique skillset not currently represented among NW Natural employees. Traditionally, NW Natural's Linux servers have been managed by contractors. A new FTE Linux Administrator will help ensure consistent service delivery as well as minimize disruptions in the Company's operations, thereby helping to ensure reliable service to customers.

Q. Please explain the need for two new Network Administrator positions.

A. Network Administrators support day-to-day tasks related to internet and cellular networks, supporting functions such as mobile customer service technicians and data center operations. However, NW Natural currently has no Network Administrators, leading to limited awareness of communications issues and poor network performance. These two new positions will proactively monitor and troubleshoot this essential infrastructure as well as support everyday business tasks related to developing and maintaining the Company's network. Two network administrators are being added so that we can deliver consistent service coverage (e.g., mitigate work stoppage due to vacation, illness or other absence), reduce service delivery times by working on multiple workstreams simultaneously, and affect a proper "on-call" rotation that will extend support hours and mitigate employee burn-out.

Q. Please explain the need for a new Security Architect position.

A. Cybersecurity is critically important to ensure both the privacy of customer information, as well as the safe and reliable provision of service to customers. The Security Architect position focuses on the long-term to ensure that security factors are fully considered in the identification, selection, and design of new security technologies. For instance, this position will work to identify potential security deficiencies and emerging threats and will recommend proactive solutions. This strategy is far more efficient and effective than attempting to provide for security after the fact.

Q. Please explain the need for a new Security Operations Lead position.

A. A new Security Operations Lead position will be a hands-on security team member, improve security processes, and provide leadership to other security staff. This person's responsibilities will include configuring and monitoring security systems for alerts and improving responses to security incidents by conducting more frequent and focused testing exercises. This position will also be responsible for ensuring that security vendors comply with contracted service-level agreements and for staying abreast of security trends, practices, and regulations. As a senior security team member, this person will provide overall leadership and oversight for other security team members—a necessary role for a larger team.

Q. Please explain the need for a new Industrial Control Systems ("ICS") Security Specialist position.

A. ICS is similar to the nervous system of the gas infrastructure, as it provides comprehensive information about how our gas system is functioning at any given time. The security of this system is critical to NW Natural's ability to provide safe and reliable service to our customers. In order to ensure that the ICS continues to be adequately protected, the new ICS Security Specialist will ensure that security-related maintenance (e.g., installing technical patches) and process controls (e.g. developing secure coding standards) are implemented and monitored. These steps will be undertaken in collaboration with staff responsible for monitoring and controlling the flow of gas throughout our pipeline as well as managing our natural gas storage facilities.

Q. Please explain the need for a new Governance/Risk Specialist position.

A. NW Natural is increasingly expected to not merely improve security measures, but to document and track the measures implemented. The new Governance/Risk Specialist will fill this function by developing and documenting the Company's security and risk-mitigation policies and practices. This documentation process will help ensure that NW Natural develops the necessary institutional memory to track security and risk-mitigation measures, independent of individual staff and personnel.

Q. Please explain the need for a new Applications Security Specialist position.

A. The new Applications Security Specialist combines experience developing applications with the security knowledge necessary to collaborate with NW Natural's other software developers in the design and implementation of more secure software. While individual developers each strive to develop secure applications and to fix issues as they arise, we also need additional security-specific expertise to ensure that the security of our applications is more consistent and repeatable across the application ecosystem.

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Q. Will all of the new FTE positions, described above, be filled before the test year?

A. Yes. All of these FTE positions have been approved for hiring and job listings have been posted.[5] NW Natural intends to fill these positions by February 2020.

V. MAJOR IT&S PROJECTS

A. Data Center Migration and Modernization Project

Q. Please describe NW Natural's data center migration and modernization project.

A. The data center migration and modernization project involves relocating, reconfiguring, and upgrading the Company's data center system. A data center is a dedicated space that houses an organization's IT operations and equipment, and is also where the organization stores, manages, and disseminates data. Currently, NW Natural's primary data center is located in the Company's headquarters basement, which is seismically vulnerable and susceptible to flooding, with a second back-up data recovery center located in Sherwood, Oregon. Both sites are within the impact zone of a large Cascadia seismic event. In large part due to these seismic concerns, NW Natural has been considering relocating its data centers for years. Now that NW Natural is relocating its headquarters, migrating the data centers has become

[5] The job postings for each of the new IT&S FTE positions are attached as exhibit *NW Natural/601, Downing*.

unavoidable—the existing headquarters must be vacated by May 31, 2020. NW Natural intends to reset its data center operations as follows:

- **First,** the Company will establish three data center locations: (1) a new data center at a co-located, leased facility in Bend, Oregon; (2) NW Natural's existing Sherwood, Oregon, data center; and (3) a small, supplemental data room at the Company's new operations center at 250 Taylor.
- **Second,** NW Natural will reconfigure its data center system to transition from the existing two-location system to a three-location approach, allowing rapid recovery following disaster events. This approach will allow NW Natural to maintain only a small data room at 250 Taylor to provide on-site needs, while establishing full redundancy of critical systems at the Sherwood and Bend locations.
- **Third,** the Company's relocated and redesigned data centers will also be enhanced to implement modern cybersecurity measures, enabling greater protection of customer data and critical systems.

This relocation, redesign, and upgrading process is expected to require $11.0 million in capital investment, and will be placed in service in May of 2020.

Q. Why has NW Natural adopted a three-location approach?

A. NW Natural adopted a three-location approach for two basic reasons:

- **First,** by maintaining a small on-site data room at the new 250 Taylor operations center, NW Natural can provide adequate support for those

applications requiring a local presence or particularly high-speed responses, such as network, security, and phone systems. However, reserving a more substantial space in 250 Taylor for a data center would have been an uneconomical use of space. Thus, NW Natural concluded that the most economical and efficient approach was to minimize on-site data room functions and to maintain the bulk of data center services off-site. Having established a much smaller data room at 250 Taylor, two independent data centers are needed to ensure comprehensive resilience in case of a disaster event.

- **Second,** NW Natural chose to use the Bend and Sherwood sites to provide the bulk of data center services because these are two relatively diverse geographic locations—thus ensuring that no single seismic event or other emergency event could reasonably undermine the Company's critical IT&S infrastructure.

Q. What alternatives did NW Natural consider in developing the data center migration and modernization project?

A. NW Natural considered two alternatives to the data center migration and modernization project described above: (1) building a new data center in an existing resource center in The Dalles, Oregon; and (2) migrating one of the three data centers to a cloud-based solution.

Q. Why did NW Natural choose not to pursue these alternatives?

A. **First,** building a new data center in The Dalles location would be more expensive when accounting for ongoing O&M costs, such as power, cooling,

physical security, and maintenance. There was also a concern about the build-time to construct a data center at this location before needing to vacate the Company's existing headquarters.

Second, moving the data center as a whole to a cloud computing solution was similarly rejected at this time due to greater costs, a lack of testing capabilities necessary to ensure system resilience, and substantial incompatibilities with existing critical systems—meaning that the Company would still require full physical support systems in addition to a cloud-based service.

As a result of this analysis, NW Natural decided to modernize the existing Sherwood facility and to establish a new data center at a purpose-built, co-located leased facility in Bend. This option was the most attractive due to its reliability, geographic diversity, and cost-effectiveness. Moreover, by pursuing a five-year lease at the Bend location, NW Natural retains the flexibility to consider cloud-based or other solutions in the future, if costs and technologies change.

Q. Why was it necessary to modernize the Sherwood data center?

A. The Sherwood data center was not created to serve as a primary data center because the Company currently has a full on-site data center at the existing headquarters. As a result, the Sherwood location required additional power, cooling, and other equipment to allow that facility to serve as a reliable and efficient primary resource, and also to ensure that the Company could operate directly out of that location in an emergency.

Q. Please explain the costs involved in the data center migration and modernization project.

A. The two most significant costs associated with the data center migration and modernization project are network and labor. Specific cost categories are shown below in Table 2:

Table 2

Category	Cost
Cyber Security	$750 thousand
Load Balancing	$100 thousand
Network	$3.019 million
Server	$780 thousand
Storage	$611 thousand
Software	$100 thousand
Labor	$4.833 million

Q. What did network costs entail?

A. The majority of network costs includes purchasing equipment such as routers, firewalls, security monitoring devices, cabling, and the software technologies that run the integrated data center network. This equipment will simplify the data center's automated systems and allows applications to be more easily mapped onto the data center's network.

Q. What did labor costs entail?

A. The labor costs associated with migrating and upgrading the data centers entail significantly more than simply moving physical equipment. All of the applications and IT infrastructure currently mapped onto the existing data centers must be assessed, inventoried, installed on the new systems,

configured to work effectively, and then tested and reconfigured as necessary. This process involves the time and attention of network engineers, infrastructure engineers, software engineers, security engineers, technical analysts, and project managers.

Q. Were labor costs higher than anticipated?

A. Yes – this is due in large part to the age and complexity of the applications being transferred, the short window of time available to complete the work, and the need to proceed carefully so as to minimize disruptions and downtime for critical applications being supported by the data centers. NW Natural's IT&S infrastructure has grown organically in the past decades, with many applications dependent on each other to operate smoothly. Meanwhile, data center technologies and application requirements have made significant leaps forward. As a result, the modernization process required significantly more work than anticipated to ensure a relatively seamless and long-lasting transition with maximum benefits for NW Natural's customers.

Q. What recovery is NW Natural requesting for the data center migration in this case?

A. NW Natural seeks to recover its capital investment of approximately $11.0 million.

B. COM Project

Q. Please describe NW Natural's COM project.

A. The COM project will replace NW Natural's homegrown CRMS with a new COM system. CRMS serves new and prospective customers by answering

customer requests for service and information, while also ensuring that all engineering and customer service needs—as well as federal, state, and tariff requirements—are fully met when providing new customer service. An effective CRMS must offer full-service functionality to serve customers, including managing and fulfilling inquiries, tracking orders, and providing real-time information on gas availability. The COM project is expected to be completed by June 30, 2020, with an expected capital cost of $13.5 million. The cost of the project is in line with industry-standard costs for such a multi-faceted and critical software upgrade, which typically takes 2-4 years and ranges in cost from $6 million to $15 million.

Q. Please describe the issues that the Company faces with its current CRMS.

A. The current CRMS was fully customized and has been in use since 2003. With more than 15 years in service, the existing CRMS has had an extraordinarily long life span for this type of software. As business, customer, and regulatory needs have evolved over these years, the Company has been able to delay the need for major replacements through incremental modifications to the CRMS, resulting in layers of add-ons and updates. While these interim measures allowed the CRMS to withstand a significant amount of change, the accumulating modifications have ultimately resulted in an unwieldy and unsustainable software architecture that is no longer supportable by vendors or available employee skillsets. Moreover, the CRMS

interacts with other NW Natural software systems, and is increasingly struggling to interface with other modern software applications.

As a result of this complexity and the lack of support for the existing CRMS technology, it has become increasingly difficult to make necessary process changes, resulting in a growing backlog of required development needed to maintain the system.

Q. What alternatives did the Company consider when evaluating how to address the problems with the current CRMS?

A. The Company considered three alternatives: (1) keep the existing CRMS, (2) create a new custom system developed in-house, and (3) use (and, if necessary, adapt) an off-the-shelf replacement system. The Company concluded that the first option was not viable because the existing CRMS is no longer supported or supportable, based on the following factors:

- NW Natural's homegrown system, as a platform built incrementally over 15 years with complex interconnections, suffers from frequent breakages when it is updated. As the CRMS is necessary to onboard customers and respond to customer orders, it is a mission critical system that must be workable 24/7.
- The CRMS is inadequate to meet customer expectations for speed and response times. The system has become increasingly slow, with basic screen changes taking up to a minute to process. Customers have increasingly come to expect fast-paced response times, akin to the

service provided by large-scale service providers, such as Amazon.com or eBay.com.

- The incremental creation of the system entails a variety of manual input processes (such as independently-managed excel spreadsheets) and extensive, multi-year training processes for employees. As NW Natural has, consistent with the rest of the industry, experienced greater turnover rates in IT services, the ability to maintain continuity for a large, internally-developed and maintained system has decreased.
- Unfortunately, CRMS's complexity does not allow for incremental retrofits without either jeopardizing the system's integrity or requiring a complete system overhaul equivalent to developing and maintaining a new custom software package—replicating the Company's existing continuity and staffing concerns.

In light of these factors, the Company concluded that retrofitting the existing software is not a feasible option. As a result, the Company considered whether to create a new custom software solution or use an off-the-shelf software solution. Of these remaining two options, custom-built software is consistently more expensive and, as demonstrated by the Company's experience developing and maintaining CRMS, requires extensive ongoing maintenance. In recent years vendors have specialized in developing comprehensive products that, with some modification, can meet the demands

of NW Natural's range of processes—with external vendors responsible for the streamlined ongoing maintenance of the software product. By outsourcing these expensive and highly labor-intensive maintenance tasks, while reducing the up-front development cost, adapting an off-the-shelf software solution was deemed the best option in today's market.

Q. What are the benefits of the new COM system?

A. There are two major categories of benefits for the new COM system: substantially increased functionality and long-term cost savings.

Q. Please describe the functional benefits of the new COM system.

A. The new COM system will upgrade the largely manual CRMS into an automated, streamlined customer-service tool. By using an intuitive design that incorporates the range of engineering, legal, and regulatory requirements, NW Natural can ensure that it is accurately and promptly responding to informational and service requests.

For instance, a minor difference in the type of equipment that a customer seeks to install (e.g., type of water heater) can lead to major differences in the facilities put in place by NW Natural (e.g., pipe size). Such details previously needed to be memorized by staff or pulled from lengthy informational binders—a cumbersome and time-consuming process. Now these details are incorporated into the COM system, allowing customer service representatives to answer questions and requests more promptly. As a result, the Company estimates that response times may be reduced by one-third, and intends to track these anticipated efficiency gains going forward.

Moreover, because the new COM system is highly configurable, it can be adjusted to include new requirements and questions without requiring developer resources.

In sum, the new system will:

- respond to changing internal and external requirements;
- allow coordinated outreach to all customers impacted by common issues, such as weather events;
- monitor customer orders to ensure that the Company and customers have adhered to all relevant deadlines;
- provide broader access to information across multiple areas of the Company;
- support digital data storage, thus reducing the need for paper and physical storage;
- produce on-demand project reporting and status data; and,
- reduce reliance on developers as new accounts can be tracked individually, also resulting in greater transparency for internal data.

Collectively, these improvements will allow NW Natural employees to respond more quickly and efficiently to customer questions and requests, resulting in a better experience for existing and prospective customers.

Q. Please describe the long-term cost savings of the new COM system.

A. The new COM system will ultimately provide cost savings to customers both by reducing reliance on developer resources and by dramatically shortening

the training required for new employees. The efficiencies expected from the COM system averted the need to hire up to four additional FTEs on the Customer Acquisition team that would have been required due to order volume. In addition, the new system helps prevent errors that might delay orders or otherwise impact costs.

Q. What is the current status of the project?

A. The Company is on track to place the new COM system in service by June 30, 2020.

Q. What recovery is NW Natural requesting for the COM project in this case?

A. NW Natural seeks to recover its capital investment of approximately $13.5 million and will update its request with actual amounts in the Company's Reply Testimony.

C. Digital Portal Project

Q. Please describe NW Natural's Digital Portal project.

A. NW Natural's Digital Portal project will replace NW Natural's out-of-date website in order to improve data security and accommodate the Company's growing mobile traffic. The new Digital Portal will also more seamlessly integrate with impending CIS changes from Horizon 2. In order to achieve these goals, the project will replace the existing website's "content management system" with a comprehensive new digital framework—including a modern "experience management platform," online payment processing

provider and platform, and hosting infrastructure.[6] The Digital Portal is based on a new development approach that provides a tailored online experience depending on the type of user thus ensuring that customers can more quickly and easily find the information and resources they need regardless of the screen size of the device used to access the portal. Information is also provided in a range of formats and languages, increasing accessibility for all customers. The project will require an estimated $11.5 million in capital investment and is expected to be placed in service on June 1, 2020.

Q. Why is it necessary to replace NW Natural's existing website?

A. NW Natural's existing website was developed in 2010 and launched in 2012, and is no longer capable of meeting either the Company's or its customers' expectations for modern digital security and excellent customer service. Given that, in my experience, the typical life span of a website is approximately five years, NW Natural's current platform is understandably struggling to meet today's customer demands.[7] In particular, the past decade has transformed both the cybersecurity landscape as well as customers'

[6] A "content management system" is a simplified website tool that allows for only edits to a website's content, not substantial or structural changes. In contrast, an "experience management platform" provides many different additional functions such as far more robust website analytics, flexible marketing automation, and the ability to create different website experiences based on the type of user—among other features.

[7] Orbit Media Studios, "What is the average website lifespan? 10 Factors In Website Life Expectancy" (2017) available at: https://www.orbitmedia.com/blog/website-lifespan-and-you/; Thomas Digital, "What is the average lifespan of a website design?", available at: https://thomasdigital.com/what-is-the-average-lifespan-of-a-website-design/; Creative Media Services, Inc., "What is the lifespan of a typical website?" (2016), available at: https://www.cmsdecatur.com/2016/06/23/websites-lifespan-typical-website/.

reliance on mobile access technologies—a functionality not adequately supported by the Company's existing digital platform.

Q. What are the security reasons for replacing the existing website?

A. The existing website relies on a number of outdated security features that are becoming increasingly vulnerable, while cybersecurity threats are becoming more sophisticated. These features involve layers of protections to shield both customers' sensitive personal information as well as NW Natural's internal network from users accessing the website. If the Company continued to rely on legacy code, software, and hardware that follow outdated cybersecurity measures, customer and Company data could be compromised. A simplified visual depiction of the security features is shown in Figure 1.

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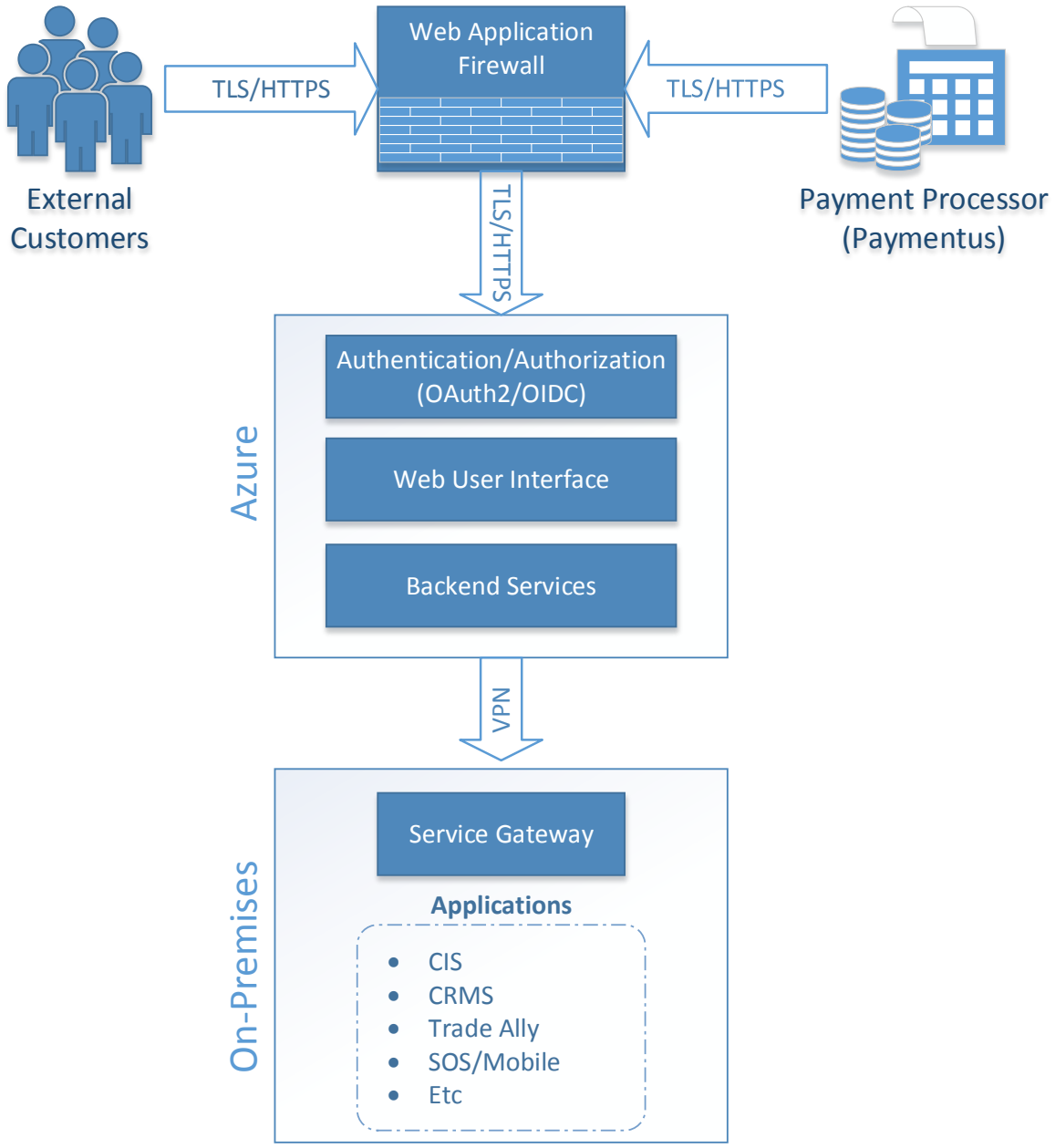
Figure 1



As shown in Figure 1, the Transport Layer Security ("TLS") forms a crucial protective layer between users of NW Natural's Digital Portal and the rest of NW Natural's internal network, ensuring that individuals accessing the

website cannot interfere with NW Natural's operating systems. However, NW Natural's existing website uses a version of TLS—TLS 1.0—that was released in 1999 and is now significantly out-of-date. Indeed, four of the country's largest web browser providers intend to disable use of this security system by March of 2020.[8] NW Natural's new Digital Portal will be incorporating TLS 1.2 which, according to a recent industry survey, has already been adopted by approximately 94 percent of websites.[9]

Similarly, the existing website's hosting infrastructure—the software system that serves as the platform for the website itself—is an on-premises solution that has been significantly outpaced by the security and resiliency features of modern cloud-based hosting platforms. The new Digital Portal's hosting infrastructure, Azure, is a cloud-based Microsoft program that not only leverages all of Microsoft's digital security protocols, but also allows for full disaster recovery because it is not tied to a particular data server.

Q. What are some of the security benefits of the new Digital Portal project?

A. In addition to the upgraded TLS shield and hosting infrastructure described above, the new Digital Portal will incorporate many modern security features including an advanced user authentication system, tighter controls on who can reach NW Natural's system from the Digital Portal, and more secure

[8] Ars Technica, "Apple, Google, Microsoft, and Mozilla come together to end TLS 1.0" (Oct. 16, 2018), available at https://arstechnica.com/gadgets/2018/10/browser-vendors-unite-to-end-support-for-20-year-old-tls-1-0/.

[9] Qualys SSL Labs, "SSL Pulse," (accessed Nov. 19, 2019), available at: https://www.ssllabs.com/ssl-pulse/

payment processing system practices—all of which will significantly reduce system risk and increase the system's resistance to cyber-attacks.

Q. Please describe the benefits of the new user authentication system.

A. The new user authentication system upgrades the existing system to a modern technology system because the existing technology is increasingly vulnerable. For instance, the new system incorporates two-factor authentication and provides a stronger, customizable filter that can block users making suspicious requests or from certain locations—shrinking the pool of bad actors that might seek to work around the Digital Portal's other protective layers.

Q. Are there other security features that will be upgraded in the new Digital Portal?

A. Yes. The Digital Portal will also incorporate:

- an additional protective layer around subsidiary components of the project—known as "microservices"—that are created by third-parties;
- a secure communication tie between cloud and on-premise services through a Virtual Private Network (VPN) that provides a secure tunnel to NW Natural's server for select communications; and,
- a new vault provided as part of Microsoft's hosting infrastructure that tightly controls access to the various tokens, passwords, certificates, and other types of keys necessary to access the Digital Portal and NW Natural's system.

Q. What are the security benefits associated with the Digital Portal's new payment processing provider?

A. As detailed later in my testimony, the Digital Portal integrates with a new payment processing provider (Paymentus) for transacting credit, debit, and ACH payments online. By moving to the new partner, NW Natural is able to have all customer Payment Card Information related to utility services payments handled by a company focused on processing payments and with robust protections for the associated data. Paymentus is subject to significant scrutiny as they are in the top tier of credit card processors. For instance, and in contrast to NW Natural's existing payment provider, a customer needing to communicate sensitive payment information over the phone with a customer service representative will be transitioned seamlessly into an Interactive Voice Response ("IVR") tool through Paymentus before being returned to a customer service representative, thereby shielding the sensitive information more securely.

Q. In addition to cybersecurity benefits, you mentioned mobile functionality as a second key benefit of the new Digital Portal. Why is it important to establish full mobile functionality?

A. Full mobile access is critically important as NW Natural's customers increasingly use their phones or tablets to access essential customer resources. Today, more than 42 percent of NW Natural's website traffic and payment transactions are from mobile devices—up from 38 percent in 2018.

Given that approximately two-thirds of today's households use mobile devices to access the internet, this number will likely continue to increase.[10]

Q. Are NW Natural's customers satisfied with the existing website's mobile experience?

A. No. According to the Company's most recent third-party survey, 50 percent of customers were not satisfied with the mobile experience offered by the current website.

Q. What are the impacts of poor mobile functionality?

A. With more than 22 million annual page views and over 287 thousand registered online accounts, limited mobile access and poor self-service feature performance not only degrade customer satisfaction but can result in substantially greater customer service call volume.

By way of background, there are more than two dozen customer-self-service features offered on the website today, such as customer usage history, payment plan enrollment options, and appointment scheduling. These self-service features are designed to enable quick, easy, and on-demand resolution to common customer needs without speaking with a NW Natural representative. Similarly, the website provides vital information about gas safety and ways to save energy and money. Yet neither these self-service options nor the customer information pages can be optimized for mobile devices on the existing web platform.

[10] U.S. Census Bureau, "More Than Two-Thirds Access Internet on Mobile Devices," (describing research showing that mobile broadband is accessed in 68 percent of households).

Tellingly, close to 70 percent of users that visit the "Customer Service" section of the Company's website use a mobile device to do so. This concentration of mobile users seeking direct customer service support suggests that a disproportionate share of mobile customers are not being effectively served by the existing website. This service gap creates a burden on customer support services that could be readily eased by improving customers' ability to resolve issues and find information quickly and easily through frictionless mobile access.

Q. Are there any other reasons to upgrade the existing website?

A. Yes. The existing website's outdated technology also poses increasing reliability concerns as ongoing maintenance and performance responsibilities are placed on the Company's overburdened internal development team. Critically, the new Digital Portal allows NW Natural's non-developer staff to make changes to the website as necessary and avoids the need for time-intensive development and implementation processes that are currently required for most website revisions.

Q. How does the new Digital Portal provide an improved customer experience?

A. The new Digital Portal provides an improved customer experience by using a responsive design and component architecture. This new framework provides easy, user-friendly access to content pages, service, and functionality features on all kinds of digital devices—including smartphones and tablets. Using the Digital Portal's powerful new experience management

platform and online payment processing partner, customers will be able to find information and conduct business online with NW Natural faster, easier, and without technology barriers.

For instance, the new system includes more than 58 individual components delivering over 100 content pages and over 35 functional applications that have been completely reengineered and designed to facilitate self-service participation in all of the Company's customer convenience programs, account management features, and billing and payment options. Ready access to these functions and programs on any device will save customers time, money, and frustration.

Q. How will the Digital Portal interact with impending infrastructure upgrades?

A. Both the Horizon 2 CIS replacement and the COM project will provide web features, such as user personalization, that are not currently supported by the existing website infrastructure and are essential to providing a user-friendly customer experience. The structure of the new Digital Portal will allow it to integrate with the new CIS with minimal effort, and will be far more efficient than attempting to interface a new CIS with the existing website.[11] Thus, the Company plans to complete the Digital Portal before the new CIS replacement is implemented (Horizon 2). This sequential approach will also

[11] The Digital Portal, unlike the existing website, has been developed using an Application Program Interface (API) between the front-end and back-end of the project architecture. This layer makes integration with the new back-end applications far easier.

ensure that development staff currently dedicated to the Digital Portal will be available to provide necessary support for the impending Horizon projects.

Q. What is the Digital Portal's new experience management platform provider?

A. The Digital Portal's new experience management platform provider is Sitecore, which offers compatibility with multiple devices and browsers, sufficient flexibility to enable the full suite of customer-service features, and fully-integrated editing tools to reduce developer needs—all while accommodating the complexity of NW Natural's customer self-service features and back-end integration needs.

Q. Did NW Natural consider any other platform providers?

A. Yes. At the time that NW Natural was selecting a platform provider, the company identified Sitecore and Adobe as the two industry leaders based on consultation with peer utilities. While Adobe also offered sufficient features to meet the project's requirements, the underlying programming language used by Adobe (Java) is not generally used by NW Natural—unlike Sitecore, which uses .NET.

Q. Did NW Natural hire vendors to help develop and implement the Digital Portal?

A. Yes. NW Natural hired vendors to aid in (1) project development; (2) payment processing; and (3) project testing.

Q. Who is developing the Digital Portal and how was this vendor selected?

A. NW Natural selected Connective DX as the Sitecore project developer through a competitive bidding process. Following a request for proposals ("RFP"), NW Natural evaluated six developer bids and assessed each proposal for industry experience, development methodology, and cost competitiveness. Connective DX, a Portland-based company, achieved one of the top scores in this assessment process. Moreover, of the highest-scoring bids, Connective DX was the only option that allowed for effective transitional training for NW Natural development staff, which is necessary to enable long-term management and maintenance on the new Sitecore platform.

Q. Who will be the new payment processing outside consultant and how was this vendor selected?

A. NW Natural selected Paymentus as the Company's new payment processing provider through a similar competitive bidding and RFP process. Four bids were evaluated based on completeness of the service offering, security standards, utility experience, development methodology, payment method flexibility, integrated IVR technology, and cost competitiveness. Paymentus, a Charlotte, North Carolina company, achieved one of the top scores and offered the most complete overall solution.

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Q. Who will be providing back-end development and testing support for the Digital Portal project and how was this vendor selected?

A. NW Natural selected Online Business Systems to supplement the Company's internal technical development and testing staff. A project of this size depends on substantial technical support and testing resources that do not need to be sustained after the project is in service; NW Natural simply does not have a sufficient number of full-time staff to support this effort. Online Business Systems, a Winnipeg, Canada company with a Portland office, has provided consistent, high-quality performance on more than a decade of previous NW Natural projects. Before selecting Online Business Systems, NW Natural investigated three other development and testing support providers through a Request for Information process. However, none of these other providers offered the same degree of available staff experienced working in the necessary technologies. As a result, and given NW Natural's previous positive experiences, Online Business Systems was selected.

Q. What alternatives to the Digital Portal did NW Natural consider?

A. NW Natural considered two alternatives to the Digital Portal, including (1) removing the digital engagement tool and pursuing a new content management system only; and (2) delaying the project until the CIS replacement (Horizon 2) is under development.

NW Natural concluded that removing the digital engagement tool was not appropriate because the tool provides the means of engaging with customers and providing customer support services. Ultimately, these digital

engagement services will be provided by Sitecore and Paymentus, such that a third-party digital engagement provider is not necessary.

NW Natural also rejected the option of delaying the website replacement so that it would be completed during the Horizon 2 CIS replacement project. This option was not recommended given the strain on resources required to complete both projects simultaneously. Moreover, the condition of the existing website, described above, requires prompt attention to avoid further customer frustration and dissatisfaction.

Q. Would it have been possible to modify the existing website to enable mobile functionality?

A. No. Unfortunately, the existing website structure uses a template-style architecture that cannot be effectively scaled for different device sizes. Additionally, upgrading the security standards for the existing website required new software, hardware, and payment processing upgrades, all now provided with the Digital Portal project.

Q. Has the estimated cost of the Digital Portal project increased since the Company first performed an alternatives analysis?

A. Yes. The Company's initial alternatives analysis was performed in 2016, and constituted a very preliminary and high-level estimate focused on the front-end website component of the Digital Portal. Since that time, and after the planning phase was completed, it became clear that the initial estimates were far too low to accommodate the technical complexity involved in integrating the new and existing infrastructures, while also re-engineering to allow for the

mobile and security improvements that are necessary to adequately serve customers. Moreover, the connections between the Digital Portal project and the Company's various back-end applications, such as the CIS, entailed substantially more time and developer resources than initially anticipated.

Q. What recovery is NW Natural requesting for the Digital Portal project in this case?

A. NW Natural requests recovery of approximately $11.5 million in capital investment for the Digital Portal project.

D. Microsoft Office 365 E5

Q. What is Microsoft Office 365 E5?

A. Microsoft Office 365 E5 is a suite of services first offered in 2010, including both the core Microsoft Office 365 applications (Word, Excel, Power Point, Outlook, OneNote, SharePoint, OneDrive, and Microsoft Teams) as well as cloud-based software for communications (Skype for Business), client access licenses (e.g., Windows 10 Licenses, Windows Server, Exchange Email, SharePoint), and various security products (Threat Analytics, Endpoint Protection, Cloud Security). Microsoft Office 365 E5 also offers three additional critical functions:

- **First,** the suite's robust security helps defend users against threats hidden in emails, attachments, and malicious links while securing our cloud portfolio with two-factor authentication.

- **Second,** the suite's advanced information protection will provide the users at the Company content encryption and minimize data loss.
- **Third,** Microsoft Office 365 E5's Skype for Business will allow the Company to avoid making substantial investments in the existing aged Avaya phone system. To continue using the current Avaya phone system, NW Natural would need to implement an upgrade costing between $1 million and $4.8 million.

In sum, upgrading the Company to Microsoft Office 365 E5 will avoid substantial investment necessary to support the legacy Avaya phone system, reduce other routine maintenance costs associated with upgrading the on-premises version of Microsoft Office, and provide important tools to increase our cybersecurity both on-premises and in the cloud.

Q. What are the increased O&M costs associated with Microsoft Office 365 E5 and why are these costs necessary?

A. NW Natural's subscription to Microsoft Office 365 E5 is expected to be $850 thousand annually. Currently, NW Natural uses Microsoft Office 2019, which does not involve an annual subscription. However, this software suite is the last "on-premises" Microsoft Office product and does not provide the additional cloud security benefits and mobility required to work in a cloud-based ecosystem. In contrast to the non-subscription approach, the Microsoft Office 365 E5 includes product feature and security updates over the life of the subscription and access to applications not necessarily included in

previously purchased software packages. Microsoft has shifted its software strategy so that suites like Office 365 E5 are the primary means of obtaining both Microsoft's Office suite as well as the licenses and tools described above.

VI. CONCLUSION

Q. What are your recommendations regarding the data center migration and modernization, COM, Digital Portal and Microsoft Office 365 E5 projects?

A. I propose the Commission approve cost recovery for these projects. As described in my testimony above, these projects are necessary for NW Natural to continue to provide safe and reliable service and will provide an improved and secure customer experience.

Q. Does this conclude your direct testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Jim Downing

INFORMATION TECHNOLOGY & SERVICES
EXHIBIT 601

December 30, 2019

Job Title: Database Administrator 2 or 3

Database Administrator 2 or 3

Non-Union Position
BI/DBA; Portland, Oregon (US-OR)
Regular FT
Posting # 142

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
Responsible for daily maintenance, MSSQL and Oracle tuning, configuration, and performance on the SQL platform.

Day to Day:

- Provides primary SQL DBA support including index tuning, schema changes, security and data replication.
- Performs database administrative tasks such as maintaining database jobs (i.e. database backups, database indexing), setting up database security (i.e. users and roles), and monitors disk space for database growth. (i.e. using tools such as DB Artisan, TOAD, SQL Enterprise Manager, Oracle Enterprise Manager, Oracle RMAN).
- Optimizes queries, reports and application code response time (i.e. using tools such as SQL Profiler).
- Develops documents and maintains procedures for database servers such as backups, restores, performance tuning, and configurations and performs daily and monthly backups of production systems and other backups as required.
- Supports 3rd party tools for replication, encryption, backups, change management and interfaces.
- Performs database object promotions.
- Provides SOX and audit reporting information as required to management, internal and external auditors
- Works with IT team leads to ensure consistency in architecture, schema and change control for SQL and Oracle database environments.
- Effectively communicates design considerations and recommendations to team members and business.
- Responds to developer requests for changes.
- Participates in on call rotation.
- Supports Company’s commitment to a culture of safe work practices.

Come on your first day with:

- Bachelor’s degree in Computer Science or an equivalent combination of education and experience.
- Minimum 1 year MSSQLDBA experience for Level 2 position. Additional years of experience required for Level 3.
- Knowledge of TSQL coding for database support.
- Knowledge of data integration concepts, approaches, ETL tools and the role of data architecture in successful implementation of data integration strategies.
- Knowledge of physical database design and tuning using major RDBM’s such as SQL Server, Oracle etc.
- Knowledge of with system architecture changes, database schema changes, database performance optimizations. Experience designing and implementing required for Level 3.
- Experience developing Spatial data queries a plus.
- Working knowledge of data modeling tools and reporting tools.
- Demonstrated ability to work effectively with staff at all levels and across departments and customer units.
- Proven ability to function in a highly cohesive team environment to complete department goals.
- Experience working with vendor packages (i.e. replication, encryption, change management).
- Knowledge of and experience with logical and physical data modeling and database design, database security and integrity and indexing strategy and management.
- Demonstrated willingness to acquire new skills and learn new tools.
- Excellent oral and written communication skills including the ability to work effectively with employees at all levels and across departments.
- Skilled at defining issues, analyzing and evaluating information, presenting recommendations and identifying alternative solutions.
- Highly self-motivated and directed combined with extensive experience working in a collaborative, team-oriented environment.
- Oracle and Postgres SQL experience required
- Cloud experience (i.e. Azure) a plus

What we offer:

- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women’s Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2 - $81,300.00 - $112,550.00 per year

Level 3 - $93,650.00 to $129,600.00 per year
Depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 29, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

NW Natural does not accept unsolicited submissions or assistance from search firms for posted positions. Resumes submitted by search firms working under a valid and current written contract with NW Natural valid written Statement of Work in place for this position from NW Natural HR/Employment will be deemed the sole property of NW Natural. No fee will be paid in the event the candidate is hired by NW Natural as a result of the referral or through other means.

Job Title: Integration Lead 3 or 4

Integration Lead 3 or 4

Non-Union Position
Applications Support Group; Portland, Oregon (US-OR)
Regular FT
Posting # 140

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

General Purpose:
The Integration Lead is responsibility for design, development and overall management of new and existing integrations across the enterprise. These include cloud to cloud, prem to prem and hybrid scenarios. Lead is responsible for developing and maintaining system integrations and components, including but not limited to; application to application integrations, services, internal and external API and file transfer. Responsibility also for integrating new services into the organization’s portfolio of internal systems and existing cloud services. Should be proficient in developing systems using different technologies and can communicate the results back to the technical teams and senior architects. Integration Lead will also work with end-users to optimize integration and user-experience. Key contributor in requirements analysis and decomposition, design, development, internal testing and the documentation. Integration Lead is part of the Enterprise Application team and will work closely with developers and operational support staff.

Decision Making / Impact:
- Determines appropriate analysis, integration pattern(s), solutions and techniques for obtaining results
- Provides input and recommendations regarding new technologies and concepts for continuous improvement

Competencies:
- Proficiency in web service design using RAML, WSDLs, Swagger
- Ability to debug using tools like SOAPUI
- Experience in and opinions on good and bad approaches to systems integration, software development, message-based middleware and SOA, APIs, API management, data modelling
- Expertise in many key technical aspects and design patterns of integration such REST vs SOAP, pub-sub vs request-reply, when to use message queuing vs not
- Advanced integration experience with industry standard products, preferably MuleSoft, SAP PO/PI, SAP CPI, BizTalk
- Advanced Experience with SOA (Service Oriented Architecture)/ESB (Enterprise Service Bus)
- Advanced knowledge of SDLC, code management concepts and platforms
- 1 to 2 years of general development experience with a mainstream language such as Java, JavaScript, or C#. Additional years of experience required for level 4.
- Experience with secure coding standards and API security;
- Familiarity with integrating with Cloud/SaaS applications, APIs, SDK of packaged applications and legacy applications
- Familiar with microservices architecture

Education/Experience
- Bachelor's degree in Information Systems or related field, or equivalent combination of education and technical experience resulting in proven systems skills.

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women’s Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 3 - $81,300.00 - $112,550.00
Level 4 - $93,650.00 - $129,600.00
Per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: December 8, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

NW Natural does not accept unsolicited submissions or assistance from search firms for posted positions. Resumes submitted by search firms working under a valid and current written contract with NW Natural valid written Statement of Work in place for this position from NW Natural HR/Employment will be deemed the sole property of NW Natural. No fee will be paid in the event the candidate is hired by NW Natural as a result of the referral or through other means.

Job Title: Application Administrator 2 or 3 (OpenText)

Application Administrator 2 or 3 (OpenText)

Non-Union Position
Applications Support Group; Portland, Oregon (US-OR)
Regular FT
Posting # 152

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
This opportunity will be responsible for technical configuration and application administration of NW Natural systems and associated 3rd party tools. This position will work closely with IT&S leadership, system analysts, and development teams to ensure our application solutions effectively support the business needs. Primary applications for this role will include SAP Document Presentment by OpenText (formerly OpenText Exstream) and OpenText Extended Enterprise Content Management (xECM).

Day to Day:
- Actively monitors, configures and administers applications to ensure system performance, reliability and availability; takes proactive and immediate steps to mitigate issues.
- Provides direct routine support and assistance to application end users; supports users with both process and technical issue resolution, including coordination with external service providers.
- Proactively resolves application hardware and software trouble tickets with vendors; provides application configuration information, application performance logs, and vendor required information.
- Plans, coordinates, and implements vendor recommended and validated application and system patches in a timely manner to ensure the viability and supportability of each application assigned.
- Act as subject matter expert (SME) for the associated applications on assigned projects.
- Maintains a high level of understanding of user processes; routinely communicates and coordinates with application key stakeholders, supervisors, managers and technical subject matter experts to identify and integrate process changes and improvements.
- Promotes application changes between non-production and production environments for defined applications.
- Monitors trends in application license usage and makes recommendations for updates.
- Supports the NW Natural IT&S cultural pillars of accountability & integrity, customer focus, growing & learning, and respect.
- Supports Company's commitment to a culture of safe work practices.

Come on your first day with:
Required
- Bachelor's degree in computer science, information technology or a related study, or equivalent experience
- Minimum of 5 years of configuration, administration, and implementation experience in information technology and systems. Additional years of experience required for Level 3.
- Working technical knowledge of enterprise application and system design, configuration and/or development, including application integrations, servers and storage.
- Minimum of 2 years OpenText Extended ECM (xECM) experience in technical administration and configuration, including solution design and development.

Desired
- Experience with technical administration, development, and configuration of SAP Document Presentment by OpenText (formerly OpenText Exstream)
- Knowledge of formal document and record management best practices, including archival and security standards
- Technical knowledge of application integrations (web services and API) and file transfer solutions
- Experience with payment processing systems and financial applications, especially with associated file types and metadata
- Experience with OpenText product interrelationship within the SAP application ecosystem, including on-premises and SaaS products such ECC/S4, SuccesFactors, and Concur.
- Understanding and knowledge of IT service management (ITSM) and Information Technology Infrastructure Library (ITIL Foundations Certification is required within 3 months of hire)
- Experience and/or working knowledge of the natural gas or other utility industries

Competencies
- Ability to apply multiple technical solutions to enable future-state business capabilities that, in turn, drive targeted business outcomes
- Strong problem-solving and analytical skills; capable of understanding system configurations and the inter relationships of an application architecture.
- Skilled at defining issues, analyzing and evaluating information, presenting recommendations and identifying alternative solutions.
- Strong written communication skills including the ability to effectively create and document technical plans.
- Excellent verbal communication skills including the ability to work effectively with employees at all levels and across departments.
- Highly self-motivated and directed combined with extensive experience working in a collaborative, team-oriented environment.
- Demonstrated skill at managing time effectively to meet deadlines and balance priorities.
- May require evening and weekend work hours to accommodate resolution of system outages and scheduled maintenance or production changes.

What we offer:

- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women's Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2: $74,600.00 - $103,300.00
Level 3: $81,300.00 to $112,550.00

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 29, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

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Job Title: SAP UI5 / Fiori Developer 3 or 4

SAP UI5 / Fiori Developer 3 or 4

Non-Union Position
Applications Support Group; Portland, Oregon (US-OR)
Regular FT
Posting # 148

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

General Purpose:
The SAP UI5/Fiori Developer will be accountable for continual roll-out of Fiori as the UI paradigm for the SAP ecosystem. Developer will be responsible for SAP UI/UX creative user centric design thinking, responsible for driving successful projects around Fiori, Mobility Strategy, and Mobile Services. Provide UI design guidance including security considerations, communicating with business to ensure all SAP and non-SAP apps integrate to become a cohesive enterprise solution. Collaborate with a cross-functional teams to ensure that work delivered meets requirements and standards both functionally and technically. Will be working as part of the SAP application team that is responsible for development and support of all SAP applications across the enterprise.

Decision Making / Impact:
- Determines appropriate analysis, design principles, solutions and techniques for obtaining results
- Provides input and recommendations regarding new technologies and concepts for continuous improvement

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women’s Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 3 - $81,300.00 to $112,550.00
Level 4 - $93,650.00 to $129,600.00
Per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: December 8, 2019

All applications must be submitted through NW Natural’s Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

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Job Title: Network Engineer 2 or 3

Network Engineer 2 or 3

Non-Union Position
Network Engineering; Portland, Oregon (US-OR)
Regular FT
Posting # 151

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
The Network Engineer 2 or 3 will design, build, and implement solutions that enable the business to communicate in support of internal and external services. The Network Engineer 2 will analyze requirements, design, test, install, operate, and optimize a secure, highly available network. They will collaborate on projects as a member of cross functional teams and will assist Network Administrators and Service Desk personnel with incident response escalations.

Day to Day:
- Ensure network capacity and capabilities meet existing and future requirements
- Collaborate on projects as a member of cross functional teams
- Assist Network Administrators and Service Desk personnel with incident response escalations
- Cultivate relationships with industry peers, service providers, and manufacturers to stay apprised of the technological landscape
- Optimize traffic distribution across diverse transport network options
- Test and document network performance
- Create and document procedures for installing, configuring, maintaining, and troubleshooting network hardware, software, and peripheral devices.
- Conduct research and make recommendations on network products, services, protocols, and standards in support of network procurement and development efforts.
- Test and document hardware and software upgrades procedures
- Mentor Service Desk staff and Network Administrators
- Represent Network Engineering in Change Management process.
- Support and optimize network hardware, software, and communication links.
- Requires participation in an on-call rotation
- Requires evening and weekend work hours to accommodate resolution of network outages and scheduled maintenance (patching, upgrades, testing, implementation of new services, etc.)
- Supports Company's commitment to a culture of safe work practices

Come on your first day with:
- Demonstrated strong communication skills, including the ability to explain complex technological concepts to a non-technical audience.
- Foundational knowledge of wireless communication technologies (microwave, RF, cellular, etc.)
- Excellent knowledge of current protocols and standards, including TCP/IP, 802.11, EIGRP, BGP, MPLS, IPSEC.
- Experience configuring and managing QoS.
- Understanding of SDN & NFV
- Experience with Cisco ACI is preferred
- Proven ability to organize & prioritize workload effectively.
- Ability to understand advanced system configurations and the inter-relationships of a complex application architecture.
- Must have the inclination to take initiative and be assertive in a professional manner
- Expertise with systems management and monitoring tools
- Proven critical thinking and problem-solving ability
- Demonstrated ability to interact with employees at all organizational levels
- Possess/maintain a valid Oregon or Washington driver's license and a satisfactory driving record. Must obtain a valid Oregon/Washington driver's license within 90 days if current valid license is from another state
- Pertinent Professional or Expert level (CCNP, CCIE, PCNSE, etc.) certifications desired.

Education and Experience Requirements:
- Bachelor's degree in Information Systems or Telecommunications, or a combination of education and relevant work experience.
- 2 + years’ experience in a network engineering role; additional years of experience required for Level 3
- Expert proficiency with command line network troubleshooting utilities
- Expert proficiency with Cisco wireless access points, switches, and routers
- Proficiency with SolarWinds NCM
- Hands-on experience with dynamic routing protocols
- Minimum of 4 years’ experience managing and configuring enterprise-wide LANs, WANs, WLANs, VLANs, etc.

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women’s Network

- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2 - $81,300.00 - $112,550.00
Level 3 - $93,650.00 to $129,600.00

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 29, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

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Job Title: Skype Administrator 2 or 3

Skype Administrator 2 or 3

Non-Union Position
IS Infrastructure; Portland, Oregon (US-OR)
Regular FT
Posting # 147

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
The Skype Administrator will assist with the installation, operation, monitoring, and ongoing maintenance of a NW Natural’s Microsoft Skype For Business server applications and supporting infrastructure. They will monitor the Skype infrastructure, contribute to related voice/collaboration projects, and will provide Tier 2 support as well as incident response escalations as required. Deployment, monitoring, and troubleshooting are key responsibilities for this position. While this role will primarily be back-office, there is interaction with our internal customers on a daily basis.

Day to Day:
- Assist Skype For Business moves/adds/changes
- Planning, implementing, sustaining, administering server applications
- Monitoring network connectivity as it relates to voice and collaboration
- Provide incident support and respond to service requests
- Develop and maintain training materials
- Evaluate, test, and deploy software and/or hardware configuration changes, upgrades, patches, etc.
- Provide feedback in the spirit of continuous improvement
- Respond to after-hours emergency requests as needed
- Participate in after hours work to support resolution of outages and as well as scheduled maintenance (patching, upgrades, testing, service activation, etc.)
- Possess/maintain a valid Oregon/Washington driver’s license and a satisfactory driving record.
- Travel to the various NW Natural locations (from 1-4 hours away) as needed
- Supports Company's commitment to a culture of safe work practices

Come on your first day with:
- Fundamental knowledge of networking concepts, OSI model, and IT best practices
- Proven Skype operational performance analysis skills
- Hands-on technical troubleshooting capabilities
- Experience supporting networked services across a variety of transport media
- Foundational knowledge of current protocols, technologies, and standards as they relate to voice ecosystem (including encryption, TCP/IP, DNS, DHCP, SIP, PRI, QOS, etc.)
- Familiarity with systems management and monitoring tools
- Proven critical thinking and problem-solving ability
- Must have the inclination to take initiative and be able to be assertive in a professional manner.
- Strong interpersonal skills
- Proven ability to organize/prioritize workload effectively

Education and Experience Requirements:
- Bachelor's degree in Information Systems or Telecommunications, or relevant work experience.
- 3+ years’ experience in a telephony administration role for Level 2. Additional years of experience for Level 3.
- Avaya Telephony voice network engineering experience
- Skype For Business 2019 (On-premises) deployment and management experience
- Strong understanding of Exchange / Skype / Active Directory inter-dependencies
- Experience with AudioCodes VOIP phones and their management
- Experience with AudioCodes Session Border Controllers

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women’s Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2 - $74,600.00 - $103,300.00
Level 3 - $93,650.00 to $129,600.00

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 29, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

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Job Title: System Administrator 2 or 3 (Linux)

System Administrator 2 or 3 (Linux)

Non-Union Position
IS Infrastructure; Portland, Oregon (US-OR)
Regular FT
Posting # 266

The Role:
The System Administration IT Specialist (Linux Administrator) is responsible for effective provisioning, installation/configuration, operation, and maintenance of systems hardware, software and related infrastructure, including participation in technical research and development to enable continuing innovation within our infrastructure environment. Deploy release of new technologies as well as design, install, configure, maintain and integrate system testing performance of Red Hat / CentOS operating systems, related utilities, hardware, and Azure cloud instances.

Day to Day:
- Assist Skype For Business moves/adds/changes
- Planning, implementing, sustaining, administering server applications
- Monitoring network connectivity as it relates to voice and collaboration
- Provide incident support and respond to service requests
- Develop and maintain training materials
- Evaluate, test, and deploy software and/or hardware configuration changes, upgrades, patches, etc.
- Provide feedback in the spirit of continuous improvement
- Respond to after-hours emergency requests as needed
- Participate in afterhours work to support resolution of outages and as well as scheduled maintenance (patching, upgrades, testing, service activation, etc.)
- Travel to the various NW Natural locations (from 1-4 hours away) as needed

Come on your first day with:
- Prior Red Hat Enterprise (RHEL) system administration experience, including RPM patch management (Spacewalk experience a plus), PERL or shell scripting, server cluster management, best practices for system security hardening, and understanding of RHEL in an Azure environment
- Knowledge of distributed file systems and disk quota management
- Experience with RHEL system hardening, patching, and remediation
- Experience with server monitoring, capacity management, and event alert response
- Experience with system event log configuration & troubleshooting
- Basic knowledge of troubleshooting, going down and up the OSI layers
- Experience with RHEL in a VMWare environment a strong plus
- Possess/maintain a valid Oregon/Washington driver's license and a satisfactory driving record. If valid license is from another state, be able to obtain an OR/WA license within 90 days

Education and Experience Requirements:
- A Bachelor's degree (or equivalent) in computer science, or other related science.
- 2+ years of experience with Linux operating system, including terminal command line familiarity. Additional years of experience for level 3.
- 2+ years of experience working with cyber (IT) security concepts. Additional years of experience for level 3.
- The ability to obtain a Secret security clearance.

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women's Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2 - $74,600.00 - $103,300.00
Level 3 - $93,650.00 to $129,600.00
Per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: December 22, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

NW Natural does not accept unsolicited submissions or assistance from search firms for posted positions. Resumes submitted by search firms working under a valid and current written contract with NW Natural valid written Statement of Work in place for this position from NW Natural HR/Employment will be deemed the sole property of NW Natural. No fee will be paid in the event the candidate is hired by NW Natural as a result of the referral or through other means.

Job Title: Network Administrator

Network Administrator

Non-Union Position
Network Engineering; Portland, Oregon (US-OR)
Regular FT
Posting # 145

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
The Network Administrator will perform day to day tasks related to the installation, operation, monitoring, and ongoing maintenance of a secure, highly available network. They will collaborate on projects as a member of cross functional teams and will assist service desk personnel with incident response escalations. Networked service deployment, monitoring, and troubleshooting are key responsibilities for this position.

Day to Day:
- Assist in network implementation & moves/adds/changes
- Assist in service order fulfillment
- Install and configure network equipment
- Maintain network connectivity
- Proactively monitor and troubleshoot our Wide Area, Local Area, and Data Center Networks
- Provide support to users via incident and service request response
- Monitor policies related to the use of network resources
- Evaluate, test, and deploy software and/or hardware configuration changes, upgrades, patches, etc.
- Monitor network to ensure optimal performance and policy compliance
- Provide feedback in the spirit of continuous improvement
- Create and maintain technical documentation
- Participate in on-call rotation
- May require travel to the various Resource Centers (typically 2-3 hours away).
- May require evening and weekend work hours to accommodate resolution of network outages and scheduled maintenance (patching, upgrades, testing, service activation, etc.)

Come on your first day with:
- Fundamental knowledge of networking concepts and IT best practices
- Proven network operations and network performance analysis skills
- Hands-on technical troubleshooting capabilities
- Experience supporting networked services across a variety of transport media
- Experience with Cisco ACI preferred
- Experience with Palo Alto Networks firewalls preferred
- SDN/NFV experience preferred
- Scripting and/or automation experience a plus
- Network+, CISSP, CCNA, or CCNP certification a plus
- Foundational knowledge of current protocols, technologies, and standards (including encryption, TCP/IP, DNS, EIGRP, BGP, QOS, VoIP, etc)
- Familiarity with systems management and monitoring tools (SolarWinds NCM)
- Proven critical thinking and problem-solving ability
- Must have the inclination to take initiative and be able to be assertive in a professional manner
- Strong interpersonal skills
- Proven ability to organize/prioritize workload effectively
- Possess/maintain a valid Oregon/Washington driver’s license and a satisfactory driving record.

Education and Experience Requirements:
- Bachelor's degree in Information Systems or Telecommunications, or a combination of education and relevant work experience.
- 2+ years’ experience in a network administration role
- Proficiency with command line network troubleshooting utilities
- Experience with Cisco wireless access points, switches, and routers

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women’s Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range: $74,600.00 - $103,300.00 per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 29, 2019

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Job Title: System Administrator 2 or 3

System Administrator 2 or 3

Non-Union Position
IT&S Infrastructure; Portland, Oregon (US-OR)
Regular FT
Posting # 137

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
The System Administration IT Specialist is responsible for effective provisioning, installation/configuration, operation, and maintenance of systems hardware, software and related infrastructure, including participation in technical research and development to enable continuing innovation within our infrastructure environment. Deploy release of new technologies as well as design, install, configure, maintain and integrate system testing performance of server operating systems, related utilities and hardware.

Day to Day:
System Administration and Provisioning

- Engineering of Microsoft Windows systems solutions for various project and operational needs within virtualized environments based on VMware vSphere and Microsoft Azure
- Install new / rebuild existing servers and configure hardware, peripherals, services, settings, directories, storage, etc. in accordance with standards and architected designs based on project / operational requirements
- Leads and manages projects including concept identification, planning, design, purchasing, build-out, oversight, training and documentation in collaboration with business units, and other IT&S verticals for Microsoft and IBM iSeries solutions
- Research and recommend innovative, and where possible automated approaches for system administration tasks

Operations and Support

- Perform daily system monitoring, verifying the integrity and availability of hardware, server resources, systems and key processes, reviewing system and application logs, and verifying completion of scheduled jobs such as backups on Microsoft & IBM iSeries systems
- Investigate, troubleshoot, repair and recover from hardware or software failures
- Troubleshoot & correct job failures on IBM iSeries platform
- Administers Microsoft AD / DHCP / DNS / System Center components
- Administers communications platforms; Microsoft Exchange & Skype for Business
- Manages enterprise storage platforms and integration with host systems
- Administer system backups and Disaster Recovery leveraging Rubrik, VMware, and Zerto
- Participate in on-call rotation for support

Maintenance

- Apply OS & application patches and upgrades on a regular and coordinated schedule using SCCM
- Apply OS Upgrades / PTF’s to IBM iSeries on a regular and coordinated schedule
- Upgrade of administrative tools, utilities, data center infrastructure’s BIOS / firmware / etc. on a regular schedule
- Maintain operational, configuration, or other procedures
- Maintains awareness of the latest security threats, technologies and solutions
- Perform periodic performance reporting and ongoing performance tuning

General Duties & Responsibilities

- Installs, maintains and upgrades internal computer hardware and software systems used for designing and developing company products
- Performs general Windows server, Active Directory and GPO administration / configuration / maintenance tasks
- Identity / access management, and user provisioning in Microsoft & IBM iSeries environments
- Respond quickly and effectively to Windows issues / outages through troubleshooting server software and hardware issues
- Monitors system usage & performance of Microsoft & IBM iSeries environments
- Provide recommendations on system enhancements that will improve reliability and performance of system
- Assists with recommending, scheduling and implementing system hardware and/or software upgrades or repairs
- Researches, evaluates and recommends software and hardware solutions based on business need & anticipated growth
- Supports Company's commitment to a culture of safe work practices

Come on your first day with:

- Degree in Computer Science or related field and a minimum of 3 years' experience in an enterprise as a Windows System Administrator or equivalent combination of education and experience (additional years' experience required for Level 3 position)
- MCSE certification preferred
- VCA certification preferred
- IBM Professional certification preferred
- ITIL Foundation certified (or complete within 90 days of hire date)
- Experienced with, and excel in server administration running in VMware vSphere, and Azure
- Experience with data center hardware such as Dell HCI, Dell PowerEdge, Dell Compellent, NetApp, Rubrik, F5, IBM iSeries Power platform
- Experience working in an enterprise Windows environments with formal change management practices
- Mastery of Microsoft AD / ADFS / AD Policies / DHCP / DNS
- Understanding of, and experience with IBM iSeries AS/400 administration / monitoring / backups / security / release management
- Scripting experience (VBScript, PowerShell, DOS batch files)
- Understanding of network routing, firewalls, VLAN's and security
- Understanding of the industry best practices for Windows security
- Energy, initiative, and a positive attitude
- Excellent troubleshooting skills
- Must be detail-oriented with good organization skills
- Proficient with MS Office products (Word, Excel, Outlook, Access, PowerPoint, Visio, SharePoint)
- Strong documentation skills and the ability to effectively aggregate, organize, and present information to both technical & non-technical audiences
- Ability to be effective in a fast-paced environment poised for change
- Pragmatic ability to balance compliance, quality, innovation, and expedience
- Excellent collaboration and interpersonal skills
- Ability to learn quickly and work independently

What we offer:

- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
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- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women's Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2 - $74,600.00 - $103,300.00 per year
Level 3 - $93,650.00 to $129,600.00 per year

Depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 22, 2019

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Job Title: Security Solutions Architect

Security Solutions Architect

Non-Union Position
IS Security & Analytics; Portland, Oregon (US-OR)
Regular FT
Posting # 144

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Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

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The Role:
You will be accountable for proactively and holistically leading or supporting security and EA activities that create deliverables that guide the direction and development for technological responses to disruptive forces and driving targeted business outcomes. Technologies will include business applications, cloud security solutions, severs, security technologies, and industrial controls systems.
In this role, you would provide the leadership, facilitation, analysis and design tasks required for the development of an enterprise's security architecture. They create deliverables that help develop target-state guidance (reusable standards, guidelines, individual parts and configurations) for evolving information security across the enterprise, in order to enable business strategy and manage risk. They facilitate and orchestrate the delivery of targeted business outcomes through technical decisions and within alignment of the security and EA practices to ensure a cohesive solution is provided.

Day to Day:
- Work with EA, security peers, and other stakeholders to analyze the enterprise business context (business strategy and trends), as well as change requirements in other enterprise architecture viewpoints (such as business, information and solution) to derive the security architecture future state. This includes defining the requirements, principles and models that guide technology decisions for the enterprise.
- Understand security trends and the practical application of existing, new, and emerging technologies to enable new and evolving business and operating models.
- Demonstrated experience in assessing risks and defining security strategy enterprises based on those risks.
- Demonstrated experience in architecting, designing, implementing, and managing security for highly available, resilient systems (physical, virtual, cloud).
- Drive digital innovation by leveraging innovative new technologies and approaches to renovate, extend, and transform the existing core technology base and IT estate.
- Define high-level plans to address the gaps between the current and future state, typically in sync with the IT budgeting or other capital planning processes.
- Lead the analysis of the current technology environment to detect critical deficiencies and recommend solutions for improvement. In addition, lead the analysis of technology industry and market trends to determine their potential impact on the enterprise as well as on the enterprise technology architecture.
- Coach, mentor and collaborate with technical subject matter experts and EA peers to develop a security architecture that enables and drives new business capabilities and operating models.
- Assist with designing the governance, assurance and standards activities associated with ensuring enterprise security architecture compliance.
- Oversee, or consult on, technology implementation and modification activities (for example, projects), particularly for new or shared security solutions.
- Oversee and facilitate the research, evaluation, and selection of hardware and software technology and product standards in the security area, as well as the design of standard configurations.
- Identify the organizational impact (for example, on skills, processes, structures and culture) and financial impact of the enterprise technology architecture.
- Document necessary enterprise security architecture design and analysis work, possibly including project postmortem documentation and metric collection.
- Understand, advocate, and augment the business and IT strategies. Be prepared to "sell" the enterprise information security process its outcome and ongoing results.
- Reports straight-line to the Senior Manager for Information Security and IT Compliance with a dotted-line to the Director of Enterprise Architecture.
- Collaborate with business constituents, other EA team members, project teams and staff in various IT functional areas as needed to fulfill the responsibilities described above.

Come on your first day with:
- Bachelor's degree in computer science, system analysis or a related study, or equivalent experience
- Minimum of 10+ years of design and implementation experience in IT, with a deep knowledge in of the following technical disciplines: security architecture and design supporting enterprise level application environments, middleware, servers and storage, database management, and IT operations.
- 3 + years of experience with cloud technologies (Azure, AWS)
- Working knowledge of security solutions and Active Directory at the enterprise level.
- Working knowledge of current threats
- Exposure to multiple, diverse technical configurations, technologies and processing environments

Skills
- Excellent interpersonal skills in areas such as teamwork, facilitation and negotiation

- Strong leadership skills
- Excellent analytical and technical skills
- Excellent written and verbal communication skills
- Excellent planning and organizational skills
- Knowledge of many, if not most, aspects of an enterprise security architecture
- Knowledge of information principles and processes
- Knowledge of financial models and budgeting
- Understanding of infrastructure and application architecture
- Understanding and knowledge of system development life cycle methodologies (such as waterfall, spiral, agile software development, rapid prototyping, incremental, synchronize and stabilize, and DevOps)
- Understanding and knowledge of IT Service Management (ITSM) and Information Technology Infrastructure Library (ITIL Foundations Certification is required within 90 days of hiring) (TOGAF and CISSP certification are encouraged, but not required)
- Knowledge and understanding of different modeling languages
- Understanding and knowledge of IT standards and controls

Competencies

- Ability to understand the long-term ("big picture") and short-term perspectives of situations and how they relate to achieving targeted business outcomes
- Ability to estimate the financial impact of technology alternatives
- Ability to apply multiple technical solutions to enable future-state business capabilities that, in turn, drive targeted business outcomes
- Ability to quickly comprehend the functions and capabilities of existing, new and emerging technologies that enable and drive new business designs and models
- Demonstrated ability to work well with others and be respected as a leader
- Organizationally savvy, with understanding of the political climate of the enterprise and how to navigate obstacles and politics.
- Ability to balance the long-term (big picture) and short-term implications of individual decisions
- Motivated and driven by achieving long-term business outcomes
- Team player and collaborative

What we offer:

- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women's Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range: $103,200.00 - $142,850.00 per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: November 29, 2019

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We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

We are a drug free workplace and we comply with Federal Drug Free Workplace Act and Department of Transportation regulations. Pre-employment drug tests are part of the hiring process and apply to all positions.

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Job Title: Information Security Operations Lead

Information Security Operations Lead

Non-Union Position
IS Security & Analytics; Portland, Oregon (US-OR)
Regular FT
Posting # 146

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
You will be a critical member of the information security team by coordinating the security operations team’s activities, working with technology managers to ensure security is prioritized, and maturing security processes, like incident response.

This is a leadership role that requires an individual with a strong technical background, as well as an ability to work with the technology organization and business management to align priorities and plans with key business objectives. The ISL will act as an empowered representative of the senior manager for information security and IT compliance during technology planning initiatives to ensure that security measures are incorporated into strategic technology plans and that service expectations are clearly defined. You will also be responsible for working with business and technology stakeholders to balance real-world risks with business drivers such as speed, agility, flexibility and performance.

You will be responsible for leading technical staff as they work to accomplish company and personal development goals. Documentation and presentation skills, analytical and critical thinking skills, and the ability to identify needs and take initiative are key requirements of this position.

This role reports directly to the senior manager for information security and IT compliance.

Day to Day:
Operational Support

- Coordinate, measure and report on the technical aspects of security management.
- Manage security vendors compliance with contracted service-level agreements.
- Manage and coordinate operational components of incident management, including detection, response and reporting.
- Maintain a knowledgebase comprising a technical reference library, security advisories and alerts, information on security trends and practices, and laws and regulations.
- Manage the day-to-day activities of threat and vulnerability management, identify risk tolerances, recommend treatment plans and communicate information about residual risk.
- Manage security projects and provide expert guidance on security matters for other technology projects.
- Assist and guide the disaster recovery planning team in the selection of recovery strategies and the development, testing and maintenance of disaster recovery plans.
- Ensure audit trails, system logs and other monitoring data sources are reviewed periodically and are in compliance with policies and audit requirements.
- Design, coordinate and oversee security testing procedures to verify the security of systems, networks and applications, and manage the remediation of identified risks.

Strategic Support

- Work with the senior manager for information security and IT compliance to develop a security program and security projects that address identified risks and business security requirements.
- Manage the process of gathering, analyzing and assessing the current and future threat landscape, as well as providing the senior manager for information security and IT compliance with a realistic overview of risks and threats in the enterprise environment.
- Work with the senior manager for information security and IT compliance to develop budget projections based on short- and long-term goals and objectives.
- Monitor and report on compliance with security policies, as well as the enforcement of policies within the technology department.
- Propose changes to existing policies and procedures to ensure operating efficiency and regulatory compliance.
- Manage a staff of information security professionals, hire and train new staff, conduct performance reviews, and provide leadership and coaching, including technical and personal development programs for team members.

Security Liaison

- Provide security communication, awareness and training for audiences, which may range from senior leaders to field staff.
- Work as a liaison with vendors and the legal and purchasing departments to establish mutually acceptable contracts and service-level agreements.
- Manage production issues and incidents and participate in problem and change management forums.
- Work with various stakeholders to identify information asset owners to classify data and systems as part of a control framework implementation.
- Serve as an active and consistent participant in the information security governance process.
- Work with the senior manager for information security and IT compliance and technology and business stakeholders to define metrics and reporting strategies that effectively communicate successes and progress of the security program.
- Provide support and guidance for legal and regulatory compliance efforts, including audit support.

Engineering Support

- Recommend and coordinate the implementation of technical controls to support and enforce defined security policies.
- Research, evaluate, design, test, recommend or plan the implementation of new or updated information security hardware or software, and analyze its impact on the existing environment; provide technical and managerial expertise for the administration of security tools.
- Develop and implement controls and configurations aligned with security policies and legal, regulatory and audit requirements.

Come on your first day with:

- Bachelor's degree in computer science, system analysis or a related study, or equivalent experience; an M.B.A. or M.S. in information security is preferred.
- Minimum of 10+ years of IT experience, with five years in an information security role
- Working knowledge of security solutions and Active Directory at the enterprise level.
- Working knowledge of current threats
- Exposure to multiple, diverse technical configurations, technologies and processing environments

Skills

- Excellent interpersonal skills in areas such as teamwork, facilitation and negotiation
- Strong leadership skills
- Excellent analytical and technical skills
- Excellent written and verbal communication skills
- Knowledge of information principles and processes
- Understanding and knowledge of IT Service Management (ITSM) and Information Technology Infrastructure Library (ITIL Foundations Certification is required within 90 days of hiring) (Security certifications such as CISSP or CISM are encouraged)
- Understanding and knowledge of IT standards and controls

Competencies

- Demonstrated ability to work well with others and be respected as a leader
- Organizationally savvy, with understanding of the political climate of the enterprise and how to navigate obstacles and politics.
- Ability to balance the long-term (big picture) and short-term implications of individual decisions
- Motivated and driven by achieving long-term business outcomes
- Team player and collaborative

What we offer:

- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
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Base salary range: $103,200.00 - $142,850.00 per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

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Job Title: IT Security Specialist 2 or 3 (Industrial Control System)

IT Security Specialist 2 or 3 (Industrial Control System)

Non-Union Position
IS Security & Analytics; Portland, Oregon (US-OR)
Regular FT
Posting # 158

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
As an IT Security Specialist 2 or 3 (Industrial Control System), you’d be a member of the Security Operations Team and collaborate with our teams at plants and in control rooms as we enhance an industrial control system security program. Your responsibilities would include people, process, and technology. You would understand security in the context of operation priorities / constraints by working closely with Operations staff and translate between operations staff and security team members.

This is a key role in a technology organization maturing its processes and modernizing its technology. To be successful, this role will partner with operations to achieve their goals, not focusing exclusively on security but balancing operational and security needs. This position will be based at our office in downtown Portland, but you'll also travel to our storage facilities in western Oregon.

Day to Day:
Security Consulting
You (with support from the security team and operations teams) would develop and lead our industrial control system security program:

- Collaborate on projects to ensure that security issues are addressed throughout the project lifecycle
- Provide ad hoc consulting on tactical security topics
- Research, evaluate, design, test, recommend, and plan new or updated security technologies
- Take operations requirements into account when considering security measures.

Vulnerability Management

- Assess and track vulnerabilities in our industrial control systems

Security Awareness and Training

- Partner with operations staff to improve their understanding of the risks associated with security threats to industrial control systems
- Partner with security staff to improve their understanding of the risks associated with security threats to industrial control systems

Security Monitoring

- Review alerts from security monitoring tools (including alerts generated from non-industrial control systems)
- Research and assess new threats and vulnerabilities

Incident Response

- Respond to security incidents including leading the response for smaller incidents
- Liaise between incident response leads and subject matter experts
- While the security monitoring and incident response responsibilities mean that there is an afterhours component to this role, typically it is less than one hour per week.

Come on your first day with:
Educational Qualifications

- Minimum of six years' industrial control systems experience, additional years’ experience required for level 3.
- Bachelor's degree or equivalent additional work experience
- ITIL Foundations certified or successful completion within 90 days of starting
- Valid driver's license with evidence of a safe driving record is required

Technical Competency

- Strong understanding of business applications, including ERP and financial systems
- Experience with manufacturing IT, operational technologies (OT), or industrial control system (ICS) environments
- Understanding of common OT network protocols, vendors, devices, and applications
- Ability to communicate security concepts and situations to audiences with varying levels of familiarity with these concepts
- Demonstrated experience working with PLCs, DCS’, SIS’, HMIs or SCADA systems

Occupational Personality

- You’ll interact with NW Natural's personnel at various levels and across business units to understand business imperatives.
- Strong communication and facilitation skills will be key to your success. Excellent written and verbal communication skills will help you succeed. Leadership abilities with the capability to direct other technical staff on security initiatives and guide team members
- You’ll get to work with minimal supervision. Strong analytical skills to analyze security requirements and relate them to appropriate security controls.
- Your ability to manage expectations appropriately will help and build long-term relationships.

- You'll remain current with industry trends and evolving threats.

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
- Green Team / Diversity, Equity & Inclusion Council / Safety Team / Women's Network
- Numerous volunteer and community engagement opportunities
- Employee Stock Purchase Plan with a 15% discount
- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range:
Level 2 - $81,300.00 - $112,550.00
Level 3 - $103,200.00 - $142,850.00
Per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

https://careers.nwnatural.com/search

Deadline: December 8, 2019

All applications must be submitted through NW Natural's Electronic Application System. Resumes submitted via email, fax or mail will not be accepted in lieu of an electronic application.

We are an Equal Opportunity Employer and do not discriminate against any employee or applicant for employment because of race, color, sex, age, national origin, sexual orientation, gender identity, veteran status, disability or any federal, state or locally protected class.

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Job Title: IT Risk & Governance Analyst

IT Risk & Governance Analyst

Non-Union Position
Change Mgmt & IT Compliance; Portland, Oregon (US-OR)
Regular FT
Posting # 159

At NW Natural, we like to say, “We grew up here.” We’ve been an energy supplier and community leader since 1859. Some of our neighbors know us through our philanthropy and volunteer programs and innovative approaches to carbon reduction.

Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

The Role:
As a Risk and Governance Analyst, your role on the Governance, Risk, and Compliance (GRC) team will include leveraging your knowledge of policies, standards, controls, and industry best practices to consult with partners across the company. You will play a critical role in ensuring that GRC functions are incorporated into IT&S daily operations and all new technology projects while validating that risk mitigation functions within NW Natural IT&S are functioning correctly.

Day to Day:
- Maintain and evolve the IT&S Risk Management Program through the establishment of formal governance and measurement frameworks (COBIT, NIST, CSA, etc.) to drive IT continual improvement
- Monitor, analyze and maintain the IT&S risk register
- Document and assist others in documenting IT&S specific policies, standards, controls, control activities, and standard operating procedures
- Diplomatically influence teams to implement a Governance Framework showing the value it will be bring and tactfully help adjust existing operations to align with the framework
- Socialize and influence others to buy into a process-oriented approach to their work
- Provide training, lessons learned, and best practices guidance to IT leadership and IT personnel to improve IT governance, security and controls posture
- Build a process and culture of proactive risk identification by monitoring the IT control environment for changes and emerging risks
- Develop and maintain professional relationships with IT business partners, IT leadership and Internal Audit stakeholders
- Take ambiguous high-level language and translate it into real world operations
- Diplomatically influence teams to implement a Governance Framework showing the value it will be bring and tactfully help adjust existing operations to align with the framework
- Think both strategically and tactically to enable a better future state while continuing to execute against current milestones
- Stay current on IT, trends, standards and best practices

Come on your first day with:
- Bachelor’s degree in Finance, Business Administration, or Business Systems, or combination of education and experience resulting in a proven ability to perform the essential functions of the job.
- 3-5 years of experience in Governance Risk and Compliance processes.
- Working knowledge of databases, systems, and applications in order to synthesize information.
- Working knowledge of business process redesign principles, techniques, and standards.
- Strong relationship building and influencing skills with cross functional partner

What we offer:
- Arguably the most competitive healthcare and wellness benefits in the Pacific Northwest
- Meaningful Annual Incentive Bonus Opportunity in addition to base salary
- 401(k) with generous match and additional 5% employer contribution
- Company provided Trimet or C-Tran passes/Bike storage for cyclists
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- Numerous volunteer and community engagement opportunities
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- 20% Employee discount on Natural Gas
- 7 Paid Holidays and up to 3 floating holidays to add an extra paid day off to Holidays Observed by NW Natural
- Flexible work schedule opportunities

Base salary range: $74,600.00 - $103,300.00 per year, depending on qualifications

Application Process: To be considered for this position, submit a complete electronic application including cover letter and resume via our website.

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Job Title: Information Security Specialist 2 or 3 (Application Security)

Information Security Specialist 2 or 3 (Application Security)

Non-Union Position
IS Security & Analytics; Portland, Oregon (US-OR)
Regular FT
Posting # 149

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Our customers know us because of the clean, safe, efficient, and low-cost natural gas we provide. We are a service-oriented utility, with a “Best in the West” customer satisfaction ranking.

If you share our core values – integrity, safety, service ethic, caring and environmental stewardship – we invite you to apply to NW Natural.

General Purpose:
As an Information Security Specialist 2 or 3 (Application Security), you would be a member of the Security Operations Team and collaborate with our application development teams as we build an application security program. Your responsibilities would include people, process, and technology. You would conduct threat modeling and application security testing as well as translate between developers and security team members. This is a key role in a technology organization, maturing its processes and modernizing its technology.

Roles and Responsibilities:
Application Vulnerability Management
You (with support from the security team) would develop and lead our secure software development lifecycle collaboratively with development teams:

- Cooperate and communicate effectively with development teams incorporate security throughout development processes
- Guide development teams to secure coding standards to address common coding vulnerabilities
- Conduct threat modeling
- Create a software source code review process that is a part of the development lifecycle
- Conduct application security testing for applications to assess the vulnerabilities
- Define testing criteria for systems and applications
- Analyze the results of assessments and recommend risk mitigation strategies
- Deploy, tune, and run application vulnerability-scanning tools

Security Consulting

- Collaborate on projects to ensure that security issues are addressed throughout the project lifecycle
- Provide ad hoc consulting on tactical security topics
- Research, evaluate, design, test, recommend, and plan new or updated information security technologies

Security Awareness and Training

- Partner with developers to improve the security of our code and increases their understand of how to secure applications

Security Monitoring

- Review alerts from security monitoring tools
- Research and assess new threats and vulnerabilities

Incident Response

- Respond to security incidents including leading the response for smaller incidents
- Liaise between incident response leads and subject matter experts
- While the security monitoring and incident response responsibilities mean that there is an after-hours component to this role, typically it is less than one hour per week.

Qualifications and Experience:
Educational Qualifications

- Minimum of six years' software development and/or information security experience, additional years’ experience required for level 3.
- Bachelor's degree or equivalent additional work experience
- ITIL Foundations certified or successful completion within 90 days of starting

Technical Competency

- Strong understanding of business applications, including ERP and financial systems
- Understanding of different Software Development Lifecycles (for example scrum, waterfall, agile) and how to incorporate security into those processes
- Strong knowledge of secure coding and application security testing practices and tools
- Ability to develop security requirements of an application in development
- Ability to perform code analysis, interpret results, and help direct mitigation
- Understanding of how X.509 certificates (also called PKI certificates or SSL certificates) provide confidentiality and authentication in TLS
- Understanding of different forms of authentication, for example OAuth2 and SAML
- Understanding best practices concerning authentication/authorization/roles/policies for system to system communication and integration, including strategies for securing applications with third party organizations and providers

Occupational Personality

- You'll interact with NW Natural's personnel at various levels and across business units to understand business imperatives.
- Strong communication and facilitation skills will be key to your success, as well as leadership abilities with the capability to direct other technical staff on security initiatives and guide team members
- You are comfortable working with minimal supervision and have strong analytical skills to analyze security requirements and relate them to appropriate security controls.
- Your ability to manage expectations appropriately will help build long-term relationships.
- You'll remain current with industry trends and evolving threats.

What we offer:

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BEFORE THE

OREGON PUBLIC UTILITY COMMISSION

UG 388

NW Natural

Direct Testimony of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBIT 700

REDACTED VERSION

December 30, 2019

EXHIBIT 700 – DIRECT TESTIMONY– COMPENSATION & BENEFITS

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position at Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is Melinda B. Rogers. My title is Vice President, Chief Human Resources and Diversity Officer. I am responsible for overseeing various administrative functions at NW Natural, including Human Resources, Diversity, Equity and Inclusion, Safety, Labor Relations, and Payroll.

Q. Please describe your education and employment background.

A. I received a Bachelor of Business Administration from Bryant University in 1987. Prior to NW Natural, I was employed by the Atkinson Graduate School at Willamette University for three years as Director of Executive Education. Before joining Willamette University, I served as Vice President of Enterprise Learning and as Vice President of Human Resources for 4 years at Knowledge Universe in Portland. I was employed in other senior human resource roles and management positions at Qualcomm and Hewlett Packard for 14 years prior to joining Knowledge Universe. I joined NW Natural in September of 2015 and have been an officer for the Company since August of 2018.

Q. Please summarize your testimony.

A. In my testimony, I:

- Describe the Company's compensation practices, which result in total compensation that is at the market median for comparable companies;

- Describe the employee benefit program offered by NW Natural, demonstrate that it is aligned with the market, and that the Company has carefully managed these benefits to ensure reasonable costs;
- Describe the overall level of compensation and benefits costs included in the Company's requested revenue requirement for the November 2020 through October 2021 test year ("Test Year"); and
- Describe the Company's requested employee headcount for Full-Time Equivalent ("FTE") employees in the Test Year.

II. NW NATURAL'S COMPENSATION PHILOSOPHY

Q. What is NW Natural's approach to determining the compensation it provides to its employees?

A. NW Natural's approach is to provide a level of total compensation that is necessary to attract, motivate, and retain qualified employees needed to run a safe and reliable natural gas delivery business, with high-quality customer service and at a cost that is reasonable. In order to do this, we provide a competitive total compensation package for employees that allows us to hire and retain a qualified workforce.

Q. Please explain what you mean by "competitive total compensation."

A. Total compensation is the combination of base pay, merit-based incentive pay (or "pay-at-risk"), medical benefits, and retirement benefits. Total compensation is competitive when its total value is at the median level for total compensation offered in the marketplace for comparable jobs. It is through offering a competitive total compensation package that NW Natural is able to compete in

the job market to attract, hire and retain the employees it requires to run a safe, reliable, customer service-focused gas utility.

Q. How does NW Natural determine that its total compensation is at the median level?

A. As I will explain in my testimony, the Company performs research to ensure that each aspect of its compensation is at the median level and is therefore competitive with the compensation offered by its competitors for comparable jobs.

Q. Are there established practices that allow you to be confident that you are offering competitive total compensation, and not more?

A. Yes. There are well-established methodologies that we employ in order to ensure that we offer competitive compensation, based on comparable jobs. I will describe those in more detail in my testimony.

III. BASE PAY

Q. You mentioned that "base pay" is a major component of offering competitive total compensation. How are you defining base pay?

A. Base pay is the guaranteed financial compensation provided to employees for the work performed. It is delivered on either an hourly or salaried basis. Base pay excludes the other important components of compensation (*e.g.*, pay-at-risk) that are not guaranteed and are not paid on a regular interval but are nevertheless a critical component of offering competitive compensation to attract qualified employees.

Q. How does the Company determine its employees' base pay?

A. NW Natural purchases and regularly analyzes comprehensive survey data to ensure that its base pay is aligned with the median of the market for comparable jobs with other companies that would typically compete with NW Natural for employee talent. NW Natural's most recent analysis, as completed by the Company in 2019, is attached as *NW Natural/701, Rogers*. The analysis demonstrates that NW Natural's base pay midpoints for non-bargaining unit ("NBU") jobs are at the median of comparable companies. This well-established process confirms that NW Natural is offering an appropriate level of base pay to its employees as a component of competitive total compensation.

For bargaining unit ("BU") employees, total compensation—including base pay—is determined through a negotiated process. The Company and the union have jointly agreed to utilize selected market survey data sources and union contracts, primarily of northwest gas utility companies, as the points of comparison for setting BU wage steps. Using the agreed-upon sources of competitive pay data, the average is used to determine pay grades. Pay increase trend data and union contracts are consulted when negotiating annual wage increases throughout the term of the contract. As with any labor negotiations, trade-offs are negotiated for other terms and conditions in the contract.

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Q. How does NW Natural determine competitive compensation for Company officers?

A. As with other employees, NW Natural uses competitive compensation data to determine compensation for Company officers. However, in the case of officers, competitive compensation data is collected and analyzed by an independent compensation consultant, Pay Governance, using peer company and survey data. Pay Governance's analysis, which is attached as *NW Natural/702, Rogers*, demonstrates that the Company's compensation for officers is within the market competitive range of peer and survey data.

Q. What is the cost of utility employees' base pay for the Test Year, as included in the Company's requested revenue requirement?

A. Table 1 below provides the cost of base pay for the Test Year. This number includes only the cost for gas utility employees of NW Natural, and represents the Oregon-allocated base pay for FTEs.

Table 1
Utility Employee Total Base Pay (Wages & Salaries)
(Oregon Allocated)

Type of Utility Employee	Cost of Base Pay
Bargaining Unit (BU) Employees	$43,845,000
NBU Employees	$52,850,000
Officers	$3,005,000
Total	$99,700,000

Q. How did NW Natural determine the cost of base pay in Table 1 for NBU employees in the Test Year?

A. For NBU employees, the amounts shown were determined by taking base pay costs for the Base Year (calendar year 2019) and escalating them by 4.00

percent in 2020 and 4.70 percent in 2021. This reflects a 3.40 percent and 3.50 percent merit increase, respectively, and an additional 0.60 percent each year to reflect promotions and equity adjustments. The merit percentages were derived using the anticipated pay movement of competitor companies as provided in compensation trend surveys. The additional amount for promotions and equity adjustments was determined based upon past experience and compensation trend surveys.

[redacted]

Q. How did NW Natural determine the cost of base pay in Table 1 for BU employees in the Test Year?

A. For BU employees, the costs were established according to the agreement recently negotiated with those employees. The new contract provides for initial wages and uses a wage increase formula that provides two increases in the first year of the contract. The first is an increase of 1.5 percent on December 1, 2019 and the second is an increase of 2 percent on June 1, 2020. This was done to shift the contract to a renewal date of June 1, rather than December 1.

After the second increase, there is a 3.5 percent annual increase every June 1st through the end of the contract on May 31, 2023. Further, an additional 0.80 percent was added each year to account for movement through training steps, from the entry rate to the experienced rate, as well as promotions and adjustments. This additional amount was determined based upon past experience.

Q. How did NW Natural determine the cost of base pay in Table 1 for officers in the Test Year?

A. For officers, the amounts shown were determined by taking base pay costs for the Base Year (calendar year 2019) and generally escalating them by the same percentage increases as used for the NBU employees as described above. These percentages were derived by using the anticipated pay movement of competitor companies as provided in compensation trend surveys.

IV. PAY-AT-RISK

Q. In describing competitive total compensation, you stated that "pay-at-risk" is an important component. Please define what you mean by this term.

A. Pay-at-risk is compensation made to employees only if certain performance goals are met within a defined timeframe. Pay-at-risk is not guaranteed for employees, and is intended to foster high performance. It represents an essential part of competitive total compensation, as it is necessary in order for NW Natural to compete in the job market to attract and retain the employees that it requires to run its utility business.

Q. Is "pay-at-risk" compensation a standard practice in your industry?

A. Yes, pay-at-risk is widely employed by our competitors for labor, and is expected by the workforce. Therefore, we believe we need to provide pay-at-risk (at different levels depending on the employee's position) in order to compete and meet pay expectations of the workforce. Pay-at-risk is preferred by the industry, rather than adding this pay directly to base pay. For the gas industry on average, 79 percent of companies have at least one pay-at-risk or incentive plan (see *NW Natural/703, Rogers).*

Q. Does NW Natural's "pay-at-risk" compensation result in above-market median compensation?

A. No, it does not. Our pay-at-risk compensation is a component of total compensation, which is targeted to align with market median compensation. In other words, if NW Natural did not provide pay-at-risk, its total cash compensation would be below the market median. Without the opportunity to receive this pay, total cash compensation would be below the comparative market.

Q. Is pay-at-risk provided at the same level for all employees?

A. No. To be consistent with competitive market pay practices, targets are differentiated by employee level. Generally, the market practice is to provide higher levels of at-risk compensation to officers, directors, and managers who may have a broader influence on Company activities. Table 2 represents the pay-at-risk for our Short-Term Incentive program by employee groups.

Table 2
Short-Term Incentive Pay-At-Risk

Incentive Program Type	Participants	Target percent of Pay	Maximum percent of Pay	Amount Requested in Test Year as percent of Pay
NBU Short-Term Incentive	All NBU employees (excluding officers)	7.5 percent-20 percent Depending on level	15 percent-40 percent	7.5 percent-20.0 percent
Officer Short-Term Incentive	Officers	35 percent-80 percent depending on level	61.25 percent-140 percent	35 percent-80 percent

Q. Please describe the pay-at-risk that NW Natural provides to NBU employees.

A. NW Natural provides pay-at-risk as a proportion of competitive total compensation that is in line with industry practice. Pay-at-risk is offered through a few different programs depending on job classification. The Company offers a "Goals Incentive Program" to NBU non-officer employees. This program recognizes and rewards employees who have demonstrated strong individual performance, and rewards the performers for the plan year who achieve or exceed their annual performance objectives.

Q. Please describe the pay-at-risk that NW Natural provides to BU employees.

A. Historically the Company has offered pay-at-risk compensation for BU employees through its "Key Goals Program." This program links employee total compensation to the achievement of overall Company goals and clarifies for employees how their job and work group contributes to the Company's success. In the most recent negotiations, we agreed to eliminate our Key Goals Program, and move that portion of the BU compensation to base pay. As a result, the BU

total compensation package remains competitive and in the market median. We have excluded the Key Goals Program from Test Year expense and included the updated BU base pay to reflect the changes made in the new Collective Bargaining Agreement.

Q. Does NW Natural have a separate pay-at-risk program for officers?

A. Yes. NW Natural has separate short-term and long-term incentive programs for officers. These programs are designed to attract and retain individuals with the experience necessary both to manage NW Natural's business and to navigate any challenges facing the utility and its customers.

Q. Please describe the Company's short-term incentive program for officers.

A. The short-term incentive program for officers is called the Executive Annual Incentive Plan. The Executive Annual Incentive Plan is based on three separate components: net income (50 percent), operational goals (20 percent), and individual goals specific to the officer (30 percent). An example of an individual goal is ensuring smooth and timely installation of new services.

Q. Please describe the operational goals that underlie the Company's short-term incentive programs for NBU employees and officers, 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, with each described in more detail as follows:

- Customer satisfaction has two components—satisfaction with the Company as a whole, and satisfaction with employee interaction. Both are measured by customer surveys. NW Natural employees further customer satisfaction by providing efficient, courteous, and knowledgeable service in customer interactions and by representing the Company positively through community involvement. Customers benefit from employee behavior that increases customer satisfaction.
- Company growth measures the number of new meter sets for customers. NW Natural employees contribute to this goal by providing timely hook-ups for new customers. New customers benefit when their meters are installed in an efficient manner, and existing customers benefit from growth because the Company's fixed costs are shared among a larger customer base.
- Cost management involves controlling costs to serve customers. This goal is measured in operation and maintenance budget dollars per customer. Customers benefit when employees manage costs by working efficiently and looking for ways to save time and add value, expanding work skills, and developing flexibility to meet changing customer and Company needs.
- The health and safety goal involves two components—damage call response time and odor call response time. Both are measured in percent of calls responded to in less than one hour. Customers benefit when the Company works quickly to resolve leaks and other potentially dangerous situations.

All of these operational goals promote the Company's provision of safe, reliable, efficient, and timely natural gas service to its customers.

Q. Please explain the long-term portion of the Company's officer incentive compensation program.

A. The long-term portion of the Company's officer compensation program applies to select high-performing managers, officers, and key employees. Qualifying officers receive two components of long-term incentive compensation: restricted stock units ("RSUs") and Performance Shares. RSUs are stock units that vest over time if certain retention and financial performance threshold conditions are satisfied. Performance Shares are a promise of Company stock units earned if NW Natural achieves certain performance goals during a three-year cycle. Officers receive 35 percent of their long-term incentive opportunity in the form of RSUs and 65 percent in the form of Performance Shares.

NW Natural, like other utilities around the country, believes that pay-at-risk is important in promoting high performance among all employees, however, it is even more critical for the officers of the company. These pay-at-risk benefits are earned if officers can deliver results that benefit all stakeholders in the Company. This is especially true when a utility's pay-at-risk is designed to incentivize efficiencies that benefit the utility's provision of safe and reliable service at reasonable costs. And, even in cases where pay-at-risk is tied to companies' financial goals, it is important to recognize that customers benefit from, and the Commission should encourage, utilities to maintain good financial metrics. Strong financial metrics enable the utility to efficiently raise the capital necessary to operate its business, at rates that are favorable to utility customers, who

ultimately pay the utility's cost of capital as part of the utility's revenue requirement.

Q. What percent of an officer's total pay is "at risk"?

A. The amount of total pay-at-risk varies by officer position and competitive market practice. The CEO typically has about 71 percent of pay-at-risk whereas other officers have about 50 percent. In all cases, the total pay-at-risk is comprised of short- and long-term opportunities.

Q. Given that pay-at-risk is a component of overall competitive compensation, has the Commission generally allowed utilities to include the costs of pay-at-risk to be recoverable as part of a utility's revenue requirement of providing utility service?

A. No. The Commission has generally adhered to a practice of requiring companies' shareholders to bear the costs of a portion of pay-at-risk, or incentive compensation for officers and employees. Generally, the Commission's policy has been to disallow 100 percent of officer pay-at-risk compensation. For employee pay-at-risk compensation, there is more flexibility in applying the policy, but, generally, the Commission's policy has been to disallow 50 percent of the pay-at-risk compensation if it is based on non-financial metrics and 75 percent if the incentives are based on financial performance measures.

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Q. Do you believe the Commission's practice regarding pay-at-risk is appropriate? And, if not, why?

A. No, I do not. Pay-at-risk is an important part of competitive total compensation, and a cost that is necessary for a utility to prudently operate its business. It should be a recoverable component of a utility's revenue requirement to the same extent as other prudent utility expenditures.

Further, the amount of pay-at-risk that is included in the Company's rate case expenses is related to payout based on hitting target (or budget) levels for different metrics, rather than extraordinary financial and other goals. In other words, the target amounts will be paid for hitting normal, expected levels of financial and other performance. To the extent that the Company manages the business in line with normal expected outcomes, the pay-at-risk at the target level will be paid. For extraordinary performance, where shareholders benefit at a higher rate, the Company absorbs 100 percent of all additional pay-at-risk payments, and ratepayers are not being asked to recover those amounts. For the most part, barring unforeseen negative circumstances, and because the Company is managed well, the funding of the pay-at-risk amount at the target level is expected, and is included in annual budgeting. It represents the steady state of operations. The compensation under those normal circumstances, inclusive of salaries and pay-at-risk payouts, is the cost of operating the utility business, and for that reason, the Company has included those amounts in the rate case expenses.

Additionally, the Commission's historical approach of disallowing pay-at-risk relies too heavily on the fact that shareholders may also benefit from the achievement of certain goals that enable an employee to receive her or his pay-at-risk. This is especially true when a utility's pay-at-risk is a financial metric that is designed to incentivize efficiencies that benefit the utility's provision of safe and reliable service at reasonable costs. And, even in cases where pay-at-risk is tied to companies' financial targets, it is important to recognize that customers benefit from, and the Commission should encourage, utilities maintaining good financial metrics. Good financial metrics enable the utility to efficiently raise the capital necessary to operate its business, at rates that are favorable to utility customers, who ultimately pay the utility's cost of capital as part of the utility's revenue requirement.

Q. Please describe the impact of the Commission's practice on NW Natural.

A. For NW Natural, about two-thirds of our operation and maintenance costs are actually associated with labor, so the Commission's disallowance of a portion of these is significant for our company. The Commission's policy of disallowing 100 percent of officers' at-risk pay, and requiring companies to bear at least 50 percent of non-officer employees' at-risk pay means that NW Natural would be prevented from recovering around $4.4 million of costs that reflect market-median competitive compensation, and relate directly to operating the natural gas

distribution company.[1] Thus, this issue has been substantial enough that the Company has raised its disagreement with the Commission's practice in the past.

Q. The Company brought up equivalent arguments regarding pay-at-risk in its last rate case (UG 344). Please explain why the issue wasn't resolved in that proceeding.

A. It is true that this issue of pay-at-risk recovery was identified in the last rate case. While it was fully the Company's intent to pursue the issue in that filing, the Company was able to otherwise settle terms of the case on an acceptable basis, and the issue was deferred. The possibility of a separate docket to address the issue was also considered, and may have been appropriate but for the fact that this current rate case proceeding should provide for a timely venue.

Q. How do you propose that the Commission view pay-at-risk in a utility's compensation package?

A. The Commission should treat the question of cost recovery for pay-at-risk on a case-by-case basis, with an evaluation to ensure that utilities are paying at market and that the at-risk pay programs are reasonable. This approach would be more in line with the general regulatory construct in Oregon that allows utilities to recover prudently incurred costs necessary to the provision of utility service.

Q. What is the total cost of at-risk pay that NW Natural has sought to recover as part of its revenue requirement for the Test Year, in this rate case?

A. That amount, by employee type, is shown in Table 3 below:

[1] Over $3.5 million of this relates to non-officers' at-risk pay.

Table 3
Utility Employee Target Pay-At-Risk
(Oregon Allocated)

Type of Utility Employee	Test Year
Bargaining Unit (BU) Employees	$0
NBU Employees	$6,793,000
Officers	$4,307,000
Total	$11,100,000

V. MEDICAL BENEFITS

Q. Please describe the medical benefits NW Natural provides to its utility employees.

A. NW Natural provides medical and pharmacy insurance to its employees through Cigna and Kaiser Permanente for its NBU employees, including officers. BU employees receive medical and pharmacy insurance from Regence and Kaiser Permanente through the Western States Health and Welfare Trust Fund of the OPEIU, a multi-employer union trust.

Q. Please explain why NW Natural provides its employees with these medical benefits.

A. NW Natural needs to provide competitive medical benefits to its employees in order to attract and retain a skilled, reliable workforce and because medical benefits are part of the package required to get to median total compensation levels. Additionally, quality medical benefits are necessary to ensure employees are receiving good care in a timely fashion. Good and timely care prevents the development of more serious health problems that would lead to more costly claims and higher employee absentee rates. Customers depend on receiving the

safe, efficient, and reliable service that can only be delivered through a healthy and present workforce.

Q. What is the medical benefit expense proposed for recovery in this case?

A. The Company has included $18.1 million of medical benefit costs for 2020.

Q. Have costs increased for medical coverage in the last few years?

A. Yes. NW Natural compares renewal rate increases to both national and local trend factors. Based on periodic survey data provided by Willis Towers Watson, the national trend was 5.0 percent for 2019 and is expected to be 5.0 percent for 2020 (see *NW Natural/704, Rogers)*. At the local level, the trend was reported at 7.8 percent for Medical PPO plans, (which is the type of plan the majority of NW Natural's employees enroll in) and 6.5 percent for Medical HMO plans[2].

During the last few years, NW Natural's active non-bargaining employees' medical expenses have been increasing at a rate that has been in line with trend factors. In 2019 the renewal of 8.5 percent was higher than the trend due to high claims experienced on the PPO Plan, but other years stayed close to trend or came in below trend (see *NW Natural/704, Rogers)*. In the case of bargaining unit employees, medical increases have been below the trends for the last three out of four years. Another factor that has impacted renewal rate increases is the increase from 1.5 percent to 2.0 percent in the State tax incurred by our providers to shore up Medicaid and the re-imposition of the Affordable Care Act (ACA) Health Insurance Industry Fee, which was suspended in 2019.

[2] *Willis Towers Watson Periodic Trend Survey of Oregon Fully Insured Plans.*

Q. What are the key factors that influence increases in medical costs?

A. The Company's medical benefit rates are greatly influenced by the medical experience of the population being insured. Specifically, for NBU employees, Cigna increases rates based entirely (100 percent) on the experience for our actual insured population. On the other hand, Kaiser Permanente utilizes a combination of both manual rating and actual NW Natural experience. They place 80 percent of the formula on their book of business (manual rating) and 20 percent on the actual claims of the plan participants.

In addition to claims experience, we also know that other factors impact medical costs including age, gender, family size, and geography. Based on the 2019 "Willis Towers Watson High Performance Insights in Health Care" report, which includes 2,168 companies in 18 industry groups, we know that NW Natural's average age under the pre-65 covered NBU participants in 2019 was 51.4 years old, compared to the database that indicated an average age of 44.9 for the same time period (see *NW Natural/705, Rogers).* Having a higher average age means our population is more expensive to insure than a younger workforce and is more likely to have more serious medical issues than would be seen on average with a younger workforce. In addition, the report showed NW Natural has 34 percent female enrollment, versus 42 percent for the database. Based on these two factors, the report notes "[t]he custom benchmark will be increased by 10 percent due to age and gender demographics". In addition, we also learn from this report that NW Natural's plan has dependent enrollment of 69 percent

compared to the database which has 50 percent. This difference increases the benchmark by 17 percent due to family size of our population.

The final area in which there is a slight variance is in the geographic location of the medical providers. NW Natural has a favorable outcome on this comparison with a slightly lower cost than the database (0.94 versus 1.0). The report notes that the benchmark would be decreased by 6 percent based on where the NW Natural population lives. The overall results of all of these factors showed that NW Natural's medical premiums are expected to be 22 percent higher when compared to the database.

Q. Has the Company taken any actions to manage medical costs?

A. Yes. The Company has done a number of things to control its health care costs.

First, the Company has a practice of regularly conducting requests for proposals ("RFPs") from medical insurance providers to ensure that our providers' prices are competitive. RFPs are generally issued every five years, but will be issued sooner upon notice of a significant increase in premiums from a current medical insurance provider.

Second, NW Natural regularly meets with its benefit broker/consultants, Willis Towers Watson ("WTW"), to review plan designs offered to ensure they remain market competitive with other utilities and up to date with innovative designs to effectively control rising medical and prescription costs. For instance, effective January 1, 2015, bargaining employees transitioned from contributing a flat dollar amount to paying a percent of the actual premium for medical and dental coverage. Bargaining unit employees pay 20 percent of premiums and

the company pays 80 percent. However, if the employee participates in an annual health screening, the employee contributes 15 percent of premiums and the Company pays 85 percent. Based on this approach, employees experience an increase in cost when their premiums rise, and a decrease in costs when their premiums go down. This provides an incentive to employees to stay healthy, thereby keeping their claims costs down.

Third, critical to cost management was the closure of NW Natural's retiree medical plans. This plan was closed to new NBU employees hired after December 31, 2006, and to BU employees hired after December 31, 2009. Since that change occurred, only 45 percent of active NBU employees and 46 percent of active BU employees are eligible for retiree medical benefits. NW Natural has also implemented caps to control medical costs ($2,400 per retiree per calendar year for those over 65 and $4,800 for retirees younger than 65), which have remained constant since 2006. Capping retirement medical costs alone has reduced NW Natural's projected benefit obligation for retirees by approximately $8.5 million.

Finally, in 2012 NW Natural introduced Consumer Directed Health Plans ("CDHPs") to active NBU employees with both carriers, Cigna and Kaiser. These plans continue to be a popular choice for employees looking to have more control over their health care expenses such as choosing to take a generic drug rather than a brand name drug. They offer a lower premium because cost is incurred when care is needed rather than paying for coverage that may not be required. CDHPs also allow NW Natural to provide plan participants with Health Savings

Accounts (HSA), which also serve as savings vehicles for health care expenses well into retirement. Since implementation, NW Natural continues to have year over year favorable claims experience for these plans which has allowed premiums to stay low for those that select to participate.

Q. How does the design of NW Natural's medical plans compare with that of other companies?

A. In 2019, WTW completed an analysis of the Company's medical benefits relative to 12 peer utilities and 81 other utility/energy companies in their Energy database for the non-bargaining group, and 46 energy companies for comparison purposes for the bargaining group. See *NW Natural/706, Rogers*. In this comparison, WTW utilized the following rating categories: Equal, Worse or Better. NW Natural's medical benefits were rated by WTW on an overall basis to be Equal to both the 12 peer companies and the overall Energy data base. This analysis compared everything from deductibles, to coinsurance (premium sharing) to co-pays for office visits and prescriptions. There was a range of ratings depending upon the specific item being rated, although the overall rating was Equal.

Q. Why does this testimony address only medical benefits and not all components of health benefits?

A. The Company focused on medical benefits (medical and pharmacy) because they make up 95.5 percent of the total health care costs (medical, pharmacy, dental, vision, life, and disability) and have been the area in which significant increases have been experienced in the past 10 plus years.

Q. Are the other health benefits being offered also market competitive?

A. Yes. The same survey source noted above for medical benefits also evaluated the competitiveness of other health care benefits including dental, vision, life, and disability. All the benefit plans were rated Equal to the 12 peer utility companies as well as the overall Energy data base provided in the WTW survey. While there were some variations in certain categories, overall the WTW survey indicated that NW Natural's benefit plans were substantially at market when compared to other utilities.

VI. RETIREMENT BENEFITS

Q. Please provide an overview of your retirement benefits.

A. Table 4 shows the retirement income benefit programs, which provide market median retirement offerings to employees:

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Table 4: Retirement Benefits

Retirement Program	Eligible Employees	Summary Description of Benefit
Retirement K Savings Plan (401k)-Employee Savings	All employees	Defined Contribution Savings plan with match: Match is 50 percent of first 8 percent saved by BU employee and 60 percent of first 8 percent saved by NBU employee
Retirement K Savings Plan (401k)-Enhanced	NBU employees hired after December 31, 2006 and BU employees hired after December 31, 2009 (covers employees not eligible for pension benefits)	Contribution made by company into "Enhanced" account-no employee contribution required Contribution is 5 percent for NBU; 4 percent for BU
NW Natural Pension Plan for BU and NBU Employees (NW Natural Retirement Plan) (closed)	Non-bargaining (NBU) and Bargaining (BU) employees	Defined benefit plan that was closed to new NBU employees hired after 12/31/06 and BU hired after 12/31/09.

Q. Are there any significant changes that NW Natural has made since the Company's last rate case?

A. Yes. As a result of the new bargaining contract, the Retirement K Savings Plan (401k) company match for BU employees will change from 50 percent of the first 6 percent saved to 50 percent of the first 8 percent saved effective January 1, 2020.

Q. How do NW Natural's retirement benefits compare to the benefits provided by other companies?

A. In 2019, the Company asked WTW to analyze the Company's 401(k) defined contribution retirement benefits relative to other utilities (using the Equal, Better,

or Worse classification described above). WTW concluded that NW Natural's 401(k) defined contribution match benefits were worse for BU employees when compared to the Energy database. WTW also concluded that the NBU employees were Equal when compared to the Energy database, but Worse when compared to the 12 target companies.

The Enhanced 401(k), for those hired after the Pension Plan was closed, and the Retirement K Savings Plan (401k), for those participating, was shown to be Equal for both the bargaining and non-bargaining groups when compared to both the total database and the 12 target companies used for the non-bargaining population.

Q. Please explain the total retirement benefits included for recovery in the Test Year.

A. Table 5 shows the amount requested for recovery in the Test Year.

Table 5
Utility Total Retirement Benefits
(Oregon Allocated)

Component	Test Year
RKSP-Matching Contribution	$4,887,000
RKSP-Enhanced Contribution	$3,195,000
Western States Pension-withdrawal liability	$510,000
Total	**$8,592,000**

VII. EMPLOYEE HEADCOUNT

Q. What is NW Natural's FTE count in the Test Year?

A. On a system level, our FTE count in the Test Year will be 1,193. This FTE count reflects the expected total number of FTEs working at NW Natural at the end of

the Base Year (1,179), plus 16 incremental FTEs that are currently in the recruitment process, minus 2 FTEs that will no longer be needed in 2020.

Q. What is the Company's expected FTE count at the end of the Base Year (calendar year 2019)?

A. At the time of filing this testimony, our FTE count on a system basis is expected to be 1,179 at the end of the Base Year.

Q. Has NW Natural increased its FTE count since its last general rate case?

A. Yes, we have. At the time of our last rate case (UG 344), our FTE footprint, *i.e.* the total number of FTE positions that are approved positions by our Hiring Controls committee, was over 1,200. In the last rate case, we requested recovery of 1,143 FTEs (1,117.5 after non-regulated FTE adjustment).[3] This number represented the Company's actual FTE count (filled positions) at the time we filed the rate case at the end of 2017. It did not take into account ongoing hiring for open positions or incremental FTE positions that we expected to hire in 2018 or in the Test Year.

NW Natural's current FTE footprint is 1,243. Since our last rate case, NW Natural has undergone routine backfilling of existing open positions in its footprint, and we have added incremental FTE positions that we have hired, or expect to hire, by the time this case is filed. A complete list of each incremental FTE added to our footprint since the time of our last rate case is included in the attached exhibit *NW Natural/707, Rogers*.

[3] For historical perspective, NW Natural's headcount in 2001 was 1,284.

Q. Why has NW Natural requested the inclusion of 16 incremental FTEs in its Test Year FTE count?

A. The 16 incremental FTEs represent additional positions that the Company recently approved for hiring and expect to fill in calendar year 2020. Fourteen of these positions are increases to our Information Technology & Services ("IT&S") department and two of the positions are increased physical security personnel in our Facilities department. These new IT&S and Facilities positions are described more fully in the testimonies of Jim Downing and Wayne Pipes, respectively *NW Natural/600*, *Downing* and *NW Natural/500, Pipes*. We anticipate having these new positions filled by March 1, 2020.

Q. Please describe the Company's requested reduction of two FTEs in its Test Year FTE count.

A. The Company plans to reduce two FTEs due to the Company outsourcing the customer communication printing and mailing function in the first half of 2020.

Q. Are you seeking to recover any costs related to employees of NW Natural subsidiaries or affiliates?

A. No. All amounts described in this testimony reflect gas utility-only costs, and not the costs of subsidiaries or affiliates.

Q. What is the total number of FTE requested for cost recovery in this case?

A. As more fully described in the testimony of Mr. Davilla (*NW Natural/900, Davilla*), NW Natural is seeking cost recovery of 1,169.5 FTEs. Mr. Davilla's testimony reflects the removal of 23.5 FTEs (assigned to non-regulated activity) from the 1,193 FTEs in the Test Year.

VIII. CONCLUSION

Q. Does this conclude your testimony?

A. Yes, it does.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBITS 701 – 707

December 30, 2019

EXHIBITS 701 – 707 – COMPENSATION & BENEFITS

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COMPENSATION & BENEFITS
EXHIBIT 701

December 30, 2019

Exhibit 701 Base Pay Analysis

2019 Salary Structure - Base Pay Analysis

2019 Salary Structure		
NWN Grade	**NWN 2017 Midpoint**	**NWN Midpoint vs. Market Median**
14	$54,550	124.7%
15	$59,400	113.8%
16	$64,750	108.9%
17	$70,550	104.9%
18	$76,900	107.7%
19	$83,950	103.3%
20	$91,400	102.7%
21	$99,600	100.7%
22	$114,700	101.9%
23	$126,400	96.5%
24	$139,350	96.7%
25	$152,600	93.8%
26	$167,950	106.3%
	Overall	**104.8%**

Data Source: NW Natural Market Review 2019

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBIT 702

December 30, 2019

Executive Summary

- In aggregate, NW Natural's compensation program and the components are competitive with the Peer Group, broader energy industry, and general industry
  - However, there is variation in market positioning by executive which should be examined on an individual basis to determine the appropriate course of action for 2019 pay decisions.

- While NW Natural's pay philosophy is to target total compensation at the 50th percentile, competitiveness is more commonly referred to as a range around the intended level. We consider the following guidelines:
  - Base salary: ±10% of the 50th percentile
  - Cash compensation: ±15% of the 50th percentile
  - Total direct compensation: ±20% of the 50th percentile

	NW Natural Variance to Market								
	Peer Group			Energy Industry - Survey			General Industry - Survey		
Pay Component	25th %ile	50th %ile	75th %ile	25th %ile	50th %ile	75th %ile	25th %ile	50th %ile	75th %ile
Base Salary	9%	-2%	-10%	8%	-10%	-21%	4%	-11%	-24%
Target Total Cash	7%	-4%	-19%	23%	-10%	-25%	2%	-16%	-32%
Long-term Incentives	19%	-26%	-38%	190%	-14%	-45%	242%	-20%	-60%
Target Total Direct	11%	-14%	-28%	51%	-12%	-33%	33%	-17%	-44%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBIT 703

December 30, 2019

Exhibit 703 Gas Industry Incentive Plans

Plan Prevelance - Bonus and Other Variable Pay Programs in which some or all Incumbents are Eligible

	% of Organizations with at Least One Plan	# of Responses
Entire Sample Combined		
Executive	85.1%	47
Management, Excluding Executives	78.7%	47
Exempt, Non-Management	76.6%	47
Nonexempt	74.5%	47

Data Source: 2018 American Gas Association Compensation Survey

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

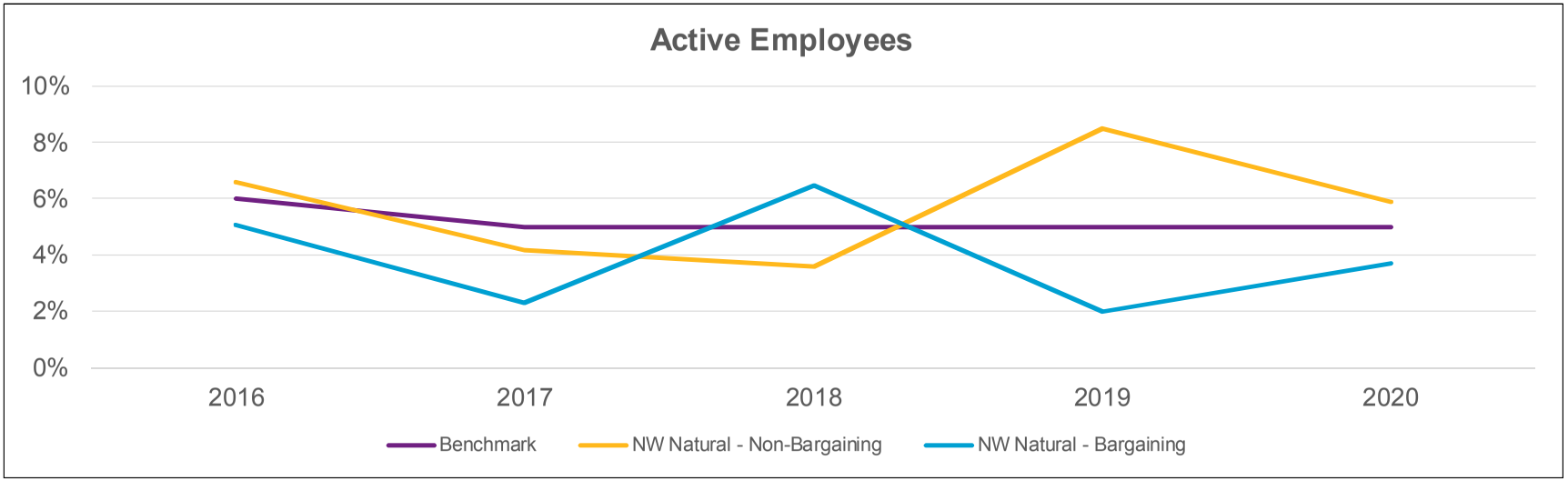
NW Natural

Exhibit of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBIT 704

December 30, 2019

Medical Benchmark Trend vs. NW Natural Renewals



	2016	2017	2018	2019	2020
Actives					
Benchmark Trends[1]	6.0%	5.0%	5.0%	5.0%	5.0%
NW Natural — Non-Bargaining Employees	6.6%	4.2%	3.6%	8.5%	5.9%
NW Natural — Bargaining Employees	5.1%	2.3%	6.5%	2.0%	3.7%

[1]Source: 2019 Willis Towers Watson Best Practices in Health Care Employer Survey.

BEFORE THE

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NW Natural

Exhibit of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBIT 705

December 30, 2019

Willis Towers Watson High Performance Insights in Health Care

2019 Health Care Financial Benchmarks

NW Natural

October 21, 2019

Willis Towers Watson

Survey Overview — Major Areas Included

Cost Efficiency	Health plans are evaluated on how efficiently they perform by adjusting cost data for plan design, demographics and geographic cost differentials. This helps employers understand how well their plans are performing on an apples-to-apples basis.
Employee Cost-Sharing	How health plans are priced to employees is analyzed to determine the impact on net company costs. This is important because prior studies have shown that many employers create unintended incentives for employees — and increase company costs — by pricing options without a clear understanding of true costs.
Employee Incentives	An increasing number of employers are using arrangements such as HSAs, HRAs and wellness incentives to encourage responsible behavior among plan participants.
Dental	Dental plan costs are compared, as well as enrollment, administration and employee contributions.

- This year's database includes:
  - 2,168 companies in 18 industry groups
  - An annual medical premium-equivalent cost of $132.3B from more than 10.4M enrollees
  - An annual dental premium-equivalent cost of $8.1B from more than 9.7M enrollees

Survey Overview — Specific Questions Addressed

Medical Benchmarks

- How do your plan costs compare to others in your industry, as well as to best performers?
- How does enrollment by plan type compare to the database?
- What is the cost impact of key factors in your population, including: age/gender, family size, geography, plan value?
- After adjustments, how efficient is your total plan overall? What is the financial impact of moving to benchmark or best practice performance?
- After adjustments, how efficient are each of your individual plans relative to benchmarks?
- How does the employer's contributions as a percentage of plan cost compare to employee contributions?
- How does your account funding for HRAs and/or HSAs compare to other employers?
- How do your incentives/wellness credits compare with the database?
- Where do your administrative fees fall within the range of other employers' fees?

Dental Benchmarks

- How do your plan costs compare to others in your industry, as well as to best performers?
- How does enrollment by plan type compare to the database?
- How do employee contributions compare to the database?
- Where do your administrative fees fall within the range of other employers' fees?

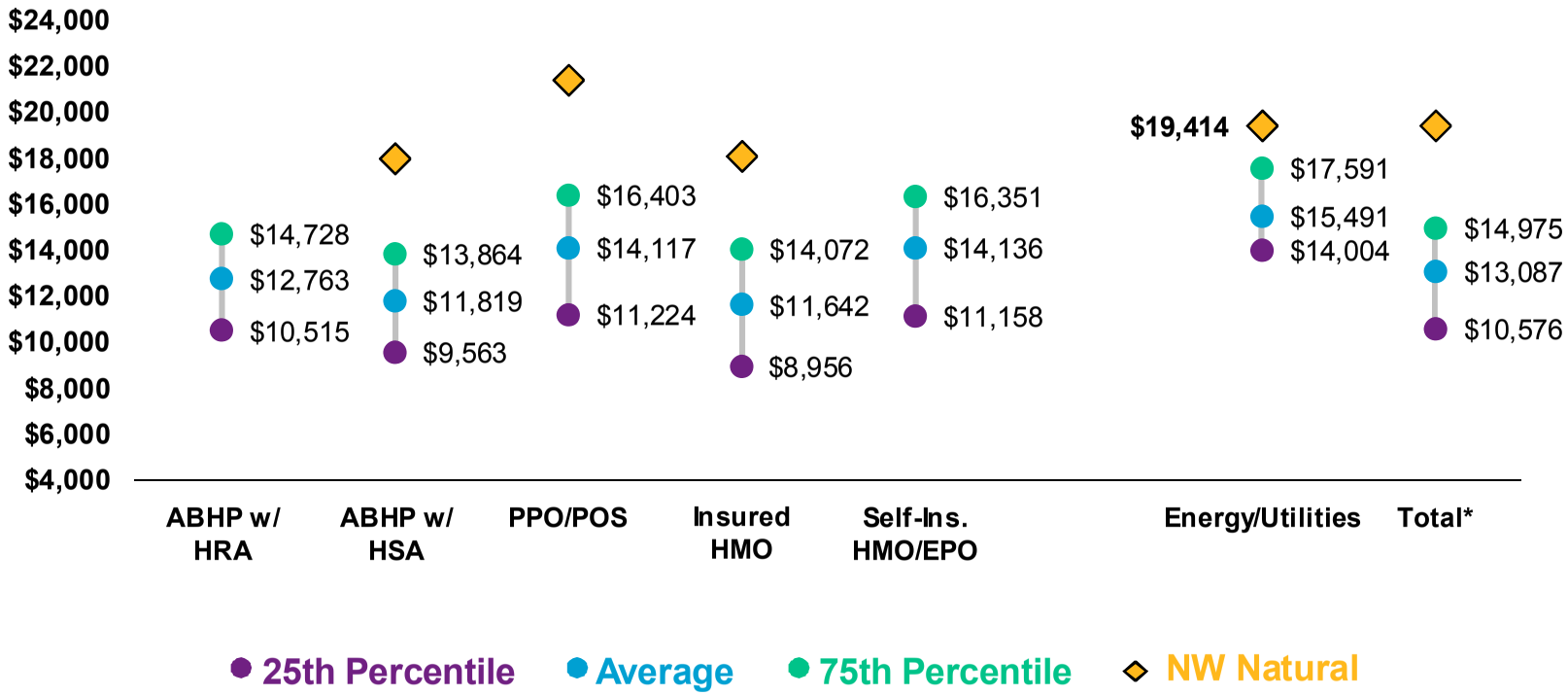
Medical Cost Benchmarks

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

Total Cost per Covered Employee per Year (Unadjusted)

How do your plan costs compare? How does enrollment across plan type impact the average cost? Even if total plan costs are favorable, are some plans more exposed to the excise tax?



NW Natural's actual costs are 48% above the benchmark average, 25% above average for NW Natural's industry.

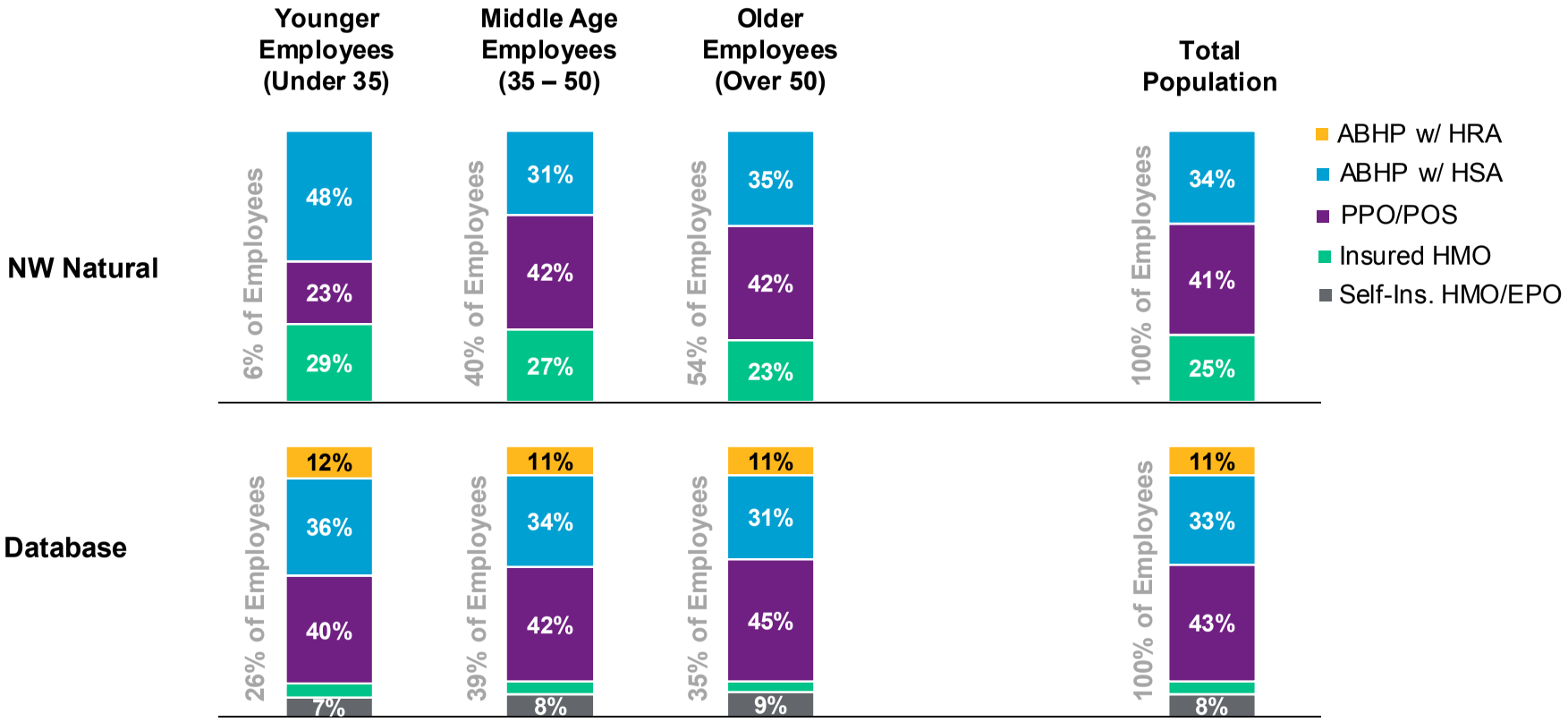
*Total costs represent an enrollment weighted average of all plan types.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

Enrollment by Plan Type and Age Breakdown

- How does enrollment by plan type compare to the database?
- Does the enrollment by age have implications for plan pricing?
- Is the plan enrollment by age influenced by employer funding of employees/dependents?



- Is employee enrollment aligned with the appropriate plans?
- What are the implications of enrollment on pricing and funding?

Medical Cost Benchmarks

Developing a Population Adjusted Benchmark

The first step in understanding the cost benchmarks is to understand your population. The average cost for employers in the database is the benchmark.

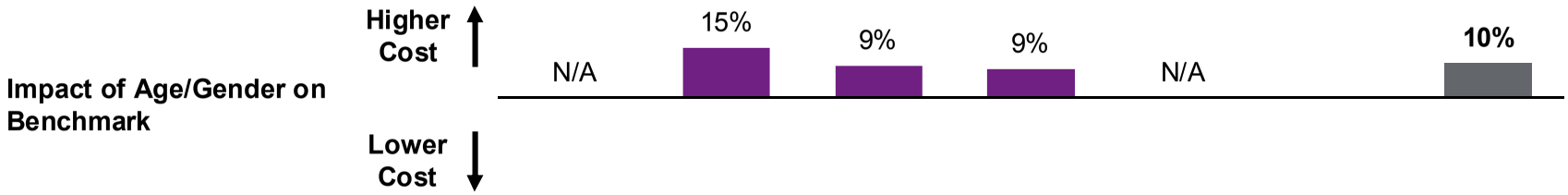
- The benchmark is adjusted to reflect differences between your organization and the database for each of four key criteria, noted below
- The result of these adjustments is a benchmark that is customized to your population (custom benchmark)
- The custom benchmark is the database cost if the database looked like your population with your plan designs

Age/Gender	The age/gender profile of the population — cost is directly correlated with age. The impact of gender on expected cost varies with age.
Family Size	The estimated number of members covered per employee, expressed in terms of adult cost equivalents — larger-than-average family size is expected to increase costs per employee.
Geography	The underlying cost for basic health care services in an area — provider competition and more prevalent managed care plans may reduce costs in some areas. More enrollment in higher-cost areas is expected to increase costs.
Plan Value	The level of benefits covered under your medical plan — plans reimbursing a higher percentage of medical expenses than the database average are expected to increase costs.

Medical Cost Benchmarks

Adjusting for Age/Gender

- What is the cost impact of age/gender in your population?
- How different is the impact of demographics by plan?
- If it is significant, why do company averages have a different pattern across plans than the database?



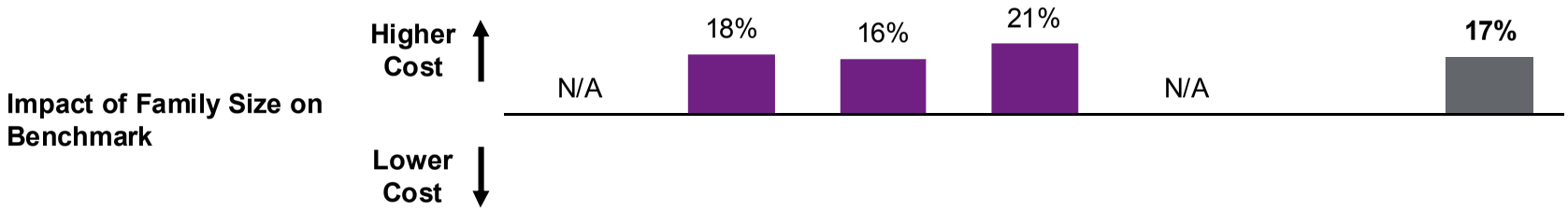
	ABHP w/ HRA	ABHP w/ HSA	PPO/POS	Insured HMO	Self-Ins. HMO/EPO	Total
Average Age — Database	45.6	42.9	46.3	44.0	45.4	44.9
Average Age — NW Natural	N/A	50.9	52.4	50.7	N/A	51.4
% Female — Database	45%	39%	42%	44%	48%	42%
% Female — NW Natural	N/A	40%	34%	28%	N/A	34%

The custom benchmark will be increased by 10% due to age and gender demographics.

Medical Cost Benchmarks

Adjusting for Family Size

- How different is the impact of family size by plan?
- If it is significant, why do company averages have a different pattern across plans than the database?
- How has this been impacted by contribution strategies of the company?



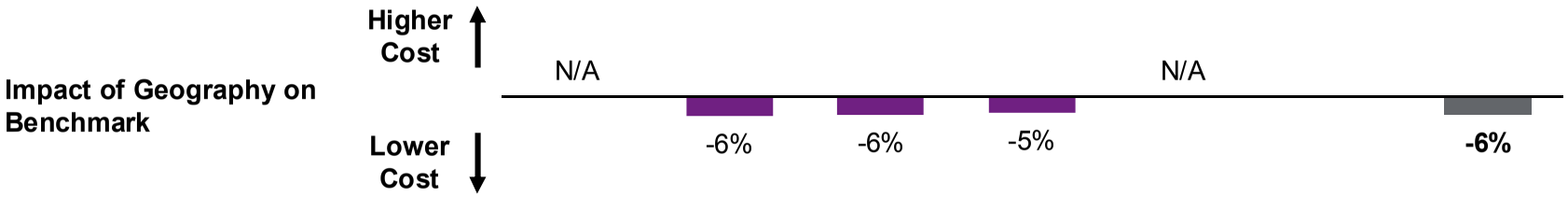
	ABHP w/ HRA	ABHP w/ HSA	PPO/POS	Insured HMO	Self-Ins. HMO/EPO	Total
Dependents (%) — Database	50%	48%	51%	46%	52%	50%
Dependents (%) — NW Natural	N/A	69%	70%	68%	N/A	69%

The custom benchmark will be increased by 17% due to family size.

Medical Cost Benchmarks

Adjusting for Geography

- How does the geographic footprint of your covered population impact your costs?
- Does the geographic impact vary by plan?



	ABHP w/ HRA	ABHP w/ HSA	PPO/POS	Insured HMO	Self-Ins. HMO/EPO	Total
Geographic Factors — Database	1.00	1.00	1.00	1.00	1.00	1.00
Geographic Factors — NW Natural	N/A	0.94	0.94	0.95	N/A	0.94

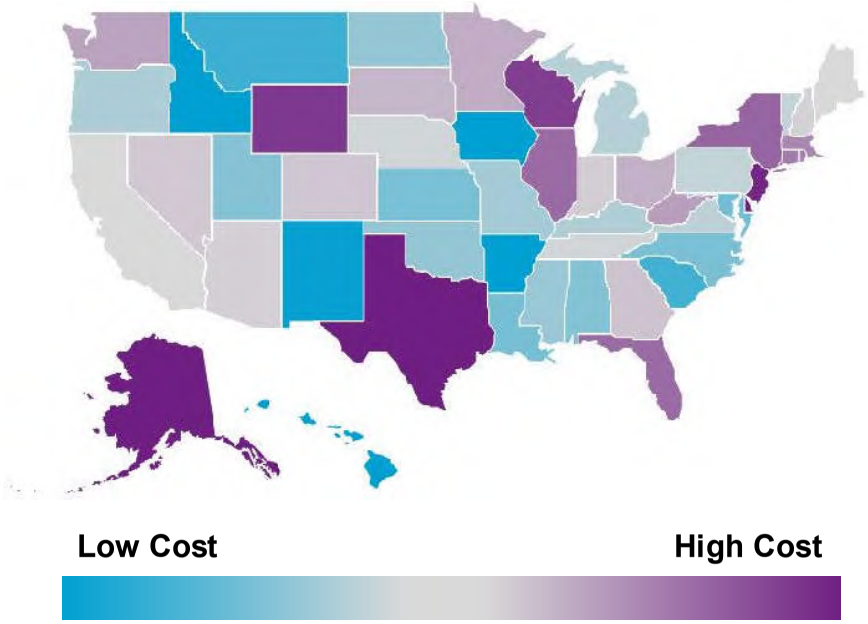
The custom benchmark will be decreased by 6% due to NW Natural's population's geography.

Medical Cost Benchmarks

Adjusting for Geography — Additional Details

How do overall health care costs vary by state?

Health Care Costs by State



Your Top States for Enrollment

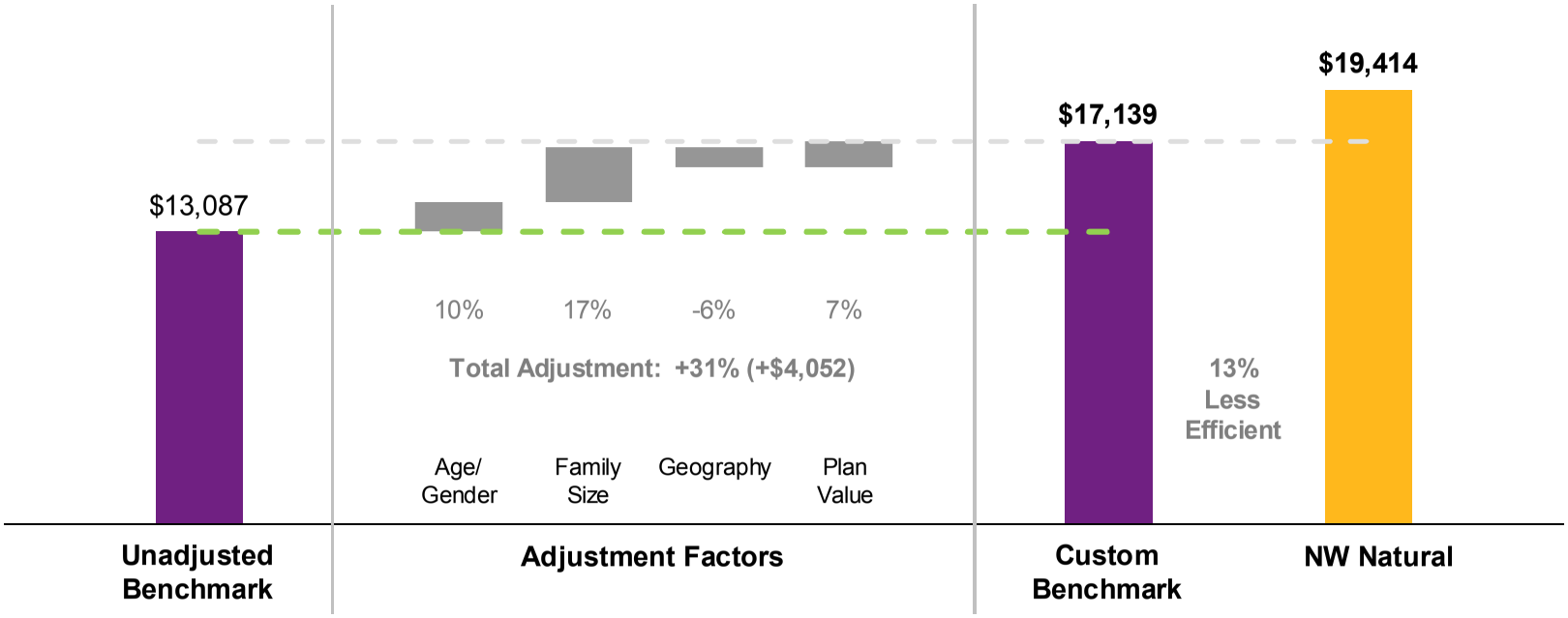
Rank	State	Your Enrollees	% of Total
1	OR	447	86%
2	WA	62	12%
3	CA	9	2%
4	AZ	1	0%
5			
Total — Top 5 States		519	100%

Understanding the impact of the geographic footprint of NW Natural's employees is important to understand NW Natural's relative cost position.

Medical Cost Benchmarks

Overall Program Efficiency

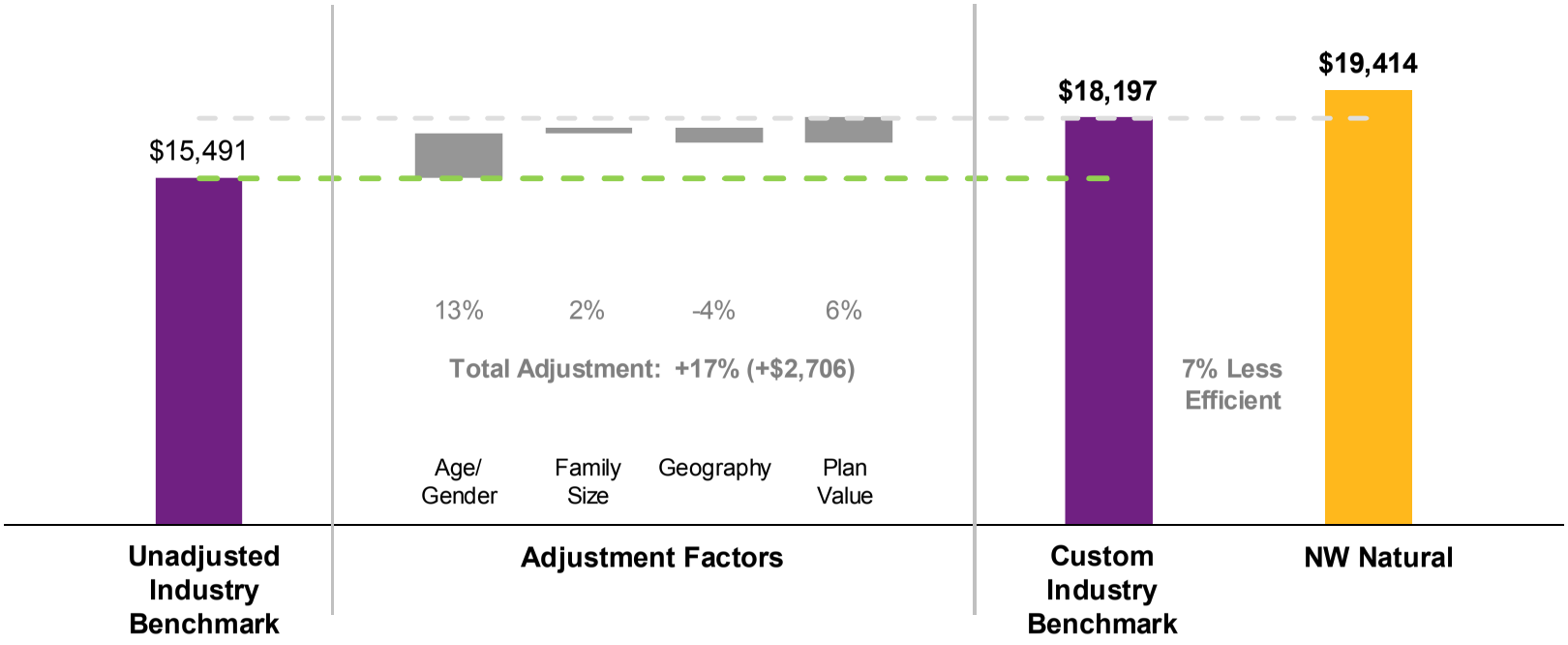
- After adjustments, how efficient is your total plan overall?
- What is the financial impact of moving to benchmark performance?



NW Natural's total program is 13% less efficient than the average database performance. This translates into a potential cost avoidance of $1.2 million. Relative to top-quartile performers, NW Natural's total program is 27% less efficient, translating into a potential cost avoidance of $2.1 million.

Medical Cost Benchmarks | Industry Efficiency

After adjustments, how efficient is your total plan compared to the energy/utilities industry?



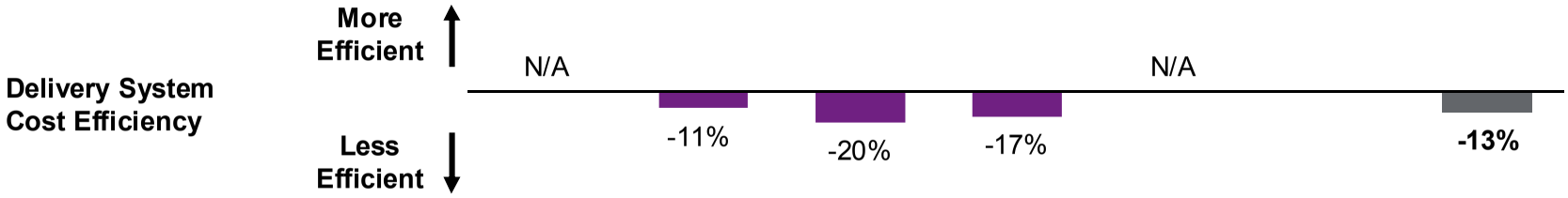
NW Natural's total program is 7% less efficient than NW Natural's industry. This translates into a potential cost avoidance of $0.6 million.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

Delivery System Cost Efficiency

How efficient are your plans relative to the benchmark?



	ABHP w/ HRA	ABHP w/ HSA	PPO/POS	Insured HMO	Self-Ins. HMO/EPO	Total
Enrollment	0%	34%	41%	25%	0%	100%
Actual Cost per Employee	N/A	$17,990	$21,399	$18,088	N/A	$19,414
Custom Benchmark Cost per EE	N/A	$16,242	$17,768	$15,492	N/A	$17,139
Efficiency	N/A	-11%	-20%	-17%	N/A	-13%
Summary		Average Enrollment	High Enrollment	Average Enrollment		
		Low Efficiency	Low Efficiency	Low Efficiency		Low Efficiency

Plan efficiency is most important for plans with higher enrollment, as this drives overall efficiency.

Employee Cost-Sharing Overview

An important driver of overall cost results is how employers price different medical plan options to employees. This section shows how your company's employee contributions compare with the database averages and how contributions are structured for different delivery systems.

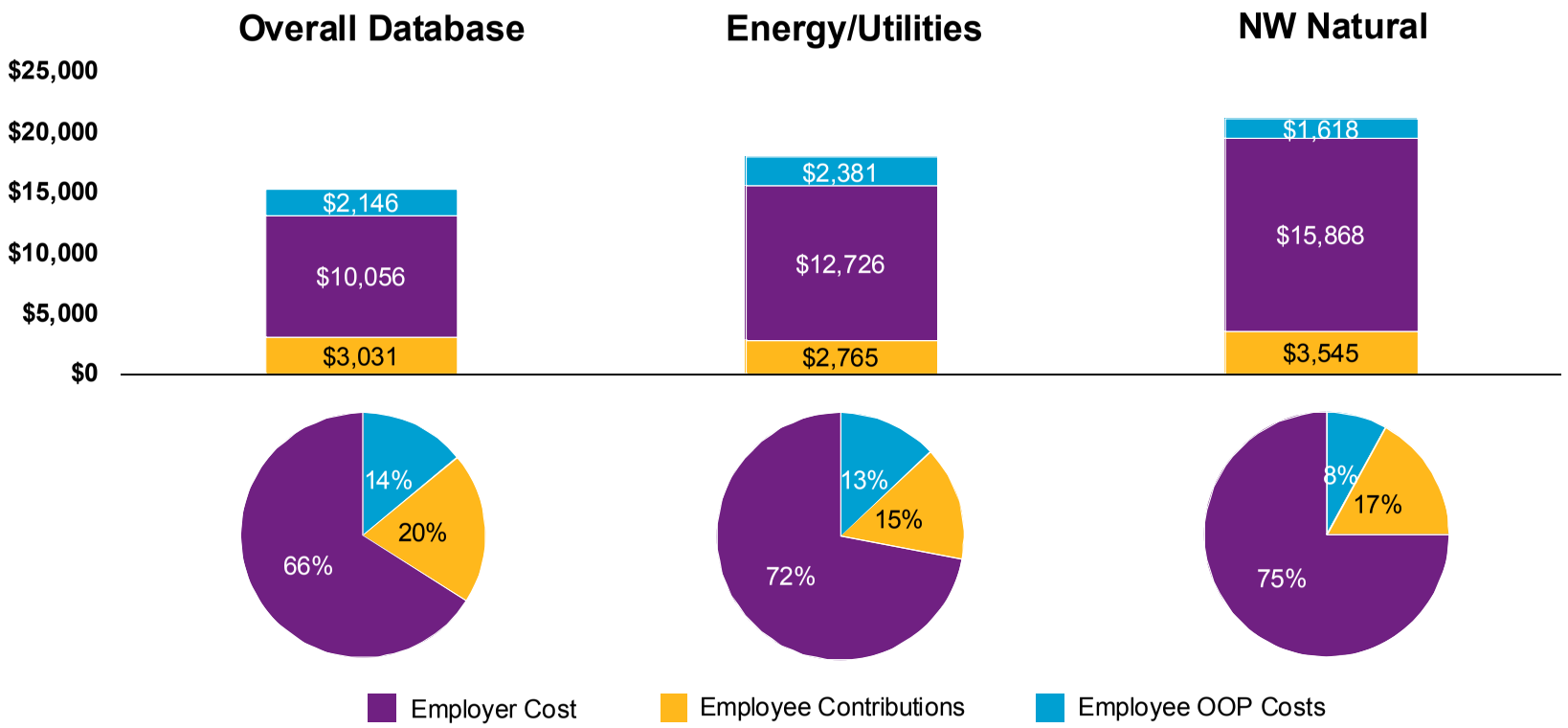
Included are:

- Comparisons of employee vs. dependent subsidy levels
- Net cost analysis by plan type

Medical Cost Benchmarks

Total Cost and Contributions

How do your employees' share of total cost, including contributions and out-of-pocket expenses, compare to benchmarks?



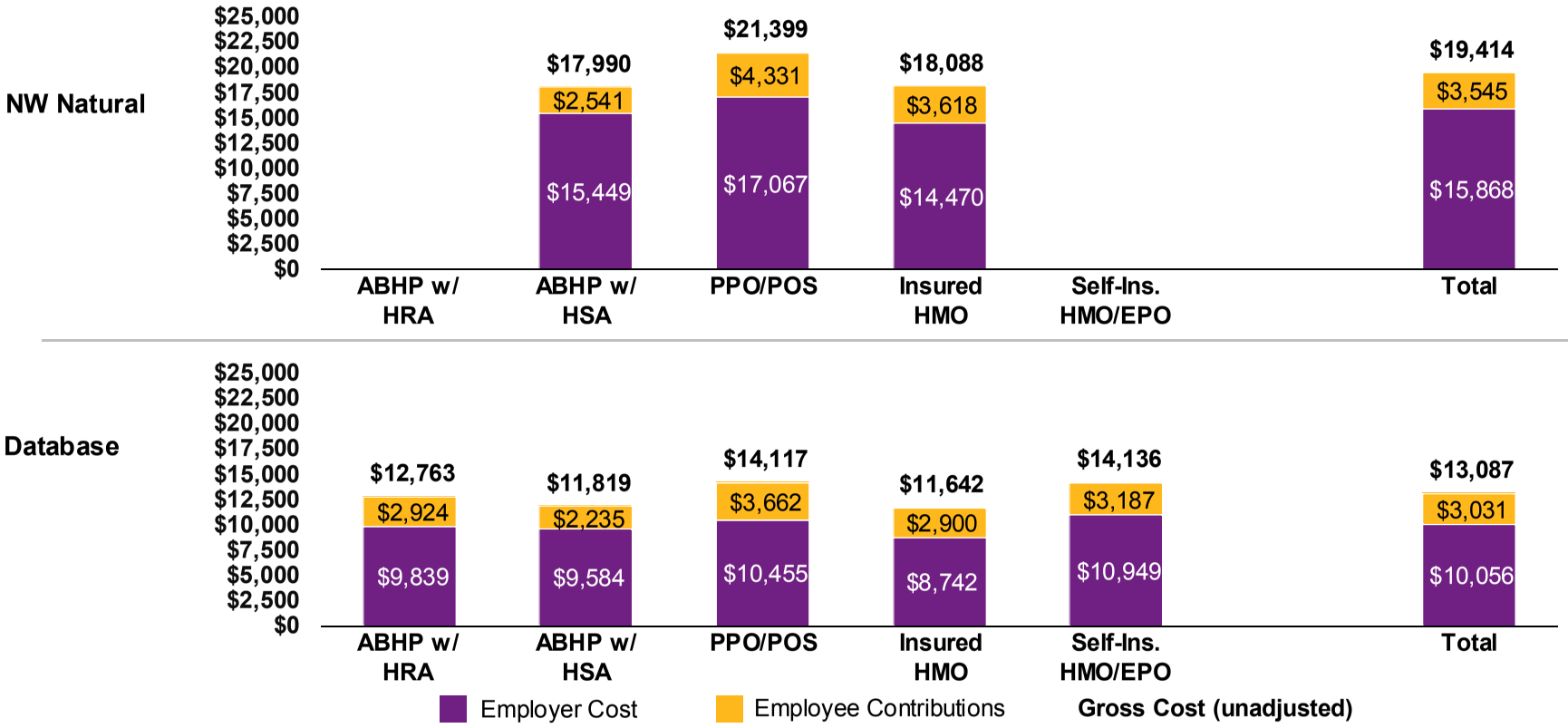
- Compared to the overall database, NW Natural's employee share of total costs is lower
- Compared to others in your industry, NW Natural's employee share of total costs is lower

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

Employee Cost-Sharing (Unadjusted)

How do your employee payroll contributions vary across plans?



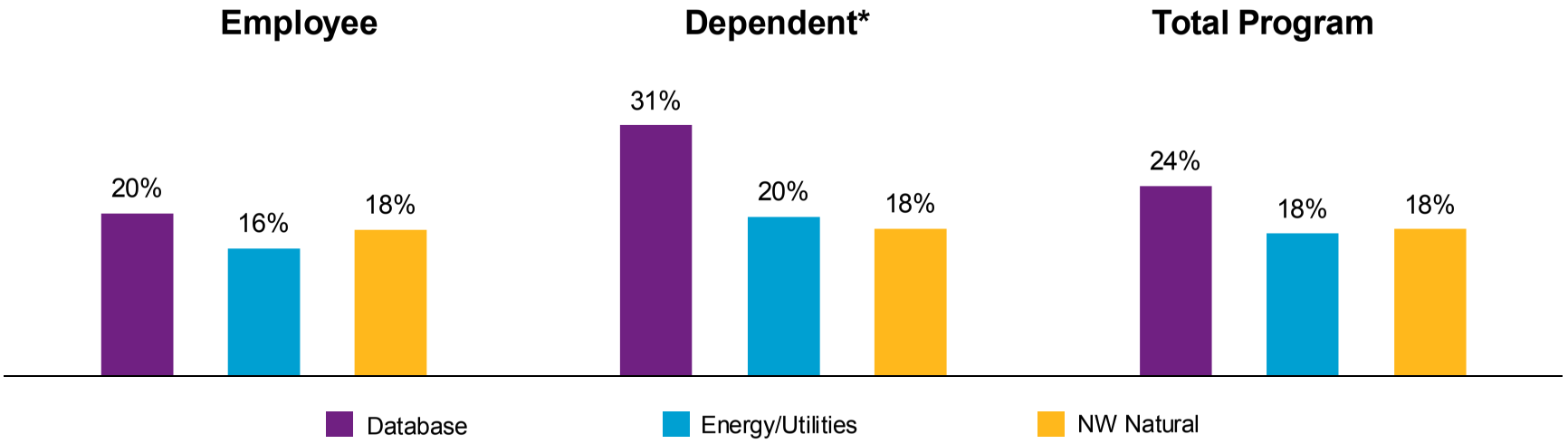
On average, NW Natural employees pay $514 more per year than the database.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

Employee Contributions as a % of Plan Cost

How does your cost-sharing, for employees and dependents, compare to benchmarks?



Employee Contributions as a % of Total Cost	ABHP w/ HRA	ABHP w/ HSA	PPO/POS	Insured HMO	Self-Ins. HMO/EPO
NW Natural	N/A	14%	20%	20%	N/A
Database	24%	20%	27%	25%	23%

- Employees contribute less than the database average but more than the industry average
- Dependents are below the database and industry averages

*Dependent includes spouse, children, family, etc.

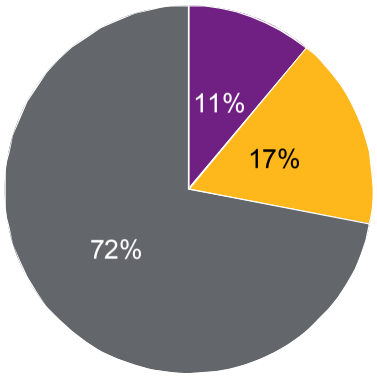
http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

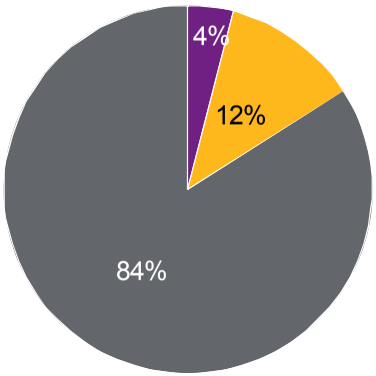
Wellness Credits for Accounts and Contributions

How does the company's approach compare to the database?

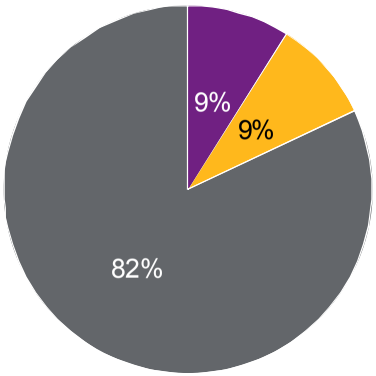
% of database with wellness credits



% of database with wellness credits deposited in HRA or HSA accounts



% of database with wellness credits applied to payroll contributions



Employee Only | Employee and Spouse | None

NW Natural's provides wellness credits through payroll contributions.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks

Impact of Account Seeding on HSA Plan Design*

- How does your funding of the HSA compare with the database?
- How does your net deductible (deductible minus guaranteed and earned incentives) compare with the database?

HSAs	NW Natural	Database		
		25th	Average	75th
Base Deductible	$1,500	$1,500	$2,320	$2,700
▪ **Guaranteed Contribution**	$750	$11	$448	$600
▪ **Average Earned Incentive**	$0	$0	$36	$0
Net Deductible Paid by Employees	$750	$1,073	$1,836	$2,332

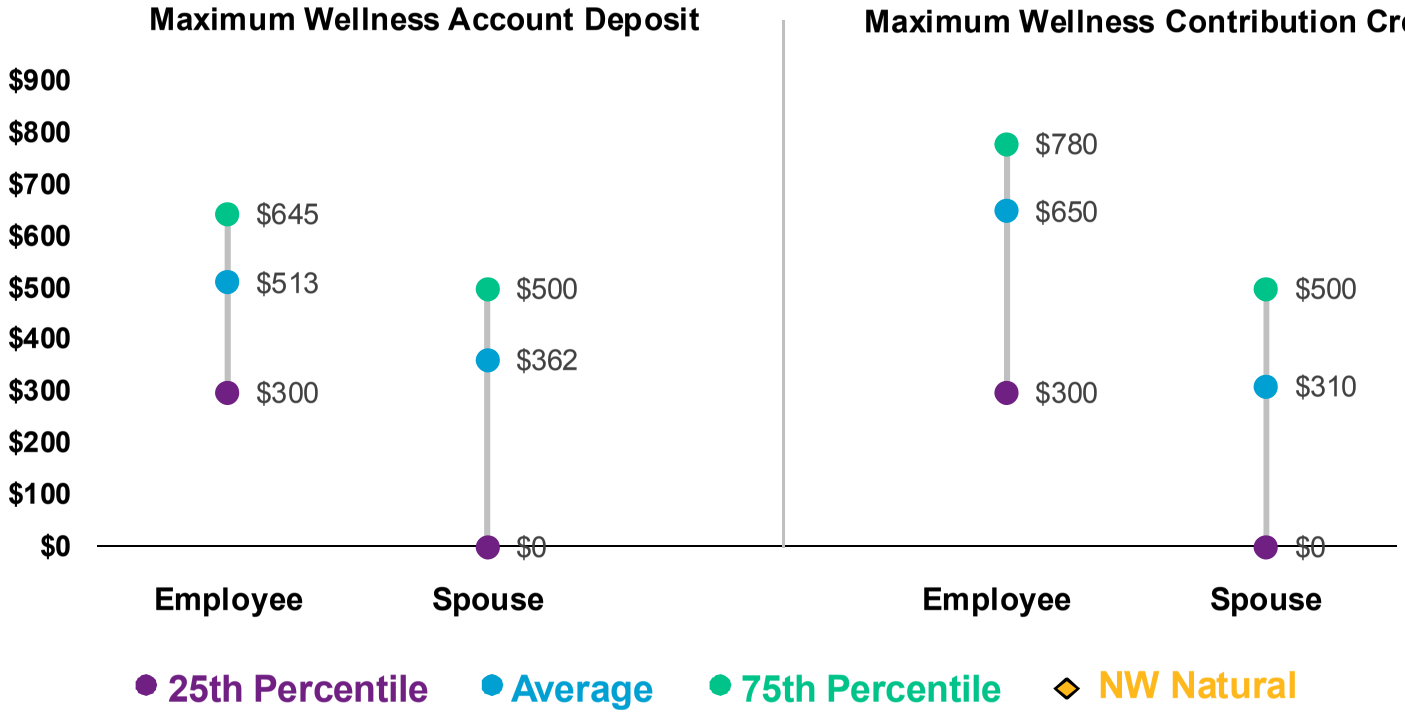
Your net deductible is $1,086 less than the database average.

*Employee coverage only

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Medical Cost Benchmarks | Wellness Incentives

- How does the company's maximum potential wellness credit compare with the database?
- How does the allocation between employee and spouse compare to the database?
- How does the approach for employees and spouses compare between contributions and wellness credits?



Maximum wellness account deposits and contribution credits average $513 and $650 for employees and $362 and $310 for spouses.

Medical Cost Benchmarks

Annual Self-Insured Administration Fees by Covered Employee by Employer Size*

How do your administration fees compare to the database? What is contributing to the company's variance from average? What other variable fees are being paid to the vendor in addition to the monthly per employee administration fees?

Not applicable.

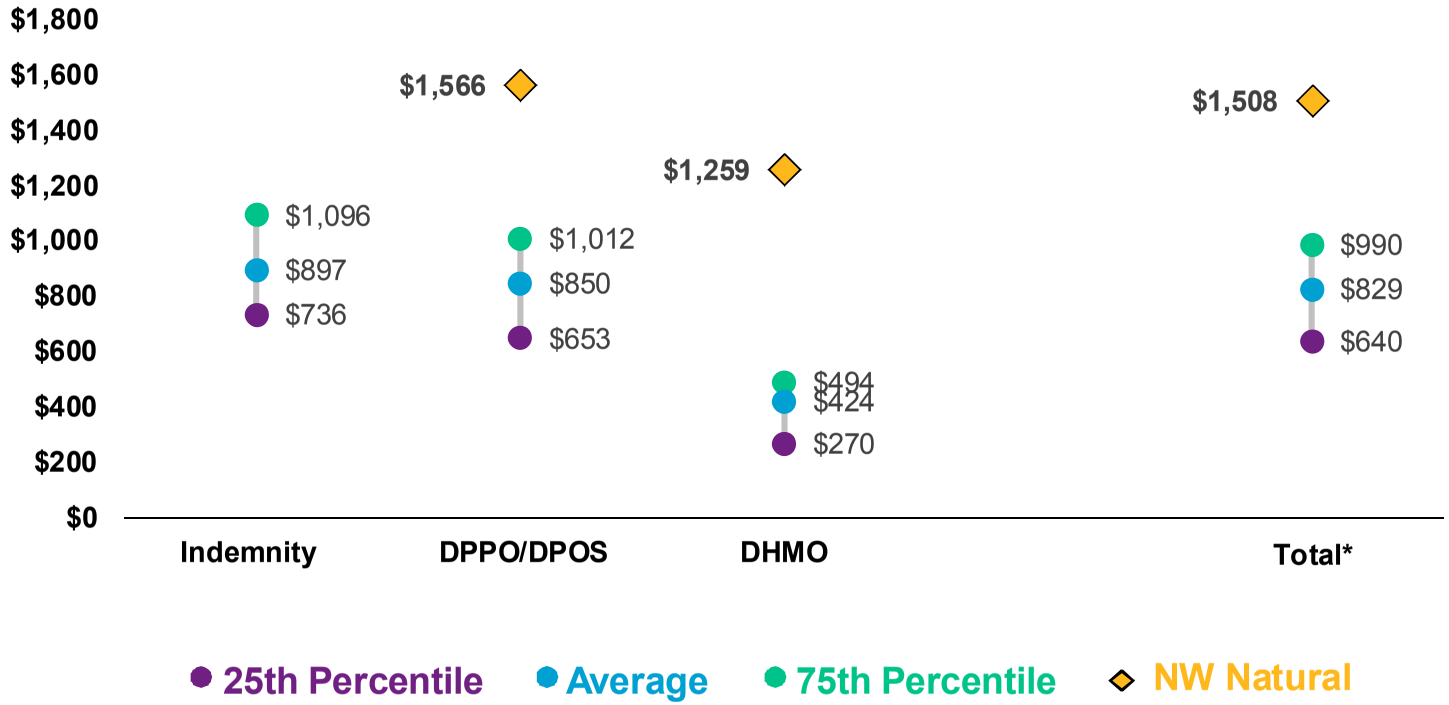
*Results by employer size for companies with self-insured arrangements.

Dental Cost Benchmarks

Dental Cost Benchmarks

Total Cost per Covered Employee per Year (Unadjusted)

- How do your plan costs compare to the database?
- How do costs vary by plan type?



NW Natural's dental costs are 82% higher than database average.

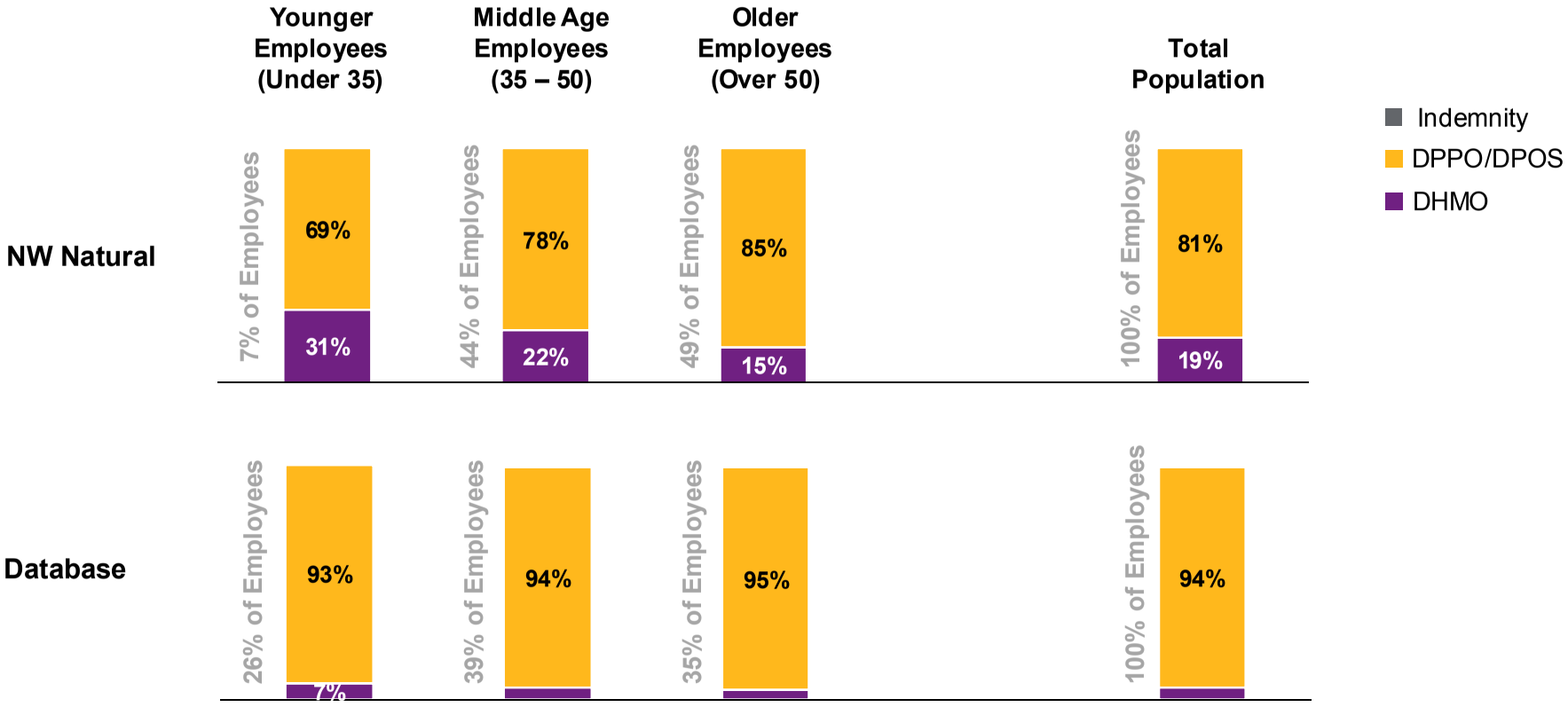
*Total costs represent an enrollment weighted average of plan types.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Dental Cost Benchmarks

Enrollment by Plan Type and Age Breakdown

How is enrollment distributed by age and plan?



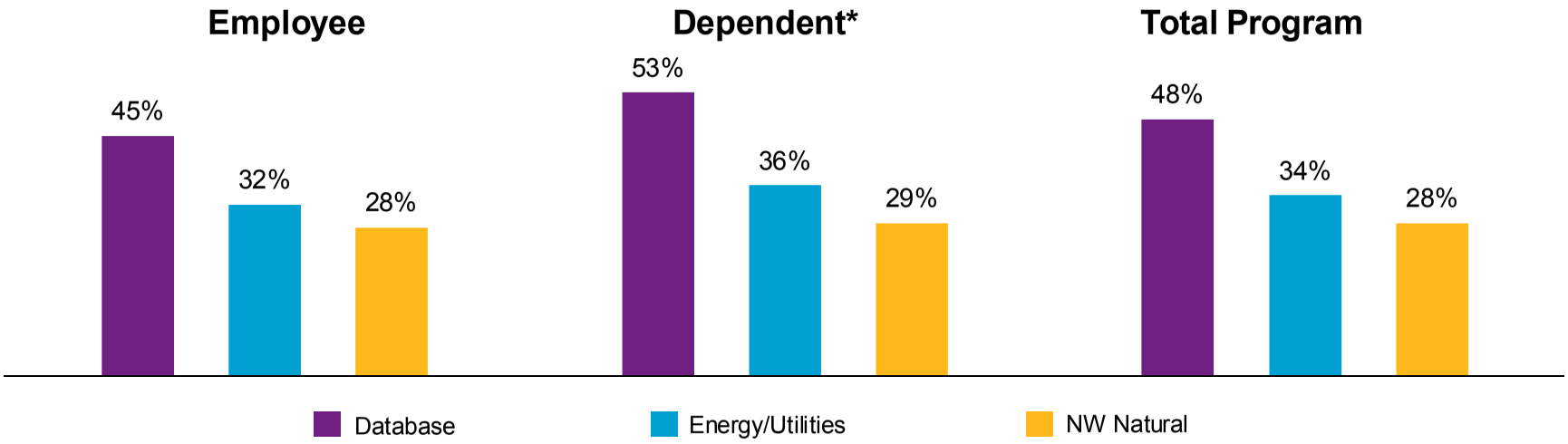
The majority of employees in the database are enrolled in DPPO/DPOS dental plans.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Dental Cost Benchmarks

Employee Contributions as a % of Plan Cost

How do employee contributions as a percentage of plan cost compare to the database benchmarks?



Employee Contributions as a % of Total Cost	Indemnity	DPPO	DHMO
NW Natural	N/A	30%	20%
Database	43%	48%	47%

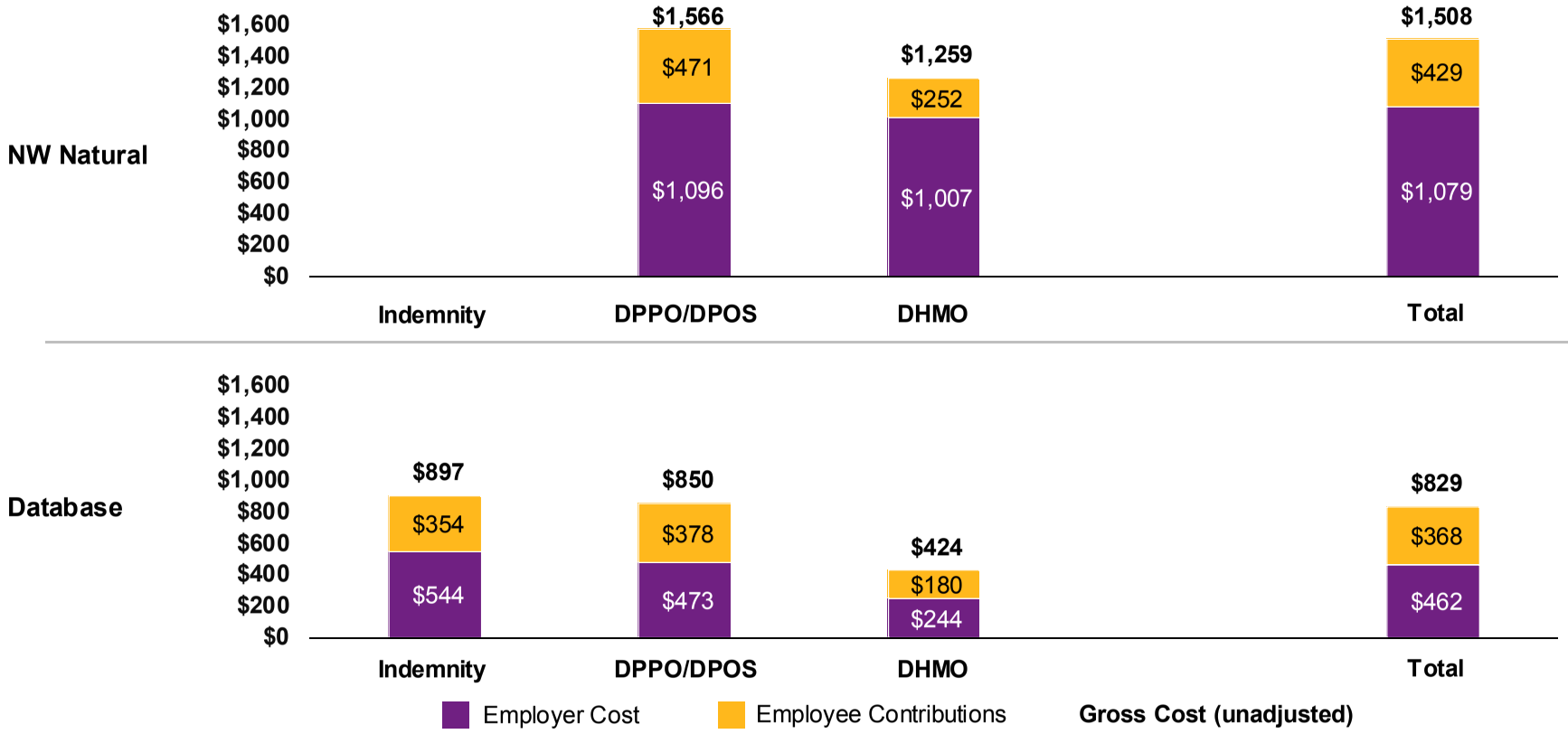
Across NW Natural's total program, contributions as a percentage of total cost are less than the database and industry averages.

*Dependent includes spouse, children, family, etc.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Dental Cost Benchmarks — Employee Cost-Sharing — Net Cost Analysis

How do your employees' payroll contributions vary across plans?



On average, NW Natural employees pay $61 more per year than the database.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

Dental Cost Benchmarks

Annual Self-Insured Administration Fees per Covered Employee by Employer Size*

How do administration costs compare to the database benchmarks?

Not applicable.

*Results by employer size for companies with self-insured arrangements.

http://natct.internal.towerswatson.com/clients/604927/NWNatural2019HB/Documents/2019%20Health%20Care%20Financial%20Benchmarks%20-%20NW%20Natural.pptx

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Melinda B. Rogers

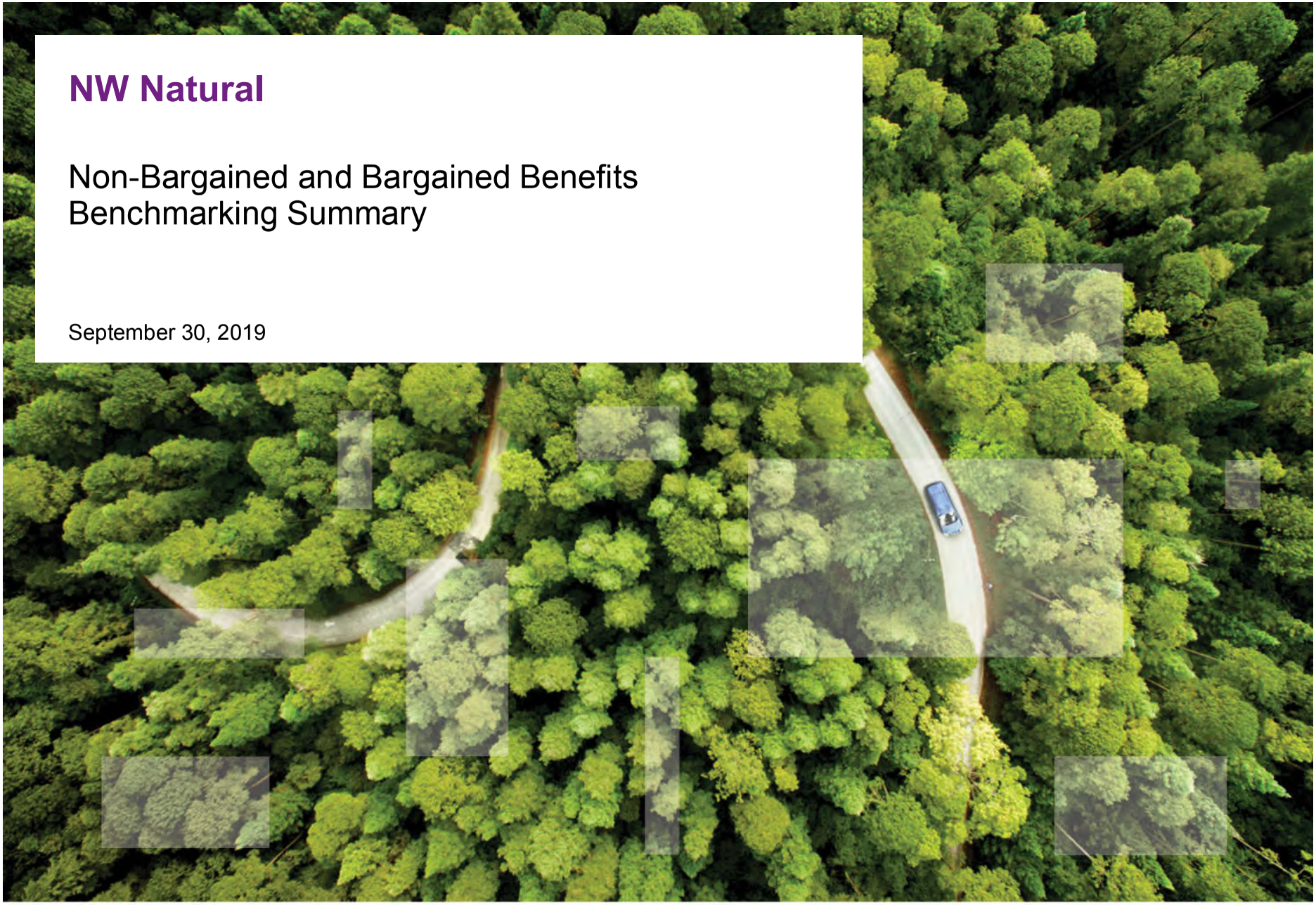
COMPENSATION & BENEFITS
EXHIBIT 706

December 30, 2019

NW Natural

Non-Bargained and Bargained Benefits Benchmarking Summary

September 30, 2019



Willis Towers Watson

Table of Contents

Methodology and Assumptions

- Willis Towers Watson compared the 2019 NW Natural new hire benefits for both non-bargained and bargained employees to the following in our database:
  - NW Natural non-bargained:
    - All 81 energy companies in the non-bargained database
    - 12 targeted energy companies in the non-bargained database
      - Includes: Ameren Corporation, Atmos Energy Corporation, Avista Corporation, Chesapeake Energy Corporation, Exelon Corporation, Northwestern Corporation, Otter Tail Corporation, PNM Resources, Inc., Portland General Electric (PGE), Puget Sound Energy, SEMCO Energy, Inc., Southwestern Energy Company
      - Seven companies additional were added to the targeted company subgroup for the medical benchmarking, due to the number of organizations with PPO benchmarking data available. Includes: CenterPoint Energy, Knoxville Utilities Board, Liberty Utilities, ONE Gas, Inc., ONEOK, Inc., Spire Inc., Tucson Electric Power Company.
  - NW Natural bargained:
    - All 46 energy companies in the bargained database
    - We were not able to provide a comparison to the 12 targeted energy companies for bargained benefits because there were too few of these companies that either submitted or have separate bargained benefits

Methodology and Assumptions (continued)

- Willis Towers Watson is providing a comparison for: medical, dental, vision, 401(k), enhanced 401(k)/DB, STD, LTD, basic life, employee supplemental life, dependent life, vacation and holiday
- We are comparing the same plan types for both NW Natural and the database because this ensures an apples-to-apples comparison
  - For example, on the medical comparison we are comparing the PPO plan to the database PPO plans
- We are basing the NW Natural plan design information on NW Natural's 2019 submission into the Willis Towers Watson Benefits Data Source database. For bargained employees, we are basing NW Natural's plan design information on the 2019 benefit materials provided by NW Natural.
- The plan summaries for the energy companies within our database reflect either 2018 or 2019 data depending on final submission by each employer
- When providing as assessment of NW Natural's benefit plans to the peer group, we designated an "equal," "better" or "worse" designation
  - This designation is based on our consulting knowledge only and is not actuarially based

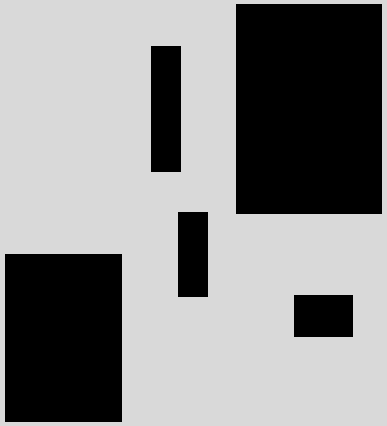
Executive Summary

- The following table provides an overall comparison summary for each of the benefits reviewed
  - The comments reflect how NW Natural's benefits compare to the benchmarks

Plan	Comparison to Non-Bargained Total Database	Comparison to Non-Bargained 12 Target Companies	Comparison to Bargained Total Database
Medical*	Equal	Equal	Equal
Dental	Equal	Equal	Equal
Vision	Equal	Equal	Equal
401(k)	Equal	Worse	Worse
Enhanced 401(k)	Equal	Equal	Equal
STD	Overall determination cannot be made — see details	Overall determination cannot be made — see details	Overall determination cannot be made — see details
LTD	Equal	Equal	Equal
Basic Life	Overall determination cannot be made — see details	Overall determination cannot be made — see details	Worse
Child Life (paid by employees in the benchmark)	Equal	Equal	Equal
Vacation	Equal	Equal	Equal
Holiday	Equal	Equal	Equal

*Target company group was expanded to 19 companies for medical

Non-Bargained Detailed Summary



Health Benefits — Medical

- The following table provides a comparison of the non-bargained NW Natural PPO plan to both the total energy benchmark and also the benchmark for the targeted company subset
  - Only the PPO plans are being compared because they are the highest enrolled plan options within the Willis Towers Watson database and the highest enrolled option for NW Natural
  - PPO benchmarks are available for 11 of the 19 energy companies in the subset
- For comparison purposes, the $50 per month credit NW Natural employees receive is assumed to offset the medical contributions
- Overall, the PPO medical plan is equal to both benchmarks

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison	19 Energy Company Subset Benchmark	Comparison
Health Benefits					
Medical	**PPO (In-Network Only Shown)**	**PPO (In-Network Only Shown)**	**NW Natural to Benchmark**	**PPO (In-Network Only Shown)**	**NW Natural to Benchmark**
Single Deductible	$500	$300 – $500	Slightly Worse	$300 – $500	Slightly Worse
Single Out-of-Pocket Maximum	$2,000	$2,500	Better	$2,000 – $3,000	Equal
Coinsurance	90%	80%	Better	80%	Better
Office Visits	$15 copay, no deductible	$25 copay or coinsurance	Better	$20 – $30 copay	Better
Preventive Care	100%	100%	Equal	100%	Equal
Emergency Room	$100 copay, no deductible	$100 – $150 copay or coinsurance	Equal	$100 – $300 copay or coinsurance	Equal
Generic Drugs — Retail	$10 copay	$10 copay	Equal	$10 copay	Equal
Brand Formulary Drugs — Retail	$35 copay	$30 copay	Worse	$40 copay or 20% coinsurance with min/max	Better
Brand Non Formulary Drugs — Retail	$50 copay	$50 copay	Equal	$60 copay or 20% – 40% coinsurance with min/max	Equal
Monthly Employee Only Contributions	$136	$120+	Equal	$120+	Equal
Monthly Family Contributions	$483	$400+	Worse	$400+	Worse
Overall Assessment			Equal		Equal

Health Benefits — Dental and Vision

- The following table provides a comparison of the non-bargained NW Natural dental Buy-Up and the vision plan associated with the PPO medical plan to both the total energy benchmark and also the benchmark for the 12 company subset
- The $50 per month credit NW Natural employees receive is not assumed to offset dental contributions (per the prior page, it is assumed to offset medical contributions)
- Overall, the dental Buy-Up PPO and the vision plan are equal to both benchmarks

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison	12 Energy Company Subset Benchmark	Comparison
Health Benefits					
Dental	**PPO (In-Network Only Shown)**	**PPO (In-Network Only Shown)**	**NW Natural to Benchmark**	**PPO (In-Network Only Shown)**	**NW Natural to Benchmark**
Deductible Per Person	$25	$50	Better	$25 – $50	Equal
Annual Maximum	$2,000	$1,500 – $2,000	Equal	$1,500 – $2,000	Equal
Preventive Coinsurance	100%	100%	Equal	100%	Equal
Basic Coinsurance	80%	80%	Equal	80%	Equal
Major Coinsurance	50%	50%	Equal	50%	Equal
Orthodontia Deductible	Plan deductible applies	None	Worse	None or plan deductible applies	Equal
Orthodontia Coinsurance	50%	50%	Equal	50%	Equal
Orthodontia Lifetime Maximum	$1,500	$1,500	Equal	$1,500	Equal
Monthly Employee Only Contributions	$21.86	$15	Worse (just for Buy-Up)	Under $10	Worse (just for Buy-Up)
Monthly Family Contributions	$63.22	$45	Worse (just for Buy-Up)	$30	Worse (just for Buy-Up)
Overall Assessment			Equal		Equal
Vision					
Exam	100% after $15 copay	100% after $10 copay	Worse	100% after $10 – $20 copay	Equal
Frames	$200 allowance for all hardware every 12 months	$150 allowance every 12 months	Better	$150 allowance every 12 months	Equal
Lenses		$10 – $25 copay every 12 months	Equal	$10 – $25 copay every 12 months	Equal
Contacts		$150 allowance every 12 months in lieu of frames/lenses	Better	$150 allowance every 12 months in lieu of frames/lenses	Equal
Monthly Employee Only Contributions	Included with medical	$5 – $10	N/A	Less than $5	N/A
Monthly Family Contributions	Included with medical	$10 – $30	N/A	Less than $15	N/A
Overall Assessment			Equal		Equal

Retirement Benefits

- The following table provides a comparison of the non-bargained NW Natural retirement plans to both the total energy benchmark and also the benchmark for the 12 company subset
- Overall, the 401(k) plan is equal to the total energy benchmark and worse than the peer company benchmark
- Overall, the enhanced 401(k) plan is equal to both benchmarks

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison	12 Energy Company Subset Benchmark	Comparison
Retirement Benefits					
401(k)					
Employer Match	60% of the first 8%	50% – 100% up to 6% (average employer match of 4.5%)	Equal	100% up to 5% – 6%	Worse
Vesting	Immediate	Immediate	Equal	Immediate	Equal
Overall Assessment			Equal		Worse
Additional Retirement Plans					
Additional Plans Available	Enhanced 401(k)	52 have non-contributory 401(k)		10 have non-contributory 401(k)	
Non-Contributory 401(k) Contribution (if offered)	5% of current annual pay	4% – 6% of pay	Equal	4% – 5% of pay	Equal

Welfare Benefits — Disability and Life

- The following table provides a comparison of the non-bargained NW Natural disability and life plans to both the total energy benchmark and also the benchmark for the 12 company subset
- Willis Towers Watson has not made an overall assessment of the short-term disability and basic life plans because without running a full benefits valuation we are unable to actuarially weight the various components
- Overall, the long-term disability, employee supplemental life, spouse life and child life benefits are equal to both benchmarks

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison	12 Energy Company Subset Benchmark	Comparison
Welfare Benefits					
Short-Term Disability					
Coverage	70% – 85% depending on years of service	60% – 100% of pay depending on years of service	Equal	60% – 100% of pay depending on years of service	Equal
Waiting Period	4 days	7 days	Better	5 to 7 days	Better
Long-Term Disability					
Waiting Period	180 days	180 days	Equal	180 days	Equal
Coverage	60% of pay for base plan	60% of pay	Equal	60% of pay	Equal
Monthly Maximum	$10,000	$10,000	Equal	$10,000	Equal
Basic Life					
Coverage	1.25x pay	1x pay to 2x pay	Equal	1x – 2x pay	Equal
Maximum	$750,000	$750,000 – $1,500,000	Equal	$1,000,000 – $1,500,000	Worse
Supplemental Life Coverage					
Child Life	$5,000 (NW Natural paid)	Multiples up to $10,000	Equal	Multiples up to $10,000	Equal

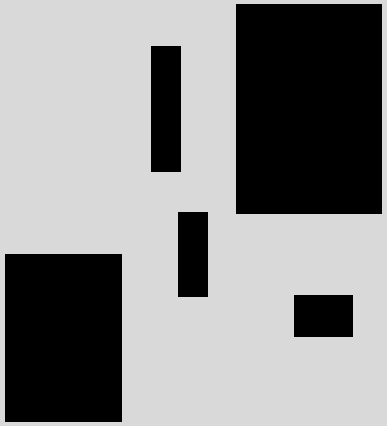
Time Off Benefits — Vacation and Holiday

- The following table provides a comparison of the non-bargained NW Natural vacation and holiday benefits to both the total energy benchmark and also the benchmark for the 12 company subset
- Overall, the vacation benefit is equal to both benchmarks
- Overall, the total holiday benefit is equal to both benchmarks

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison	12 Energy Company Subset Benchmark	Comparison
Time Off					
Vacation*					
Days at Hire	11 days	10 days	Equal	10 to 15 days	Equal
Days at Year 3	11 days	10 to 15 days	Equal	10 to 15 days	Equal
Days at Year 7	16 days	15 to 20 days	Equal	15 to 20 days	Equal
Days at Year 15	21 days	20 days	Equal	20 days	Equal
Long-Service — Maximum Days	26 days	25 to 30 days	Equal	25 to 30 days	Equal
Carryover Limit	40 days	5 to 10 days	Better	10 days	Better
Holiday					
Employer Elected Days	8 days	8 to 10 days	Equal	8 to 11 days	Equal
Employee Elected Days	3 days	0 to 3 days	Equal	0 to 3 days	Equal
Total Days	11 days	10 to 13 days	Equal	10 to 13 days	Equal

*Subtracted 5 days to account for sick days with NW Natural

Bargained Detailed Summary



Health Benefits — Medical

- The following table provides a comparison of the bargained NW Natural PPO plan to the total energy benchmark
- Overall, the PPO medical plan is equal to the benchmark

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison
Health Benefits			
Medical	**PPO (In-Network Only Shown)**	**PPO (In-Network Only Shown)**	**NW Natural to Benchmark**
Single Deductible	$300	$300	Equal
Single Out-of-Pocket Maximum	$3,000	$1,500 – $2,000	Worse
Coinsurance	80%	80%	Equal
Office Visits	$20 copay, no deductible	$20 copay, no deductible	Equal
Preventive Care	100%	100%	Equal
Emergency Room	$75 copay, deductible and coinsurance	$100 copay	Better
Generic Drugs — Retail	20%, $10 minimum copay	$5 – $10 copay	Worse
Brand Formulary Drugs — Retail	20%, $20 minimum copay	20% with $20 minimum or $30 copay	Equal
Brand Non Formulary Drugs — Retail	50%	30% with $40 minimum or $50 copay	Worse
Monthly Employee Only Contributions*	$230	$150+	Worse
Monthly Family Contributions*	$230	$400+	Better
Overall Assessment			Equal

*Lower contribution available for employees who completed the health assessment and biometrics. Includes dental and vision.

Health Benefits — Dental and Vision

- The following table provides a comparison of the bargained NW Natural dental trust indemnity plan and the vision plan to the total energy benchmark
- Overall, both the dental and vision plans are equal to the benchmark

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison
Health Benefits			
Dental	**PPO (In-Network Only Shown)**	**PPO (In-Network Only Shown)**	**NW Natural to Benchmark**
Deductible per Person	$10	$50	Better
Annual Maximum	$1,500	$1,500 – $2,000	Equal
Preventive Coinsurance	80%	100%	Worse
Basic Coinsurance	80%	80%	Equal
Major Coinsurance	80%	50%	Better
Orthodontia Deductible	None	None	Equal
Orthodontia Coinsurance	50%	50%	Equal
Orthodontia Lifetime Maximum	$1,000	$1,500 – $2,000	Worse
Monthly Employee Only Contributions	Included with medical	$10 – $15	N/A
Monthly Family Contributions	Included with medical	$30 – $40	N/A
Overall Assessment			Equal
Vision			
Exam	100% after $15 copay	100% after $10 copay	Worse
Frames	$130 allowance every 24 months	$130 – $150 allowance every 12 or 24 months	Equal
Lenses	100% after $25 copay every 12 months	100% after $15 – $25 copay every 12 months	Equal
Contacts	$130 allowance in lieu of frames/lenses	$130 – $150 allowance in lieu of frames/lenses	Equal
Monthly Employee Only Contributions	Included with medical	$5+	N/A
Monthly Family Contributions	Included with medical	$17+	N/A
Overall Assessment			Equal

Retirement Benefits

- The following table provides a comparison of the bargained NW Natural retirement plans to the total energy benchmark
- Overall, the 401(k) plan is worse than the benchmark
- Overall, the Enhanced 401(k) plan is equal to the benchmark

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison
Retirement Benefits			
401(k)			
Employer Match	50% of the first 6%	100% up to 6%	Worse
Vesting	Immediate	Immediate	Equal
Overall Assessment			Worse
Additional Retirement Plans			
Additional Plans Available	Enhanced 401(k)	19 have a non-contributory 401(k) plan	
Non-Contributory 401(k) Contribution (if offered)	4% of current annual pay	4% – 5% of pay	Equal

Welfare Benefits — Disability and Life

- The following table provides a comparison of the bargained NW Natural disability and life plans to the total energy benchmark
- An overall assessment of the short-term disability plan has not been made because a full benefits valuation must be completed to actuarially weight the various components of the plan
- Overall, the long-term disability and child life benefits are equivalent to the benchmark
- Overall, the basic life benefit is significantly worse than the benchmark

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison
Welfare Benefits			
Short-Term Disability			
Coverage	70% – 85% depending on years of service	60% – 100% of pay depending on years of service	Equal
Waiting Period	4 days	5 working days	Better
Long-Term Disability			
Waiting Period	180 days	180 days	Equal
Coverage	60% of pay for Base Plan	60% of pay	Equal
Monthly Maximum	$10,000	$10,000	Equal
Basic Life			
Coverage	$3,000	1x – 2x pay	Worse
Maximum	N/A	$1,000,000	N/A
Supplemental Life Coverages			
Child Life	$5,000 (NW Natural paid)	Multiples up to $10k	Equal

Time Off Benefits — Vacation and Holiday

- The following table provides a comparison of the bargained NW Natural vacation and holiday benefits to the total energy benchmark
- Overall, the vacation benefit is equivalent to the the benchmark
- Overall, the total holiday benefit is equivalent to the benchmark

Coverage Provisions	NW Natural Coverage	Total Energy Benchmark	Comparison
Time Off			
Vacation*			
Days at Hire	11 days	10 days	Equal
Days at Year 3	11 days	10 days	Equal
Days at Year 7	16 days	15 days	Equal
Days at Year 15	21 days	20 days	Equal
Long-Service — Maximum Days	26 days	25 to 30 days	Equal
Carryover Limit	60 days	5 to 10 days	Better
Holiday			
Employer Elected Days	8 days	9 to 10 days	Worse
Employee Elected Days	3 days	2 days	Better
Total Days	11 days	11 to 12 days	Equal

*Subtracted 5 days to account for sick days with NW Natural

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Melinda B. Rogers

COMPENSATION & BENEFITS
EXHIBIT 707

December 30, 2019

Date of Request for System Setup	Position Title	Area/Department	Org. Unit Number	FT/PT	BU/NBU	Type of Assignment
01/03/18	Construction 2	Field Operations	10001096	FT	BU	Regular
01/11/18	Compliance Manager	Compliance	10001212	FT	BU	Regular
01/15/18	Customer Contact Center Analyst 2	CCC	10001036	FT	NBU	Regular
01/31/18	Project Business Analyst 3	PMO	50044827	FT	NBU	Regular
2/6/2018	Technical Training Consultant 2	Operations Technical Services	50105163	FT	NBU	Regular
02/13/18	Construction 3	Field Operations	10001094	FT	BU	Regular
02/21/18	CFS 2 - In Training 1	Field Operations	50169451	FT	BU	Regular
03/30/18	Staff Assistant 3	Environmental	10001198	PT	NBU	Regular
04/02/18	IT Planner/Buyer 3	IT	10001154	FT	NBU	Regular
09/19/18	Accounting Analyst 3	Accounting	10001166	FT	NBU	Regular
09/20/18	Solutions Architect	IT	50141819	FT	NBU	Regular
09/20/18	Solutions Architect	IT	50141819	FT	NBU	Regular
09/20/18	Desktop Admin IT Spec II	IT	10001182	FT	NBU	Regular
04/18/19	Business Development Director	Business Development	10001137	FT	NBU	Regular
05/29/19	Chief M&A Legal Counsel	Legal	10001196	FT	NBU	Regular
06/18/19	Engineering 3	Engineering	10001083	FT	NBU	Regular
08/09/19	Operational Support 3	Gas Storage	10001152	FT	BU	Regular
08/19/19	Applications Engineering 3	IT	50092906	FT	NBU	Regular
09/11/19	Businsses Development Counsutant 3	Business Development	50211219	FT	NBU	Regular
10/09/19	Field Operations Supervisor	Field Operations	10001089	FT	NBU	Regular
09/13/19	RNG Program Manager 2	Business Development	50298151	FT	NBU	Regular
TBD	Accounting Analyst 2	Accounting	TBD	FT	NBU	Regular
10/22/19	Engineering 2	Engineering	10001083	FT	NBU	Regular
10/25/19	Attorney 3	Legal	10001196	FT	NBU	Regular
11/08/19	Syst Admin IT Spec 2 (Network Admin)	IT	50173077	FT	NBU	Regular
11/08/19	Syst Admin IT Spec 2 (Network Admin)	IT	50173077	FT	NBU	Regular
TBD	Syst Admin IT Spec 2 (Network Admin)	IT	TBD	FT	NBU	Regular
11/08/19	Network Engineering II	IT	50173077	FT	NBU	Regular
11/08/19	System Admin IT Spec 2 or 3 (Skype)	IT	10001181	FT	NBU	Regular
11/08/19	DB Developer/Administrator 2	IT	50024303	FT	NBU	Regular
11/08/19	Solutions Architect	IT	10001180	FT	NBU	Regular
11/11/19	IT Security Specialist 2	IT	10001180	FT	NBU	Regular
11/11/19	IT Security Specialist 3 (Sec Operations Lead)	IT	10001180	FT	NBU	Regular
11/11/19	Application Engineering 4 (SAP Fiori Dev)	IT	50024302	FT	NBU	Regular
11/11/19	Application Engineering 4 (Integration Lead)	IT	50024302	FT	NBU	Regular
11/11/19	Application Engineer II (Open Text)	IT	50092906	FT	NBU	Regular
11/12/19	Tax Consultant 2	Tax	50071029	FT	NBU	Regular
11/12/19	IT Compliance Analyst (Risk & Governance Analy	IT	10001180	FT	NBU	Regular
11/12/19	IT Security Specialist 2 (Industrial Controls)	IT	10001180	FT	NBU	Regular
TBD	Security Consultant 2	Facilities	TBD	FT	NBU	Regular
TBD	Security Consultant 3	Facilities	TBD	FT	NBU	Regular
TBD	Environmental and Sustainability Consultant	Environmental	TBD	FT	NBU	Regular

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Cory Beck

CUSTOMER COMMUNICATIONS
EXHIBIT 800

December 30, 2019

EXHIBIT 800 - DIRECT TESTIMONY - CUSTOMER COMMUNICATIONS

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position at Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is Cory Beck. I am the Senior Manager of External Communications and User Experience for NW Natural. My responsibilities include customer and general public communications, advertising, website and digital portal services, marketing communications and public safety awareness. I have worked for NW Natural since 2005.

Q. Please describe your education and employment background.

A. I received my undergraduate degree in Graphic Design from Oregon State University and a Master of Business Administration from Marylhurst University. From 1994 to 1998, I worked as an account executive at a design agency, Electro Art in Portland, Oregon. From 1998 to 2000, I worked as an account executive at an advertising agency, Gerber Advertising in Portland, Oregon. From 2000 to 2005, I worked as an account supervisor at a marketing and advertising agency, CMD (Creative Media Development) also in Portland, Oregon.

Q. Please summarize your testimony.

A. In my testimony, I:

- Describe Category A communications as defined in Oregon Administrative Rule ("OAR") 860-026-0022 and discuss the Company's Category A communications plan for the November 2020-October 2021 test year ("Test Year");

- Explain why the Company's Category A Test Year expense level is reasonable under OAR 860-026-0022;
- Present the Company's Test Year Category B proposed expense; and
- Describe the level of Category C (corporate imaging) expense the Company has excluded from Test Year expense.

II. CATEGORY A - COMMUNICATIONS PLAN

Q. Please describe Category A customer communications.

A. The Public Utility Commission of Oregon's (the "Commission" or "OPUC") administrative rules categorize utility customer communications and set forth ratemaking standards applicable to each category. Category A communications are defined as "Energy efficiency or conservation advertising expenses that do not relate to a Commission-approved program, utility service advertising expenses, and utility information advertising expenses."

Q. What topics does the Company's Test Year Category A communications plan address?

A. The Company's Test Year Category A communications plan addresses the following topics:

- The efficient use of natural gas;
- Payment options and programs for customers;
- Online customer service options and information;
- Bill credits, and natural gas price changes;

- Cost, performance, and environmental benefits of high-efficiency natural gas equipment;
- Information about the ways NW Natural's pipeline system and customers can reduce greenhouse gas emissions;
- Education about Senate Bill 98 ("SB 98"), renewable natural gas ("RNG"), associated benefits for customers and the climate improvement goals in Oregon; and
- Phone numbers and contact information.

Q. How does the Company plan to communicate with customers on these topics?

A. The Company plans to continue communicating with customers through bill inserts, our website, customer e-newsletters, new customer information packets, telephone directory advertising, digital advertising, community events, and broadcast and streaming media.

Q. What Category A communications expenses are included in the Test Year?

A. The Company has included $1,750,000 for Category A communications and media outreach expenses in the Test Year.

Q. How does the Test Year proposal compare to the Category A communications expense established in UG 344, the Company's last rate case ("2018 Rate Case")?

A. The Category A communications expense level was part of a broader negotiated settlement agreement in the 2018 Rate Case, and therefore, a specific amount of

Category A expense was not approved. For comparative purposes, however, the amount of Category A expense requested in the last case was $2.52 per customer for the Test Year (November 2018 through October 2019). In this case, the proposed Test Year Category A communications expense is $2.54 per customer. This level of annual expense represents a 2 cent, or less than 1% increase, on a per-customer basis over a two-year period of time.

Q How does NW Natural's proposed Test Year Category A communications expense compare to the level that is presumed just and reasonable under OAR 860-026-0022?

A. Under OAR 860-026-0022(3)(a), expenditures for Category A advertising up to 0.125% of gross retail operating revenues are presumed just and reasonable. In NW Natural's case, that percentage would allow NW Natural $754,495 for Category A communications based on 2018 revenues, which is equivalent to about $1.14 per customer.

Q. Does NW Natural believe that the "gross retail operating revenues" formula provides an amount that is appropriately scaled to NW Natural's customer communications?

A. No, we do not. The gross retail revenue-based formula produces a skewed result because the Company's gross retail revenues are, in part, driven by natural gas commodity costs. This means that when natural gas prices are low (as they currently are), the Company's gross retail revenues will be lower, and in turn, so will the results of the formula. For this reason, we find it difficult to make

a correlation between the amounts presumed reasonable per rule OAR 860-026-0022(3)(a) and the amounts needed to effectively communicate Category A topics to our customers.

Additionally, the revenue-based formula applicable to all energy utilities results in natural gas utilities having far less Category A expense presumed reasonable as compared to electric utilities. NW Natural should be allowed rate recovery for communications that are generally in line with electric utilities in Oregon on a per customer basis. NW Natural's request for $2.54 per customer achieves this goal. For example, based on 2018 data, the revenue-based formula translates into an allowance of $2.64 per customer for PacifiCorp and $2.50 per customer for Portland General Electric Company compared to $1.14 per customer for NW Natural (see *NW Natural/801, Beck)*. This funding gap seems inappropriate given NW Natural delivers more energy to our customers on an annual basis than any other Oregon utility.

Q. Does OAR 860-026-0022 prevent NW Natural from recovering more than $1.14 per customer for Category A communications expense?

A. No, it does not. Under OAR 860-026-0022(4), an energy utility seeking to include expenditures in excess of 0.125% of revenues bears the burden of demonstrating that the expenditures are just and reasonable. In other words, the rule sets an amount that is presumed reasonable, but allows for more to be recovered as long as support is provided and the Commission approves. In the 2012 and 2018 Rate Cases, NW Natural proposed Category A communications expense that exceeded the amount calculated based on revenues, and as a

result, a higher amount was requested in the Company's revenue requirement. As previously discussed, in the 2018 Rate Case filing, the customer communications expense was part of a broader settlement, and therefore, a per-customer amount is not available as a result from that case.

Q. Please explain why NW Natural is requesting $2.54 per customer for Category A expense.

A. First, TV media costs in the Portland market fluctuate each year based upon TV ratings and have risen on average each year requiring a larger investment to reach customers on the most viewed media channels. Second, our service territory is geographically broad, requiring the Company to enter two distinct media markets (Portland and Eugene) in order to reach our customers throughout the State. Third, media consumption habits and audience demographics continue to evolve to include a diversified mix of multiple media channels including streaming media services, online, and mobile as well as TV and other traditional media, requiring a larger media investment to effectively reach customers where they seek information. Fourth, in addition to providing information about payment options and programs, online customer service, billing, payment, and rate information, NW Natural has continued to invest in its educational and informational communications about the detriments of greenhouse gas emissions, the options available to customers, and the Company's actions that include the pursuit of renewable natural gas under SB 98 legislation.

Q. Starting with the first stated reason for the Company's requested Category A expense, how have television media costs risen over time?

A. Television media costs have risen an average of 43% over the last five years and 94% since 2017 across the four main television networks in the Portland market (see *NW Natural/802, Beck)*. This pattern of cost increases limits the amount NW Natural invests in TV media, which as stated, is still the dominant source for news and information of any media channel. For NW Natural to maintain similar exposure to our customers each year, an increased investment is necessary.

The Company uses the Cost Per Point ("CPP") metric to evaluate television media costs, which is derived by dividing the rate (cost per TV commercial aired for each network) by the Target Rating Point, or "TRP". The TRP represents the percentage of the total population that the spot is expected to reach. The CPP represents the cost to reach 1% of the target population, and is a measure of cost efficiency that enables the Company to compare the cost of a commercial across networks, stations and time slots over time.

For illustrative purposes, see the chart below using 2017 and 2018 data for KATU in Portland. The rate per spot represents the cost of a single TV spot on KATU. Assuming a population of 1,000,000 in Portland, during 2017 a single TV spot on KATU cost $250 with an estimated TRP of 1.2% of the total market population (12,000), resulting in a $208.33 CPP. Using the same population for analysis in 2018, a single TV spot cost $200 and was estimated to reach an estimated TRP of 0.5% of the total market population (5,000), resulting in a $400

CPP. With that in mind, NW Natural would have to invest in airing two TV spots in 2018, or $400, to reach a similar number of people that $250 reached in 2017.

KATU Illustration - 2017 - 2018		
	2017	**2018**
Rate per Spot	$250.00	$200.00
TRP	1.2	0.5
CPP	$208.33	$400.00
Population	1,000,000	1,000,000
Total Audience Reached	12,000	5,000

Q. Is television an allowed communication channel under OAR 860-026-0022?

A. Yes. Among other broad-based media channels identified in OAR 860-026-0022 (1) (a), television is listed as an allowed means of delivering communications to inform, influence, and/or educate customers.

Q. Is television an important media channel to reach customers?

A. Yes. In 2018, third-party research shows TV is still the dominant media channel in average time spent per day.[1] In a recent media study, attentiveness is the highest while watching television—ahead of smartphones, computers and tablets.[2] This finding was confirmed by Forbes, where TV messages are recalled at a higher rate – as high as 60%[3] - over other media. Additionally, NW Natural customers have rated television the highest among media channels for how

[1] https://www.statista.com/statistics/276683/media-use-in-the-us/
[2] https://www.marketingcharts.com/television-68800
[3] https://www.forbes.com/sites/baininsights/2017/02/07/to-keep-a-consumer-brand-top-of-mind-consider-old-school-advertising/#490c8c2467cd

important the source is to receive news and information (see *NW Natural/803, Beck*). Research also reveals television is the leading media channel for news and information.[4] With those facts in mind, the majority of the NW Natural TV media purchases occur during local news programming.

Q. Turning to the second stated reason for the Company's requested Category A expense, how does the nature of NW Natural's service territory support a per-customer allocation higher than the amount automatically allowed under OAR 860-026-0022?

A. NW Natural must communicate across 126 cities and towns within its Oregon service territory, *(*see *NW Natural/804, Beck*), making our service territory geographically diverse and more expensive from a communications delivery standpoint. The OAR 860-026-0022 formula does not address the differences utilities have in service territories, and yet these differences increase the number of media channels and associated costs needed to effectively deliver information to customers.

Q. How does NW Natural's geographically broad service territory serving two Designated Market Areas ("DMAs") incur additional costs?

A. NW Natural serves customers in two DMAs – Portland and Eugene. Satellite areas such as Coos Bay are also purchased separately. To reach customers in the Eugene DMA, NW Natural must divert more than 10% of an already modest annual media budget. This results in a reduction in media spend to effectively

[4] https://www.pewresearch.org/fact-tank/2017/10/04/key-trends-in-social-and-digital-news-media/

reach customers in the Portland DMA – an area that ranks 22nd in the nation[5] in terms of media costs, making Portland among the more expensive media markets in which to operate. This fact further reinforces the challenge the gross retail revenue allowable creates for NW Natural in effectively reaching our customers. Because NW Natural serves the same Portland DMA as our electric utility counterparts, I believe that our funding levels should be in line with theirs.

Q. Turning next to your third stated reason for the Company's requested Category A expense, how have media consumption habits and audience demographics evolved requiring a more diversified mix and, consequently, additional costs?

A. As stated, television remains the dominant channel for news and information, but it is often viewed simultaneously with online screens resulting in media fragmentation. In fact, U.S. adults are spending more than 11 hours a day on average consuming media in some form.[6] Thanks to media multitasking, U.S. adults will share their daily viewing time watching live and time-shifted TV, internet-connected TV devices, smartphones, tablets, and computers. According to the 2018 Q3 Nielson Total Audience Report, media consumption through smart phones and internet-connected TV devices (Smart TV, Roku, Amazon Fire, Apple TV, Google Chromecast, game console) has increased over 2017 among all age groups. In fact, roughly 3 in 4 U.S. homes (74%) have at least

[5] https://mediatracks.com/resources/nielsen-dma-rankings-2019/
[6] https://qz.com/1344501/americans-now-spend-11-hours-with-media-in-an-average-day-study/

one internet-connected TV device. That percentage is up from 69% in 2017, and is more than triple the proportion from 2010 (24%).[7] In addition to media viewing trends, the demographics in our largest service area are evolving, which also requires the Company to segment its communications across multiple channels. In fact, Portland is ranked number one for millennial population change in the country; a 22.8% growth representing 18.6% of the population.[8] Further, in addition to reaching our audience where they consume information, the frequency of the messages being delivered involves cost considerations and is an evolving dynamic. For decades, the marketing industry stated that the rule of seven is an effective benchmark for the amount of times a person needs to be exposed to a message to remember the message. Today, given media fragmentation, the marketing and advertising industry believes that a frequency between 7 and 20 times is needed to be effective.[9] As a result of these trends, the integration of digital media, paid social media, and streaming media into our overall message delivery strategy is essential to the Company's communications efforts.

In summary, the communications landscape has changed, and increased media fragmentation and demographic changes require broader, multi-channel investment. To effectively communicate to our customer base, it is essential that the Company utilize a diversified media mix (delivered multiple times), which

[7] https://www.marketingcharts.com/digital/non-mobile-connected-devices-105538
[8] https://havenlife.com/blog/where-are-millennials-moving/
[9] https://mission-minded.com/when-it-comes-to-your-message-how-much-is-enough/

includes streaming services, digital, social networks and website display advertising, in addition to television, radio, community events and print advertising.

Q. Transitioning to the fourth stated reason for the requested Category A expense, why is an increase to environmental education necessary?

A. Concerns about climate change continue to weigh heavily on customer minds. In a September 2018 study, 71% of NW Natural customers stated they are extremely concerned or very concerned about climate change (see *NW Natural/805, Beck/4*). This is up from 64% of customers who believed climate change to be a serious problem from a 2017 survey of NW Natural Customers *(*see *NW Natural/806, Beck).* Additionally, Oregon's focus on climate and related changes to energy policy to address climate change is in the forefront. To that end, NW Natural has been delivering communications within the "Less We Can" initiative about the Company's energy supply strategy, State emissions reduction goals, sources of energy and climate benefits of RNG. The "Less We Can" initiative supports:

- Ways customers can reduce energy use and associated emissions through conservation and energy efficiency, and by offsetting their emissions through the Smart Energy program;
- The efforts NW Natural and others are taking to support RNG development and technology advancements that can help lower emissions; and

- The role natural gas and RNG can play to lower the emissions and air pollutants of heavy duty vehicles and associated fleets in the transportation sector.

To enhance the effectiveness in communicating the impacts and benefits to customers of the above efforts, the Company's communications plan employs a diversified mix of bill inserts, streaming media services, online and mobile content, as well as TV and other traditional media.

Q. Are NW Natural's customers familiar with RNG?

A. No, most of our customer are not familiar with RNG. In a recent NW Natural survey performed in 2018, we found that our customers have little awareness or familiarity with RNG. Of those surveyed, only 14% of respondents were extremely or very familiar with RNG, while 52% were not familiar or only slightly familiar (see *NW Natural/805, Beck/3*).

Q. Are there additional reasons to increase Category A expense to educate customers about RNG?

A. Yes. In 2019, Governor Kate Brown signed into law SB 98, which allows local distribution companies to purchase RNG for end-use delivery to its sales customers. Over the next 30 years, the law sets targets for local distribution companies to have RNG comprise 30% of its annual gas portfolio. NW Natural intends to meet or exceed these targets, and therefore, we believe it is necessary to educate our customers about the product that we are delivering into their homes and businesses, and the environmental benefits of RNG.

Q. Does OAR 860-026-0022 include this type of communication in Category A?

A. Yes, it does. The definition of "Utility Information Advertising Expense" (OAR 860-026-0022(g)) is "advertising expenses, the primary purpose of which is to increase customer understanding of utility systems and the function of those systems, and to discuss generation and transmission methods, utility expenses, rate structures, rate increases, load forecasting, environmental considerations, and other contemporary items of customer interest."

Q. What action does the Company request the Commission take with respect to Category A communications expense?

A. The Company requests that the Commission find that the proposed level of Test Year Category A communications expense is just and reasonable under OAR 860-026-0022. The Company's proposed expense level is necessary for the Company to effectively deliver Category A communications to customers, and is reasonable given the factors discussed in my testimony.

III. CATEGORY B - SAFETY-RELATED COMMUNICATIONS

Q. What are safety-related communications?

A. Safety-related communications are legally mandated messages intended to ensure that NW Natural customers, contractors, public officials, emergency officials and the general public within the NW Natural service territory know how to use natural gas safely, are prepared in the event of an earthquake, know how to recognize, react, and respond to a potential leak or safety issue related to natural gas, and how to prevent damages to the underground utility lines. Safety-related communications are also referred to as Category B

communications, as defined in OAR 860-026-0022. Under OAR 860-026-0022(3)(b), Category B communications are presumed to be just and reasonable for ratemaking purposes.

Q. Please identify the legal mandates requiring this expenditure.

A. The Company's Category B communications meet federal Pipeline and Hazardous Materials Safety Administration requirements for Public Safety Awareness Plans outlined in Recommended Practice API 1162 ("RP-1162") and enforced by the OPUC Safety Staff. In compliance with RP-1162, the Company executes a robust public safety awareness plan each year supported by paid media, customer communications, public relations, and sponsored community events. In addition, the Company distributes audience-specific pipeline safety information to required groups, including emergency officials, first responders, public officials, excavators, multi-family property managers, floating homes, and residents and businesses located along transmission lines, in high-consequence areas, or along rights-of-way.

Q. What Category B communications expenses are included in the Test Year?

A. The Company has included $1,010,000 for Category B communications and media outreach expenses in the Test Year.

Q. Please describe any new Category B expenses since NW Natural's 2018 Rate Case (UG 344).

A. The primary source of new Category B expense since the 2018 Rate Case (UG 344) is focused on damage prevention and emergency preparedness awareness and education. In recent years, local economic recovery has led to an increase

in construction activity, which, in turn, has resulted in a substantial rise in damages to NW Natural pipelines. In fact, from 2015 to 2018, total system damages by contractors in Oregon have increased by 9%, despite a declining damage rate per thousand locates and an extremely high awareness of the "Call Before You Dig" law (see *NW Natural/807, Beck*).

Contractors damaging our underground lines pose the largest threat to public safety and represented 559 out of 790 total damages in 2018. That is over 70% of all damages to the NW Natural system (see *NW Natural/808, Beck*). In response, the Company has increased its investment for the contractor audience through prevention outreach and a media campaign to encourage behavior change to reduce damages to our system. Damages per thousand locates are trending down, but the Company's goal is zero damages. To achieve this mark, the Company's Test Year enhanced damage prevention effort includes higher levels of paid media across more channels, including TV, streaming media, radio, print, digital and social media. It also includes additional outreach through targeted mailings, online content, training, and community events.

IV. CATEGORY C – CORPORATE IMAGING COMMUNICATIONS

Q. Please describe the level of Category C (corporate imaging) expense NW Natural has excluded from Test Year expense.

A. An amount of $600,000 in administrative, marketing and advertising activities is budgeted in Category C during the Test Year period, none of which is proposed to be included in rates. These activities 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.

Q. Does this conclude your direct testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Cory Beck

CUSTOMER COMMUNICATIONS
EXHIBITS 801 – 808

December 30, 2019

EXHIBITS 801-808 – CUSTOMER COMMUNICATIONS

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PUBLIC UTILITY COMMISSION OF OREGON

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NW Natural

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CUSTOMER COMMUNICATIONS
EXHIBIT 801

December 30, 2019

NW Natural_801_Beck_1

2018 Category A per Customer Based on Operating Revenue

	Year	Operating Revenue	CAT A - 0.125%	# of Customers	CAT A per Customer
NW Natural	2018	603,595,973	754,495	659,959	1.14
PGE	2018	1,760,150,960	2,200,189	881,766	2.50
Pacificorp	2018	1,239,371,197	1,549,214	587,365	2.64

Source of Revenues and Customers - OPUC Oregon Utility Statistics - 2018

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PUBLIC UTILITY COMMISSION OF OREGON

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CUSTOMER COMMUNICATIONS
EXHIBIT 802

December 30, 2019

NW Natural/802, Beck
NW Natural TV Media Cost Analysis
Late News Comparison
2012-2018

			2014	2015		2016		2017		2018	
Population A35-54											
KATU	11p-1135p	Rate	$175	$425		$350		$250		$200	
		TRP	0.9	1.0		0.9		1.2		0.5	
		CPP	$194.44	$425.00		$388.89		$208.33		$400.00	
KGW	11p-1135p	Rate	$250	$500		$500		$500		$305	
		TRP	1.3	2.4		1.8		1.5		0.8	
		CPP	$192.31	$208.33		$277.78		$333.33		$381.25	
KOIN	11p-1135p	Rate	$175	$300		$285		$300		$250	
		TRP	0.7	0.9		2.3		2.3		0.7	
		CPP	$250.00	$333.33		$123.91		$130.43		$357.14	
KPTV	10p-11p	Rate	$300	$600		$500		$300		$550	
		TRP	2.0	2.7		1.8		2.9		1.5	
		CPP	$150.00	$222.22		$277.78		$103.45		$366.67	
		Average CPP	$196.69	$297.22		$267.09		$193.89		$376.26	
		% Change			51.11%		-10.14%		37.75%		94.06%
		5-year Average % Change	43.20%								
		17-18 Average % Change	149.14%								

KATU Illustration - 2017 - 2018		
	2017	**2018**
Rate per Spot	$250.00	$200.00
TRP	1.2	0.5
CPP	$208.33	$400.00
Population	1,000,000	1,000,000
Total Reach	12,000	5,000

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PUBLIC UTILITY COMMISSION OF OREGON

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NW Natural

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CUSTOMER COMMUNICATIONS
EXHIBIT 803

December 30, 2019

2018 Natural Gas Safety Tracking Survey

Market Intelligence, Strategic Planning
January 2018

NW Natural®

Research Background

Methodology: telephone survey fielded in December 2018

Sample size: 150 gas customers, 150 non-customers.

Sample design: both customers and non-customers samples are randomly selected to represent both the total customers and general public in NW Natural service territories

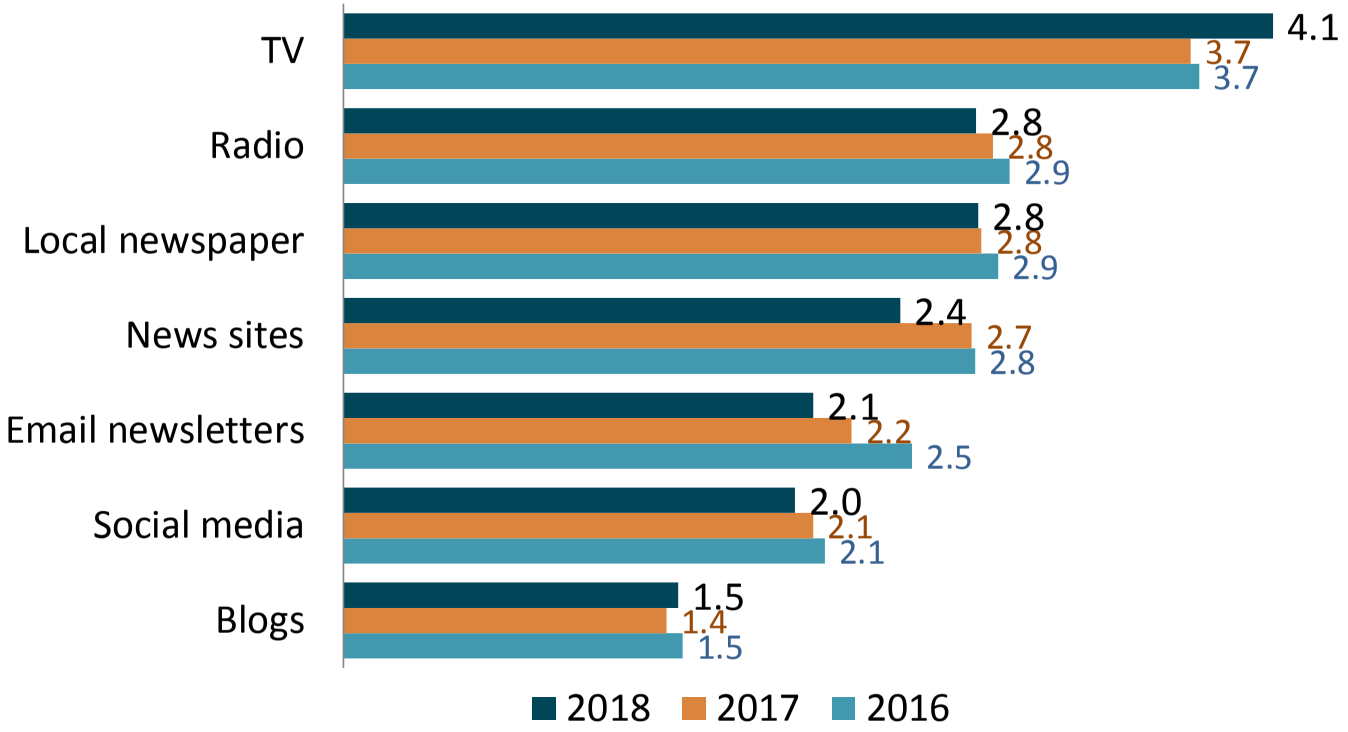
Confidence level: 95%

Margin of error: +/-8%

Total: 300

Importance of News Sources

please rate how important the following sources of news and information are to you on 5 point scale.



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NW Natural

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CUSTOMER COMMUNICATIONS
EXHIBIT 804

December 30, 2019

Counts of Counties and Cities with active accounts as of 2017 11 30

NWN/502
Heiting/1-

Obs	State	County	Active_Accounts	Count
1	Oregon	Benton	19,435	1
2	Oregon	Clackamas	92,486	2
3	Oregon	Clatsop	13,365	3
4	Oregon	Columbia	8,452	4
5	Oregon	Coos	1,821	5
6	Oregon	Hood River	4,020	6
7	Oregon	Lane	41,319	7
8	Oregon	Lincoln	10,655	8
9	Oregon	Linn	23,852	9
10	Oregon	Marion	66,198	10
11	Oregon	Multnomah	202,196	11
12	Oregon	Polk	14,747	12
13	Oregon	Wasco	2,043	13
14	Oregon	Washington	141,020	14
15	Oregon	Yamhill	12,498	15
16	Washington	Clark	79,582	1
17	Washington	Klicktat	1,514	2
18	Washington	Skamania	513	3

Counts of Counties and Cities with active accounts as of 2017 11 30

Obs	State	City	Active_Accounts	Count
1	Oregon	Adair Village	6	1
2	Oregon	Albany	16,229	2
3	Oregon	Aloha	60	3
4	Oregon	Amity	334	4
5	Oregon	Astoria	4,520	5
6	Oregon	Aumsville	751	6
7	Oregon	Aurora	996	7
8	Oregon	Ballston	1	8
9	Oregon	Banks	444	9
10	Oregon	Barlow	4	10
11	Oregon	Beavercreek	220	11
12	Oregon	Beaverton	47,124	12
13	Oregon	Boring	2,006	13
14	Oregon	Brooks	2	14
15	Oregon	Brownsville	512	15
16	Oregon	Canby	3,615	16
17	Oregon	Cannon Beach	1,451	17
18	Oregon	Carlton	24	18
19	Oregon	Clackamas	6,615	19
20	Oregon	Clatskanie	160	20
21	Oregon	Coberg	1	21
22	Oregon	Coburg	169	22
23	Oregon	Columbia City	659	23
24	Oregon	Coos Bay	890	24
25	Oregon	Coquille	213	25
26	Oregon	Cornelius	2,219	26
27	Oregon	Corvallis	14,901	27
28	Oregon	Cottage Grove	2,582	28
29	Oregon	Creswell	1,314	29
30	Oregon	Dallas	4,242	30
31	Oregon	Damascus	1,879	31
32	Oregon	Dayton	9	32

Counts of Counties and Cities with active accounts as of 2017 11 30

Obs	State	City	Active_Accounts	Count
33	Oregon	Deer Island	31	33
34	Oregon	Depoe Bay	1,387	34
35	Oregon	Donald	181	35
36	Oregon	Dundee	978	36
37	Oregon	Durham	5	37
38	Oregon	Eugene	29,546	38
39	Oregon	Fairview	2,133	39
40	Oregon	Forest Grove	3,433	40
41	Oregon	Foster	4	41
42	Oregon	Gearhart	1,473	42
43	Oregon	Gervais	373	43
44	Oregon	Gladstone	3,064	44
45	Oregon	Gleneden Beach	1,147	45
46	Oregon	Grand Ronde	249	46
47	Oregon	Gresham	17,943	47
48	Oregon	Halsey	254	48
49	Oregon	Hammond	419	49
50	Oregon	Happy Valley	6,252	50
51	Oregon	Harrisburg	643	51
52	Oregon	Hillsboro	24,527	52
53	Oregon	Hood River	4,020	53
54	Oregon	Hubbard	975	54
55	Oregon	Independence	1,726	55
56	Oregon	Jasper	22	56
57	Oregon	Jefferson	805	57
58	Oregon	Junction City	1,541	58
59	Oregon	Keizer	9,011	59
60	Oregon	King City	271	60
61	Oregon	Lafayette	832	61
62	Oregon	Lake Oswego	14,375	62
63	Oregon	Lebanon	5,429	63
64	Oregon	Lincoln City	4,601	64

Counts of Counties and Cities with active accounts as of 2017 11 30

Obs	State	City	Active_Accounts	Count
65	Oregon	Lyons	426	65
66	Oregon	Marion	8	66
67	Oregon	Marylhurst	21	67
68	Oregon	Maywood Park	1	68
69	Oregon	McMinnville	3,358	69
70	Oregon	Mehama	55	70
71	Oregon	Mill City	505	71
72	Oregon	Millersburg	68	72
73	Oregon	Milwaukie	478	73
74	Oregon	Molalla	2,179	74
75	Oregon	Monmouth	1,318	75
76	Oregon	Mount Angel	798	76
77	Oregon	Mulino	128	77
78	Oregon	Myrtle Point	151	78
79	Oregon	Neotsu	207	79
80	Oregon	Newberg	5,816	80
81	Oregon	Newport	2,144	81
82	Oregon	North Bend	567	82
83	Oregon	North Plains	970	83
84	Oregon	Oregon City	11,805	84
85	Oregon	Otis	673	85
86	Oregon	Philomath	1,312	86
87	Oregon	Pleasant Hill	151	87
88	Oregon	Portland	243,966	88
89	Oregon	Rainier	416	89
90	Oregon	Rickreall	69	90
91	Oregon	Rose Lodge	13	91
92	Oregon	Saint Helens	3,402	92
93	Oregon	Salem	47,473	93
94	Oregon	Sandy	3,540	94
95	Oregon	Scappoose	2,509	95
96	Oregon	Scio	330	96

Counts of Counties and Cities with active accounts as of 2017 11 30

Obs	State	City	Active_Accounts	Count
97	Oregon	Seaside	3,205	97
98	Oregon	Shedd	72	98
99	Oregon	Sheridan	877	99
100	Oregon	Sherwood	6,856	100
101	Oregon	Siletz	175	101
102	Oregon	Silverton	2,992	102
103	Oregon	Sodaville	2	103
104	Oregon	South Beach	5	104
105	Oregon	Springfield	5,993	105
106	Oregon	St Benedict	1	106
107	Oregon	Stayton	1,861	107
108	Oregon	Sublimity	739	108
109	Oregon	Sweet Home	2,304	109
110	Oregon	Tangent	384	110
111	Oregon	The Dalles	2,044	111
112	Oregon	Tigard	1,130	112
113	Oregon	Toledo	332	113
114	Oregon	Tolovana Park	1	114
115	Oregon	Troutdale	4,946	115
116	Oregon	Tualatin	6,962	116
117	Oregon	Turner	786	117
118	Oregon	Vernonia	710	118
119	Oregon	Warren	600	119
120	Oregon	Warrenton	2,251	120
121	Oregon	West Linn	9,574	121
122	Oregon	Westport	21	122
123	Oregon	Willamina	408	123
124	Oregon	Wilsonville	6,485	124
125	Oregon	Wood Village	143	125
126	Oregon	Woodburn	5,589	126
127	Washington	Battle Ground	4,657	1
128	Washington	Bingen	209	2

Counts of Counties and Cities with active accounts as of 2017 11 30

Obs	State	City	Active_Accounts	Count
129	Washington	Brush Prairie	190	3
130	Washington	Camas	7,537	4
131	Washington	Carson	288	5
132	Washington	Dallesport	7	6
133	Washington	Klickitat	118	7
134	Washington	La Center	836	8
135	Washington	Lyle	1	9
136	Washington	North Bonneville	225	10
137	Washington	Ridgefield	3,231	11
138	Washington	Vancouver	59,418	12
139	Washington	Washougal	3,712	13
140	Washington	White Salmon	1,179	14
141	Washington	Woodland	1	15

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Cory Beck

CUSTOMER COMMUNICATIONS
EXHIBIT 805

December 30, 2019

Renewable Natural Gas

NW Natural Customer Insight Panel Study

September 2018

NW Natural®

Background

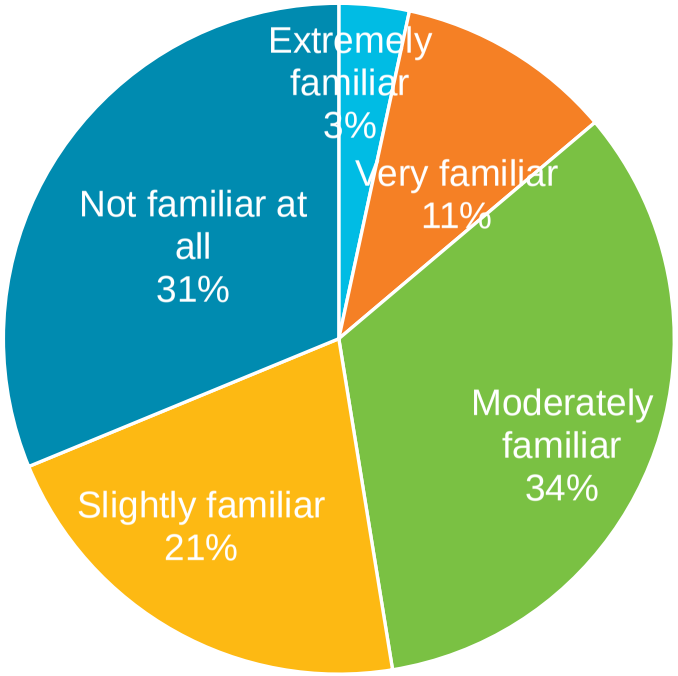
Field time: September, 2018

# of Customer Respondents: 1,893

Objective:

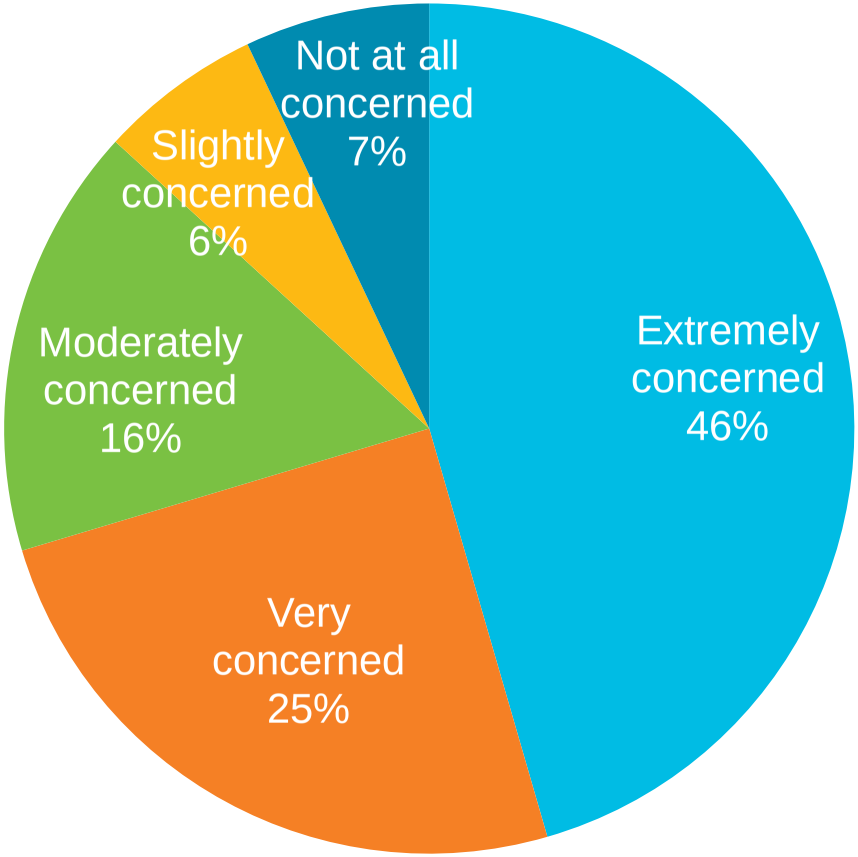
- Gain feedback about the RNG advertising video
- Evaluate customer willingness to pay for RNG
- Test RNG statements

Familiarity with RNG



- Only 14% respondents are extremely or very familiar with RNG, while 31% are not familiar at all.
- Awareness about RNG is consistent across different geographic areas.

Concern About Climate Change



BEFORE THE

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UG 388

NW Natural

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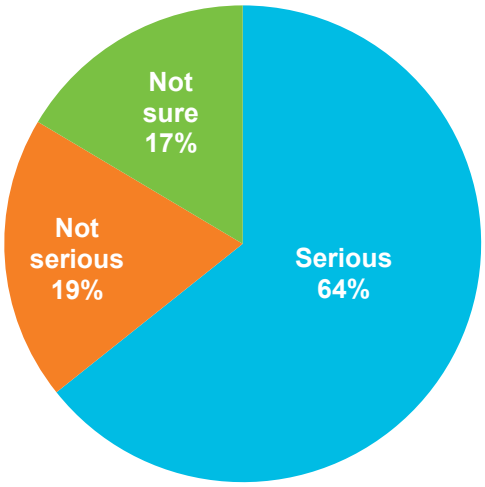
CUSTOMER COMMUNICATIONS
EXHIBIT 806

December 30, 2019

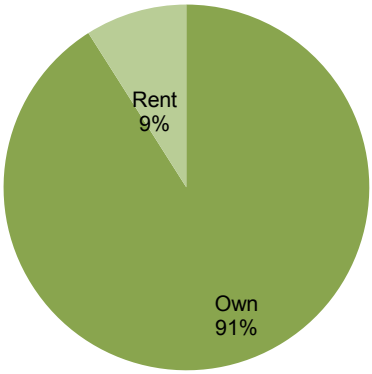
Environmental Issues Customer Research
October, 2017



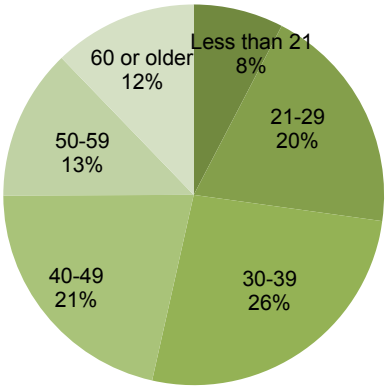
In your opinion, how serious of a problem is climate change?

RESEARCH DESIGN
Research firm: C & T Marketing Group provided the survey participants
Methodology: Online survey through Qualtrics, fielded in October 2017
Sample size: 322 gas customers
Sample design: 3rd party research panel members who reside within NW Natural service territory
Confidence level: 95%
Margin of error: +/-5%
Demographics:

Homeownership



Age



BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Cory Beck

CUSTOMER COMMUNICATIONS
EXHIBIT 807

December 30, 2019

2018 Natural Gas Safety Tracking Survey

Market Intelligence, Strategic Planning
January 2018

NW Natural®

Research Background

Methodology: telephone survey fielded in December 2018

Sample size: 150 gas customers, 150 non-customers.

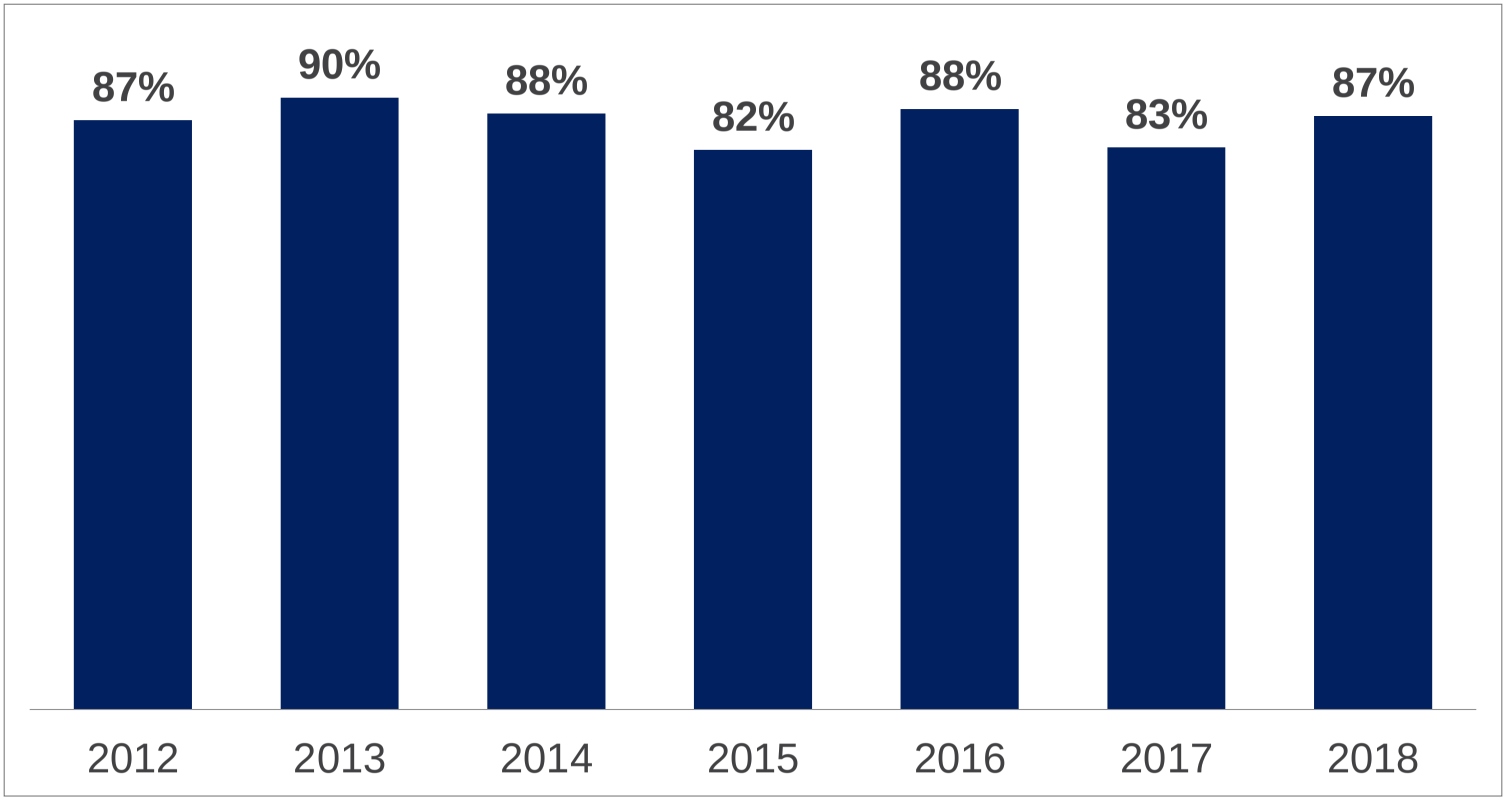
Sample design: both customers and non-customers samples are randomly selected to represent both the total customers and general public in NW Natural service territories

Confidence level: 95%

Margin of error: +/-8%

Awareness of Call Before You Dig

Total: 308



BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

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NW Natural

Exhibit of Cory Beck

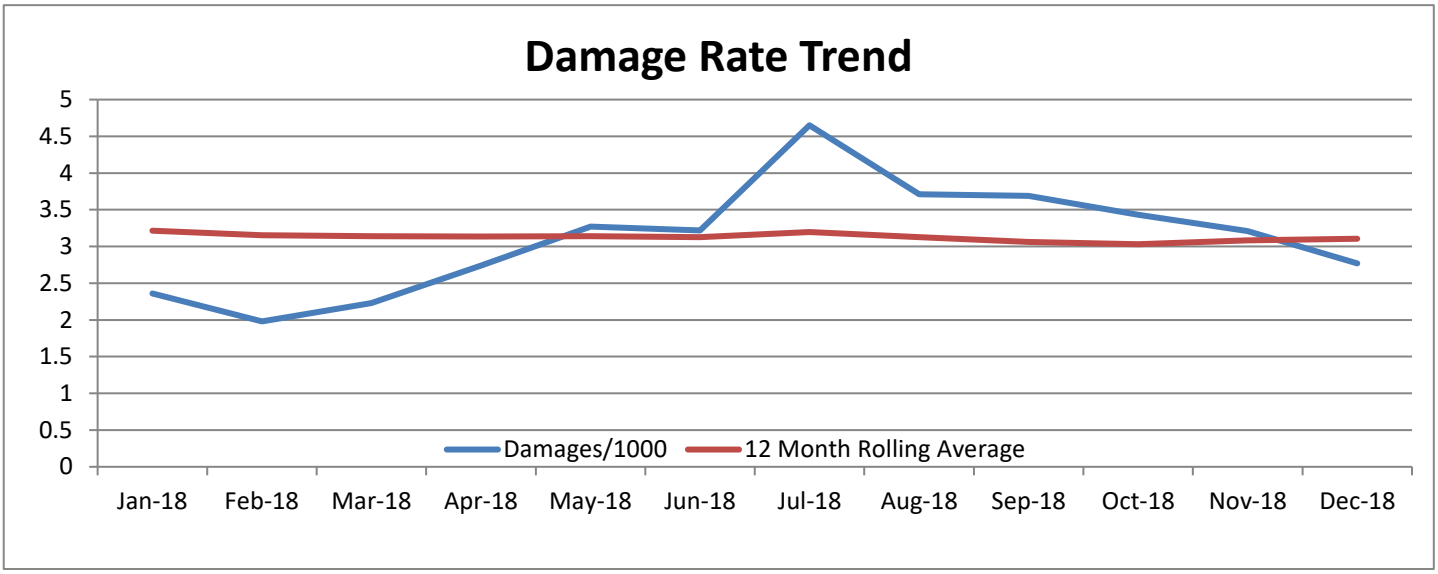
CUSTOMER COMMUNICATIONS
EXHIBIT 808

December 30, 2019

EXCAVATION DAMAGE SUMMARY

2018

Excavation Damages	Total Locates	Damage Rate/ 1000 Locates[1]		
		2016	2017	2018
790	251,362	3.52	3.25	3.14

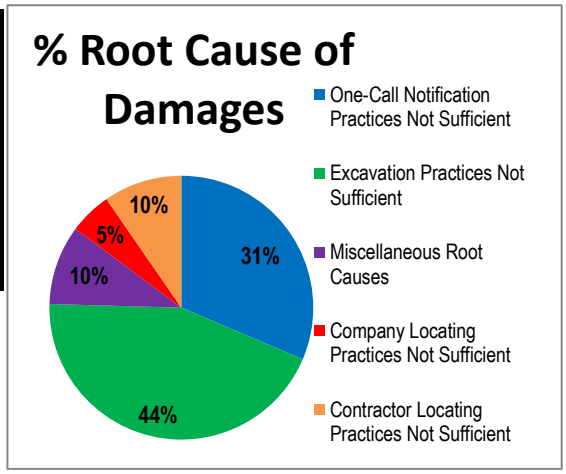


Damaging Agency	Total
City	30
Contractor	559
County	1
Occupant	109
Plumber	7
State	1
Unknown	41
Utilility	42

Damages by Service Area	Total	Damages per 1,000
01-Portland	470	3.10
02-Central Coast	15	5.18
03-Clark County	91	3.14
04-North Willamette	92	2.78
05-Central Willamette	33	2.74
06-South Willamette	50	3.25
07-Columbia Grg, OR	14	5.87
08-Columbia Grg, WA	6	6.32
09-South Coast	3	2.24
10-North Coast	16	6.43

Damaging Party	
1st	11
2nd	6
3rd	773

Root Cause	#	% of Total Damages
One-Call Notification Practices Not Sufficient	248	31%
Excavation Practices Not Sufficient	348	44%
Miscellaneous Root Causes	77	10%
Company Locating Practices Not Sufficient	41	5%
Contractor Locating Practices Not Sufficient	76	10%



[1]Excavation damages only.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Tobin Davilla

OPERATIONS & MAINTENANCE / CAPITAL EXHIBIT 900

REDACTED VERSION

December 30, 2019

EXHIBIT 900 – DIRECT TESTIMONY – OPERATIONS & MAINTENANCE / CAPITAL

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company ("NW Natural" or "the Company").

A. My name is Tobin Davilla. I am the Budget and Financial Analysis Manager at NW Natural. I am responsible for producing the annual operations and maintenance ("O&M") budget, the capital expenditures ("capex") budget, and the income statement budget. I also support the development of the short-term and long-term financial forecasts for senior management and support the organization with financial modeling and analysis.

Q. Please summarize your educational background and business experience.

A. I hold both a Bachelor of Science degree and a Master of Business Administration degree from Oregon State University. Prior to joining NW Natural, I held a position in Finance at PacifiCorp. I joined NW Natural in 2007 as a financial analyst and have held numerous positions within the Finance department, and have been in my current position since 2018.

Q. Please provide a summary of your testimony.

A. In my testimony, I:

- Explain how the Company developed the O&M amount included in the revenue requirement, including how the Company calculated O&M costs for the calendar year 2019 base year ("Base Year") and used those costs to develop the Oregon-allocated O&M costs for the test period consisting of the 12-months ending October 31, 2021 ("Test Year");

- Discuss the Company's performance in managing O&M expense; and
- Present the Company's ongoing capital expenditures levels.

II. TEST YEAR OPERATIONS AND MAINTENANCE COSTS

Q. What is the Oregon-allocated O&M expense included in NW Natural's revenue requirement in this case?

A. The Oregon-allocated Test Year O&M expense included in the revenue requirement in this case is $185.2 million. This compares to a Company total of $206.2 million of O&M for the Test Year, which is adjusted for state allocations, uncollectible accounts expense (which is developed separately as part of the Revenue Requirements testimony in this case), and amounts that represent O&M for which the Company is not seeking cost recovery in this case. Exhibit *NW Natural/901, Davilla* shows the Base Year O&M expense and exhibit *NW Natural/902, Davilla* shows the Test Year O&M expense by Federal Energy Regulatory Commission ("FERC") account.

Q. You state that the Base Year is calendar year 2019. How did NW Natural establish Base Year O&M costs given that this filing is being made in December 2019?

A. The Company used the actual expenses for January through September 2019 and forecast the expenses for the remaining three months of 2019 to develop the total Base Year O&M expenses. The total Company Base Year O&M, excluding uncollectible accounts expense, is forecast to be $173.8 million, or $156.1 million on an Oregon-allocated basis. The Company adopted the calendar year 2019 as the Base Year because that period reflects the most recent historical information

available and allows for a comparison of the Base Year with historical years consisting of the same months. NW Natural took this same approach in its last general rate case, UG 344.

Q. How did NW Natural determine the forecast costs for October through December 2019?

A. The costs for these months are based on a forecast provided by the different business units. Business units prepare an annual budget for the coming year and provide periodic forecast updates throughout the year, the most recent update being in October 2019. The projected O&M and capital by month for the year is based on historical activity levels, in addition to planned projects and activities. NW Natural used actual expenses for the first nine months of 2019 and the forecast for the three remaining months of the calendar year to develop total Base Year O&M expense.

Q. How were the Test Year O&M costs developed?

A. O&M is composed of three components: A) O&M payroll costs; B) O&M non-payroll costs; and C) O&M other cost adjustments. The Company Base Year O&M amounts were separated into these three components. Except for several specific items, non-payroll costs were adjusted using the most current West Region Urban Consumer Price Index ("CPI"). Other O&M cost adjustments were calculated specifically for the Test Year. Base Year payroll costs were also adjusted for increases through the 12-months ended October 31, 2021, Test Year.

A. O&M Payroll Costs

Q. What was the first step in calculating Test Year O&M payroll costs based on the Base Year costs?

A. The forecasted number of the Company's full-time equivalent positions ("FTEs") in the Test Year is the largest factor in the Test Year payroll O&M cost estimate; these costs account for roughly two-thirds of NW Natural's total O&M costs. The year-end 2019 Base Year forecast includes 1,155.5 regulated FTEs. These 1,155.5 FTEs represent positions that are expected to be filled and working at NW Natural.

Q. How did you project the number of FTEs at the end of the Base Year?

A. NW Natural's Human Resources Department provided FTE projections for the final three months of 2019 by taking into account actual FTE counts, projected FTE attrition, and projected FTE hires. Projected FTE attrition is based on known retirements and departures, as well as recent trends. Projected FTE hires are based on positions the Company was in the process of hiring, taking into account the stage in hiring process for each position.

Q. Do you request rate recovery for any incremental FTEs added after the Base Year?

A. Yes. The Company is requesting a net increase of 14 FTEs that will be added during 2020. The Company is in the process of hiring 16 incremental FTEs to fill a critical gap in the number of information technology and services ("IT&S") and safety staff and to respond to NW Natural's growing security needs. Further detail on these FTEs can be found in Jim Downing's direct testimony (*NW*

Natural/600, Downing) and Wayne Pipes' direct testimony (*NW Natural/500, Pipes)*.

The Company also plans to reduce two FTEs due to the Company outsourcing the customer communication printing and mailing function in the first half of 2020, and subsequently has included this reduction in its Test Year FTE count. In total, the Company is requesting 14 FTEs in addition to the 1,155.5 FTEs at the year-end Base Year FTE count, for a total regulated FTE count of 1,169.5.

Q. Did the projected FTE count take into account projected vacancies and FTEs allocated to non-utility activities?

A. Yes. NW Natural does not seek to recover in rates costs for 50.5 vacant FTE positions and 23.5 FTEs allocated to non-utility activities (termed "non-regulated FTEs" in this testimony). Table 1 below illustrates the adjustments made to the total internally-approved FTEs.

Table 1

	Test Year
Approved FTEs	1,243.5
Unfilled FTE Adjustment	(50.5)
Hired FTEs	**1,193.0**
Non-regulated FTE Removal	(23.5)
Regulated FTEs	**1,169.5**

Q. You state that NW Natural does not seek recovery for non-regulated FTEs in the Test Year. Please explain how non-regulated FTEs are determined.

A. Based on their work portfolio, each utility employee was assigned, either in part or in full, to regulated or non-regulated operations. A total of 23.5 FTEs were

assigned to non-regulated activities, which includes NW Natural employees' directly charged time to NW Natural's affiliates. Table 2 below shows the calculated FTEs for which the Company does not seek cost recovery:

Table 2

	Test Year
Appliance Center	(9.4)
Affiliate Activity	(11.0)
Interstate Storage & Other	(3.2)
Non-Regulated FTE Removal	**(23.5)**

Q. Please explain how FTEs are allocated to affiliates.

A. The Company has several departments that may provide services to affiliates that specifically benefit another entity. These departments direct-charge time incurred to the respective affiliate, known as "Shared Services." The Company calculates this credit based on departmental forecasts of the services expected to be provided to affiliates in the Test Year.

In addition, the Company has several departments that perform administrative and general functions for the benefit of NW Natural, Northwest Natural Holding Company ("NW Holdings") and its affiliates. These departments' labor costs are indirectly charged via a corporate allocation to the affiliates that benefit from their service.

The two labor allocation mechanisms are described in more detail in the Cost Allocation Manual ("CAM")[1].

[1] See UI 385, Master Services Agreement, CAM, Page 4 (filed December 28, 2018).

Q. Please explain your escalation methodology for payroll costs.

A. Bargaining unit ("BU") employee payroll costs were adjusted for expected wage increases according to the Collective Bargaining Agreement ("CBA") with the Union that commenced on December 1, 2019, and will run through May 31, 2024[2]. Under the agreement, effective December 1, 2019, all bargaining unit employees were first moved to a new base rate for their job group in accordance with Schedule A of the CBA[3] resulting in a 3.50 percent increase for the BU employees generally. The agreement also includes a partial scheduled wage increase of 1.50 percent on December 1, 2019, and 2.00 percent on June 1, 2020, and 3.50 percent on June 1 annually thereafter. The partial increase on December 1, 2019 and the increase on June 1, 2020 serve as a transition of the future bargaining term to a June to May annual period, as compared to previous December to November periods. The Company also assumes an additional 0.80 percent per year for promotions and movements from entry rate to experienced rate as described in the CBA.

Similarly, payroll costs were escalated for expected salary increases for non-bargaining unit ("NBU") employees. These increases are expected to be 3.40 percent on March 1, 2020, and 3.50 percent on March 1, 2021. Based on historical trends, the Company also assumes an additional 0.60 percent for NBU employee promotions/equity adjustments in 2020 and 2021 [redacted]

[2] NW Natural will provide the CBA when the final signed CBA is available.

[3] *Id*.

[redacted] For more detail on the target changes see *NW Natural/700, Rogers/5-6*.

Payroll costs were also adjusted for expected changes in benefits costs. The Direct Testimony of Melinda Rogers (*NW Natural/700, Rogers*) discusses these salary and benefits cost increases in greater detail.

Q. How were payroll overhead rates calculated for the Test Year?

A. Payroll overhead is used to allocate benefits expense. The payroll overhead rates used are a calculated ratio of the total benefits expense to total payroll for the year. These payroll overhead rates are applied to the forecast for executives payroll and non-executives payroll for the Test Year. The payroll overhead rates in the Test Year for non-executive employees are 58.6 percent in 2020 and 58.2 percent in 2021. For executives, the payroll overhead rate is 74.9 percent in 2020 and 76.3 percent in 2021.

Q. How did you determine the utility regulated payroll that is allocated to O&M activities?

A. Once the Company determines the regulated utility payroll costs, it allocates utility regulated payroll expenses to O&M and capital. NW Natural uses two approaches to allocate expenses and to charge time for various activities. In the first approach, most employees who directly work on capital activities will track and directly charge their time to capital. In the second approach, employees that are generally supportive of both capital and O&M projects, such as human resources, accounting, or finance, have a portion of their time applied to capital

via an administrative transfer. The O&M payroll allocation used in the Test Year is 63.7 percent. The Company calculated this allocation using the historical O&M allocation for the trailing 12-month period ended September 2019 and incorporating the O&M allocation of FTEs hired after that date.

B. O&M Non-Payroll Costs

Q. Please explain your escalation methodology for non-payroll costs.

A. The Company escalated general non-payroll costs using year-over-year rates of change in the forecast of the West Region Urban CPI as reported in the September 2019 Oregon Economic and Revenue Forecast, published by the Oregon Office of Economic Analysis ("OEA")[4]. These escalation factors were applied at January 1, 2020 and January 1, 2021. The Company also identified a number of items where the growth projection was greater than using CPI and adjusted these items with their specific growth rates or increases.

Q. Why did NW Natural use the West Region Urban CPI as the escalator for these accounts instead of the U.S. All-Urban CPI?

A. NW Natural specifically selected the West Region Urban CPI because a regional CPI provides a better measure of aggregate price changes experienced by the Company than a national CPI. This is because most of the Company's non-payroll expenses (*e.g.,* office supplies, utilities, repairs and maintenance, contractors, professional services) are regional purchases (*i.e.*, purchases made

[4] See *NW Natural/903, Davilla/46*.

within Oregon or southwest Washington). Therefore, a regional CPI is more representative of the price changes experienced by the Company.

Q. You state above that the Company adjusted for certain items in the Test Year instead of using a CPI growth rate applied to the Base Year. Please explain what these items are and why it is more appropriate to use these cost adjustments instead of the CPI escalation factor.

A. The Company made these adjustments to ensure that the Test Year expense is as accurate as possible. These items change because of either fluctuations of contractual agreements which are both known and measurable, or the Company knows that the expenses will increase at a rate that would not be best reflected using CPI as an escalation factor. An escalation factor should only be relied on where actual costs are unknown or otherwise fail to be indicative of future costs. The following Oregon allocated expenses in the Test Year have been adjusted accordingly:

- 250 Taylor Lease Expense (FERC 931), Tenant Improvement Amortization (FERC 931), Operating Expenses (FERC 935) and Company Vehicle Parking Expense (FERC 921): The Direct Testimony of Wayne Pipes (*NW Natural/500, Pipes*), discusses in more detail the move to a new headquarters facility at 250 Taylor, including the decision-making process leading to that move. The total Test Year expense for 250 Taylor is $12.4 million. This is composed of $9.9 million in lease expense, $1.1 million in tenant improvement amortization, $1.2 million operating expenses, and $0.2 million in

company vehicle parking. The operating and lease expenses excluding the storage component were then allocated 95.2 percent to the utility. This allocation reflects the amount of square footage used for utility activities in comparison to the total square footage of the building. In other words, it removes the square footage of all planned sublease spaces. After the allocation to utility, the total utility expense is $11.9 million for the system or $10.5 million Oregon-allocated. The lease expense, tenant improvement amortization expense and the operating expenses are subject to a capital administrative transfer, where 35 percent of these costs are transferred to Capital. This reduced the O&M expense $3.6 million and brought the total Oregon O&M allocated 250 Taylor expense in the Test Year to $6.9 million. All existing One Pacific Square ("OPS") headquarters expenses were removed from the Test Year. Exhibit *NW Natural/904, Davilla* provides more detail on Test Year expenses.

- Contracted Customer Payment Processing Fees (FERC 903): The Company entered into an agreement with Paymentus[5] to provide electronic bill payment services beginning on July 1, 2020. The contracted Paymentus transaction charge is a flat fee per credit or debit transaction and no charge for Automated Clearing House ("ACH") transactions. In addition to the new contracted rate, the Company has

[5] See *NW Natural/905, Davilla* (Confidential).

experienced strong customer preference to pay by bankcard, as evidenced by the number of transactions increasing at a 13.0 percent compound annual growth rate ("CAGR") since 2017. Test Year transactions are expected to continue growing at 13.0 percent from the Base Year to the Test Year. Lastly, the expenses are allocated to Oregon. In 2018, Oregon transactions accounted for 85.7 percent of the total system transactions, and similarly in January 2019 through September 2019 the Oregon transactions have also accounted for 85.7 percent of the total system transactions. The Company projects that this state allocation will continue into the Test Year. The total expense increase in the Test Year is $1.2 million, the Oregon-allocated amount is $1.1 million.

- Compressor Maintenance (FERC 834) & Lease Expense (FERC 818): There are four compressors that are being rebuilt and are projected to be completed in 2020. The expenses incurred are amortized over 5 years, or 60 months. The total expense increase in the Test Year is $764 thousand, the Oregon allocated amount is $683 thousand. In addition, the Company has an agreement to lease a compressor from Fortis that began in July 2019, and is therefore included in 6 months of the Base Year. This expense is annualized for the Test Year. The total expense increase in the Test Year is $55 thousand, the Oregon-allocated amount is $49 thousand.

- Employee Protection Equipment (FERC 921): Negotiated as part of the new CBA with the OPEIU beginning December 1, 2019, was an increase in allowance for field employees for fire resistant clothing, safety footwear, and safety glasses. The total expense increase in the Test Year is $148 thousand, the Oregon-allocated amount after administrative transfer is $111 thousand.
- Contracted Locating Services (FERC 874): The Company employs the services of a third-party contactor, Locating, Inc., to provide locating and marking services to the Company. The Company entered into a new amended agreement with Locating, Inc. effective October 22, 2019.[6] The Company and Locating, Inc. have a new amended agreement that sets the rate per locate for both low and high pressure locates, as well as hourly standby rates. These rates are set to increase at a 2.25 percent annual increase. In addition to this increase in rate per locate in the Test Year, Locating, Inc. has also experienced annual increases in the number of locating service calls it receives. This increase is due to customer education and customer growth. From 2016 to 2018 the Company has experienced a 10.7 percent increase in the number of locates. In 2019 the number of locates over the prior year has increased by another 5.1 percent. The Company expects that usage will continue to increase 5.0 percent annually

[6] See *NW Natural/906, Davilla* (Confidential).

through the Test Year. The total expense increase in the Test Year is $1.8 million, and the Oregon allocated amount is $1.6 million.

- Contracted Survey Services (FERC 874): The Company entered into a new agreement with Heath Consultants on November 25, 2019, effective January 1, 2020 and running through December 31, 2022, to provide survey and inspection services to the Company.[7] The Company and Heath Consultants have a contractual agreement that sets the rate per foot of inspection. These rates are set to increase at a 2 percent annual increase throughout the three-year contract. The total expense increase in the Test Year is $299 thousand, and the Oregon-allocated amount is $264 thousand.
- IT&S (FERC 921): The Direct Testimony of Jim Downing (*NW Natural/600, Downing)* discusses in more detail the IT&S O&M expense increase. The total expense increase in the Test Year is $3.6 million, and the Oregon-allocated amount after administrative transfer is $2.7 million.
- Contracted Security Solutions (FERC 921): The Direct Testimony of Wayne Pipes (*NW Natural/500, Pipes)* discusses the need for increased security resources. In addition to two security FTEs described in Mr. Pipes' testimony, the total expense increase in the Test Year for contracted security is $103 thousand, and the Oregon-

[7] See *NW Natural/907, Davilla* (Confidential)

allocated amount after administrative transfer is $77 thousand.

- Board of Director Fees (FERC 930): The Company has added one director to the Board in the Test Year [redacted] The total expense increase in the Test Year is $411 thousand, and the Oregon-allocated amount is $364 thousand.
- Insurance (FERC 924): The Company has incurred insurance premiums for the fiscal period 2019-2020 and these expenses were allocated using the Company's insurance allocation model. This allocation model is designed in compliance with the Company's CAM.[8] Pursuant to the Company's CAM, individual premiums are allocated to entities consistent with the nature of the insurance policy. For example, workers compensation policies are allocated based on payroll, and property insurance is allocated based on total assets. The Company uses four allocation factors to allocate insurance premiums to non-utility operations and affiliates: revenues, assets, payroll, and number of directors and officers. The premiums during this period have increased 5 percent as compared to fiscal year 2018-2019. The Company projects the Test Year expense to continue to increase at

[8] See UI 385, Master Services Agreement, Exhibit A – CAM, Page 8.

this same rate. The total expense increase in the Test Year is $402 thousand, and the Oregon-allocated amount is $357 thousand.

Q. Are Non-Payroll O&M costs adjusted to reflect services provided from NW Natural to its affiliates?

A. Yes. NW Natural's O&M costs are reduced to reflect a credit for expenses associated with services to affiliates. The Company has several departments that may provide services to affiliates that specifically benefit another entity. These departments direct-charge time incurred to the respective affiliate, known as "Shared Services." The Company calculates this credit based on departmental forecasts of the services expected to be provided to affiliates in the Test Year. The non-payroll portion of Shared Services is calculated by imputing an administrative overhead of 27.5 percent to the payroll charges.[9] The Oregon-allocated direct charge administrative overhead non-payroll credit to the utility during the Test Year is $356 thousand.

In addition, the Company has several departments that perform administrative and general functions for the benefit of NW Natural, NW Holdings and its affiliates. These departments' labor and non-labor costs are indirectly charged via a corporate allocation to the affiliates that benefit from their service. The payroll, non-payroll and a 27.5 percent overhead applied to payroll is credited through a mechanism described in more detail in the CAM[10]. The

[9] See UI 385, Master Services Agreement, Exhibit A – CAM, Page 6

[10] See UI 385, Master Services Agreement, Exhibit A – CAM, Page 4

Oregon-allocated indirect non-payroll allocated amount and 27.5 percent administrative overhead credited to the utility during the Test Year is $90 thousand.

Q. Does the Test Year include any other adjustments?

A. Yes. Supplemental Executive Retirement Plan and Executive Supplemental Retirement Income Plan costs were removed, as NW Natural is not seeking recovery for these costs. Also, "Category C" advertisement expenses were removed in the Test Year as described in the Direct Testimony of Cory Beck (*NW Natural/800, Beck)*.

C. O&M Other Cost Adjustments

Q. Once you have calculated O&M payroll and non-payroll expenses, do you perform any further adjustments?

A. Yes. Once payroll and non-payroll expenses are calculated, O&M is adjusted to reflect: a) the Commission-authorized amount of $5.0 million expense related to environmental remediation (see UM 1635, Order No. 15-049, where a tariff rider of $5.0 million was established to be applied toward recovery of environmental remediation expense); b) the Commission-authorized amount of $7.1 million expense related to pension balancing amortization (see UG 344 Phase II, Order No. 19-105); and c) corporate O&M adjustments.

Q. What items are included in the corporate O&M adjustments?

A. Listed below are the items included in the Oregon allocated corporate adjustments:

- Administrative transfer: $14.5 million credit – the administrative transfer allocates a portion of payroll and non-payroll administrative expenses, such as the salaries and expenses of Accounting, Human Resources, Facilities, and general administration, from O&M to construction activities. These costs are categorized as indirect construction overhead because they are not charged directly to specific or individual construction projects.
- Payroll tax: $6.3 million credit – this credit removes payroll tax expense from O&M and transfers it to the "Other Taxes" line of the revenue requirement. This adjustment is required by FERC accounting methodology. The payroll tax expense is included in the revenue requirement in this case under the "Other Taxes" area, and is not included in O&M costs.
- Post-Retirement Medical Non-Service: $863 thousand expense – the total post-retirement medical plan expense (ASC-715-60), is forecasted by our actuary, Fidelity. The Company used the latest forecast provided to us prior to filing this rate case. The actuary forecasted total post-retirement medical plan costs in the Test Year to be $1.2 million. This is made up of a service component (Operating Cost) and a non-service component (Non-Operating Cost). The service expense forecasted in the Test Year is $0.3 million, and is included in the payroll overhead rates that are allocated to O&M, capital and non-utility work based on the payroll work mix. The total

non-service expense projected by the actuary for the test year is $1.0 million, or $863 thousand Oregon-allocated. This cost is expensed as an O&M expense. Table 3 below shows the Post-Retirement Medical Service and Non-Service cost from Fidelity and the O&M allocation of the Non-Service component.

Table 3

In Millions	2019	2020	2021	Test Year
Service Cost[1]	$0.2	$0.3	$0.2	$0.3
Non-Service Costs[2]	$1.0	$1.1	$0.9	$1.0
Total Post-Retirement Medical Expense	$1.3	$1.4	$1.2	$1.2
OR Allocation				89.45%
OR Allocation of Post-Retirement Medical Non-Service Costs				$0.9

(1) Service Cost allocated thorugh Payroll OH rate and allocated to O&M, Capital and Non-Utility
(2) Non-Service Cost is an O&M expense

- Pension Non-Service[11]: $9.3 million expense – the total pension expense (ASC 715) is forecasted by our actuary, Fidelity. The Company used the latest forecast provided to us prior to filing this rate case. The actuary forecasted total pension cost in the Test Year to be $16.9 million. This is made up of a service component and a non-service component. The service expense forecasted in the Test Year is $6.5 million, and is included in the payroll overhead rates that are allocated to O&M and capital based on the payroll work mix. The total non-service expense projected by the actuary for the Test Year is $10.4 million, or $9.3 million Oregon-allocated. This non-service

[11] The testimony of Kyle Walker, *NW Natural/1000, Walker*, describes the ratemaking treatment of pension expense in greater detail.

portion of pension is expensed as O&M. Table 4 below shows the Pension Service and Non-Service cost from Fidelity and the O&M allocation of the Non-Service component.

Table 4

In Millions	**2019**	**2020**	**2021**	**Test Year**
Service Cost[1]	$6.0	$7.1	$6.4	$6.5
Non-Service Costs[2]	$10.5	$13.2	$9.8	$10.4
Total Pension Expense	$16.5	$20.3	$16.2	$16.9
OR Allocation				89.45%
OR Allocation of Pension Non-Service Costs				$9.3

(1) Service Cost allocated thorugh Payroll OH rate and allocated to O&M, Capital and Non-Utility
(2) Non-Service Cost is an O&M expense

- Uncollected claims and damages: $166 thousand expense – this expense is based on a three-year historical average.
- Stock expense: $1.5 million expense – includes employee stock purchase plan, as well as other employee stock expense compensation.
- Long Term Incentive Plan: $1.6 million expense – this long term incentive applies to officers and key employees. The Direct Testimony of Melinda Rogers (*NW Natural/700, Rogers)* discusses this plan in detail.

The overall effect of these corporate adjustments is a reduction to Company O&M of $7.4 million.

Q. How did NW Natural allocate O&M expenses to Oregon?

A. The Company converted its O&M forecast into FERC accounts based on actual historical FERC allocations to allow for a state allocation based on FERC accounts. For Test Year expenses that may not have been incurred in the historical period, the costs were allocated to the appropriate FERC account. NW Natural then applied the relevant Oregon allocation factor to each FERC account to calculate Oregon allocated O&M. The Oregon FERC allocation factors are determined by considering the specific drivers such as volumes or customers that have a causative effect on costs in that account. The allocation methodology is described in the Direct Testimony of Kyle Walker (*NW Natural/1000, Walker/27)*.

III. O&M EXPENSE MANAGEMENT AND COMPANY PERFORMANCE

Q. Does NW Natural have cost control protocols and practices in place?

A. Yes. Under the direction of the Chief Financial Officer and Chief Executive Officer, my department engages in an annual budgeting and financial planning process, through which we determine and manage to a company-wide budget. This budget is informed by individual departmental needs, overall company goals, and an ongoing focus on controlling costs. Throughout the year, we provide reporting on budgets to actuals for each department, and engage with departments on their spending levels. We also require justifications for department budgets and significant departures from budgeted amounts.

Q. Please provide your view of NW Natural's O&M levels, and the amounts of O&M reflected in the Test Year.

A. NW Natural's O&M levels have grown at a reasonable rate, reflecting good cost management practices within the Company. As is true with most companies, much of the pressure on our O&M expense levels comes from inflation. In addition, as described above, the Company's O&M in the Test Year is increasing based on contracted increases that represent "lumpier" increases to O&M, such as the 250 Taylor lease, locating and survey services, and customer payment processing fees.

Furthermore, as described more in the testimony of Jim Downing (*NW Natural/600, Downing*), the Company's IT&S department is facing new challenges as software purchases that were historically treated as capital are now annual subscription-based cloud solutions that are accounted for as O&M. The Company's subscription to Microsoft Office 365 E5 is an example of this technological evolution that represents the best choice for the Company and customers, but it has a more dramatic impact to rates because it cannot be depreciated over the life of the software.

Finally, Mr. Downing also describes the Company's need to add 14 new employees to the Company's IT&S team, and Mr. Pipes describes our need to add 2 new employees and 1 contractor for security purposes at our facilities. All of these positions are currently in the recruitment process and have been included in the Test Year O&M expense.

Given the upward pressure on rates from the non-inflationary costs, this was a contributing factor that led to the Company needing to file this rate case.

Q. Have you compared NW Natural's O&M expense per customer to O&M expenses per customer at comparable utilities?

A. Yes. Chart 1 provides a comparison of the Company's O&M per customer expense with a panel of similar gas utilities. For comparability purposes, NW Natural excludes expenses related to the environmental docket (UM 1635, Order No. 15-049) and production and transmission expenses are excluded for the peer group and NW Natural.

Chart 1

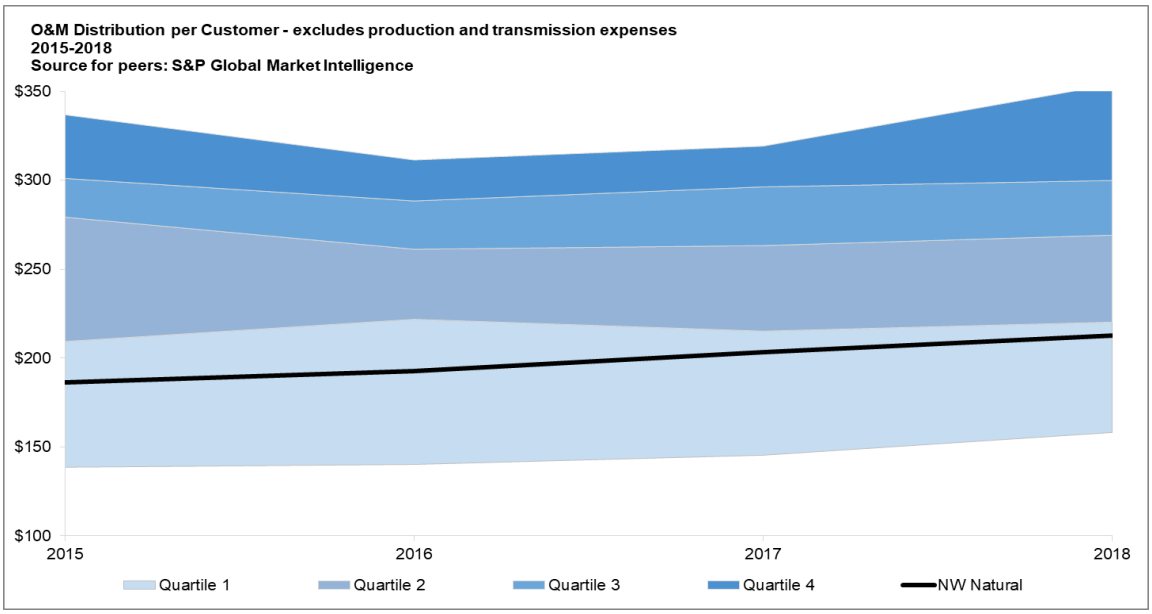


Chart 1 shows that NW Natural is consistently a top performer in O&M expense management. The panel uses customer counts and costs for those companies with FERC Form 2 information available in SNL, and includes the

following companies: Atmos, Avista, Cascade Natural Gas, National Fuel Gas, New Jersey Gas, South Jersey Gas, and Washington Gas and Light.

Again, this information shows that NW Natural performs well in managing its O&M expense to keep rates low for customers and provide the high quality service our customers have come to expect.

IV. CAPITAL EXPENDITURES AND FORECAST

Q. What are the forecasted capital expenditures for the next three calendar years and the Test Year?

A. The utility capital expenditures planned for calendar year 2019 are $237 million, for 2020 are $262 million, and for 2021 are $261 million. The capital expenditures forecasted for the Test Year are $261 million.

Q. Please describe NW Natural's recent history related to capital investments.

A. The Company has been making important capital investments in natural gas distribution, system reinforcement, gas supply and storage, facilities and new technology to better serve the needs of our customers. These investments center on enhancement of safety, service reliability, and the replacement of aging infrastructure.

Q. Please explain the capital projects for which the Company seeks recovery in this case.

A. The Company seeks to add to rate base its investment in the following categories of capital projects:

1. All capital expenditures completed since the Company's last rate case, UG 344 that will be used and useful as of the rate effective date of this

case— November 1, 2020. These include both the Company's discrete and non-discrete investments. For these capital expenditures, the Company seeks to recover the total investment, less depreciation incurred since the date the investment was completed.

2. All capital expenditures, both discrete and non-discrete, that will be completed during the Test Year. These projects may be completed at various times during that year. The Company used an average through the Test Year 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.

Q. Please describe NW Natural's capital expenditures budgeting process, and how the Company calculates projected capital expenditures.

A. The forecasted capital expenditures are developed using the following steps:

1. Operating units submit a detailed three-year capital forecast based on their business need.
2. The Financial Planning Department reviews the forecasted capital and verifies that each operating unit has adequately supported its assumptions.
3. The operating units' forecasts are summarized to create the capital requirement by year.
4. The capital requirements are reviewed by their respective executive for completeness and reasonableness, and adjustments are made as appropriate.

5. Once the calendar year forecasts are completed, program and project expenditures are spread by month based on projected project spending schedules. Most capital construction projects are planned for construction during the summer months and are placed in-service in the fall. This is to avoid any delays and complications due to inclement weather as well as providing the benefits during the heating season.

Q. Could you define the difference between "discrete" and "non-discrete" expenditures?

A. The Company's capital expenditures can be thought of as falling into one of two categories. The first category consists of "discrete investments" 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, and Mist storage or gate stations), System Reinforcement Projects, Information Technology and Land and Structures. These discrete projects tend to represent lumpy investments, and costs associated with these projects can vary widely year over year.

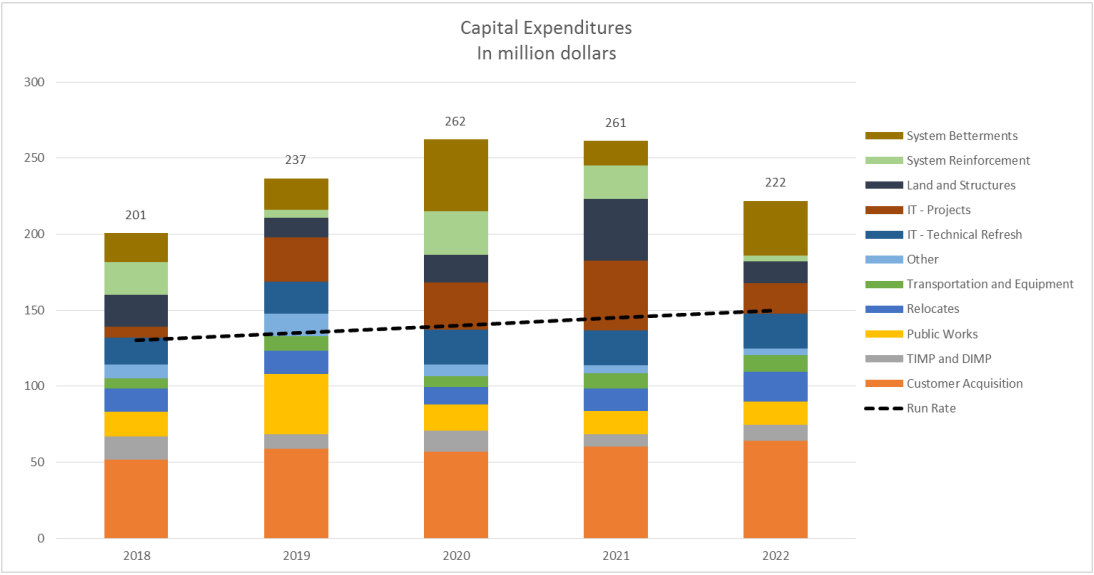
The second category can be thought of as "non-discrete capital expenditures," in which investments are made consistently year-over-year, and over which the Company generally does not exercise much discretion. The consistency of expenditures in this category forms the basis of a predictable "run rate". These investments include Public Works, Relocates, Damages, Transportation and Equipment, Tools, Technical refresh, Leakage, Customer

Growth, Transmission Integrity Management Program ("TIMP"), and Distribution Integrity Management Program ("DIMP"). A significant portion of the Company's Information Technology investment falls under this category as well, and is very consistent year-over-year, following a clear trend line, and is therefore very predictable.

Q. Have you prepared an illustration of the Company's discrete and non-discrete capital investment in recent years?

A. Yes. Figure 1 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 or have increased over time due to factors such as inflation, customer growth or jurisdictional requirements. However, on the whole, the spending related to NW Natural's non-discrete investment has increased slowly and steadily over time.

Figure 1



Q. What are the primary drivers behind NW Natural's discrete planned capital expenditures?

A. These drivers are discussed in the Direct Testimonies of Joe Karney *(NW Natural/400, Karney)*, Wayne Pipes (*NW Natural/500, Pipes),* and Jim Downing (*NW Natural/600, Downing)*.

Q. In forecasting expenditures in 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 category and summarize how forecasts were prepared for the Test Year for each?

A. Each of these categories contains 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 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.

- ***Leakage.*** Leakage costs represent 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 necessary to connect new customers to the Company's system. These projects require extending mains and installing service lines, regulators, and meters, as well as related permitting. The Company is able to accurately forecast these costs based on its gross customer addition projections. Meter and regulator equipment cost trends are also influenced by periodic changes for cause requirements (*e.g.*, 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 inspections[12] on the Company's system.

[12] 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".

- ***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-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.

Q. Have you compared NW Natural's capital expenditures to capital expenditures of comparable utilities?

A. Yes. NW Natural's capital expenditures are significantly lower than other comparable utilities. To make a relevant comparison, we evaluated capital expenditures per customer. Chart 2 below provides a comparison of the Company's capital expenditures per customer with a panel of similar gas utilities for the 2015-2018 period. NW Natural excluded investment in the North Mist expansion project. The panel includes the following companies: National Fuel Gas, South Jersey Gas, New Jersey Resources, Washington Gas and Light, Atmos, Chesapeake Utilities, Southwest Gas, Spire, and One Gas.

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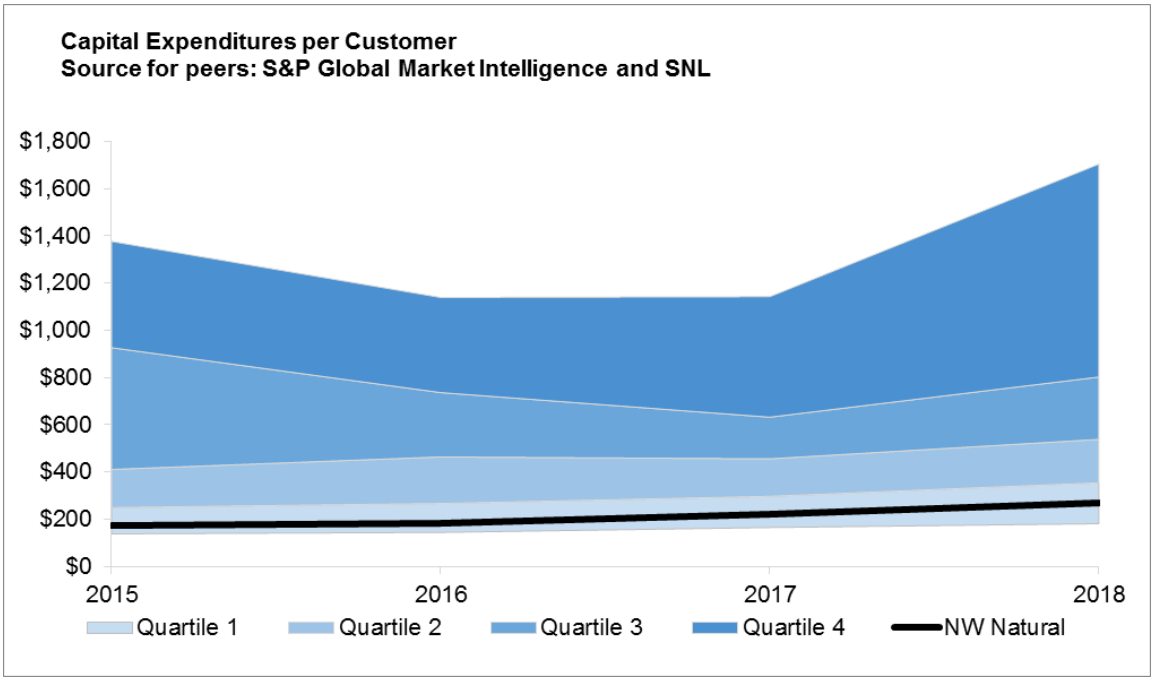
Chart 2



Again, these metrics indicate that NW Natural implements effective cost management procedures, while keeping its system safe and reliable.

Q. Does this conclude your direct testimony?

A. Yes.

BEFORE THE

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NW Natural

Exhibits of Tobin Davilla

OPERATIONS & MAINTENANCE / CAPITAL EXHIBITS 901 – 907

REDACTED VERSION

December 30, 2019

EXHIBITS 901 – 907 – OPERATIONS & MAINTENANCE / CAPITAL

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NW Natural

Exhibit of Tobin Davilla

OPERATIONS & MAINTENANCE / CAPITAL
EXHIBIT 901

December 30, 2019

NW Natural
Base Year Twelve Months Ended December 31, 2019
Operations and Maintenance Expense

Line No.	FERC Acct.	Description	BASE YEAR System (a)	BASE YEAR Oregon (b)
1		**Natural Gas Storage**		
2		**Underground Storage Expense**		
3		**Operation**		
4	816	**Wells Expense**	$337,263	$301,378
5	818	**Compressor Station Expense**	111,133	99,308
6	819	**Compressor Station Fuel**	0	0
`	820	**Measuring and Regulator Station Expense**	3,012,209	2,693,304
7	821	**Purification Expense**	(422)	(377)
8		**Maintenance**		
9	832	**Wells Expense**	188,490	168,434
10	834	**Compressor Station Expense**	272,215	243,252
11		**Total Underground Storage Expense**	3,920,887	3,505,299
12		**Other Storage Expense**		
13		**Operation**		
14	840	**Supervision and Engineering**	126,423	112,971
15		**Total Other Storage Expense**	126,423	112,971
16		**Liquified Natural Gas Expense**		
17		**Operation**		
18	844	**Supervision and Engineering**	1,925,748	1,720,848
19	845	**LNG Fuel**	(183,906)	(164,339)
20		**Maintenance**		
21	847	**Supervision and Engineering**	1,112,825	994,421
22		**Total Liquified Natural Gas Expense**	2,854,667	2,550,930
23		**Total Natural Gas Storage**	6,901,977	6,169,201
24		**Transmission Expense**		
25		**Operation**		
26	856	**Mains Expense**	2,551,886	2,383,041
27		**Maintenance**		
28	863	**Maintenance of Mains**	420,819	373,332
29		**Total Transmission Expense**	2,972,705	2,756,373
30		**Distribution Expense**		
31		**Operation**		
32	870	**Supervision and Engineering**	3,547,716	3,243,253
33	874	**Mains and Services Expense**	12,535,183	11,074,667
34	875	**Measuring and Regulator Station Expense**	217,774	195,844
35	877	**Measuring and Regulator Station Expense**	603,135	549,333
36	878	**Meter and House Regulator Expense**	6,235,312	5,529,629
37	879	**Customer Installation Expense**	10,507,707	9,319,732
38	880	**Other Expense**	1,455,923	1,312,301
39	881	**Rents**	218,783	189,551
40		**Maintenance**		
41	885	**Supervision and Engineering**	7,251,323	6,925,299
42	887	**Mains**	3,040,039	2,950,403
43	889	**Measuring and Regulator Station Expense**	1,694,557	1,538,902
44	891	**Measuring and Regulator Station Expense**	187,479	175,689
45	892	**Services**	641,747	613,173
46	893	**Meters and House Regulators**	3,364,061	3,022,304
47	894	**Other Equipment**	45,524	42,003
48		**Total Distribution Expense**	51,546,263	46,682,083
49		**Customer Accounts Expense**		
50		**Operation**		
51	901	**Supervision**	1,984,389	1,759,360
52	902	**Meter Reading Expenses**	983,115	871,733
53	903	**Customer Records and Collection Expense**	17,235,326	15,294,496
54	904	**Uncollectible Accounts**	-	-
55		**Total Customer Accounts Expense**	20,202,830	17,925,588
56		**Customer Service and Informational**		
57		**Operation**		
58	907	**Supervision**	3,492	3,092
59	908	**Customer Assistance Expense**	3,513,801	3,172,529
60	909	**Customer Information Expense**	2,836,295	2,514,659
61	910	**Miscellaneous Customer Service Expense**	196,564	174,058
62		**Total Customer Service and Informational**	6,550,152	5,864,339
63		**Sales Expense**		
64		**Operation**		
65	911	**Supervision**	17,029	15,098
66	912	**Demonstration and Selling Expense**	1,841,171	1,630,385
67	913	**Advertising**	604,758	536,176
68	916	**Miscellaneous Sales Expense**	-	-
69		**Total Sales Expense**	2,462,958	2,181,659
70		**Administrative and General Expense**		
71		**Operation**		
72	921	**Office Supplies and Expense**	61,958,050	54,535,518
73	922	**Administrative Expenses Transferred - Cre**	(20,513,243)	(18,204,922)
74	924	**Property Insurance Premium**	3,430,372	3,039,996
75	925	**Injuries and Damages**	207,592	183,968
76	926	**Employee Pensions and Benefits**	21,048,928	19,284,253
77	928	**Regulatory Commission Expense**	-	-
78	930	**Miscellaneous General Expense**	3,046,897	2,700,161
79	931	**Rents**	4,676,697	4,144,455
80		**Maintenance**		
81	935	**Maintenance of General Plant**	4,282,799	3,847,795
82		**Total Administrative and General Expense**	78,138,092	69,531,224
83		**Total Operations and Maintenance Expense**	168,774,976	151,110,467
84	407	**Environmental Rider**	5,000,000	5,000,000
85		**Total O&M Expense including Environmental Rider**	173,774,976	156,110,467

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Tobin Davilla

OPERATIONS & MAINTENANCE / CAPITAL EXHIBIT 902

December 30, 2019

NW Natural
Test Year Twelve Months Ended October 31, 2021
Operations and Maintenance Expense

Line No.	FERC Acct.	Description	TEST YEAR System (a)	TEST YEAR Oregon (b)
1		Natural Gas Storage		
2		Underground Storage Expense		
3		Operation		
4	816	Wells Expense	$352,135	$314,668
5	818	Compressor Station Expense	169,075	151,086
6	819	Compressor Station Fuel	0	0
`	820	Measuring and Regulator Station Expense	3,250,755	2,906,595
7	821	Purification Expense	(439)	(393)
8		Maintenance		
9	832	Wells Expense	205,480	183,617
10	834	Compressor Station Expense	1,035,990	925,761
11		Total Underground Storage Expense	5,012,996	4,481,334
12		Other Storage Expense		
13		Operation		
14	840	Supervision and Engineering	137,095	122,508
15		Total Other Storage Expense	137,095	122,508
16		Liquified Natural Gas Expense		
17		Operation		
18	844	Supervision and Engineering	2,078,449	1,857,302
19	845	LNG Fuel	(192,169)	(171,722)
20		Maintenance		
21	847	Supervision and Engineering	1,367,800	1,222,266
22		Total Liquified Natural Gas Expense	3,254,081	2,907,846
23		Total Natural Gas Storage	8,404,172	7,511,688
24		Transmission Expense		
25		Operation		
26	856	Mains Expense	2,707,756	2,528,598
27		Maintenance		
28	863	Maintenance of Mains	445,314	395,063
29		Total Transmission Expense	3,153,069	2,923,661
30		Distribution Expense		
31		Operation		
32	870	Supervision and Engineering	3,869,341	3,537,276
33	874	Mains and Services Expense	15,654,843	13,830,845
34	875	Measuring and Regulator Station Expense	204,054	183,506
35	877	Measuring and Regulator Station Expense	646,322	588,667
36	878	Meter and House Regulator Expense	6,808,902	6,038,302
37	879	Customer Installation Expense	12,621,915	11,194,913
38	880	Other Expense	1,591,346	1,434,365
39	881	Rents	228,920	198,334
40		Maintenance		
41	885	Supervision and Engineering	8,163,639	7,796,597
42	887	Mains	3,296,336	3,199,142
43	889	Measuring and Regulator Station Expense	1,834,542	1,666,029
44	891	Measuring and Regulator Station Expense	200,471	187,864
45	892	Services	694,470	663,548
46	893	Meters and House Regulators	3,776,600	3,392,934
47	894	Other Equipment	48,568	44,812
48		Total Distribution Expense	59,640,270	53,957,134
49		Customer Accounts Expense		
50		Operation		
51	901	Supervision	2,177,536	1,930,604
52	902	Meter Reading Expenses	1,075,349	953,517
53	903	Customer Records and Collection Expense	23,044,142	20,449,195
54	904	Uncollectible Accounts	-	-
55		Total Customer Accounts Expense	26,297,027	23,333,316
56		Customer Service and Informational		
57		Operation		
58	907	Supervision	3,621	3,206
59	908	Customer Assistance Expense	3,932,913	3,550,936
60	909	Customer Information Expense	3,223,403	2,857,869
61	910	Miscellaneous Customer Service Expense	213,575	189,122
62		Total Customer Service and Informational	7,373,512	6,601,133
63		Sales Expense		
64		Operation		
65	911	Supervision	19,006	16,851
66	912	Demonstration and Selling Expense	1,969,089	1,743,659
67	913	Advertising	-	-
68	916	Miscellaneous Sales Expense	-	-
69		Total Sales Expense	1,988,095	1,760,509
70		Administrative and General Expense		
71		Operation		
72	921	Office Supplies and Expense	71,224,731	62,692,057
73	922	Administrative Expenses Transferred - Cre	(24,820,661)	(22,027,632)
74	924	Property Insurance Premium	3,832,743	3,396,577
75	925	Injuries and Damages	236,810	209,861
76	926	Employee Pensions and Benefits	24,042,677	22,257,736
77	928	Regulatory Commission Expense	-	-
78	930	Miscellaneous General Expense	3,686,499	3,266,976
79	931	Rents	10,690,276	9,473,646
80		Maintenance		
81	935	Maintenance of General Plant	5,483,930	4,926,928
82		Total Administrative and General Expense	94,377,006	84,196,147
83		Total Operations and Maintenance Expense	201,233,152	180,283,589
84	407	Environmental Rider	5,000,000	5,000,000
85		Total O&M Expense including Environmental Rider	206,233,152	185,283,589

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Tobin Davilla

OPERATIONS & MAINTENANCE / CAPITAL EXHIBIT 903

December 30, 2019

Oregon Economic and Revenue Forecast

September 2019

Volume XXXIX, No. 3

Release Date: August 28, 2019

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Chief Operating Officer
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Foreword

This document contains the Oregon economic and revenue forecasts. The Oregon economic forecast is published to provide information to planners and policy makers in state agencies and private organizations for use in their decision making processes. The Oregon revenue forecast is published to open the revenue forecasting process to public review. It is the basis for much of the budgeting in state government.

The report is issued four times a year; in March, June, September, and December.

The economic model assumptions and results are reviewed by the Department of Administrative Services Economic Advisory Committee and by the Governor's Council of Economic Advisors. The Department of Administrative Services Economic Advisory Committee consists of 15 economists employed by state agencies, while the Governor's Council of Economic Advisors is a group of 12 economists from academia, finance, utilities, and industry.

Members of the Economic Advisory Committee and the Governor's Council of Economic Advisors provide a two-way flow of information. The Department of Administrative Services makes preliminary forecasts and receives feedback on the reasonableness of such forecasts and assumptions employed. After the discussion of the preliminary forecast, the Department of Administrative Services makes a final forecast using the suggestions and comments made by the two reviewing committees.

The results from the economic model are in turn used to provide a preliminary forecast for state tax revenues. The preliminary results are reviewed by the Council of Revenue Forecast Advisors. The Council of Revenue Forecast Advisors consists of 15 specialists with backgrounds in accounting, financial planning, and economics. Members bring specific specialties in tax issues and represent private practices, accounting firms, corporations, government (Oregon Department of Revenue and Legislative Revenue Office), and the Governor’s Council of Economic Advisors. After discussion of the preliminary revenue forecast, the Department of Administrative Services makes the final revenue forecast using the suggestions and comments made by the reviewing committee.

Readers who have questions or wish to submit suggestions may contact the Office of Economic Analysis by telephone at 503-378-3405.

Katy Coba
DAS Director
Chief Operating Officer

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EXECUTIVE SUMMARY

September 2019

The current expansion is now the longest on record, celebrating its tenth birthday over the summer. The economic data flow remains solid overall and classic recession catalysts like an overheating economy are not rearing their heads. The good news is that expansion do not die of old age and the outlook calls for ongoing growth. However, expansion do tend to die due to bad behavior and policy mistakes. As such, the risk of recession is clearly rising in recent months. Revisions to both GDP and employment reveal a weaker and slower-growing economy than previously believed. The trade war escalation is spilling over and weighing on the economy to a larger degree as well. Businesses are wary as they delay investments and slow their pace of hiring. All of this has financial markets on edge and the Federal Reserve taking out insurance rate cuts in hopes of heading off a recession. Time will tell whether this is the top of the cycle or just a rough patch.

Oregon continues to see healthy rates of economic growth, however the state is no longer outpacing the rest of the country to the same degree as earlier in the expansion. The state is not immune to national and international developments. While topline manufacturing indicators in the state look good, cracks may be forming due to the trade war. All told, Oregon continues to hit the sweet spot for now. Growth is strong enough to keep up with an increasing population and deliver economic and income gains to Oregonians. The share of working-age residents with a job is higher than the average state and both wages and overall household incomes continue to rise at a faster rate.

During odd-numbered years, Oregon's September revenue forecast provides a look back at the biennium that just came to a close. Unlike the nationwide economic expansion, Oregon's revenue picture has yet to show any cracks. Through the end of the 2017-19 biennium, all major types of Oregon's General Fund tax collections continued to outstrip gains in the underlying economy.

The strong growth at the end of the biennium resulted in an increased estimate of the kicker refund. The personal income tax kicker is now expected to be $1.57 billion, making it the third largest as a share of liability on record. Kickers of this size occur about once every decade, typically around the peak of the business cycle. As was the case with the large kicker generated during the mid-1980's, changes in federal tax policy played a large role in generating above-trend state collections last biennium.

All told, the September forecast reflects a stable economic outlook, with the expected size of General Fund collections increasing slightly over what was expected at the Close of Session. Total available resources have increased around $300 million, largely due to a bigger beginning balance carryforward.

However, when tax policy changes from the 2019 legislative session are factored in, the General Fund is expected to be significantly smaller over the forecast horizon than what was expected in May. Most notably, the enactment of a Corporate Activity Tax (HB3427) brought with it personal tax rate cuts, and is expected to reduce business tax liability. While the Corporate Activity Tax will clearly be a net positive for the state budget as a whole, it will reduce General Fund resources since the new collections will not be deposited there.

Heading into the new biennium, uncertainty about the performance of the nationwide economy has become paramount. Growth will certainly slow to a sustainable rate in the coming years, but the path taken to get there is unknown. Fortunately, Oregon is better positioned than ever before to weather a revenue downturn. Automatic deposits into the Rainy Day Fund and Education Stability Fund have added up over the decade-long economic expansion. When the expected ending balance for the current biennium is included, Oregon has more than $2.5 billion in reserves set aside, amounting to more than 12% of the two-year budget.

ECONOMIC OUTLOOK

Economic Summary

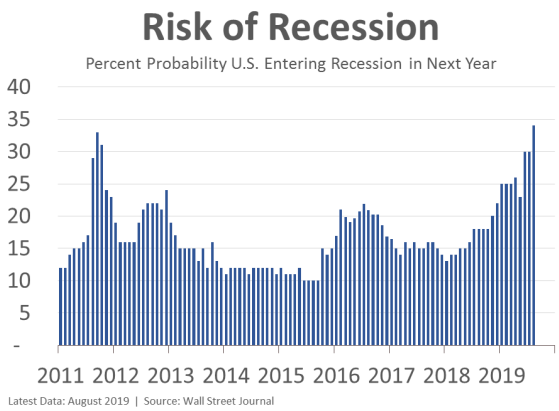
The current expansion is now the longest on record, celebrating its tenth birthday over the summer. The economic data flow remains solid overall and classic recession catalysts like an overheating economy are not rearing their heads. The good news is that expansion do not die of old age and the outlook calls for ongoing growth. However, expansion do tend to die due to bad behavior and policy mistakes. As such, the risk of recession is clearly rising in recent months. Revisions to both GDP and employment reveal a weaker and slower-growing economy than previously believed. The trade war escalation is spilling over and weighing on the economy to a larger degree as well. Businesses are wary as they delay investments and slow their pace of hiring. All of this has financial markets on edge and the Federal Reserve taking out insurance rate cuts in hopes of heading off a recession. Time will tell whether this is the top of the cycle or just a rough patch.

Oregon continues to see healthy rates of economic growth, however the state is no longer outpacing the rest of the country to the same degree as earlier in the expansion. The state is not immune to national and international developments. While topline manufacturing indicators in the state look good, cracks may be forming due to the trade war. All told, Oregon continues to hit the sweet spot for now. Growth is strong enough to keep up with an increasing population and deliver economic and income gains to Oregonians. The share of working-age residents with a job is higher than the average state and both wages and overall household incomes continue to rise at a faster rate.

U.S. Economy

The economic outlook remains intact for now, but risks are mounting. While the current expansion celebrated its tenth birthday over the summer, making it the oldest on record for the U.S., recent data revisions reveal a weaker and slower-growing economy than previously believed. Updated GDP figures show growth peaking in early 2018, slowing since then, and currently growing around its potential. The economic impact of the federal fiscal stimulus – tax cuts and increased spending – was smaller and shorter-lived than economists expected, and those initial expectations were minimal outside of a near-term boost to consumer spending. Similarly, the 2018 acceleration in job growth nationwide is set to be revised away, revealing an improving labor market but one that is closer to treading water than one beyond full employment.

Overall the underlying economic backdrop remains solid, even if it is weakening. Classic recession catalysts, like an overheating economy, financial imbalances, oil shocks, and the like are not rearing their heads either. However, the risk of recession is clearly rising.



Expansions do not die of old age but due to bad behavior and policy mistakes. The ongoing escalation of the trade war has businesses wary and financial markets spooked. While the baseline outlook calls for continued growth, concerns remain over potential policy mistakes. In real time, the Federal Reserve is trying to adjust monetary policy, which is a powerful, but blunt tool, to account for shifting administrative and fiscal policies. Whether or not the Fed can thread the needle and keep the expansion going is the key question.

In terms of the trade war, it is not necessarily the direct effect of the tariffs that will send the economy into recession. To date the increases in prices to American businesses and consumers amount to a couple tenths of a percent of GDP, although that number is set to head higher in the coming months given recent escalation. That said, it is really the broader impact of what the tariffs represent: an ongoing dispute between the world's two largest economies with few signs of agreement or de-escalation.

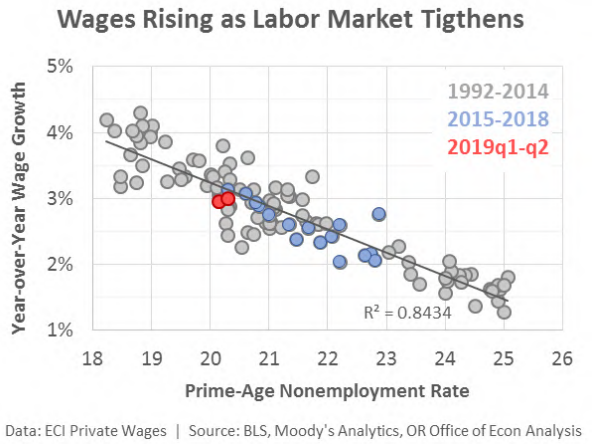
The spillover effects of the trade war are weighing on the economy. The combination of a strong U.S. dollar, slowing global growth, and a weak manufacturing sector is at least in part due to the tariffs and trade tensions. Business behavior reveals them to be wary as investment in structures and equipment is weak, and their pace of hiring is slower. If enough firms delay investment or pull back at the same time, it slows economic growth and can even cause a recessionary dynamic. The U.S. is not there yet, but it remains a risk today.

All of this has financial markets on edge. Equities, while volatile, are largely unchanged over the past year, but it's the bond market signaling the largest cause for concern. The yield curve is at least partially inverted, and nearly fully inverted – meaning short-term interest rates are higher than long-term rates. An inversion is not necessarily causal by itself, although banks may curtail lending given they borrow short and lend long. That said, the signal from an inverted yield curve has long been a reliable leading indicator of a recession in so far as the bond market sees economic weakness and expect the Federal Reserve to cut interest rates.

This is exactly the economic environment the U.S. is in today. However the policy dynamics are a bit different this time. Typically, the Fed has continued to raise interest rates after a yield curve inversion. The flow of economic data remains solid at the top of the business cycle and the Fed is more worried about inflation.

Today, however, the Fed has already cut interest rates and expects to do so again, even as the data flow remains solid overall. These cuts can largely be viewed as insurance against the risk of a weakening expansion due to the decelerating growth, trade policy uncertainty and low levels of actual inflation. The cuts can be thought of as prudent risk management. In fact, one way to read the bond market is that the inversion of the 10 year – 3 month spread but not generally the 10 year – 2 year spread is that the market believes the Fed will cut interest rates sufficiently to head off a recession. Time will tell whether this fundamental shift in Fed policy will be enough for a continued expansion or if the yield curve inversion remains a reliable indicator of recession.

Finally, it is important to remember that behind the financial market turmoil and trade uncertainty remains an economy that is largely doing well. U.S. consumer spending is holding up as the labor market remains strong; job opportunities and wages continue to grow. Additionally, households currently have a solid savings rate and the increases in debt remain in-line with income gains.



Now, consumer spending is more of a concurrent or even a lagging indicator of the economy. Households will spend until given a reason to be scared. The scariest prospect is job loss. However, labor market leading indicators continue

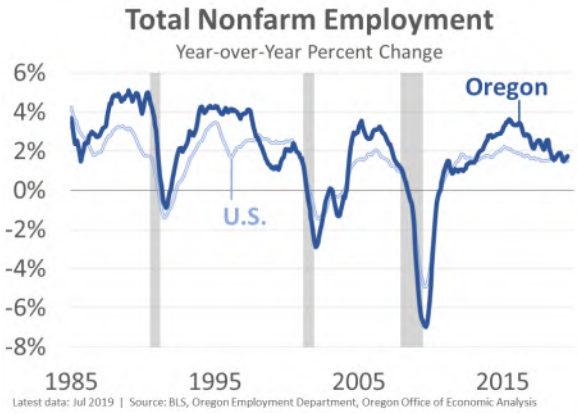
to largely flash green, particularly as initial claims for unemployment insurance – a measure of layoffs – remain near historic lows.

The concern is that should firms pull back further on hiring and unemployment rises, then expectations are that consumer spending will weaken as household confidence wanes. Another risk for spending is that the latest escalation of the trade war will impact consumer products the most and those higher prices will curb household spending. At that point, a vicious, recessionary cycle can take hold as consumers pull back, giving firms even more reason to be wary, delay investments and lay off workers.

Bottom Line: The U.S. economy remains in expansion and the baseline outlook calls for continued, albeit slower, growth. However the risk of recession is clearly rising. The typical catalysts for recession are not rearing their heads but the ongoing and escalating trade tensions are weighing on the economy and business activity. Expansions do not die of old age, but rather due to policy mistakes. All of this has financial markets spooked and the Federal Reserve taking out insurance rate cuts in hopes of heading off a recession. Time will tell whether this is the top of the cycle or just a rough patch. It's important to remember that the U.S. does not know what the eleventh year of an economic expansion looks like as we have never experienced one. The expansion has now entered into uncharted and choppy waters.

Oregon Economy

Oregon continues to see healthy rates of growth when it comes to employment, income, and GDP. However the state is no longer significantly outpacing the nation like it was a couple years ago. While local job gains are effectively matching the average state in recent quarters, we know forthcoming U.S. revisions will widen the gap a bit.



Personal income growth remains stronger, meaning Oregon income per capita, per worker, and per household is rising faster than nationwide. This is a continuation of the so-called sweet spot where economic growth is strong enough to keep up with the growing population but also deliver ongoing gains to Oregonians. This pattern of growth is expected to continue until the next recession, whenever it comes.

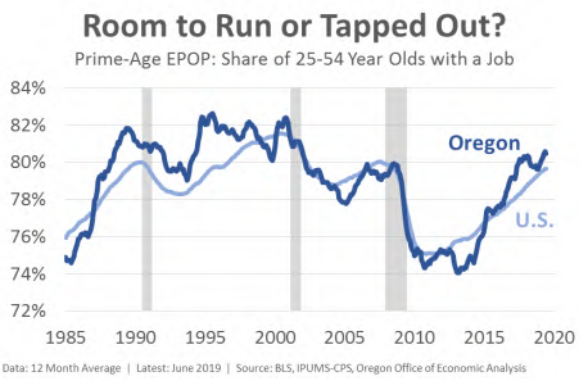
The slower pace of job gains today is not unexpected. To date it appears that the slower net employment growth is due to higher employment rates among working-age Oregonians, increasing Baby Boomer retirements, and slower in-migration in a mature expansion. Unemployment is not increasing, and new entrants into the labor market represent the largest share of Oregonians currently unemployed. Overall the slowing in Oregon job growth appears to be for good economic reasons.

Like the nation overall, the Oregon economic outlook calls for ongoing, but slower growth from today's relatively strong vantage point. This has a few different implications for firms and households.

Businesses face a combination of issues. First, sales will continue to grow. Firms will need to invest and hire to chase those increasing sales, market share, and profits. Second, however, the pace of those sales increases will be slower. Migration and job growth are tapering in a mature expansion, meaning there will be more potential customers but the increases next year will be smaller than this year. Third, the increased uncertainty regarding the economic outlook may have firms wary of investing and hiring as they may be less confident they can recoup

the fixed costs of expanding if the underlying sales do not materialize. Firms, as always, need to find the right balance. Fourth, businesses continue to face a relatively tight labor market in which attracting and retaining workers remains a key issue. To fill positions, firms must compete on price and also continue to cast a wider net and to dig deeper into their resume stacks to find candidates they may have previously passed over in a different labor market.

For households, a slowing economic outlook still brings good news, although a recession clearly does not. For Oregonians not working today, there has not been this strong of a labor market since the late 1990s. Job openings remain plentiful and firms are more willing to overlook incomplete skill sets or gaps on resumes in order to hire and expand. Now, a strong economy cannot overcome structural mismatches in terms of skills or geography, but it does ease cyclical and frictional reasons for unemployment. For those already working, a tighter labor market raises wage growth. The outlook calls for 4 percent average wage growth per year, similar to what Oregon has experienced in recent years.

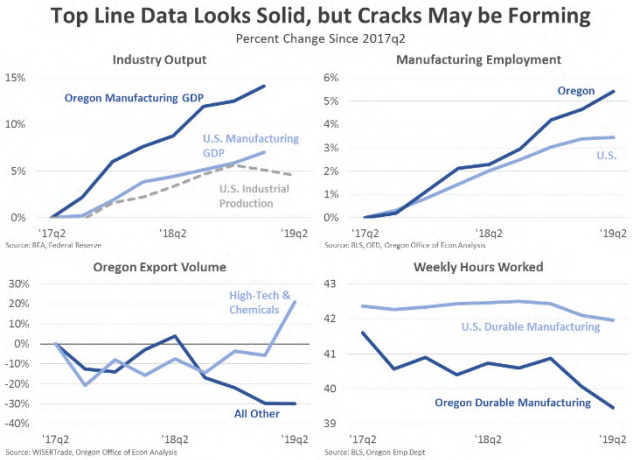


Now, overall household income growth is expected to slow even if per worker wage growth remains strong. The reason is that household incomes, at least for those in the middle of the distribution, are largely about whether or not a household member is working, how many hours they are working, and then their hourly wage. Even if the latter two items remain strong, and expectations are they will be, the slowdown in job growth overall will likely translate into relatively smaller increases in household income as most members of working-age households already have a job. Going from no job to any job is usually a bigger increase in income than going from a part-time job to a full-time job. That said, the strong labor market should continue to result in strong income gains from those in the lower parts of the distribution.

Note: The 2018 American Community Survey data will be released in late September. It will likely show further statewide improvements in terms of rising income, falling poverty, and the like. Our office will highlight the newest Census data in the December forecast.

Oregon and the Trade War

The combination of a strong U.S. dollar, slowing global growth, and escalating trade tensions is weighing on the economy. However, so far the direct impacts of the trade war have yet to really affect top line data here in Oregon. Specifically, manufacturing output and employment are holding up and outpacing national figures. This is undoubtedly good news and contributes to Oregon's stronger overall growth.

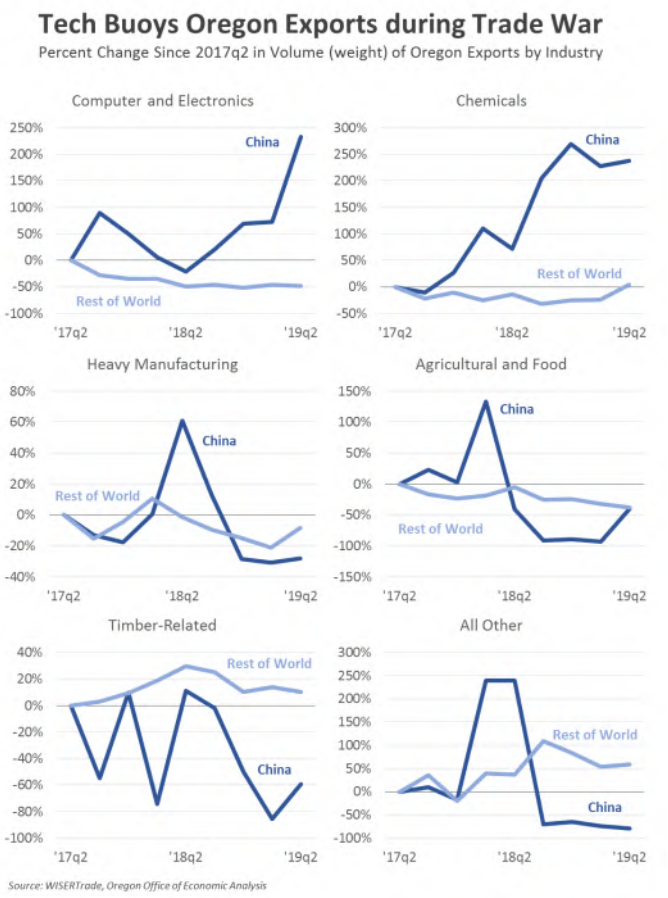


Nevertheless, upon a deeper dive, cracks are beginning to form just a bit. Weekly hours worked in manufacturing are dropping quickly so far in 2019, with Oregon's decline more than twice the nation's. This gap between ongoing employment gains and fewer hours worked per employee is not sustainable. Some of it may

be noise in the data, however, given the entire situation, our office's outlook calls for few manufacturing job gains over the forecast horizon.

Furthermore, while Oregon exports are down over the past year or two, they are holding up relatively well when compared to other states. This is in large part due to a few, isolated increases masking weakness elsewhere in the data.

In particular, Oregon exports to China are surging due to increases in computer and electronic products and chemicals[1]. So far these have not been impacted by the tariffs which would likely dampen export activity. Additionally it is an open question as to whether these increases represent new growth opportunities or firms trying to get ahead of any potential escalation in the trade war. The fact that these exports are likewise not surging to the rest of the world suggests it is more the latter than the former. Another issue to consider is that Oregon tech exports, to a large degree, represent within firm shipments and more closely follow technology product development cycles than the ebbs and flows of global demand.



That said, when looking at other sectors, exports to both China and the rest of the world are down in recent years. There have been isolated increases in both machinery and wheat to China in early 2018, but these are outliers and could represent products being shipped in advance of future trade issues. Note that the decline in timber and related exports to China is more pronounced in recent years, however if one were to extend the chart back to when Russian log tariffs were reduced, export trends would be more comparable in the big picture.

In terms of state level impacts, the International Monetary Fund recently modeled various U.S. – China trade scenarios[2] and found that Oregon ranks toward the middle of the pack across states. This is largely due to the fact that while Oregon exports a lot to China, the state is less exposed to the sectors most impacted by the trade dispute. Namely these include auto manufacturing and mining and extraction. The one exception being agriculture, where Oregon does see more exposure than many states and those exports are currently down.

In recent discussions, the Governor's Council of Economic Advisors highlighted the difference in the outlook or cause for concern in commodities versus specialized products. To the extent that commodity exports are down

[1] It has been reported that much of the increase in Oregon chemical exports in the past decade is actually Canadian potash that is railed to Oregon before being exported to Asia. This activity supports trade-related jobs in the state, but these export figures overstate the economic impact of the industry.

[2] https://www.imf.org/en/Publications/WP/Issues/2019/07/03/Trade-Wars-and-Trade-Deals-Estimated-Effects-using-a-Multi-Sector-Model-46964

then U.S. exporters can and will need to find other international markets to sell their goods. Additionally, given the recent Chinese retaliation of not buying any U.S. agricultural products, these adjustments will clearly need to be accelerating and ongoing in order to avoid further declines in export activity.

On the other side, it can be even more difficult to establish new markets and find new customers for specialized or niche products and services as they are not as interchangeable as commodities. As such, it will likely take more time for global trade patterns to shift for these customized products.

Finally, most economic data is available through early summer and the trade war escalation is more recent. It is reasonable to expect these cracks to widen as the data begins to catch up to ongoing developments.

Oregon's Labor Market

The Office of Economic Analysis examines four main sources for jobs data: the monthly payroll employment survey, the monthly household survey, monthly withholding tax receipts and the quarterly census of employment and wages. Right now all four measures of the labor market are improving. Jobs are being added, albeit at a slower rate. Wages are rising, both in aggregate and for each worker. The unemployment rate is holding steady and remains under what would historically be considered full employment for Oregon, although the share of prime working-age Oregonians without a job indicates there is room for further improvement.

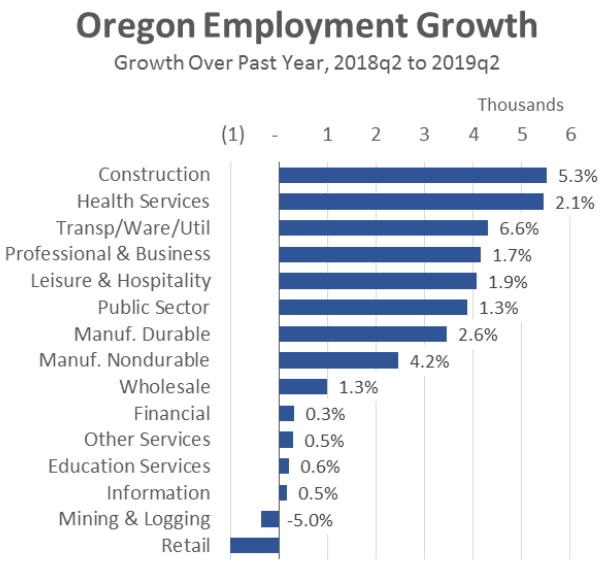
While the headline unemployment rate is relatively unchanged in the past year, the underlying dynamics behind its modest rise and fall during this time are worth monitoring. From the fall through the spring, labor force growth was outpacing employment gains, leading to a rising unemployment rate. However, in recent months employment has held steady in the household survey while the labor force participation rate has dropped, leading to a lower unemployment rate. Provided such trends are not revised away – a very real possibility given recent years' revisions – it would signal economic weakening. Given the preliminary, or unbenchmarked nature of the data, there is no real cause for concern today but these trends are worth keeping a close eye on.

More importantly, wages in Oregon remain strong, although different measures of wages have diverged a bit in recent years. Withholding out of Oregonian paychecks continue to outstrip other measures of economic wages. This gap is larger than it has been historically. It is also seen across nearly all industries and not confined to a particular sector or two. Our office and the Department of Revenue continue to research the topic. One item impacting these trends is the increase in withholding out of retirement accounts (pensions and IRA distributions). Given the increase in retirements and stock market returns, such withholdings are an increasing share of all withholding in the state, but are not directly tied to the labor market. Even so, wage growth for Oregon workers

remains strong. Oregon's average wage, while lower than the nation's, is at its highest relative point since the mills closed in the 1980s.

Overall, getting a handle of the health of Oregon's labor market is being somewhat complicated by technical issues within the underlying payroll jobs data. For this reason the employment data in our office's forecast is adjusted for two important technical purposes: seasonality at the detailed industry level and the upcoming benchmark revisions[3]. Specifically, our office uses the benchmarked, or revised employment data through 2018q3 and imputes the 2018q4 through 2019q2 employment data based upon the available preliminary Oregon estimates, national data, and our office's economic forecast model. As such, for this quarterly forecast, the first pure forecast period is 2019q3.

In the second quarter, total nonfarm employment increased 1.8 percent over the past year. Growth was led by the private sector at 1.9 percent, while the public sector increased 1.3 percent. These rates of growth are a clear step down from the full-throttle rates seen a few years ago, however still remain fast enough to keep pace with population gains so far.



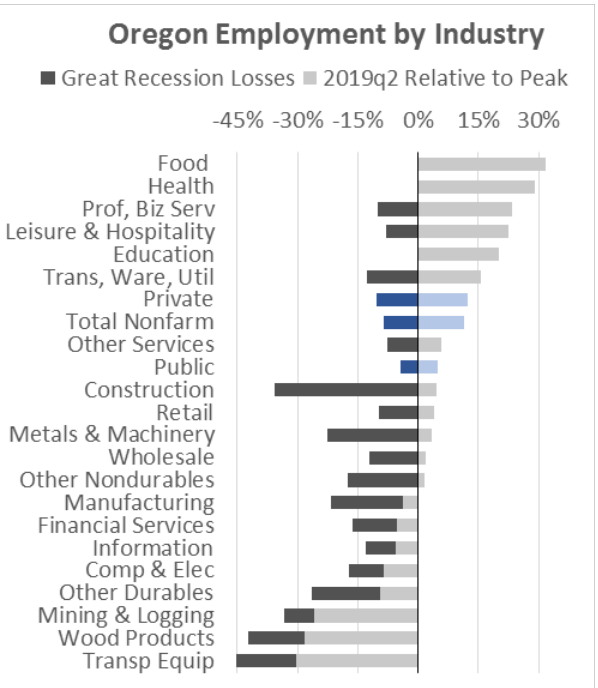
The nearby graph illustrates the number of job gains by major industry by the length of the bar. The percentage increase these changes represent is noted as well.

So far in recovery, the large service sector industries have generally led job growth in terms of the number of jobs added and with above-average growth rates. These include jobs in professional and business services, health services, and leisure and hospitality industries. These three industries have gained nearly 14,000 jobs in the past year and account for 40 percent of all job gains across the state. Now, given these industries account for 38 percent of all Oregon jobs, today they are increasing at a similar rate as the rest of the economy. Growth in the past year is being led to a larger degree by construction, manufacturing, and transportation, warehousing, and utilities.

[3] Each year the U.S. Bureau of Labor Statistics revise the employment data – a process known as benchmarking. The current establishment survey (CES), also known as the monthly payroll survey, is benchmarked against the quarterly census of employment and wages (QCEW), a series that contains all employees covered by unemployment insurance. The monthly CES is based on a sample of firms, whereas the QCEW contains approximately 96 percent of all employees, or nearly a complete count of employment in Oregon. The greatest benefit of the CES is the timeliness – monthly employment estimates are available with only a one month lag – and these estimates are reasonably accurate. However the further removed from the latest benchmark, the larger the errors. The QCEW is less timely as the data is released approximately 3-4 months following the end of the quarter. The greatest benefit of the QCEW is that is a near 100 percent count of statewide employment. For these reasons, the CES is usually used to discuss recent monthly employment trends, however once a year the data is revised to match the historical QCEW employment trends. The last month of official benchmark data is September 2018. The QCEW is currently available through March 2019, thus the preliminary benchmark used here covers the October 2018 – March 2019 period.

In terms of illustrating how each industry has fared over the Great Recession and so far in recovery, the second graph shows both the depths of recessionary losses[4] and where each industry stands today relative to pre-recession peak levels.

Currently, thirteen major industries are at all-time highs. Private sector food manufacturing, education, and health never really suffered recessionary losses – although their growth did slow during the recession. Professional and business services and leisure and hospitality have each regained all of their losses and are leading growth today. Over the past couple of years retail emploment, other services, transportation, warehousing and utilities, and construction, in addition to the public sector have surpassed their pre-recession levels and are at all-time highs. Additionally, wholesale trade and metals and machinery manufacturing have rully regained their recessionary losses. Most recently non-durable manufacturing excluding food is all the way back back; this growth is led by beverages (breweries), chemicals, and plastics and rubber. In total, the twelve private sector industries at all-time highs account for 71 percent of all statewide jobs. The public sector accounts for an additional 16 percent of all jobs.



With the Great Recession being characterized by a housing bubble, it is no surprise to see wood products, construction, mining and logging and financial services (losses are mostly real estate agents) among the hardest hit industries. These housing and related sectors are now recovering, although they still have much ground to make up. Transportation equipment manufacturing suffered the worst job cuts and is likely a structural decline due to the RV industry's collapse[5]. With that being said, the subsectors tied to aerospace are doing better and the ship and boat building subsector is growing again. Metals and machinery manufacturing, along with mining and logging, have shown the largest improvements since the depths of the recession.

Coming off such a deep recession, goods-producing industries exhibited stronger growth than in past cycles. While all manufacturing subsectors have seen some growth, they are unlikely to fully regain all of their lost jobs. The good news, certainly in the short-term, is that much of the manufacturing sector has returned to growth in the past year following declines a year or two ago. All told, Oregon manufacturers typically outperform those in other states, in large part due to the local industry make-up. Oregon does not rely upon old auto makers or textile mills. The state's manufacturing industry is comprised of newer technologies like aerospace and semiconductors. Similarly Oregon's food processing industry continues to boom[6].

[4] Each industry's pre-recession peak was allowed to vary as, for example, construction and housing-related industries began losing jobs earlier than other industries or the recession's official start date per NBER.
[5] http://oregoneconomicanalysis.com/2012/07/10/rv-workers-and-reemployment/
[6] https://oregoneconomicanalysis.com/2018/06/27/oregons-food-economy/

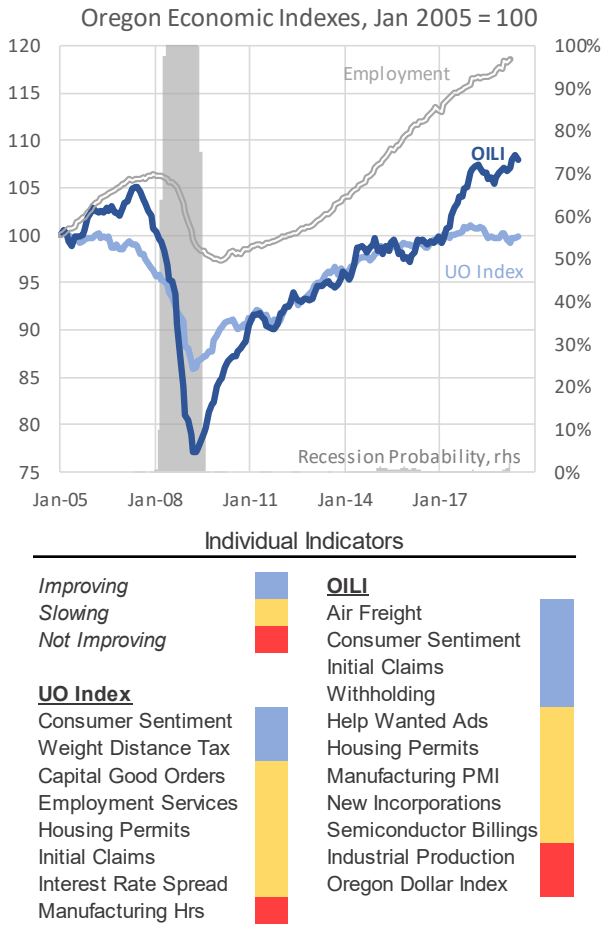
All told, each of Oregon's major industries has experienced some growth in recovery, albeit uneven. As the economy continues to recover there will be net winners and net losers when it comes to jobs, income and sales. Business cycles have a way of restructuring the economy.

For additional information on the most recent quarter's employment forecast errors, please refer to Table A.1 in Appendix A.

Leading Indicators

Over the past year both of the Oregon-specific composite leading indicators have largely moved sideways. In any given month about half of the individual indicators are positive and half are negative. Currently, if we step back and look at the bigger picture, the vast majority of indicators are still in expansion territory but clearly slowing down. This signals continued economic growth and not an impending recession, or at least not yet anyway.

In June there are only three clear indicators flashing red: U.S. industrial production, Oregon manufacturing hours worked, and the Oregon dollar index. As discussed earlier, the trade war is weighing on the data which is seen here as well. To date, manufacturing employment is growing but given that *leading* indicators are down suggests less growth moving forward.



All told the data flow and Oregon's leading indicators remain more of a mixed bag in the past year. Given that most U.S. data has firmed in recent weeks, with the exception being manufacturing for the most part, it is expected Oregon's data will also firm.

In general, economic forecasters see a heightened risk of recession so far in 2019 but are not altering their baseline forecasts accordingly. They are acknowledging the risks, however. University of Oregon professor Jeremy Piger has created a real time probability of recession[7] model, and finds there is a 0.9 percent chance the U.S. has entered into a recession. However, another recession will come, of that we can be sure. IHS Markit puts the probability of recession in the next year at 35 percent, while the Wall Street Journal Economic Forecasting Survey puts it at 34 percent.

Hopefully Oregon's leading indicators will give a signal in advance of the next recession, which neither is doing today. While past experience is no guarantee of future performance, Oregon's leading indicator series do have a good track record in their relatively brief history. Both series flattened out in 2006 and began their decline in advance of the Great Recession. Similarly both Oregon series reached their nadir in March 2009, a few months

[7] http://pages.uoregon.edu/jpiger/us_recession_probs.htm/

before the technical end of the recession (June 2009 per NBER) and about 9 months in advance of job growth returning to Oregon.

Short-term Outlook

While Oregon's economic expansion continues, growth has slowed and stabilized. In recent years, the state has enjoyed robust, full-throttle rates of job gains in the 3-3.5 percent range, or nearly 5,000 jobs per month. No longer is this the case. Oregon is expected to continue to see healthy job gains – a bit more than 2,000 per month or about 2 percent over this year and into 2020 – but the state is now past its peak growth rates for this expansion. Importantly, such gains remain strong enough to hold unemployment down and account for ongoing population growth.

After these near-term job gains, supply side constraints and longer-run demographic trends weigh on growth to a larger degree. These supply side constraints include a tighter labor market, infrastructure, energy costs, capacity utilization and the like. The large wave of retiring Baby Boomers will weigh on job growth rates for the coming decade. There will be enough jobs overall, as the generational churn is hidden underneath the labor market's surface.

The general characteristics of the current forecast remain the same as in recent quarters although total personal income and employment are revised up slightly over the medium- and long-run.

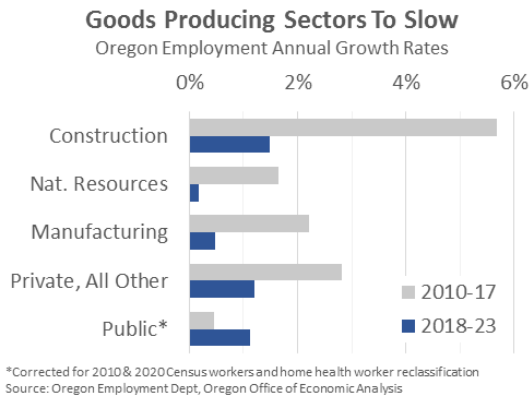
Economic Forecast Summary

		Quarterly					Annual				
		2019:2	2019:3	2019:4	2020:1	2020:2	2018	2019	2020	2021	2022
Personal Income, Nominal	U.S.	5.0	4.7	4.4	4.9	4.8	4.4	4.1	4.7	4.5	4.3
% change	Oregon	6.3	5.8	5.7	5.2	5.5	5.0	5.4	5.5	5.2	5.0
Wages and Salaries, Nominal	U.S.	3.5	4.3	4.7	4.7	4.9	4.3	3.7	4.5	4.5	4.5
% change	Oregon	5.5	6.7	6.0	5.8	6.2	5.1	5.3	5.9	5.4	5.1
Population	U.S.	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7
% change	Oregon	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.1
Housing Starts	U.S.	1.26	1.21	1.21	1.21	1.21	1.25	1.22	1.22	1.24	1.28
U.S. millions, Oregon thousands	Oregon	21.6	21.8	21.9	22.2	22.4	19.7	21.5	22.5	23.4	24.0
Unemployment Rate	U.S.	3.6	3.5	3.5	3.6	3.6	3.9	3.6	3.7	3.9	4.1
	Oregon	4.2	4.4	4.4	4.4	4.4	4.1	4.3	4.4	4.7	4.9
Total Nonfarm Employment	U.S.	1.2	1.2	1.1	1.1	1.5	1.7	1.5	1.0	0.6	0.5
% change	Oregon	1.4	2.4	1.9	1.7	2.1	2.0	1.8	1.8	1.3	1.0
Private Sector Employment	U.S.	1.4	1.4	1.1	1.0	0.7	1.9	1.7	1.0	0.7	0.4
% change	Oregon	1.5	2.5	2.1	1.7	1.5	3.3	1.8	1.8	1.4	1.0

There is one categorical change made to the forecast, which is to switch the inflation variable to the Consumer Price Index for All Urban Consumers, West Region (All Items) to align with HB 2118 (2019). For most of our office's history, we used the Portland-Salem CPI however in 2018 the Bureau of Labor Statistics stopped publishing that series due to budget cuts and realigning their work products. Portland is now the largest metropolitan area in the nation without its own CPI. BLS is still collecting local data but not publishing local estimates. HB 2118 standardizes inflation calculations throughout statute and our office is now forecasting the same inflation metric.

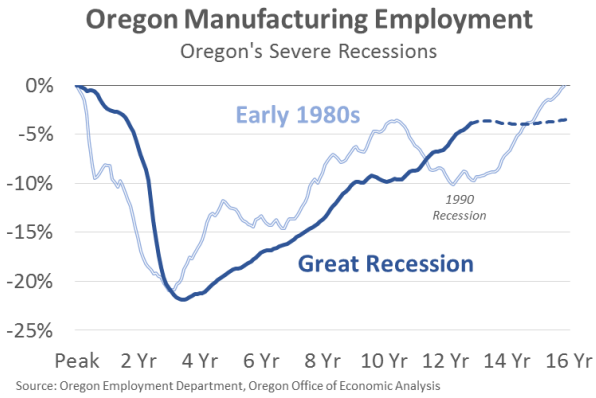
Private sector growth, measured by the number of jobs created, will be dominated by the large, service sector industries like professional and business services, leisure and hospitality and health.

Nevertheless, goods-producing industries, while smaller, had previously been growing at above-average rates. Expectations in recent forecasts have been that these goods-producing industries would slow. Growth over the next few years would be considerably less than that seen in the past few years.

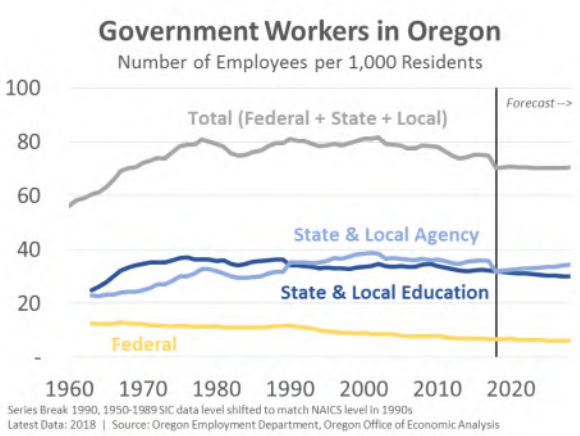


Even construction is expected to add jobs at a slower pace even as the housing rebound continues. This is in part due to the fact that growth must cool off after the exceptionally strong gains in construction in recent years. Additionally construction employment growth has far outpaced increases in new home construction. One side effect of this pattern is that productivity within the construction industry is declining. More workers producing fewer units of new housing or remodel activity means industrywide productivity is lower today than a decade or two ago. This is evident in the national data as well and is something researchers continue to dig into. No consensus has been reached as of yet.

Manufacturing is expected to see growth, albeit very slow growth in the coming years. This growth will be strongest among the state's food processors, and beverage manufacturers, predominantly breweries. That said, any further global weakening or strengthening of the dollar will weigh further on the outlook. Oregon as a whole is not expected to fully regain all of its Great Recession related manufacturing job losses. That said, both the Portland and Medford metro regions have fully regained their losses. Nationwide about 1 out of 5 metros have done so as well.



Public sector employment at the local, county and state level for both education and non-education workers is growing in Oregon, as state and local revenues continue to improve along with the economy. Over the forecast horizon, government employment is expected to grow roughly in line with population growth and the increased demand for public services, albeit just a hair faster than population growth alone. One public sector risk to the outlook is PERS. The extent to which government hiring by local and state entities is impacted in the coming years as contributions increase is unknown.



Along with an improving labor market, stronger personal income gains are here, although tax law changes have pushed around growth rates in the recent past (see the expiring Bush tax cuts and the fiscal cliff) and may do so again moving forward. Personal income is forecasted to grow 5.4 percent in 2019, picking up to 5.5 percent in 2020 and then tapering thereafter to 5.2 percent in 2021, 5.0 percent in 2022 and 4.7 percent in 2023.

As the economy continues to improve, household formation is increasing too, which will help drive up demand for new houses. Household formation was suppressed earlier in the recovery, however the improving economy

and increase in migration have returned in full force. Even as more young Oregonians are living at home, as the Millennials continue to age into their late-20s through their mid-30s, demand for housing will increase as well. In fact, given the underlying demographics, household formation should outpace overall population growth in the coming years.

Housing starts to begin the year have totaled just over 21,000 at an annual pace, which is about the level of of Oregon's long-run average, at least prior to the housing bubble. The outlook calls for a few more gains as housing production increases to meet demand. Starts will total 21,500 in 2019, and increase to 22,300 in 2020. Over the extended horizon, starts are expected to average around 24,000 per year to meet demand for a larger population and also, partially, to catch-up for the underbuilding that has occurred in recent years.

A more complete summary of the Oregon economic outlook and forecast changes relative to the previous outlook are available as Table A.2 and A.3 in Appendix A.

Forecast Risks

The economic and revenue outlook is never certain. Our office will continue to monitor and recognize the potential impacts of risk factors on the Oregon economy. Although far from comprehensive, we have identified several major risks now facing the Oregon economy in the list below:

- U.S. Economy. While Oregon is more volatile than the nation overall, the state has never missed a U.S. recession or a U.S. expansion. In fact, Oregon's business cycle is perfectly aligned with the nation's, at least when measuring peak and trough dates for total nonfarm employment. If anything, Oregon actually leads the U.S. by a month or two. The fact that there are more worrisome trends or risks at the U.S. level means there should be concerns about the Oregon outlook. Should the U.S. fall into recession, Oregon will too. That said, should the U.S. economy accelerate, Oregon's economy should receive a similar boost as well.
- Housing affordability. Even as the housing market recovers, new supply has not kept up with demand (both from new households and investor activity). This applies to both the rental and ownership sides of the market. As such, prices have risen considerably and housing (in)affordability is becoming a larger risk to the outlook. Expectations are that new construction will pick up a bit in the next year or three, to match the increase in demand, which will alleviate some price pressures. However to the extent that supply does not match demand, home prices and rents increasing significantly faster than income or wages for the typical household is a major concern. While not included in the baseline outlook, significantly worse housing affordability may dampen future growth as fewer people can afford to move here, lowering net in-migration and the size of the labor force.
- Global Spillovers Both Up and Down. The international list of risks seems to change by the day: a hard Brexit, sovereign debt problems in Europe, equity and property bubbles in places like Canada, South America and Asia, political unrest in Hong Kong, the Middle East and Venezuela, nuclear arsenal concerns with North Korea, and commodity price spikes and inflationary pressures in emerging markets. In particular, with China now a top destination for Oregon exports, the state of the Chinese economy – and its real estate market, or public debt burden – has spillover effects to the Oregon economy. Any economic slowing, or deteriorating relations in or with Asia is a potential threat to the Pacific Northwest.

- Federal fiscal policy. The uncertainty regarding federal fiscal policy remains a risk. Some policies are likely to impact Oregon than the typical state, while others maybe not as much. The good news for Oregon is that outside of outright land ownership, the federal government has a relatively small physical presence in the state. This means that direct spending reductions are less likely to hurt Oregon. Of course, it also limits the local benefit from any potential increases in federal spending, as was recently passed by Congress. In terms of federal grants as a share of state revenue, Oregon ranks 29th highest. For federal procurement as a share of the economy, Oregon ranks 48th highest. Oregon ranks below average in terms of military-dependent industries as well. The one area that Oregon ranks above average is in terms of direct federal employment, ranking 19th highest among all states. Oregon also is exposed to an above-average share of federal transfer payments to households. Transportation funding is also a major local concern. Overall, the direct impact may be less than in other states but the impact will be felt nevertheless, particularly as our closest neighboring states have large federal and military workforces.
- Climate and Natural Disasters. Weather forecasting is even more difficult than economic forecasting a year or two into the future. While the severity, duration and timing of catastrophic events like earthquakes, wildfires and droughts are difficult to predict, we do know they impact regional economies. Fires damage forests and tourism. Droughts in particular impact our agricultural sector and rural economies to a larger degree. Whenever Cascadia, the big earthquake, hits, we know our regional economy and its infrastructure will be crippled and in need of immediate repairs. Some economic modeling suggests that Cascadia's impact on Oregon will be similar to Hurricane Katrina's on New Orleans. Longer-term issues like the potential impact of climate change on domestic migration patterns are likewise hard to predict and outside our office's forecast horizon. There is a reasonable expectation that migration flows will continue to be strong as the rest of the country becomes less habitable over time.
- Commodity price inflation. Always worrisome is the possibility of higher oil (and gasoline) prices. While consumer spending has held up pretty consistently in this recovery, anytime there is a surge in gas prices, it eats away at consumers' disposable income, leaving less income to spend on all other, non-energy related goods and services. This impact is certainly more muted today[8], but a risk nonetheless.
- Federal timber policy and transfers impact regional economies and local governments. Reductions in public employment and services are being felt in the impacted counties in recent years and decades. For more information from a historical perspective, see two recent blog posts, here and here[9].
- Initiatives, referendums, and referrals. Generally, the ballot box and legislative changes bring a number of unknowns that could have sweeping impacts on the Oregon economy and revenue picture.

[8] https://oregoneconomicanalysis.com/2018/11/08/oregons-energy-intensity-and-household-spending/
[9] http://oregoneconomicanalysis.wordpress.com/2012/01/23/historical-look-at-oregons-wood-product-industry
http://oregoneconomicanalysis.wordpress.com/2013/05/28/timber-counties/

Alternative Scenarios

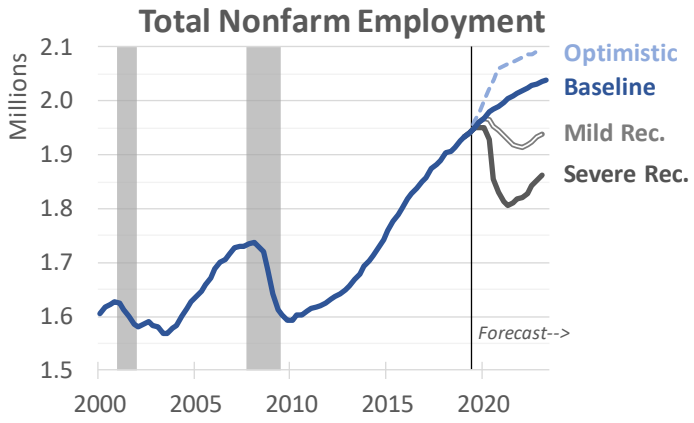
The baseline forecast is our outlook of the most likely path for the Oregon economy. As with any forecast, however, many other scenarios are possible. In conjunction with the Legislative Revenue Office, this forecast provides three alternative scenarios, which are modeled on growth patterns over previous business cycles.

Optimistic Scenario:

The expansion is able to gather steam as the trade tensions and manufacturing weakness fade and recede into the rearview mirror of history. The U.S. economy builds momentum into 2020. The economy is soon firing on all cylinders, resulting in faster productivity growth which raises the speed limit of overall gains. Wages and incomes increase likewise increase at a faster rate. All of this results in stronger consumer spending and more business investment.

In Oregon, job gains are broad based with strong growth in all private sector industries. The unemployment rate remains lower than under the baseline scenario as individuals are able to find employment more readily and income growth accelerates. The labor force participation gap closes and even turns positive as more Oregonians enter the labor market. The increase in employment and income support a self-sustaining economic expansion in which new income fuels increased consumer spending (and debt reduction) which begets further increases in employment. Such an expansion increases housing demand as newly employed households (and increasing income for existing households) find their own homes after doubling-up with family and friends during the recession. This results in new construction returns to normal levels about a year earlier than the baseline.

Alternative Scenarios **Sep 2019**



	2019	2020	2021	2022
Employment				
Baseline	1.8%	1.8%	1.3%	1.0%
Optimistic	2.1%	4.0%	2.0%	0.8%
Mild Recession	1.8%	0.6%	-1.7%	-0.1%
Severe Recession	1.6%	-2.7%	-4.2%	1.3%
Personal Income				
Baseline	5.4%	5.5%	5.2%	5.0%
Optimistic	6.8%	8.6%	6.0%	4.7%
Mild Recession	5.4%	4.2%	2.3%	4.8%
Severe Recession	5.4%	0.7%	-0.9%	6.2%

Mild Recession Scenario:

The slowdown in economic growth and increased trade tensions carry over and escalate. Financial markets remain spooked and the yield curve remains inverted. Real estate prices correct and the housing market stall worsens, removing one potential driver of growth. Strained trade relations result in falling exports, business confidence tumbles and so does capital spending. The U.S. dollar strengthens further, chocking off the manufacturing cycle entirely. These factors are enough weight on the recovery that by early-2020 the economy slides back into recession. Job losses ensue and while not severe – about 52,000 jobs in Oregon when it is all said and done – it takes a toll on business income, housing starts and personal income. The unemployment rate returns to nearly 8 percent. The net effect of the mild recession is an extended period of prolonged economic

weakness, not unlike Japan's so-called Lost Decade(s). Although inflation is expected to remain positive, a key difference.

Severe Recession Scenario:

After expanding for 10 years at relatively lackluster growth rates, the U.S. economy falls back into recession. Industrial production declines and the slower personal income growth in the U.S. worsens. Strained trade relations develop into an all-out trade war. The Fed, already lacking in traditional monetary policy ammunition, is not able to stave off such an impact. While the catalyst may be different, the economic effect is similar to late 2008 and early 2009, although not quite as severe when the dust settles. This is little comfort when the unemployment spikes back to 10 percent and more than 145,000 Oregonians lose their jobs by early-2021.

Besides the domestic economic headwinds and Federal Reserve tightening, the likely culprit in this scenario is either a meltdown of the financial markets sparked by some geopolitical shock, or quickly rising inflation. Economic growth in the U.S., while fairly steady as of late, is not nearly strong enough to withstand an external financial shock of this magnitude, nor a Federal Reserve quickly raising rates to fight inflation. Further economic effects of a recession this size are personal income losses of around 5 percent, about three-quarters the size of the Great Recession losses in Oregon. Housing starts plummet to near historical low levels of construction and home prices decline further. On the bright side, when construction does rebound, it will result in a surge of new home building that will rise above the state's long term average level of building due to pent-up demand for housing and that the state will have under built housing during this time period.

Extended Outlook

IHS Markit projects Oregon's economy to fare well relative to the rest of the country in the coming years. The state's Real Gross State Product is projected to be the nineteenth fastest among all states across the country in terms of growth with gains averaging 1.9 percent from 2019 through 2024. Total employment is expected to be the tenth strongest among all states at an annualized 0.9 percent, while manufacturing employment will be the second fastest in the country at 0.4 percent. Total personal income growth is expected to be 4.7 percent per year, the eighteenth fastest among all states, according to IHS Economics.

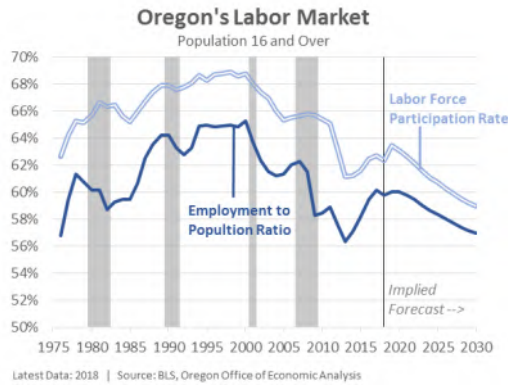
Our office is equally, if not more bullish in terms of Oregon's relative growth prospects. Much of Oregon's advantage comes from population growth, specifically the ability to attract and retain young, working-age households. Our office expects population growth to average 1.1 percent over the next handful of years. Recently, IHS lowered their forecast for Oregon population growth to 0.9 percent over the same time period. These differences are not immaterial. It amounts to a 5 year difference of nearly 50,000 Oregonians of which between two-thirds and three-fourths would be among the working-age population. As such, our overall economic outlooks have diverged just a bit.

OEA has identified three main avenues of economic growth that are important to continue to monitor over the extended horizon: the state's dynamic labor supply, the state's industrial structure and the current number of start-ups, or new businesses.

Oregon has typically benefited from an influx of households from other states, including an ample supply of skilled workers. Households continue to move to Oregon even when local jobs are scarce, as long as the economy is equally bad elsewhere, particularly in California. Relative housing prices also contribute to migration flows in and out of the state. For Oregon's recent history – data available from 1976 – the labor force in the

state has both grown faster than the nation overall and the labor force participation rate has been higher. However while the past two years have brought considerable improvements there remain potentially worrisome signs, particularly when the next recession comes.

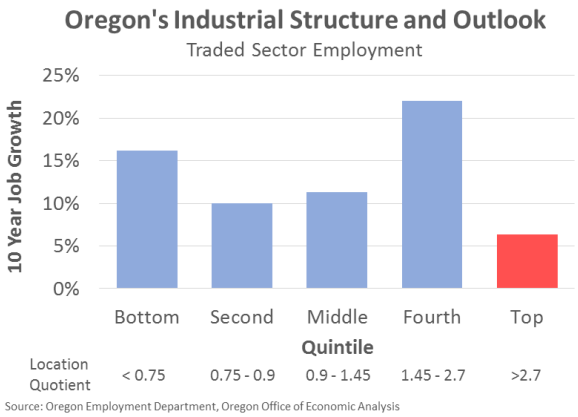
First, on the bright side, all of the recessionary-induced declines in the labor force itself have been reversed in the recent years. Oregon's labor force has never been larger. However, the participation rate remains a little lower than expected, when adjusting for the size of the population and the aging demographics.



That said, Oregon's participation rate, at least in the preliminary data, has flattened out and even fallen in recent months. The participation gap remains a cause for concern, however we are currently at the cyclical peak where ongoing job gains effectively offset the aging demographics. So a flat or even falling participation rate in and of itself is not a concern. It's the level that is a little bit more worrisome.

Additionally, while much of the past decade's patterns can be attributed to the severe nature of the Great Recession, and even the lackluster housing boom itself, some damage is likely permanent. The longer the expansion continues without seeing rising participation rates among some segments of the population, the more likely the damage is permanent. A stronger economy and a longer expansion will minimize any permanent damage.

Oregon's industrial structure is very similar to the U.S. overall, even moreso than nearly all other states. That said, Oregon's manufacturing industry is larger and weighted toward semiconductors and wood products, relative to the nation which is much more concentrated in transportation equipment (autos and aerospace). However, these industries which have been Oregon's strength in both the recent past and historically, are now expected to grow the slowest moving forward. Productivity and output from the state's technology producers is expected to continue growing quickly, however employment is not likely to follow suit. Similarly, the timber industry remains under pressure from both market based conditions and federal regulations. Barring major changes to either, the slow growth to downward trajectory of the industry in Oregon is likely to continue.

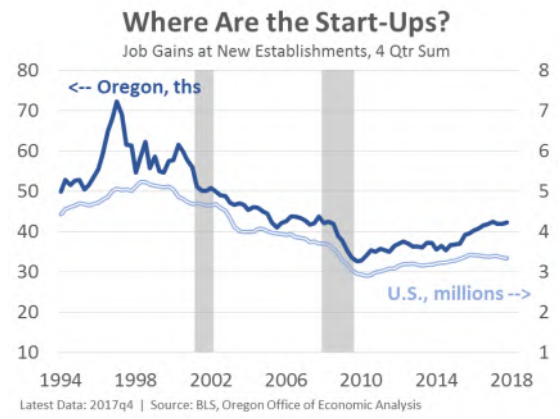


With that being said, certainly not all hope is lost. Those top industries in Oregon comprise approximately 7 percent of all statewide employment. And many industries in which Oregon has a larger concentration that then typical state are expected to perform quite well over the coming decade. These industries include management of companies, food and beverage manufacturing, published software along with some health care related firms.

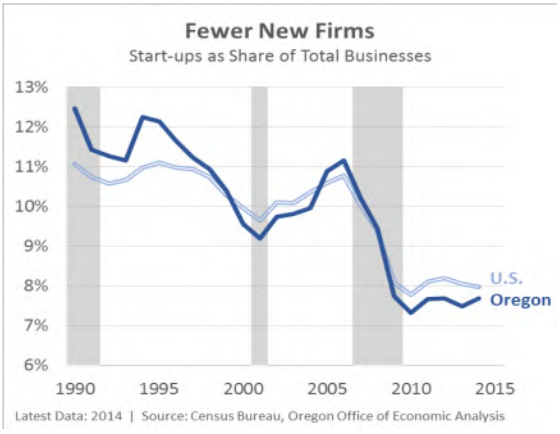
The state's real challenges and opportunities will come in industries in which Oregon does not have a relatively large concentration. These industries, like consulting, computer system design, financial investment, and scientific R&D, are expected to grow quickly in the decade ahead. To the extent that Oregon is behind the curve,

then the state may not fully realize these gains if they rely more on clusters and concentrations of similar firms that may already exist elsewhere in the country.

Another area of potential concern that may impact longer term economic growth is that of new business formation. Over the past few years, the number of new business license applications with the Oregon Secretary of State have begun to grow again and even accelerate. However data available from the U.S. Census Bureau and Bureau of Labor Statistics clearly indicate that entrepreneurship and business formation remain at subdued levels and rates.

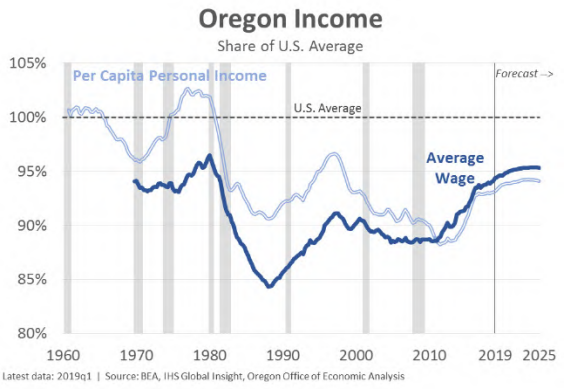


The share of all businesses that are start-ups, either in Oregon or across the nation, is effectively at an all-time low, with data starting in the late 1970s. Associated start-up employment follows a similar pattern. The concern is that new businesses are generally considered the source of innovation and new ideas, products and services that help propel economic growth. To the extent that fewer start-ups indicate that R&D more broadly is not being undertaken, slower growth is to be expected moving forward. However, if the larger firms that have won out in today's marketplace are investing in R&D and making those innovations themselves, then the worries about the number of start-ups today is overstated. It can be hard to say which is the correct view. However seeing these longer run, downward trends in new business formation warrants, at the very least, concern about future growth prospects.

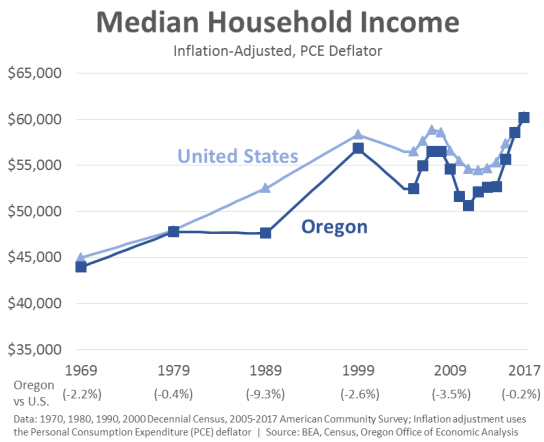


Importantly, Oregon also enjoys the long-term advantages of low electricity costs; a central location between the large markets of California, Vancouver and Asia; clean water; low business rents and living costs when compared to other Left Coast locations; and an increasingly diverse industrial base.

Finally, one long-run concern for some policymakers and think tanks has been Oregon's relatively low income and wage numbers in recent decades. Back in the heyday of the timber industry, Oregon's per capita personal income and median household income were in-line with the nation overall. At this time, Oregon's average wage was lower in part due to the industrial composition, but these lower wages were made up at the statewide level by demographics and household composition.

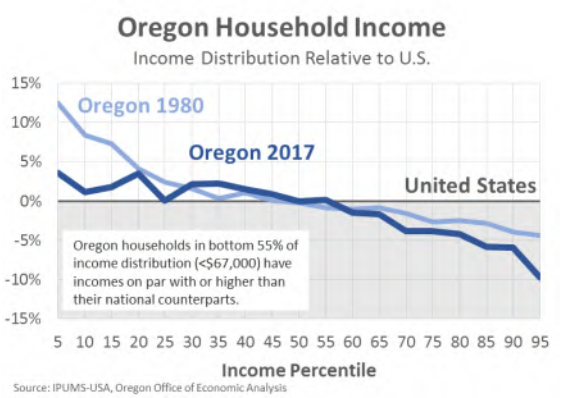


Even since the timber industry restructured following the severe early 1980s recessions, Oregon's relative incomes have been lower. The regional economy experienced a major shock and it took quite a long time to recover. However, finally, in this current economic expansion, Oregon is regaining the ground lost decades ago.



Oregon's median household income now matches the U.S. overall. Average wages in Oregon are at their highest relative point since the mills closed in the early 1980s. And the state's per capita personal income is back to where it was prior to the dotcom crash in 2001.

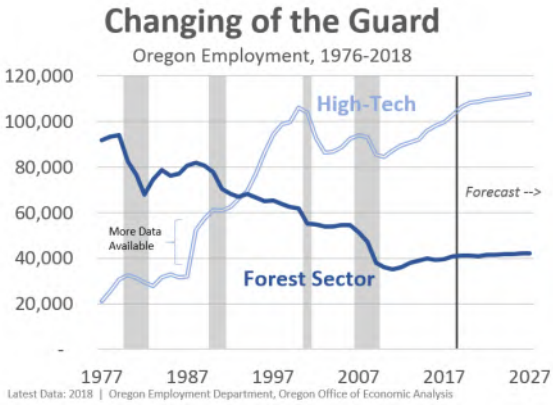
In terms of the outlook, expectations are for Oregon's relative positions to hold steady in the coming years. The primary reason for this is that Oregon's average wages have already accelerated in recent years, even as U.S. wages are just now picking up. Our office expects Oregon's average wage to continue to increase by 4 percent per year. However as the U.S. accelerates closer to Oregon's annual rate, Oregon's growth advantage in recent years will lessen.



One major factor influencing per capita personal income trends is the relative incomes at the very top of the distribution. Make no mistake, Oregon's highest-income households have done well financially. However incomes at the top of the national distribution have increased even further. This gap among the richest households is large enough, and the incomes high enough to weigh on Oregon's overall per capita income figures.

Regional Comparisons

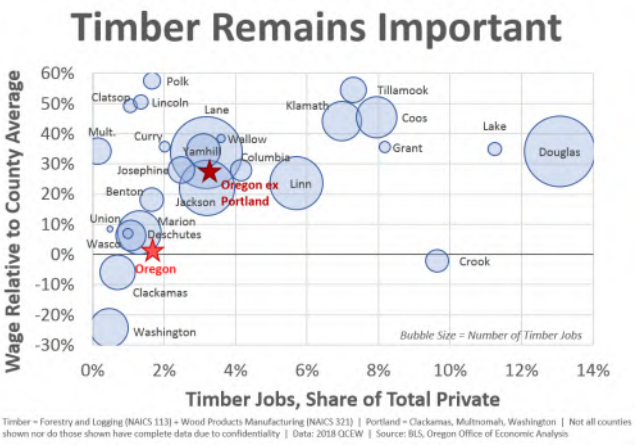
At a statewide level, Oregon's economy has underwent a changing of the guard in recent decades. The high-tech industry's growth has essentially offset the decline of the timber industry. This is good news for Oregon as a whole and many other places around the country that experienced large manufacturing losses did not have something like this to help balance out their economies.



However, even if these trends tend to offset at the statewide level they did not at the regional level or for individual workers. In the 1970s, timber was important statewide but particularly so outside the Portland region. Even so, Portland had a timber concentration two and a half times the national average. That said, Lane County's was closer to 20 times the U.S. and Douglas County was 40 times. In most eastern and southern Oregon counties, timber accounted for 20-30% or more of all local employment.

Fast forward to today where the geographic distribution of high-tech jobs is very different. Nearly 80% of tech jobs in Oregon are in the tri-county Portland area.

As such, even with the declines in recent decades, timber remains important for many regional economies across the state. Not only does the sector account for a sizable share of local jobs, it also continues to pay above average wages, when compared with the local alternative. This is in part due to the lower-wage, service type of job growth seen in many communities. Even if travel and tourism, or even lower level health care facilities replace the outright number of jobs that were lost in the timber industry, their wages are generally lower.



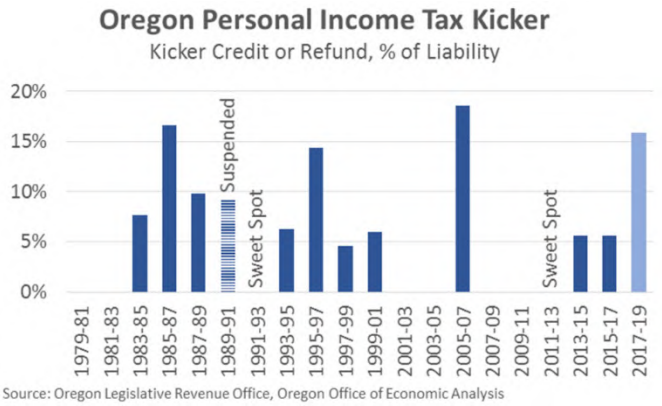
See our office's recent report on [What Replaces Timber?] for more details.

Revenue Summary

During odd-numbered years, Oregon's September revenue forecast provides a look back at the biennium that just came to a close. Unlike the nationwide economic expansion, Oregon's revenue picture has yet to show any cracks. Through the end of the 2017-19 biennium, all major types of Oregon's General Fund tax collections continued to outstrip gains in the underlying economy.

The largest part of Oregon's General Fund, personal income tax collections, surged during the peak tax season with collections coming in one-third larger than what was seen in 2018. Both year-end income tax payments net of refunds, as well as withholdings out of paychecks, have been posting growth rates above what economic gains would call for. Corporate tax collections have slowed a bit in recent months, but remain elevated above their typical size as well.

The strong growth at the end of the biennium has resulted in an increased estimate of the kicker refund. The personal income tax kicker is now expected to be $1.57 billion, making it the third largest as a share of liability on record. Kickers of this size occur about once every decade, typically around the peak of the business cycle. As was the case with the large kicker generated during the mid-1980's, changes in federal tax policy played a large role in generating above-trend state collections last biennium. Taxpayers are very sensitive to federal rules, and often shift the timing of their payments in order to minimize their federal liability over time. The federal Tax Cut and Jobs Act has greatly altered taxpayer behavior, suggesting that some of the recent growth in state tax collections may not be sustainable going forward.



Source: Oregon Legislative Revenue Office, Oregon Office of Economic Analysis

Over the next month, the Office of Economic Analysis will double check the accounting records before certifying the size of the kicker by October 1st. As it now stands, when taxpayers file at the beginning of next year, they will receive around a 15% refundable credit off of their bill. For the median filer, this amounts to a credit of $346, while the average filer will receive $739.

Income Group	Adjusted Gross Income*	Rough Estimate of Kicker Size**
Bottom 20%	< $11,700	$28
Second 20%	$11,700 - $27,500	$169
Middle 20%	$27,500 - $49,700	$373
Fourth 20%	$49,700 - $90,500	$679
Next 15%	$90,500 - $184,500	$1,379
Next 4%	$184,500 - $418,500	$3,248
Top 1%	> $418,500	$15,214
Average	**$64,300**	**$739**
Median	**$37,000-$38,000**	**$346**

** Based on 2017 actual tax returns ** Based on 2017 actual tax returns, PIT kicker amount ($1.57 billion) and the Oregon Office of Economic Analysis' forecast for tax liability in 2018*

Although the corporate kicker refund is no longer returned as a credit to taxpayers, corporate collections have come in above expectations as well. Similar to personal income taxes, federal tax reforms have clearly played a large role in the surge in collections. As a result of the unexpected corporate collections, an estimated $676 million will be dedicated to K-12 programs during the 2019-21 biennium. This is $60 million more than was expected during the May forecast.

While kicker payments have grown as a result of the unexpected revenue gains, so too have Oregon's cash balances. The General Fund beginning balance is now more than $200 million larger than what was expected at the close of the session. With the near-term outlook for corporate collections being revised upward as well,

policymakers will have around $300 million in additional resources to potentially add to the recently-enacted 2019-21 budget.

All told, the September forecast reflects a stable economic outlook, with the expected size of General Fund collections increasing slightly over what was expected at the Close of Session. However, when tax policy changes from the 2019 legislative session are factored in, the General Fund is expected to be significantly smaller than what was expected in May. Most notably, the enactment of a Corporate Activity Tax (HB3427) brought with it personal tax rate cuts, and is expected to reduce business tax liability. While the Corporate Activity Tax will clearly be a net positive for the state budget as a whole, it will reduce General Fund resources since the new collections will not be deposited there. Instead, Corporate Activity Tax collections will be directed to a Fund for Student Success, thus keeping them out of the kicker calculation[10].

These General Fund cuts, together with a big kicker payment, a slowing economy and the federal tax policy hangover do not bode well for tax collections in 2019-21. Even if we are able to avoid a recession (as is expected in the baseline case), General Fund resources are expected to be smaller than they were last biennium.

Heading into the new biennium, uncertainty about the performance of the nationwide economy has become paramount. Growth will certainly slow to a sustainable rate in the coming years, but the path taken to get there is unknown. Fortunately, Oregon is better positioned than ever before to weather a revenue downturn. Automatic deposits into the Rainy Day Fund and Education Stability Fund have added up over the decade-long economic expansion. When the expected ending balance for the current biennium is included, Oregon has more than $2.5 billion in reserves set aside, amounting to more than 12% of the two-year budget.

Longer term, revenue growth in Oregon and other states will face considerable downward pressure over the 10-year extended forecast horizon. As the baby boom population cohort works less and spends less, traditional state tax instruments such as personal income taxes and general sales taxes will become less effective, and revenue growth will fail to match the pace seen in the past.

2019-21 General Fund Revenues

Gross General Fund revenues for the 2019-21 biennium are expected to reach $21,112 million. This represents a decrease of $211 million from the May 2019 forecast, and an increase of $92 million relative to the Close of Session forecast. Although the economic outlook is stable, policymakers enacted tax laws during the 2019 legislative session that are expected to reduce General Fund resources.

Table R.1

2019-21 General Fund Forecast Summary

(Millions)	2019 COS Forecast	May 2019 Forecast	September 2019 Forecast	Change from Prior Forecast	Change from COS Forecast
Structural Revenues					
Personal Income Tax	$18,283.5	$18,705.1	$18,292.4	-$412.6	$8.9
Corporate Income Tax	$1,190.8	$1,245.8	$1,270.0	$24.2	$79.2
All Other Revenues	$1,546.1	$1,372.9	$1,549.8	$176.9	$3.7
Gross GF Revenues	$21,020.4	$21,323.7	$21,112.1	-$211.6	$91.7
Offsets and Transfers	-$203.5	-$203.5	-$196.8	$6.7	$6.7
Administrative Actions[1]	-$21.5	-$21.5	-$21.5	$0.0	$0.0
Legislative Actions	-$199.5	-$199.4	-$199.5	$0.0	$0.0
Net Available Resources	**$22,914.4**	**$23,220.9**	**$23,226.7**	**$5.8**	**$312.3**
Confidence Intervals					
67% Confidence	**+/- 8.6%**		**$1,823.9**	**$19.29B to $22.94B**	
95% Confidence	**+/- 17.3%**		**$3,647.8**	**$17.46B to $24.76B**	

1 Reflects cost of cashflow management actions, exclusive of internal borrowing.

[10] Hooray!

Personal Income Tax

Personal income tax collections were $3,471 million during the fourth quarter of fiscal year 2019, $260 million (8.1%) above the latest forecast. Compared to the year-ago level, total personal income tax collections rose by 32% relative to a forecast that called for a 22% increase. Table B.8 in Appendix B presents a comparison of actual and projected personal income tax revenues for the April-June quarter. Strong growth in collections has continued into fiscal year 2020.

Corporate Excise Tax

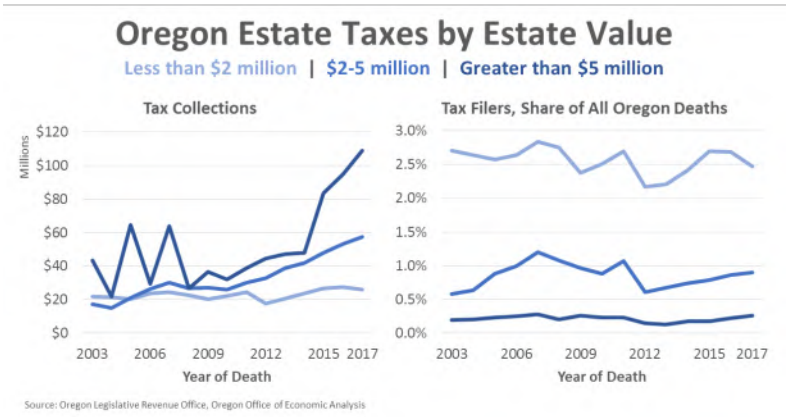
Corporate excise tax collections equaled $389 million for the fourth quarter of fiscal year 2019, $26 million below the May forecast. Compared to the year-ago level, net corporate excise tax collections rose by 8.5%.

Federal Tax Law Changes have injected a good deal of uncertainty into the outlook for corporate tax payments. It is likely that the corporate tax base has become larger in Oregon. In part, firms are now recognizing more of their global income streams. Also, some employees, investors, partnerships, S-corps and sole proprietorships face a larger tax incentive to incorporate. Conversely, some C-corporations and employees will benefit from becoming pass-through entities. Accelerated depreciation provisions are also impacting the revenue stream, as is the repatriation of deferred income from multinational corporations. While large, the amount of taxes on repatriated earnings appears to be falling short of expectations, and has been revised downward.

Other Sources of Revenue

Non-personal and non-corporate revenues in the General Fund account for approximately 7 percent of the total. One-fifth of this amount comes from Oregon Liquor Control Commission revenues, while estate taxes account for another fifth. In terms of forecast changes in recent biennia, estate taxes stand out as they have come in considerably above expectations.

Overall the number of estates impacted by the tax is relatively steady over the past decade, both in absolute numbers and as a share of all Oregon deaths. The growth in tax collections largely reflects the increasing size of a few very large estates. Looking forward, the outlook for collections remains strong, however not quite as strong as demographics and asset markets alone suggest due to household's tax planning capabilities.



All told, General Fund revenues excluding personal and corporate taxes are expected to total $1.55 billion in 2019-21, an upward revision of $3.7 million relative to the Close of Session forecast. In the out biennia, these revenues are unchanged as Legislation this past session offsets by raising judicial and liquor revenues but decreasing retaliatory taxes (insurance taxes) as part of HB 3427.

Extended General Fund Outlook

Table R.2 exhibits the long-run forecast for General Fund revenues through the 2027-29 biennium. Users should note that the potential for error in the forecast increases substantially the further ahead we look.

Revenue growth in Oregon and other states will face considerable downward pressure over the 10-year extended forecast horizon. As the baby boom population cohort works less and spends less, traditional state tax instruments such as personal income taxes and general sales taxes will become less effective, and revenue growth will fail to match the pace seen in the past.

Table R.2

General Fund Revenue Forecast Summary (Millions of Dollars, Current Law)

Revenue Source	Forecast 2017-19 Biennium	% Chg	Forecast 2019-21 Biennium	% Chg	Forecast 2021-23 Biennium	% Chg	Forecast 2023-25 Biennium	% Chg	Forecast 2025-27 Biennium	% Chg	Forecast 2027-29 Biennium	% Chg
Personal Income Taxes	18,705.1	16.5%	18,292.4	-2.2%	21,660.6	18.4%	23,647.0	9.2%	25,534.1	8.0%	28,139.0	10.2%
Corporate Income Taxes	1,752.7	44.8%	1,270.0	-27.5%	1,283.8	1.1%	1,442.7	12.4%	1,643.4	13.9%	1,821.1	10.8%
All Others	1,339.3	3.9%	1,549.8	15.7%	1,400.7	-9.6%	1,466.5	4.7%	1,537.8	4.9%	1,622.6	5.5%
Gross General Fund	21,797.2	17.5%	21,112.1	-3.1%	24,345.0	15.3%	26,556.3	9.1%	28,715.3	8.1%	31,582.7	10.0%
Offsets and Transfers	*(129.5)*		*(196.8)*		*(100.1)*		*(101.4)*		*(113.6)*		*(117.4)*	
Net Revenue	21,667.6	17.0%	20,915.3	-3.5%	24,244.9	15.9%	26,454.9	9.1%	28,601.7	8.1%	31,465.3	10.0%

Tax Law Assumptions

The revenue forecast is based on existing law, including measures and actions signed into law during the 2019 Oregon Legislative Session. OEA makes routine adjustments to the forecast to account for legislative and other actions not factored into the personal and corporate income tax models. These adjustments can include expected kicker refunds, when applicable, as well as any tax law changes not yet present in the historical data. A summary of actions taken during the 2019 Legislative Session can be found in Appendix B Table B.3. For a detailed treatment of the components of the 2019 Legislatively Enacted Budget, see: LFO 2019-21 Budget Summary.

Although based on current law, many of the tax policies that impact the revenue forecast are not set in stone. In particular, sunset dates for many large tax credits have been scheduled. As credits are allowed to disappear, considerable support is lent to the revenue outlook in the outer years of the forecast. To the extent that tax credits are extended and not allowed to expire when their sunset dates arrive, the outlook for revenue growth will be reduced. The current forecast relies on estimates taken from the Oregon Department of Revenue's 2019-21 Tax Expenditure Report together with more timely updates produced by the Legislative Revenue Office.

General Fund Alternative Scenarios

The latest revenue forecast for the current biennium represents the most probable outcome given available information. OEA feels that it is important that anyone using this forecast for decision-making purposes recognize the potential for actual revenues to depart significantly from this projection.

Currently, the overwhelming downside risk facing the revenue outlook is the threat that the U.S. economic recovery will lose steam in the near term. Such a scenario, however it played out, would result in drastic

revenue losses. Two recessionary scenarios are displayed in table R.2b. In a severe recession, biennial revenues could come in as much as $4.7 billion lower than predicted over the next two biennia[11].

Corporate Activity Tax

HB 3427 (2019) creates a new state revenue source by implementing a corporate activity tax (CAT). The tax is expected to generate $1.6 billion in revenue in 2019-21 and $2.8 billion in 2021-23. These revenues are dedicated to spending on education. The legislation also included personal income tax rate reductions, reducing General Fund revenues. The net impact of HB 3427 was designed to generate approximately $1 billion per year in new state resources.

This forecast represents the first time the new CAT has been included. Table B.12 in Appendix B has details on 10 year forecast and the allocation of resources, while the personal income tax reductions are built into the General Fund forecasts as shown in Tables B.1 and B.2.

TABLE R2b — **September 2019**

Alternative Cyclical Revenue Forecast ($ millions)

	2017-19 BN		2019-21 BN		2021-23 BN		2023-25 BN		2025-27 BN	
Baseline Case	**FY '18**	**FY '19**	**FY '20**	**FY '21**	**FY '22**	**FY '23**	**FY '24**	**FY '25**	**FY '26**	**FY '27**
Personal Income										
Level	204.2	214.6	226.7	238.6	250.6	262.8	273.6	288.1	301.9	316.2
% change	*5.1%*	*5.1%*	*5.6%*	*5.3%*	*5.0%*	*4.9%*	*4.1%*	*5.3%*	*4.8%*	*4.7%*
Taxes										
Personal Income	8,872	9,790	8,654	9,638	10,635	11,026	11,552	12,095	12,507	13,027
Corporate Excise & Income	739	927	695	575	618	666	702	741	801	843
Other General Fund	633	706	693	856	692	708	725	741	760	778
Total General Fund	10,244	11,423	10,043	11,070	11,945	12,400	12,979	13,577	14,068	14,648
% change	*4.3%*	*11.5%*	*-12.1%*	*10.2%*	*7.9%*	*3.8%*	*4.7%*	*4.6%*	*3.6%*	*4.1%*
Moderate Recession	**FY '18**	**FY '19**	**FY '20**	**FY '21**	**FY '22**	**FY '23**	**FY '24**	**FY '25**	**FY '26**	**FY '27**
Personal Income										
Level	204.2	214.6	221.1	227.1	241.2	255.8	268.5	284.9	299.2	313.9
% change	*5.1%*	*5.1%*	*3.0%*	*2.7%*	*6.2%*	*6.1%*	*4.9%*	*6.1%*	*5.0%*	*4.9%*
Taxes										
Personal Income	8,872	9,790	8,359	8,990	10,073	10,615	11,251	11,904	12,342	12,875
Deviation from baseline	*0*	*0*	*-295*	*-648*	*-561*	*-411*	*-301*	*-191*	*-165*	*-152*
Corporate Excise & Income	739	927	661	520	572	630	676	724	787	831
Deviation from baseline	*0*	*0*	*-34*	*-55*	*-47*	*-35*	*-26*	*-17*	*-14*	*-12*
Other General Fund	633	706	693	856	692	708	725	741	760	778
Total General Fund	10,244	11,423	9,713	10,366	11,337	11,954	12,652	13,369	13,888	14,484
% change	*4.3%*	*11.5%*	*-15.0%*	*6.7%*	*9.4%*	*5.4%*	*5.8%*	*5.7%*	*3.9%*	*4.3%*
Deviation from baseline	*0*	*0*	*-329*	*-703*	*-608*	*-446*	*-327*	*-208*	*-179*	*-164*
Biennial Deviation		*0*		*-1,032*		*-1,054*		*-535*		*-343*
Severe Recession	**FY '18**	**FY '19**	**FY '20**	**FY '21**	**FY '22**	**FY '23**	**FY '24**	**FY '25**	**FY '26**	**FY '27**
Personal Income										
Level	204.2	214.6	206.6	215.4	231.9	249.0	264.3	283.4	297.7	312.2
% change	*5.1%*	*5.1%*	*-3.8%*	*4.3%*	*7.7%*	*7.4%*	*6.1%*	*7.2%*	*5.0%*	*4.9%*
Taxes										
Personal Income	8,872	9,790	7,579	8,325	9,523	10,216	11,004	11,815	12,251	12,780
Deviation from baseline	*0*	*0*	*-1,075*	*-1,314*	*-1,111*	*-810*	*-548*	*-279*	*-256*	*-247*
Corporate Excise & Income	739	927	572	463	526	596	654	716	778	822
Deviation from baseline	*0*	*0*	*-123*	*-112*	*-92*	*-70*	*-48*	*-24*	*-22*	*-21*
Other General Fund	633	706	693	856	692	708	725	741	760	778
Total General Fund	10,244	11,423	8,845	9,644	10,742	11,520	12,384	13,273	13,789	14,380
% change	*4.3%*	*11.5%*	*-22.6%*	*9.0%*	*11.4%*	*7.2%*	*7.5%*	*7.2%*	*3.9%*	*4.3%*
Deviation from baseline	*0*	*0*	*-1,198*	*-1,425*	*-1,204*	*-880*	*-595*	*-304*	*-279*	*-268*
Biennial Deviation		*0*		*-2,623*		*-2,084*		*-899*		*-547*

In terms of the big picture economic impacts, as always, our office starts with the Legislative Revenue Office's impact statement and any Oregon Tax Incidence Model (OTIM) results LRO found. At the top line, OTIM results find minimal macroeconomic impacts across Oregon due to the new tax. Personal income, employment, population, investment and the like are less than one-tenth of a percent different under the new tax relative to the baseline. The model results also show that price levels (inflation) will increase above the baseline as some of the CAT is pushed forward onto consumers. Of course these top line, statewide numbers mask the varying experiences that individual firms and different industries will experience. There are likely to be some businesses or sectors that experience large impacts from the CAT, or where pyramiding increases prices to a larger degree, while other businesses or sectors see relatively few impacts.

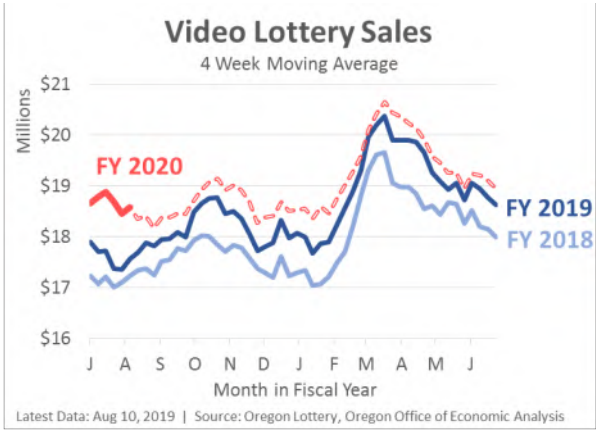
Today we have no real economic or revenue data to evaluate the impact of the corporate activity tax as it begins in 2020. While businesses will make quarterly payments throughout 2020, it really will not be until April 2021

[11] The methodology for computing alternative scenarios has been changed to reflect recent work done by the Legislative Revenue Office. Assumptions: Recessions begin in 2019 and return to baseline income by 2026. The moderate recession scenario assumes personal income growth will be reduced by one-half relative to the baseline in 2019 and 2020. The severe recession scenario assumes personal income will decline in 2019 by as much as it did in 2009. The percentage deviation in personal income taxes is 1.4 times the deviation in personal income. The percentage deviation in corporate income taxes is 2.0 times the deviation in personal income.

when their annual tax return is due that we will have a complete look at the revenue, taxpayer behavior and the like. As data does become available, our office, in conjunction with our advisors and the Legislative Revenue Office will work together to better understand the revenue and its impact. Our office will update the outlook accordingly at that time.

Lottery Earnings

While the underlying sales outlook for Lottery is largely unchanged relative to last forecast, available resources are raised due to the incorporation of Scoreboard, or Lottery's forthcoming sports betting game for the first time in our office's forecast. The game is set to launch in the coming months and is projected to generate $8.3 million in available resources in 2019-21. These revenues are dedicated to the PERS Employer Incentive Fund per SB 1049 (2019). Total available resources in 2019-21 are revised higher by $11.7 million when compared to the May forecast as video lottery sales have come in above expectations in recent weeks as well.



Longer term, sports betting is forecasted to generate $29.4 million in 2021-23 and $42.2 million 2023-25 for the Employer Incentive Fund. These estimates are highly uncertain and come from myriad assumptions about the size of the sports betting market overall, industry competition, player adoption rates, administrative costs and the like. The research team at Lottery provided the underlying estimates of the handle, gross gaming revenue and expenses. Our office worked to extend the analysis over the full forecast horizon and to translate the gaming revenue estimates into available resources.

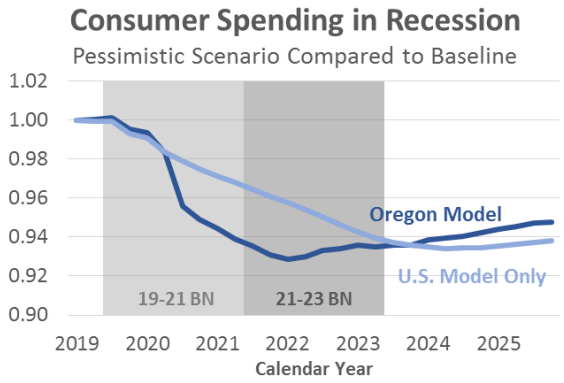
We also know that additional uncertainty arises from the volatility of revenues as wagers come in heavy on one team or another. For this reason, the forecast also assumes that Lottery will build reserves out of the sports betting revenue to help account for the expected volatility.

These figures have been discussed among the Lottery forecast advisory group and represent just a first step in incorporating sports betting revenue into the outlook. As actual sales data comes in, our office, along with the Oregon Lottery, Oregon Legislative Fiscal and Revenue Offices, and the state CFO's office will discuss trends, issues and risks. We will update the outlook accordingly.

Lottery Outlook and Distributions

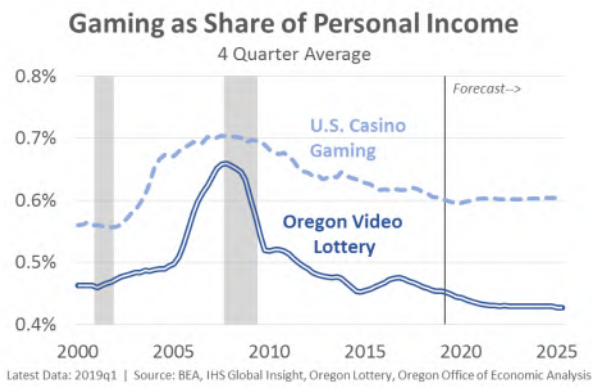
One ongoing issue to monitor is the ilani Casino Resort in southwest Washington. In analyzing casino trends elsewhere in the country, sales increase for a year or two after a new casino opens. Obviously ilani has been open longer than this today so the initial ramp-up period is likely over. There will be ongoing impacts at retailers along the Oregon-Washington border, however the biggest impact on statewide sales is likely in the rearview mirror. That said, the opening of the gaming floor is just phase one for ilani. Future expansions may include a buffet, and a hotel to attract overnight guests and make it more of a destination and not a day trip activity. In the event any of these options materialized, our office would reassess the impact on video lottery sales. Our office will continue to work the Lottery advisory group to monitor sales and discuss the outlook.

Given the uncertain economic outlook and discussions with the advisory group, our office went ahead and modeled the impacts a recession would have on video lottery spending in Oregon. Of course one can model myriad alternative scenarios, however this one starts with IHS Markit's pessimistic scenario of a mild to moderate recession. Our office then ran this through our economic and lottery models and compared the outcomes relative to the baseline.



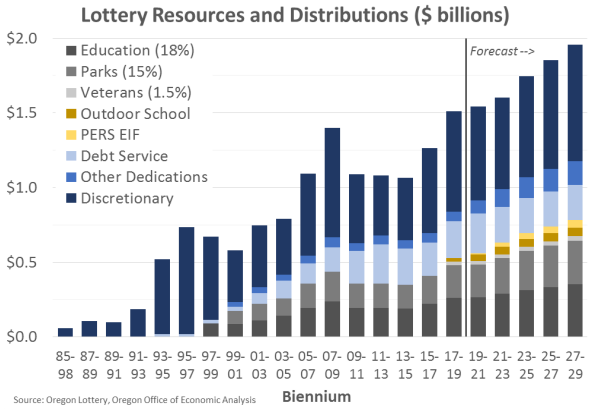
All told, there is a clear impact and a permanent reduction in sales over the forecast horizon amounting to around $45 million per year ($29 million in transfers). Consumer spending on recreational services in this scenario is not expected to return to the baseline. However, given that the baseline has ongoing growth built into it, the mild to moderate recession scenario really results in a couple of flat years for video lottery sales. At this point, they also just happen to split into 2019-21 and 2021-23. If this scenario comes to pass, overall lottery resources for both biennia will show growth, albeit slower growth than the baseline. And the more severe a recession is, the larger the impact on consumer spending.

Other big picture issues to watch include broader national trends in gaming markets, demographic preferences for recreational activities, and to what extent consumers increase the share of their incomes spent on gaming. In much of the past 10 years, consumers have remained cautious with their disposable income. Increases in spending on gaming have largely matched income growth at best.



Over the long-run our office expects increased competition for household entertainment dollars, increased competition within the gaming industry, and potentially shifts in generational preferences and tastes when it comes to gaming. As such, our outlook for video lottery sales is continued growth, however at a rate that is slightly slower than overall personal income growth. Lottery sales will continue to increase as Oregon's population and economy grows, however video lottery sales will likely be a slightly smaller slice of the overall pie.

Finally, in recent years Oregon voters approved two new amendments for where lottery resources are to be spent. The Outdoor School Education Fund is set to receive the lesser of 4 percent of net proceeds or $5.5 million per quarter ($44 million per biennium), adjusted for inflation. The Veterans' Services Fund is set to receive 1.5 percent of net proceeds.



For more on the Lottery and overall gaming outlook, see our office's recent report[12].

The full extended outlook for lottery earnings can be found in Table B.9 in Appendix B.

Budgetary Reserves

The state currently administers two general reserve accounts, the Oregon Rainy Day Fund13 (ORDF) and the Education Stability Fund14 (ESF). This section updates balances and recalculates the outlook for these funds based on the May revenue forecast.

As of this forecast the two reserve funds currently total a combined $1.29 billion. At the end of the upcoming 2019-21 biennium, they will total $1.76 billion. Due to lower interest rates, the reserve funds' interest earnings outlook have been lowered over the forecast horizon.

The forecast for the ORDF includes one deposit for this biennium relating to the General Fund ending balance from the previous biennium (2017-19). A deposit of $199.5 million is expected in early 2020 after the accountants close the books. The ORDF deposit relating to the increased corporate taxes from Measure 67 was made in June 2019. We had previously assumed it would occur during the 2019-21 biennium, however statute requires it to occur by the end of the biennium in which the revenues were received. All told, at the end of 2019-21 the ORDF will total $902.4 million.

The forecast for the ESF calls for $238.4 million in deposits during the 2019-21 biennium based on the current Lottery forecast. This would bring the ESF balance to $858.1 million at the end of the current biennium.

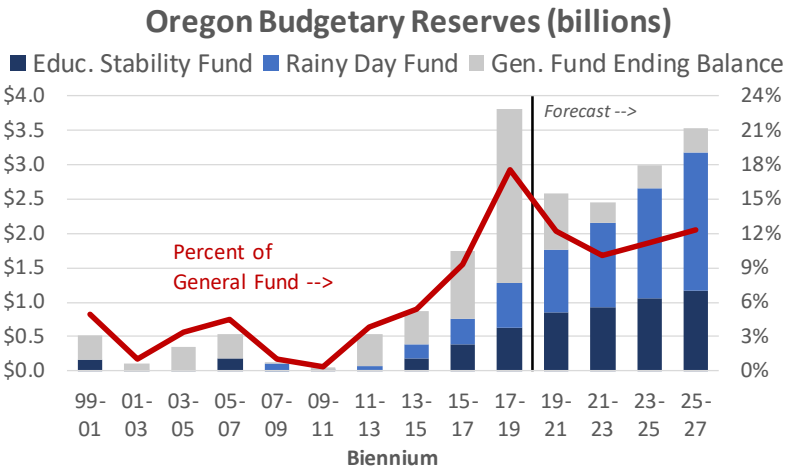
Together, the ORDF and ESF are projected to have a combined balance of $1.76 billion at the close of the 2019-21 biennium. Provided the General Fund ending balance remains unallocated, total effective reserves at the end of 2019-21 would total more than $2.5 billion, or 12.2 percent of current revenues.

Such levels of reserve balances are bigger than Oregon has ever been able to accumulate, at least in the state's recent history. However, such reserves would likely be just sufficient enough to withstand a typical recession's impact on state revenues, but not likely enough to account for the increase in public services and programs during downturns. That said, reserves of approximately 7 percent are generally accepted to withstand a medium sized recession. Oregon now has reached that threshold.

[12] https://oregoneconomicanalysis.com/2019/02/13/lottery-and-gaming-outlook-2019/

[13] The ORDF is funded from ending balances each biennium, up to one percent of appropriations. The Legislature can deposit additional funds, as it did in first populating the ORDF with surplus corporate income tax revenues from the 2005-07 biennium. The ORDF also retains interest earnings. Withdrawals from the ORDF require one of three triggers, including a decline in employment, a projected budgetary shortfall, or declaration of a state of emergency, plus a three-fifths vote. Withdrawals are capped at two-thirds of the balance as of the beginning of the biennium in question. Fund balances are capped at 7.5 percent of General Fund revenues in the prior biennium.

[14] The ESF gained its current reserve structure and mechanics via constitutional amendment in 2002. The ESF receives 18 percent of lottery earnings, deposited on a quarterly basis – 5% of which are deposited in the Oregon Growth sub-account. The ESF does not retain interest earnings. The ESF has similar triggers as the ORDF, but does not have the two-thirds cap on withdrawals. The ESF balance is capped at five percent of General Fund revenues collected in the prior biennium.



Source: Oregon Office of Economic Analysis

Effective Reserves ($ millions)

	End 2017-19	*End 2019-21*
ESF	$621.1	$858.1
RDF	$666.6	$902.4
Reserves	$1,287.7	$1,760.5
Ending Balance	$2,534.8	$819.8
Total	**$3,747.1**	**$2,580.3**
% of GF	17.2%	12.2%

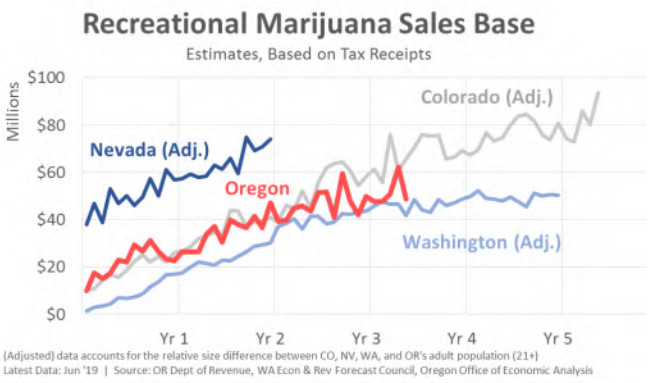
B.10 in Appendix B provides more details for Oregon's budgetary reserves.

Recreational Marijuana Tax Collections

The baseline outlook for recreational marijuana remains largely unchanged relative to last quarter. Two minor adjustments to the outlook raise available resources by less than $4 million in the 2019-21 biennium. The larger impact comes from stronger-than-expected sales in May and in July. The smaller impact comes from HB 5033 (2019) which increases the Department of Revenue's audit abilities and is expected to raise a modest amount of revenue via better tax compliance. This results in around $0.2 million in additional marijuana revenue per year over the forecast horizon.

Recent Market Trends and State Comparisons

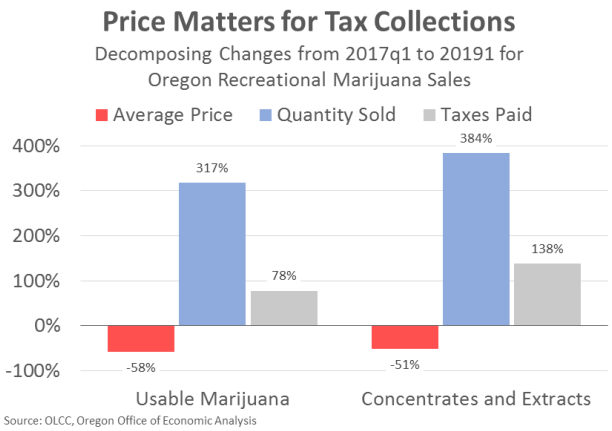
Underlying sales and tax collections in recent quarters are matching forecast overall. That said, after strong growth in recent years, retail sales have slowed or even leveled off since late 2018 in many recreational states. That said, growth is ongoing on a year-over-year basis and more timely sales data indicates further gains, at least in Oregon and Colorado.



However, these relatively flat trends in total dollars spent masks important shifts taking place within the market. Shifts that have big implications for Oregon tax collections.

As discussed every quarter since our office began developing the recreational marijuana forecast, prices are a big risk to the outlook. Oregon levies its recreational marijuana tax based on the price of the product. As such if prices fall, then the state receives less tax revenue for every ounce sold, or every edible purchased. This is exactly what has happened. Over the past two years, recreational marijuana prices in Oregon have declined by at least 50 percent across various product types.

Actual tax collections have increased because the total quantity sold has more than tripled over the same time period. This increase in quantity sold is coming from multiple sources.

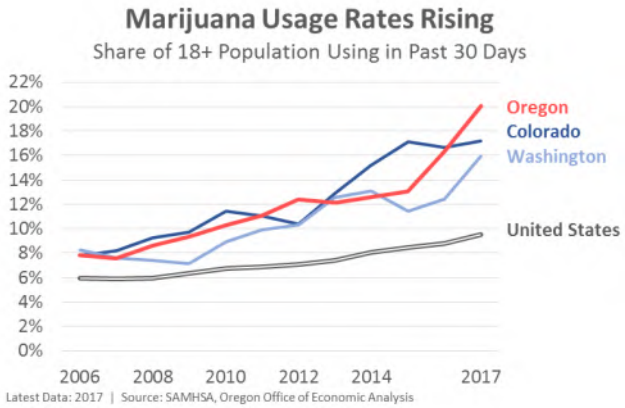


First, for normal products, as the price declines, consumers buy more as their dollar stretches further. A customer can now buy two ounces of usable marijuana for the same price as they bought one ounce previously.

Second, black and medical market conversions result in larger recreational sales. As a recent research report from OLCC[15] shows, recreational sales have increased from zero percent of Oregon's total marijuana market a couple years ago to more than half today. Even if the total marijuana market is stagnant, consumers converting to legal, recreational sales would drive the quantity sold at OLCC-licensed retailers higher.

Third, an overall increase in consumption drives the quantity sold higher. This increase can come from existing users buying more and/or new customers entering into the market.

Based on the latest usage data, Oregon now leads the nation in the share of the adult population admitting to federal survey takers that they use marijuana on a regular basis. At 20%, marijuana usage now outstrips cigarette smoking (16%) in Oregon, but trails alcohol usage (60%). It is somewhat of an open question how much this surveyed increase in marijuana usage is truly an increase and how much is due to people being more willing to admit to usage now that it is legal at the state level. Over the long-run, just how high usage goes will determine the ultimate size of the marijuana industry in the state.



All told, lower prices *should* lead to higher volumes of sales, it is just indeterminate to know in advance whether the income or substitution effect will be larger. So far, it seems to be both are driving Oregon tax collections higher, even if in recent months they are closer to offsetting one another.

Recreational Marijuana Outlook

In terms of the outlook, Oregon is poised for strong growth in the coming years. However, it remains highly uncertain with substantial upside and downside risks. These risks include not only usage rates and prices, as discussed above, but supply constraints and regulatory changes that impact the ability for product to reach consumers, in addition to potential actions by the federal government where marijuana remains a controlled substance and leakage into other states is a big concern.

[15] https://www.oregon.gov/olcc/marijuana/Documents/Bulletins/2019%20Supply%20and%20Demand%20Legislative%20Report%20FINAL%20for%20Publication(PDFA).pdf

Long-term the real economic impact from recreational marijuana will come not from the growing and retailing, which are low-wage and low value-added market segments. It will come from higher value-added products like oils, creams, and edibles, in addition to niche, specialty strains. These developments, as economist Beau Whitney points out, would be somewhat similar to the emergence and growth of craft beer in recent decades. It is here, among the value-added manufacturing processes in addition to the building up of a broader cluster of suppliers and ancillary industries that Oregon will see the real economic impacts. Furthermore, the long-term potential of exporting Oregon products and business know-how to the rest of the country remains large, at least once marijuana is legalized nationwide. Such a scenario is still years away at least, but remains a big upside risk to the long-term outlook.

See Table B.11 in Appendix B for a full breakdown of distributions for recreational marijuana tax collections. Note that these distributions are based on current law.

POPULATION AND DEMOGRAPHIC OUTLOOK

Population and Demographic Summary

Oregon's population count on April 1, 2010 was 3,831,074. Oregon gained 409,550 persons between the years 2000 and 2010. The population growth during the decade of 2000 to 2010 was 12.0 percent, down from 20.4 percent growth from the previous decade. Oregon's rankings in terms of decennial growth rate dropped from 11th between 1990 and 2000 to 18th between 2000 and 2010. Oregon's national ranking, including D.C., in population growth rate was 12th between 2010 and 2018 lagging behind all of our neighboring states, except California. Slow population growth during the decade preceding the 2010 Census characterized by double recessions probably cost Oregon one additional seat in the U.S. House of Representatives. Actually, Oregon's decennial population growth rate during the most recent census decade was the second lowest since 1900. As a result of economic downturn and sluggish recovery that followed, Oregon's population increased at a slow pace in the recent past. However, Oregon's current population is showing very strong growth as a consequence of state's strong economic recovery. Population growth between 2017 and 2018 was 11th fastest in the nation. Due to this better than average growth on national scale, Oregon will most likely get an additional seat in the U.S. House of Representatives. Based on the current forecast, Oregon's population of 4.195 million in 2018 will reach 4.705 million in the year 2029 with an annual rate of growth of 1.0 percent between 2018 and 2029.

Oregon's economic condition heavily influences the state's population growth. Its economy determines the ability to retain existing work force as well as attract job seekers from national and international labor market. As Oregon's total fertility rate remains below the replacement level and number of deaths continue to rise due to aging population, long-term growth comes mainly from net in-migration. Working-age adults come to Oregon as long as we have favorable economic and living conditions. During the 1980s, which include a major recession and a net loss of population during the early years, net migration contributed to 22 percent of the population change. On the other extreme, net migration accounted for 76 percent of the population change during the booming economy of early 1990s. This share of migration to population change declined to 32 percent in 2010, lowest since early 1980s when we actually had negative net migration for several years. As a sign of slow to modest economic gain, the ratio of net migration-to-population change has registered at 89 percent in 2018 and will continue to rise throughout the forecast horizon. By 2029, all of the population growth and more in Oregon will come from the net migration due to the combination of continued high net migration, decline in the number of births, and the rise in the number of deaths. The natural increase of population, defined as the numbers of births minus deaths, will actually turn negative by the end of the forecast period due to the below replacement level fertility and increase in the number of deaths associated with the increase in the elderly population. With Oregon's favorable economic and environmental conditions, high level of net migration into Oregon will continue through the forecast horizon that will be solely responsible for Oregon's population growth.

Age structure and its change affect employment, state revenue, and expenditure. Demographics are the major budget drivers, which are modified by policy choices on service coverage and delivery. Growth in many age groups will show the effects of the baby-boom and their echo generations during the forecast period of 2018-2029. It will also reflect demographics impacted by the depression era birth cohort combined with changing migration of working age population and elderly retirees through history. After a period of slow growth during the 1990s and early 2000s, the elderly population (65+) has picked up a faster pace of growth and will surge to the record high levels as the baby-boom generation continue to enter this age group and attrition of small depression era cohort due to death. The average annual growth of the elderly population will be 2.9 percent

during the 2018-2029 forecast period. However, the youngest elderly (aged 65-74) has been growing at an extremely fast pace in the recent past and will continue the trend in the near future exceeding 4 percent annual rate of growth due to the direct impact of the baby-boom generation entering the retirement age and smaller pre-baby boom cohort exiting the 65-74 age group. This fast paced growth rate will taper off to negative growth by the end of the forecast period as a sign of end of the baby-boom generation transitioning to elderly age group. Reversing several years of slow growth and a period of shrinking population, the elderly aged 75-84 started to show a positive growth as the effect of depression era birth-cohort has dissipated. An unprecedented fast pace of growth of population in this age group has started as the baby-boom generation is starting to mature into 75-84 age group. Annual growth rate during the forecast period of 2018-2029 is expected to be unusually high 5.3 percent. The oldest elderly (aged 85+) will continue to grow at a slow but steady rate in the near future due to the combination of cohort change, continued positive net migration, and improving longevity. The average annual rate of growth for this oldest elderly over the forecast horizon will be 2.9 percent. An unprecedented growth in oldest elderly will commence near the end of the forecast horizon as the fast growing 75-84 age group population transition into this oldest elderly age cohort. As a sign of massive demographic structure change of Oregon's population, starting in 2023 the number of elderly population will exceed the number of children under the age of 18. To illustrate the contrast, in 1980 elderly population numbered less than half of the number of children in Oregon.

As the baby-boom generation matures out of oldest working-age cohort combined with slowing net migration, the once fast-paced growth of population aged 45-64 has gradually tapered off to below zero percent rate of growth by 2012 and has remained and will remain at slow or below zero growth phase for several years. The size of this older working-age population will see only a small increase by the end of the forecast period. The 25-44 age group population is recovering from several years of declining and slow growing trend. The decline was mainly due to the exiting baby-boom cohort. This age group has seen positive but slow growth starting in the year 2004 and will increase by 1.5 percent annual average rate during the forecast horizon mainly because of the exiting smaller birth (baby-bust) cohort being replaced by larger baby-boom echo cohort. The young adult population (aged 18-24) will remain nearly unchanged over the forecast period. Although the slow or stagnant growth of college-age population (age 18-24), in general, tend to ease the pressure on public spending on higher education, but college enrollment typically goes up during the time of very competitive job market, high unemployment, and scarcity of well-paying jobs when even the older people flock back to colleges to better position themselves in a tough job market. The growth in K-12 population (aged 5-17) will remain very low in the near future and will see negative growth for the rest of the forecast years. This will translate into slow growth or even decline in the school enrollments. On average for the forecast period, this school-age population will actually decline by -0.2 percent annually. The growth rate for children under the age of five has remained below or near zero percent in the recent past due to the sharp decline in the number of births. Although the number of children under the age of five declined in the recent years, the demand for child care services and pre-Kindergarten program will be additionally determined by the labor force participation and poverty rates of the parents.

Overall, elderly population over age 65 will increase rapidly whereas the number of children actually decline over the forecast horizon. The number of working-age adults in general will show fast paced growth after the year 2023. Hence, based solely on demographics of Oregon, demand for public services geared towards children and young adults will likely to decline or increase at a slower pace, whereas demand for elderly care and services will increase rapidly.

Procedure and Assumptions

Population forecasts by age and sex are developed using the cohort-component projection procedure. The population by single year of age and sex is projected based on the specific assumptions of vital events and migrations. Oregon's estimated population of July 1, 2010 based on the most recent decennial census is the base for the forecast. To explain the cohort-component projection procedure very briefly, the forecasting model "survives" the initial population distribution by age and sex to the next age-sex category in the following year, and then applies age-sex-specific birth and migration rates to the mid-period population. Further iterations subject the in-and-out migrants to the same mortality and fertility rates.

Populations by age-sex detail for the years 2000 through 2009, called intercensal estimates, in the following tables are developed by OEA based on 2000 and 2010 censuses. Post-censal population totals for the years 2010 through 2018 are from the Population Research Center, Portland State University. The numbers of births through 2018 and the deaths through 2017 are from Oregon's Center for Health Statistics. All other numbers and age-sex detail are generated by OEA.

Annual numbers of births are determined from the age-specific fertility rates projected based on Oregon's past trends and past and projected national trends. Oregon's total fertility rate is assumed to be 1.6 per woman in 2018 and this rate is projected to remain below the replacement level of 2.1 children per woman during the forecast period, tracking below the national rate.

Life Table survival rates are developed for the year 2010. Male and female life expectancies for the 2010-2029 period are projected based on the past three decades of trends and national projected life expectancies. Gradual improvements in life expectancies are expected over the forecast period. At the same time, the difference between the male and female life expectancies will continue to shrink. The male life expectancy at births of 77.4 and the female life expectancy of 81.8 in 2010 are projected to improve to 79.4 years for males and 83.5 years for females by the year 2029.

Estimates and forecasts of the number of net migrations are based on the residuals from the difference between population change and natural increase (births minus deaths) in a given forecast period. The migration forecasting model uses Oregon's employment, unemployment rates, income/wage data from Oregon and neighboring states, and past trends. Distribution of migrants by age and sex is based on detailed data from the American Community Survey. The annual net migration between 2018 and 2029 is expected to remain in the range of 38,500 to 47,500, averaging 42,600 persons annually. In the recent past, slowdown in Oregon's economy resulted in smaller net migration and slow population growth. Estimated population growth and net migration rates in 2010 and 2011 were the lowest in over two decades. Migration is intrinsically related to economy and employment situation of the state. Still, high unemployment and job loss in the recent past have impacted net migration and population growth, but not to the extent in the early 1980s. Main reason for this is the fact that other states of potential destination for Oregon out-migrants were not faring any better either, limiting the potential destination choices. The role of net migration in Oregon's population growth will get more prominence as the natural increase will decline considerably due to rapid increase in the number of deaths associated with aging population and decline in the number of births largely due to the decline in fertility rate.

APPENDIX A: ECONOMIC FORECAST DETAIL

Table A.1 – Employment Forecast Tracking

Total Nonfarm Employment, 2nd quarter 2019

(Employment in thousands, Annualized Percent Change)

	Preliminary Estimate		Forecast		Forecast Error		Y/Y Change
	level	% ch	level	% ch	level	%	% ch
Total Nonfarm	1,939.6	1.4	1,948.2	2.0	(8.6)	(0.4)	1.8
Total Private	1,640.7	1.5	1,649.1	2.1	(8.4)	(0.5)	1.9
Mining and Logging	6.9	(7.8)	7.2	1.4	(0.4)	(4.9)	(5.0)
Construction	109.8	6.7	109.3	1.3	0.4	0.4	5.3
Manufacturing	200.0	2.9	199.4	0.2	0.6	0.3	3.1
Durable Goods	138.1	1.4	138.7	0.0	(0.6)	(0.4)	2.6
Wood Product	23.7	1.7	23.5	0.1	0.3	1.1	1.4
Metals and Machinery	40.6	(0.3)	40.1	0.3	0.4	1.0	4.1
Computer and Electronic Product	38.5	1.1	39.3	(0.0)	(0.8)	(2.1)	2.0
Transportation Equipment	12.8	9.3	12.4	(1.9)	0.4	3.1	6.4
Other Durable Goods	22.5	0.8	23.3	0.7	(0.8)	(3.5)	0.0
Nondurable Goods	61.9	6.4	60.7	0.5	1.2	2.0	4.2
Food	31.0	9.1	30.2	0.7	0.8	2.5	3.4
Other Nondurable Goods	30.9	3.8	30.5	0.3	0.5	1.5	4.9
Trade, Transportation & Utilities	355.9	0.6	357.4	1.6	(1.5)	(0.4)	1.2
Retail Trade	210.6	0.7	212.4	1.0	(1.8)	(0.8)	(0.5)
Wholesale Trade	76.3	0.9	75.6	2.0	0.6	0.8	1.3
Transportation, Warehousing & Utilities	69.1	0.1	69.4	2.8	(0.4)	(0.5)	6.6
Information	34.2	(0.8)	34.0	(0.6)	0.2	0.6	0.5
Financial Activities	102.5	(1.1)	103.3	1.9	(0.8)	(0.8)	0.3
Professional & Business Services	252.4	(0.5)	255.6	4.6	(3.3)	(1.3)	1.7
Educational & Health Services	299.7	2.4	302.7	2.3	(3.0)	(1.0)	1.9
Educational Services	36.7	1.3	36.4	(2.5)	0.4	1.0	0.6
Health Services	263.0	2.6	266.4	3.0	(3.4)	(1.3)	2.1
Leisure and Hospitality	214.6	2.2	215.8	2.7	(1.2)	(0.6)	1.9
Other Services	64.7	0.6	64.2	0.2	0.5	0.7	0.5
Government	298.9	1.1	299.1	1.5	(0.2)	(0.1)	1.3
Federal	29.0	9.8	28.0	(0.4)	1.0	3.5	3.6
State	41.2	1.6	40.7	(3.4)	0.5	1.2	3.4
State Education	0.8	35.8	0.8	0.8	0.1	6.8	14.2
Local	228.7	0.0	230.3	2.7	(1.7)	(0.7)	0.7
Local Education	133.5	(0.2)	132.9	(1.7)	0.5	0.4	0.5

Table A.2 – Short-Term Oregon Economic Summary

Oregon Forecast Summary

	Quarterly					Annual					
	2019:2	2019:3	2019:4	2020:1	2020:2	2018	2019	2020	2021	2022	2023
Personal Income ($ billions)											
Nominal Personal Income	219.1	222.2	225.2	228.1	231.2	209.3	220.6	232.6	244.6	256.8	268.9
% change	6.3	5.8	5.7	5.2	5.5	5.0	5.4	5.5	5.2	5.0	4.7
Real Personal Income (base year=2012)	199.7	201.5	203.1	204.6	206.5	193.4	200.6	207.3	213.8	220.0	226.0
% change	3.7	3.6	3.2	3.1	3.8	2.9	3.7	3.4	3.1	2.9	2.7
Nominal Wages and Salaries	110.9	112.8	114.4	116.0	117.8	106.3	111.9	118.5	124.8	131.2	137.5
% change	5.5	6.7	6.0	5.8	6.2	5.1	5.3	5.9	5.4	5.1	4.8
Other Indicators											
Per Capita Income ($1,000)	51.6	52.2	52.8	53.3	53.8	49.9	51.9	54.1	56.2	58.4	60.5
% change	5.0	4.5	4.4	3.9	4.2	3.6	4.1	4.2	3.9	3.8	3.6
Average Wage rate ($1,000)	56.7	57.3	57.9	58.5	59.0	55.1	57.0	59.3	61.8	64.3	66.9
% change	3.7	4.7	4.0	4.0	4.0	3.1	3.5	4.1	4.1	4.1	4.1
Population (Millions)	4.2	4.3	4.3	4.3	4.3	4.20	4.25	4.30	4.35	4.40	4.45
% change	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.1	1.1
Housing Starts (Thousands)	21.6	21.8	21.9	22.2	22.4	19.7	21.5	22.5	23.4	24.0	23.7
% change	23.5	4.0	2.1	5.4	3.4	2.1	9.3	4.9	4.0	2.2	(1.3)
Unemployment Rate	4.2	4.4	4.4	4.4	4.4	4.1	4.3	4.4	4.7	4.9	4.9
Point Change	(0.2)	0.2	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.2	0.0
Employment (Thousands)											
Total Nonfarm	1,939.6	1,951.0	1,960.2	1,968.6	1,978.9	1,912.3	1,945.9	1,980.6	2,006.0	2,026.2	2,040.9
% change	1.4	2.4	1.9	1.7	2.1	2.0	1.8	1.8	1.3	1.0	0.7
Private Nonfarm	1,640.7	1,650.9	1,659.3	1,666.3	1,672.6	1,617.3	1,646.4	1,676.2	1,698.9	1,716.0	1,728.2
% change	1.5	2.5	2.1	1.7	1.5	3.3	1.8	1.8	1.4	1.0	0.7
Construction	109.8	109.7	110.0	110.3	110.6	105.3	109.4	110.8	112.3	112.9	113.7
% change	6.7	(0.1)	1.0	0.9	1.3	7.6	3.9	1.3	1.3	0.6	0.7
Manufacturing	200.0	200.4	200.6	200.5	200.1	195.2	199.9	200.1	200.0	200.8	201.4
% change	2.9	0.8	0.3	(0.2)	(0.8)	2.8	2.4	0.1	(0.0)	0.4	0.3
Durable Manufacturing	138.1	138.4	138.6	138.5	138.2	135.6	138.2	138.1	137.7	137.9	138.1
% change	1.4	0.8	0.5	(0.2)	(0.9)	3.0	1.9	(0.0)	(0.3)	0.2	0.1
Wood Product Manufacturing	23.7	23.8	23.9	24.0	23.9	23.5	23.8	23.9	23.9	24.2	24.4
% change	1.7	1.6	1.0	0.9	(1.0)	2.4	1.2	0.4	(0.1)	1.4	0.7
High Tech Manufacturing	38.5	38.9	39.0	39.1	38.9	38.0	38.7	38.9	38.8	38.8	38.6
% change	1.1	4.8	0.7	1.3	(2.0)	3.1	1.8	0.5	(0.4)	0.2	(0.5)
Transportation Equipment	12.8	12.7	12.8	12.5	12.5	12.2	12.7	12.4	12.2	12.2	12.3
% change	9.3	(3.6)	2.3	(10.0)	(0.1)	2.8	4.3	(2.3)	(1.6)	0.0	0.2
Nondurable Manufacturing	61.9	62.0	62.0	62.0	61.9	59.6	61.7	61.9	62.3	62.9	63.3
% change	6.4	0.6	(0.0)	(0.2)	(0.6)	2.1	3.5	0.4	0.6	1.0	0.6
Private nonmanufacturing	1,440.7	1,450.5	1,458.8	1,465.9	1,472.5	1,422.1	1,446.5	1,476.2	1,498.9	1,515.2	1,526.8
% change	1.3	2.7	2.3	2.0	1.8	3.4	1.7	2.0	1.5	1.1	0.8
Retail Trade	210.6	211.5	211.9	212.0	212.1	211.5	211.1	212.1	212.6	212.5	212.2
% change	0.7	1.6	0.7	0.2	0.2	0.3	(0.2)	0.5	0.2	(0.1)	(0.1)
Wholesale Trade	76.3	76.4	76.4	76.5	76.6	75.0	76.3	76.6	76.9	77.1	77.3
% change	0.9	0.7	0.2	0.5	0.1	0.1	1.7	0.4	0.4	0.2	0.3
Information	34.2	34.6	34.6	34.8	34.9	34.4	34.4	34.9	35.0	34.7	34.8
% change	(0.8)	4.6	0.6	1.8	1.4	0.3	0.2	1.5	0.3	(1.0)	0.2
Professional and Business Services	252.4	256.3	259.8	262.9	265.1	249.7	255.3	266.7	276.6	283.0	286.6
% change	(0.5)	6.4	5.6	4.8	3.4	2.1	2.2	4.5	3.7	2.3	1.3
Health Services	263.0	264.9	266.9	268.9	270.9	258.9	264.0	271.7	278.3	284.1	289.5
% change	2.6	3.0	3.0	3.0	2.9	9.3	2.0	2.9	2.4	2.1	1.9
Leisure and Hospitality	214.6	216.7	218.5	219.8	221.4	211.2	215.8	221.9	224.1	226.7	228.4
% change	2.2	4.0	3.4	2.4	2.9	2.3	2.2	2.8	1.0	1.1	0.7
Government	298.9	300.0	300.8	302.2	306.3	295.0	299.5	304.4	307.1	310.2	312.7
% change	1.1	1.6	1.1	1.9	5.5	(4.8)	1.5	1.7	0.9	1.0	0.8

Table A.3 – Oregon Economic Forecast Change

Oregon Forecast Change (Current vs. Last)

	Quarterly					Annual					
	2019:1	2019:2	2019:3	2019:4	2020:1	2018	2019	2020	2021	2022	2023
Personal Income ($ billions)											
Nominal Personal Income	219.1	222.2	225.2	228.1	231.2	209.3	220.6	232.6	244.6	256.8	268.9
% change	0.6	0.6	0.6	0.5	0.4	0.1	0.5	0.4	0.3	0.3	0.5
Real Personal Income (base year=2012)	199.7	201.5	203.1	204.6	206.5	193.4	200.6	207.3	213.8	220.0	226.0
% change	0.8	0.9	0.7	0.6	0.6	0.1	0.7	0.6	0.6	0.8	1.2
Nominal Wages and Salaries	110.9	112.8	114.4	116.0	117.8	106.3	111.9	118.5	124.8	131.2	137.5
% change	(0.5)	(0.4)	(0.3)	(0.3)	(0.3)	0.2	(0.4)	(0.3)	(0.4)	(0.2)	(0.1)
Other Indicators											
Per Capita Income ($1,000)	51.6	52.2	52.8	53.3	53.8	49.9	51.9	54.1	56.2	58.4	60.5
% change	0.6	0.6	0.6	0.5	0.4	0.1	0.5	0.4	0.3	0.3	0.5
Average Wage rate ($1,000)	56.7	57.3	57.9	58.5	59.0	55.1	57.0	59.3	61.8	64.3	66.9
% change	(0.2)	(0.1)	(0.1)	(0.2)	(0.2)	0.1	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)
Population (Millions)	4.24	4.25	4.27	4.3	4.3	4.20	4.25	4.30	4.35	4.40	4.45
% change	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Housing Starts (Thousands)	21.6	21.8	21.9	22.2	22.4	19.7	21.5	22.5	23.4	24.0	23.7
% change	4.4	3.7	3.2	4.1	4.1	(0.2)	4.2	3.3	0.9	0.2	(0.7)
Unemployment Rate	4.2	4.4	4.4	4.4	4.4	4.1	4.3	4.4	4.7	4.9	4.9
Point Change	(0.2)	0.0	0.0	0.0	0.0	(0.0)	(0.1)	0.0	0.0	0.0	0.0
Employment (Thousands)											
Total Nonfarm	1,939.6	1,951.0	1,960.2	1,968.6	1,978.9	1,912.3	1,945.9	1,980.6	2,006.0	2,026.2	2,040.9
% change	(0.4)	(0.3)	(0.2)	(0.2)	(0.1)	0.0	(0.3)	(0.2)	(0.2)	(0.1)	0.1
Private Nonfarm	1,640.7	1,650.9	1,659.3	1,666.3	1,672.6	1,617.3	1,646.4	1,676.2	1,698.9	1,716.0	1,728.2
% change	(0.5)	(0.3)	(0.2)	(0.2)	(0.2)	0.0	(0.3)	(0.2)	(0.2)	(0.1)	0.1
Construction	109.8	109.7	110.0	110.3	110.6	105.3	109.4	110.8	112.3	112.9	113.7
% change	0.4	0.4	0.3	0.3	0.3	0.1	0.1	0.3	0.4	0.4	0.4
Manufacturing	200.0	200.4	200.6	200.5	200.1	195.2	199.9	200.1	200.0	200.8	201.4
% change	0.3	0.5	0.6	0.6	0.6	0.0	0.3	0.6	0.9	0.8	0.8
Durable Manufacturing	138.1	138.4	138.6	138.5	138.2	135.6	138.2	138.1	137.7	137.9	138.1
% change	(0.4)	(0.2)	0.0	0.0	0.0	0.0	(0.3)	0.1	0.5	0.3	0.2
Wood Product Manufacturing	23.7	23.8	23.9	24.0	23.9	23.5	23.8	23.9	23.9	24.2	24.4
% change	1.1	1.1	1.1	1.1	1.3	0.1	1.0	1.4	1.8	1.9	1.9
High Tech Manufacturing	38.5	38.9	39.0	39.1	38.9	38.0	38.7	38.9	38.8	38.8	38.6
% change	(2.1)	(0.9)	(0.5)	(0.2)	(0.5)	0.0	(1.5)	(0.4)	(0.3)	(1.0)	(1.5)
Transportation Equipment	12.8	12.7	12.8	12.5	12.5	12.2	12.7	12.4	12.2	12.2	12.3
% change	3.1	2.3	3.1	1.3	1.9	0.3	2.2	2.4	4.2	4.3	4.2
Nondurable Manufacturing	61.9	62.0	62.0	62.0	61.9	59.6	61.7	61.9	62.3	62.9	63.3
% change	2.0	2.1	1.9	1.9	1.8	0.0	1.6	1.8	1.8	1.8	2.0
Private nonmanufacturing	1,440.7	1,450.5	1,458.8	1,465.9	1,472.5	1,422.1	1,446.5	1,476.2	1,498.9	1,515.2	1,526.8
% change	(0.6)	(0.4)	(0.3)	(0.3)	(0.3)	0.0	(0.4)	(0.3)	(0.3)	(0.2)	(0.0)
Retail Trade	210.6	211.5	211.9	212.0	212.1	211.5	211.1	212.1	212.6	212.5	212.2
% change	(0.8)	(0.7)	(0.7)	(0.9)	(0.9)	0.0	(0.8)	(1.0)	(1.6)	(1.9)	(2.1)
Wholesale Trade	76.3	76.4	76.4	76.5	76.6	75.0	76.3	76.6	76.9	77.1	77.3
% change	0.8	0.9	0.9	0.9	0.7	(0.3)	0.9	0.7	0.4	0.5	0.8
Information	34.2	34.6	34.6	34.8	34.9	34.4	34.4	34.9	35.0	34.7	34.8
% change	0.6	1.1	0.7	0.5	0.6	0.3	0.7	0.8	1.0	0.7	1.1
Professional and Business Services	252.4	256.3	259.8	262.9	265.1	249.7	255.3	266.7	276.6	283.0	286.6
% change	(1.3)	(0.9)	(0.5)	(0.5)	(0.3)	0.2	(0.7)	(0.3)	0.0	0.2	0.2
Health Services	263.0	264.9	266.9	268.9	270.9	258.9	264.0	271.7	278.3	284.1	289.5
% change	(1.3)	(1.2)	(1.0)	(0.8)	(0.7)	(0.2)	(1.1)	(0.8)	(1.0)	(0.8)	(0.2)
Leisure and Hospitality	214.6	216.7	218.5	219.8	221.4	211.2	215.8	221.9	224.1	226.7	228.4
% change	(0.6)	(0.1)	0.1	0.0	0.2	0.0	(0.3)	0.3	0.7	0.9	1.2
Government	298.9	300.0	300.8	302.2	306.3	295.0	299.5	304.4	307.1	310.2	312.7
% change	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	0.0	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)

Table A.4 – Annual Economic Forecast

Sept 2019 - Personal Income

(Billions of Current Dollars)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Personal Income*												
Oregon	199.4	209.3	220.6	232.6	244.6	256.8	268.9	281.5	294.9	308.9	323.6	339.0
% Ch	5.2	5.0	5.4	5.5	5.2	5.0	4.7	4.7	4.8	4.7	4.7	4.8
U.S.	16,830.9	17,569.5	18,295.4	19,155.4	20,022.3	20,888.0	21,776.5	22,736.4	23,774.6	24,836.7	25,948.5	27,134.6
% Ch	4.4	4.4	4.1	4.7	4.5	4.3	4.3	4.4	4.6	4.5	4.5	4.6
Wage and Salary												
Oregon	101.1	106.3	111.9	118.5	124.8	131.2	137.5	144.1	151.0	158.2	165.6	173.4
% Ch	5.5	5.1	5.3	5.9	5.4	5.1	4.8	4.8	4.8	4.7	4.7	4.7
U.S.	8,453.8	8,821.3	9,143.6	9,558.0	9,985.3	10,432.5	10,884.2	11,369.7	11,911.9	12,478.0	13,058.0	13,669.8
% Ch	4.6	4.3	3.7	4.5	4.5	4.5	4.3	4.5	4.8	4.8	4.6	4.7
Other Labor Income												
Oregon	24.8	25.9	26.9	28.3	29.8	31.4	32.9	34.4	36.2	38.1	40.0	41.9
% Ch	5.7	4.3	4.1	4.9	5.4	5.2	4.8	4.8	5.1	5.2	4.9	4.9
U.S.	1,348.1	1,389.8	1,429.6	1,491.0	1,557.6	1,627.4	1,697.9	1,773.6	1,858.2	1,946.5	2,037.0	2,132.5
% Ch	4.2	3.1	2.9	4.3	4.5	4.5	4.3	4.5	4.8	4.8	4.6	4.7
Nonfarm Proprietor's Income												
Oregon	17.6	18.6	19.2	19.5	19.7	19.9	20.1	20.5	21.2	22.0	23.0	24.0
% Ch	13.3	5.7	3.1	1.6	1.2	1.0	1.1	1.9	3.1	4.1	4.4	4.3
U.S.	1,462.0	1,541.8	1,582.9	1,599.7	1,616.8	1,633.7	1,651.6	1,677.6	1,709.4	1,748.0	1,803.4	1,873.1
% Ch	5.8	5.5	2.7	1.1	1.1	1.0	1.1	1.6	1.9	2.3	3.2	3.9
Dividend, Interest and Rent												
Oregon	40.6	42.6	44.6	47.2	49.6	52.0	54.6	57.2	59.6	62.1	64.7	67.5
% Ch	4.6	5.1	4.5	6.0	5.0	4.9	5.0	4.7	4.3	4.1	4.2	4.4
U.S.	3,361.8	3,528.1	3,668.1	3,887.2	4,082.6	4,274.9	4,472.1	4,677.6	4,885.1	5,079.4	5,282.4	5,504.1
% Ch	4.7	4.9	4.0	6.0	5.0	4.7	4.6	4.6	4.4	4.0	4.0	4.2
Transfer Payments												
Oregon	37.7	39.6	42.7	44.8	47.2	50.0	52.7	55.6	58.5	61.6	64.8	68.1
% Ch	2.6	4.9	7.9	4.9	5.5	5.8	5.5	5.4	5.3	5.2	5.2	5.1
U.S.	2,804.0	2,920.0	3,115.8	3,274.6	3,435.6	3,607.7	3,799.4	4,004.0	4,216.1	4,432.6	4,658.6	4,891.9
% Ch	3.2	4.1	6.7	5.1	4.9	5.0	5.3	5.4	5.3	5.1	5.1	5.0
Contributions for Social Security												
Oregon	17.9	19.0	19.9	20.7	21.7	22.6	23.7	24.8	26.1	27.3	28.5	29.7
% Ch	7.5	5.9	4.6	4.3	4.5	4.4	4.8	4.8	4.9	4.6	4.4	4.5
U.S.	693.3	729.1	759.7	789.2	820.9	855.5	891.0	929.8	973.3	1,019.0	1,066.1	1,115.9
% Ch	5.3	5.2	4.2	3.9	4.0	4.2	4.2	4.4	4.7	4.7	4.6	4.7
Residence Adjustment												
Oregon	(4.7)	(4.9)	(5.1)	(5.2)	(5.3)	(5.4)	(5.6)	(5.7)	(5.9)	(6.1)	(6.3)	(6.4)
% Ch	3.4	4.0	3.5	2.1	2.0	2.2	2.5	3.0	3.1	2.7	3.2	3.0
Farm Proprietor's Income												
Oregon	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
% Ch	(35.9)	(7.9)	(15.7)	7.1	25.0	(13.2)	(11.0)	2.9	6.6	2.7	0.9	1.5
Per Capita Income (Thousands of $)												
Oregon	48.2	49.9	51.9	54.1	56.2	58.4	60.5	62.6	65.0	67.4	70.0	72.7
% Ch	3.5	3.6	4.1	4.2	3.9	3.8	3.6	3.6	3.7	3.7	3.8	3.9
U.S.	51.7	53.6	55.4	57.6	59.8	62.0	64.2	66.6	69.1	71.8	74.5	77.4
% Ch	3.7	3.7	3.4	4.0	3.8	3.6	3.5	3.7	3.9	3.8	3.8	3.9

* Personal Income includes all classes of income minus Contributions for Social Security

Sept 2019 - Employment By Industry
(Oregon - Thousands, U.S. - Millions)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Nonfarm												
Oregon	1,875.3	1,912.3	1,945.9	1,980.6	2,006.0	2,026.2	2,040.9	2,055.6	2,072.1	2,086.4	2,099.0	2,112.6
% Ch	2.3	2.0	1.8	1.8	1.3	1.0	0.7	0.7	0.8	0.7	0.6	0.6
U.S.	146.6	149.1	151.4	152.9	153.9	154.6	155.1	155.7	156.5	157.3	158.1	158.9
% Ch	1.6	1.7	1.5	1.0	0.6	0.5	0.3	0.4	0.5	0.5	0.5	0.5
Private Nonfarm												
Oregon	1,565.5	1,617.3	1,646.4	1,676.2	1,698.9	1,716.0	1,728.2	1,740.3	1,753.8	1,764.9	1,773.9	1,783.9
% Ch	2.5	3.3	1.8	1.8	1.4	1.0	0.7	0.7	0.8	0.6	0.5	0.6
U.S.	124.3	126.6	128.8	130.1	131.0	131.6	131.9	132.3	133.0	133.7	134.3	135.0
% Ch	1.8	1.9	1.7	1.0	0.7	0.4	0.2	0.3	0.5	0.5	0.5	0.5
Mining and Logging												
Oregon	7.0	7.2	7.0	7.1	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3
% Ch	(1.8)	3.2	(3.3)	1.7	0.9	0.7	0.4	0.1	0.5	0.3	0.2	0.4
U.S.	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
% Ch	1.1	8.3	3.9	1.9	0.8	1.9	1.1	1.4	0.6	(0.7)	(0.4)	(0.1)
Construction												
Oregon	97.8	105.3	109.4	110.8	112.3	112.9	113.7	114.1	114.4	114.8	115.4	115.9
% Ch	8.2	7.6	3.9	1.3	1.3	0.6	0.7	0.3	0.3	0.4	0.5	0.4
U.S.	7.0	7.3	7.5	7.5	7.5	7.5	7.6	7.7	7.9	8.1	8.2	8.4
% Ch	3.6	4.6	2.7	0.1	(0.0)	0.6	0.8	1.4	2.1	2.3	2.1	2.0
Manufacturing												
Oregon	190.0	195.2	199.9	200.1	200.0	200.8	201.4	201.6	202.1	202.8	203.3	203.6
% Ch	0.9	2.8	2.4	0.1	(0.0)	0.4	0.3	0.1	0.2	0.4	0.2	0.1
U.S.	12.4	12.7	12.8	12.7	12.5	12.5	12.4	12.3	12.3	12.3	12.2	12.1
% Ch	0.7	2.0	1.2	(0.9)	(1.4)	(0.6)	(0.5)	(0.5)	(0.4)	(0.1)	(0.7)	(1.2)
Durable Manufacturing												
Oregon	131.6	135.6	138.2	138.1	137.7	137.9	138.1	138.1	138.3	138.8	139.0	139.0
% Ch	0.3	3.0	1.9	(0.0)	(0.3)	0.2	0.1	0.0	0.2	0.3	0.1	0.0
U.S.	7.7	7.9	8.1	8.0	7.9	7.8	7.8	7.7	7.7	7.7	7.7	7.5
% Ch	0.3	2.7	1.5	(0.7)	(1.7)	(0.9)	(0.6)	(0.5)	(0.2)	0.1	(0.7)	(1.4)
Wood Products												
Oregon	23.0	23.5	23.8	23.9	23.9	24.2	24.4	24.5	24.6	24.7	24.7	24.8
% Ch	0.9	2.4	1.2	0.4	(0.1)	1.4	0.7	0.5	0.5	0.3	0.2	0.3
U.S.	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
% Ch	1.1	2.4	1.9	4.9	3.5	4.3	2.1	0.3	2.0	2.4	(0.3)	(1.4)
Metal and Machinery												
Oregon	37.4	39.3	40.4	39.7	39.2	38.8	38.9	39.2	39.5	39.7	39.7	39.7
% Ch	1.9	5.1	2.9	(1.7)	(1.4)	(0.9)	0.1	0.7	0.8	0.5	0.1	(0.0)
U.S.	2.9	3.0	3.0	3.0	2.9	2.9	3.0	3.0	3.0	3.0	2.9	2.9
% Ch	0.1	3.1	1.6	(0.2)	(2.2)	(0.1)	1.0	0.4	(0.2)	(0.0)	(1.1)	(2.0)
Computer and Electronic Products												
Oregon	36.9	38.0	38.7	38.9	38.8	38.8	38.6	38.2	37.9	37.7	37.6	37.5
% Ch	(2.4)	3.1	1.8	0.5	(0.4)	0.2	(0.5)	(1.1)	(0.9)	(0.5)	(0.4)	(0.3)
U.S.	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0
% Ch	(0.9)	1.6	1.9	(1.3)	(0.8)	(0.1)	0.1	0.5	0.4	(0.1)	(0.5)	(1.0)
Transportation Equipment												
Oregon	11.9	12.2	12.7	12.4	12.2	12.2	12.3	12.2	12.2	12.3	12.4	12.5
% Ch	(2.3)	2.8	4.3	(2.3)	(1.6)	0.0	0.2	(0.4)	(0.0)	1.0	0.9	0.7
U.S.	1.6	1.7	1.7	1.7	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.4
% Ch	0.8	3.6	1.8	(3.5)	(2.7)	(4.0)	(5.0)	(3.0)	(1.1)	0.1	(0.1)	(0.8)
Other Durables												
Oregon	22.6	22.7	22.6	23.2	23.7	23.8	24.0	24.0	24.2	24.4	24.5	24.5
% Ch	3.4	0.3	(0.3)	2.7	2.0	0.6	0.6	0.3	0.6	0.9	0.6	(0.1)
U.S.	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2
% Ch	0.9	1.8	1.1	1.1	(0.7)	0.0	0.0	(0.5)	(0.0)	0.5	(0.7)	(1.3)
Nondurable Manufacturing												
Oregon	58.4	59.6	61.7	61.9	62.3	62.9	63.3	63.5	63.7	64.0	64.3	64.5
% Ch	2.3	2.1	3.5	0.4	0.6	1.0	0.6	0.3	0.3	0.5	0.4	0.3
U.S.	4.7	4.7	4.8	4.7	4.7	4.7	4.6	4.6	4.6	4.6	4.5	4.5
% Ch	1.3	0.9	0.6	(1.2)	(0.9)	(0.2)	(0.3)	(0.6)	(0.7)	(0.5)	(0.6)	(0.7)
Food Manufacturing												
Oregon	29.8	29.9	30.9	31.2	31.6	32.0	32.2	32.3	32.3	32.5	32.6	32.8
% Ch	2.2	0.6	3.0	1.2	1.2	1.2	0.6	0.3	0.2	0.5	0.5	0.4
U.S.	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8
% Ch	2.7	1.3	1.2	0.6	0.9	1.7	1.4	1.0	0.7	0.8	0.5	0.1
Other Nondurable												
Oregon	28.6	29.7	30.8	30.7	30.7	30.9	31.1	31.3	31.4	31.6	31.7	31.8
% Ch	2.5	3.7	4.0	(0.5)	0.1	0.8	0.6	0.4	0.5	0.5	0.3	0.3
U.S.	3.1	3.1	3.1	3.1	3.0	3.0	2.9	2.9	2.8	2.8	2.8	2.7
% Ch	0.6	0.7	0.3	(2.2)	(1.8)	(1.2)	(1.3)	(1.5)	(1.5)	(1.3)	(1.3)	(1.2)
Trade, Transportation, and Utilities												
Oregon	349.0	352.2	356.4	357.9	358.7	358.8	358.8	359.4	360.1	360.3	360.5	360.4
% Ch	2.0	0.9	1.2	0.4	0.2	0.0	(0.0)	0.2	0.2	0.1	0.0	(0.0)
U.S.	27.4	27.7	27.8	27.7	27.6	27.3	27.1	26.9	26.7	26.7	26.6	26.5
% Ch	0.7	0.9	0.6	(0.5)	(0.4)	(0.8)	(0.9)	(0.9)	(0.5)	(0.2)	(0.2)	(0.3)

Sept 2019 - Employment By Industry
(Oregon - Thousands, U.S. - Millions)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Retail Trade												
Oregon	210.9	211.5	211.1	212.1	212.6	212.5	212.2	212.6	213.1	213.2	213.1	212.8
% Ch	1.9	0.3	(0.2)	0.5	0.2	(0.1)	(0.1)	0.2	0.2	0.1	(0.0)	(0.1)
U.S.	15.8	15.8	15.8	15.6	15.5	15.4	15.2	15.0	14.9	14.8	14.8	14.7
% Ch	0.0	(0.1)	(0.3)	(1.0)	(0.7)	(1.1)	(1.1)	(1.1)	(0.9)	(0.5)	(0.2)	(0.2)
Wholesale Trade												
Oregon	75.0	75.0	76.3	76.6	76.9	77.1	77.3	77.5	77.6	77.7	77.8	78.0
% Ch	1.4	0.1	1.7	0.4	0.4	0.2	0.3	0.2	0.2	0.1	0.1	0.2
U.S.	5.8	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.0	5.9	5.9	5.9
% Ch	0.5	0.7	1.6	0.5	0.3	(0.1)	(0.3)	(0.1)	(0.1)	(0.1)	(0.0)	(0.6)
Transportation and Warehousing, and Utilities												
Oregon	63.1	65.7	69.1	69.1	69.2	69.2	69.3	69.3	69.4	69.4	69.5	69.6
% Ch	3.3	4.0	5.2	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1
U.S.	5.7	6.0	6.1	6.1	6.1	6.0	5.9	5.9	5.9	5.9	5.9	5.9
% Ch	3.1	3.9	2.2	(0.3)	(0.5)	(0.8)	(1.0)	(0.9)	(0.1)	0.3	(0.1)	(0.3)
Information												
Oregon	34.2	34.4	34.4	34.9	35.0	34.7	34.8	34.9	34.8	34.8	34.8	34.8
% Ch	1.9	0.3	0.2	1.5	0.3	(1.0)	0.2	0.4	(0.1)	(0.1)	0.1	(0.0)
U.S.	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7
% Ch	0.7	0.5	(1.2)	(0.8)	0.6	(1.2)	0.3	0.3	(0.4)	(0.4)	(0.9)	(1.6)
Financial Activities												
Oregon	100.0	102.3	102.9	103.9	105.3	106.1	106.2	106.0	105.7	105.2	104.9	104.9
% Ch	3.0	2.2	0.7	0.9	1.4	0.8	0.1	(0.2)	(0.3)	(0.5)	(0.3)	0.0
U.S.	8.4	8.6	8.7	8.7	8.8	8.9	8.8	8.8	8.8	8.7	8.7	8.7
% Ch	2.0	1.4	1.2	0.7	0.9	0.5	(0.1)	(0.3)	(0.4)	(0.5)	(0.6)	(0.0)
Professional and Business Services												
Oregon	244.6	249.7	255.3	266.7	276.6	283.0	286.6	291.3	297.9	303.1	306.8	311.8
% Ch	2.2	2.1	2.2	4.5	3.7	2.3	1.3	1.7	2.3	1.7	1.2	1.6
U.S.	20.5	21.0	21.5	22.5	23.1	23.4	23.6	24.0	24.5	25.0	25.4	25.8
% Ch	2.0	2.4	2.5	4.4	2.8	1.4	0.9	1.6	2.3	1.9	1.4	1.6
Education and Health Services												
Oregon	272.9	295.5	300.7	308.5	315.2	321.1	326.5	331.3	335.3	338.3	340.9	343.3
% Ch	2.9	8.3	1.8	2.6	2.2	1.9	1.7	1.5	1.2	0.9	0.8	0.7
U.S.	23.2	23.7	24.2	24.4	24.8	25.0	25.2	25.4	25.6	25.7	25.9	26.1
% Ch	2.4	2.1	2.3	0.9	1.4	1.0	0.8	0.8	0.6	0.5	0.7	0.9
Educational Services												
Oregon	36.0	36.6	36.6	36.7	36.9	37.0	37.0	37.1	37.1	37.2	37.2	37.2
% Ch	0.9	1.5	0.1	0.3	0.4	0.2	0.2	0.2	0.2	0.0	0.0	0.0
U.S.	3.7	3.7	3.8	3.7	3.7	3.6	3.5	3.4	3.4	3.3	3.3	3.3
% Ch	2.8	1.6	1.4	(1.8)	(1.7)	(2.1)	(2.1)	(1.8)	(1.7)	(1.5)	(1.3)	(1.0)
Health Care and Social Assistance												
Oregon	236.8	258.9	264.0	271.7	278.3	284.1	289.5	294.2	298.1	301.2	303.8	306.1
% Ch	3.2	9.3	2.0	2.9	2.4	2.1	1.9	1.6	1.3	1.0	0.9	0.8
U.S.	19.5	19.9	20.4	20.7	21.1	21.4	21.7	22.0	22.2	22.4	22.6	22.8
% Ch	2.4	2.1	2.4	1.4	1.9	1.5	1.3	1.2	1.0	0.8	1.0	1.1
Leisure and Hospitality												
Oregon	206.4	211.2	215.8	221.9	224.1	226.7	228.4	229.7	231.2	232.7	234.4	235.9
% Ch	3.3	2.3	2.2	2.8	1.0	1.1	0.7	0.6	0.7	0.7	0.7	0.7
U.S.	16.1	16.4	16.8	17.2	17.3	17.6	17.8	17.9	17.9	18.0	18.0	18.2
% Ch	2.5	1.9	2.7	2.2	0.8	1.6	1.0	0.6	0.2	0.2	0.5	0.8
Other Services												
Oregon	63.5	64.4	64.6	64.4	64.5	64.7	64.7	64.9	65.1	65.5	65.7	66.0
% Ch	(0.6)	1.4	0.4	(0.3)	0.2	0.3	(0.0)	0.3	0.4	0.6	0.3	0.5
U.S.	5.8	5.8	5.9	5.9	5.8	5.8	5.8	5.7	5.7	5.7	5.7	5.7
% Ch	1.4	1.3	1.3	(0.9)	(0.4)	(0.6)	(0.7)	(0.5)	(0.3)	(0.1)	0.2	0.4
Government												
Oregon	309.8	295.0	299.5	304.4	307.1	310.2	312.7	315.3	318.3	321.5	325.1	328.7
% Ch	1.0	(4.8)	1.5	1.7	0.9	1.0	0.8	0.8	1.0	1.0	1.1	1.1
U.S.	22.4	22.4	22.6	22.8	22.9	23.0	23.2	23.4	23.5	23.7	23.8	24.0
% Ch	0.5	0.4	0.5	1.3	0.2	0.7	0.7	0.7	0.7	0.6	0.6	0.6
Federal Government												
Oregon	28.2	28.1	28.6	29.7	28.4	28.4	28.3	28.3	28.2	28.2	28.1	28.1
% Ch	(0.2)	(0.4)	1.8	4.0	(4.4)	(0.2)	(0.2)	(0.2)	(0.1)	(0.2)	(0.1)	(0.1)
U.S.	2.8	2.8	2.8	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
% Ch	0.4	(0.3)	0.6	4.6	(4.2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Government, Oregon												
State Total	56.2	39.5	41.0	41.1	41.6	42.1	42.4	42.7	43.1	43.6	44.2	44.8
% Ch	1.0	(29.7)	3.7	0.2	1.2	1.0	0.8	0.8	0.9	1.1	1.3	1.4
State Education	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
% Ch	3.4	2.0	1.5	1.1	(0.3)	(0.2)	(0.4)	0.2	0.0	(0.0)	0.3	0.5
Local Government, Oregon												
Local Total	225.3	227.4	229.8	233.6	237.0	239.8	242.0	244.3	247.0	249.7	252.8	255.8
% Ch	1.2	0.9	1.1	1.6	1.5	1.2	0.9	1.0	1.1	1.1	1.2	1.2
Local Education	132.7	132.9	133.2	133.8	134.9	135.7	136.4	136.9	137.3	138.0	138.7	139.0
% Ch	1.2	0.1	0.2	0.4	0.9	0.6	0.5	0.3	0.3	0.5	0.5	0.2

Sept 2019 - Other Economic Indicators

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
GDP (Bil of 2009 $),												
Chain Weight (in billions of $)	18,050.7	18,566.4	19,047.6	19,394.9	19,725.9	20,047.1	20,365.6	20,750.7	21,188.7	21,624.0	22,066.3	22,542.9
% Ch	2.2	2.9	2.6	1.8	1.7	1.6	1.6	1.9	2.1	2.1	2.0	2.2
Price and Wage Indicators												
GDP Implicit Price Deflator,												
Chain Weight U.S., 2009=100	107.9	110.3	112.3	114.9	117.6	120.4	123.1	125.8	128.4	131.2	134.1	137.1
% Ch	1.9	2.2	1.8	2.3	2.4	2.4	2.3	2.2	2.1	2.1	2.2	2.2
Personal Consumption Deflator,												
Chain Weight U.S., 2009=100	106.1	108.2	110.0	112.2	114.4	116.7	119.0	121.3	123.7	126.2	128.7	131.4
% Ch	1.8	2.0	1.6	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.1	2.1
CPI, Urban Consumers,												
1982-84=100												
West Region, Urban Size A	254.7	263.3	270.7	277.3	284.0	291.0	297.9	305.0	312.2	319.7	327.5	335.6
% Ch	2.8	3.3	2.8	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
U.S.	245.1	251.1	255.9	261.4	267.1	273.0	278.9	285.0	291.1	297.5	304.2	311.1
% Ch	2.1	2.4	1.9	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
Oregon Average Wage												
Rate (Thous $)	53.4	55.1	57.0	59.3	61.8	64.3	66.9	69.6	72.4	75.4	78.4	81.7
% Ch	3.2	3.1	3.5	4.1	4.1	4.1	4.1	4.0	4.0	4.0	4.1	4.1
U.S. Average Wage												
Wage Rate (Thous $)	57.7	59.2	60.4	62.5	64.9	67.5	70.2	73.0	76.1	79.3	82.6	86.0
% Ch	3.0	2.6	2.1	3.5	3.8	4.0	4.0	4.1	4.2	4.2	4.1	4.1
Housing Indicators												
FHFA Oregon Housing Price Index												
1991 Q1=100	394.3	425.4	438.8	454.0	471.2	489.4	508.6	528.1	547.5	567.4	588.0	608.8
% Ch	8.1	7.9	3.2	3.4	3.8	3.9	3.9	3.8	3.7	3.6	3.6	3.5
FHFA National Housing Price Index												
1991 Q1=100	245.8	262.1	273.0	281.0	289.0	297.5	307.1	317.0	326.8	336.6	346.6	356.6
% Ch	6.6	6.6	4.2	2.9	2.8	2.9	3.2	3.2	3.1	3.0	3.0	2.9
Housing Starts												
Oregon (Thous)	19.3	19.7	21.5	22.5	23.4	24.0	23.7	23.9	23.4	23.3	23.0	22.8
% Ch	1.6	2.1	9.3	4.9	4.0	2.2	(1.3)	0.9	(1.8)	(0.7)	(1.4)	(0.6)
U.S. (Millions)	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.2	1.2	1.2
% Ch	2.6	3.4	(2.1)	(0.6)	1.6	3.3	(1.0)	(0.4)	0.9	(2.4)	(3.3)	(1.1)
Other Indicators												
Unemployment Rate (%)												
Oregon	4.1	4.1	4.3	4.4	4.7	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Point Change	(0.7)	0.0	0.2	0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
U.S.	4.4	3.9	3.6	3.7	3.9	4.1	4.4	4.5	4.5	4.5	4.5	4.5
Point Change	(0.5)	(0.5)	(0.3)	0.0	0.2	0.2	0.3	0.1	(0.0)	(0.0)	0.0	0.0
Industrial Production Index												
U.S, 2002 = 100	104.4	108.6	109.7	110.7	111.7	112.7	113.6	115.0	117.0	119.0	121.0	123.3
% Ch	2.3	3.9	1.1	1.0	0.9	0.9	0.8	1.3	1.7	1.7	1.7	1.9
Prime Rate (Percent)	4.1	4.9	5.4	5.3	5.5	5.5	5.7	5.7	5.7	5.7	5.7	5.7
% Ch	16.7	19.7	9.9	(1.3)	3.3	(0.0)	4.2	0.3	0.0	0.0	(0.0)	(0.0)
Population (Millions)												
Oregon	4.14	4.20	4.25	4.30	4.35	4.40	4.45	4.49	4.54	4.58	4.63	4.67
% Ch	1.6	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	0.9	0.9
U.S.	325.7	327.7	330.1	332.4	334.7	337.1	339.4	341.6	343.9	346.1	348.3	350.5
% Ch	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6
Timber Harvest (Mil Bd Ft)												
Oregon	3,692.1	3,619.9	3,568.4	3,654.9	3,706.3	3,790.9	3,828.8	3,847.6	3,906.0	3,910.4	3,914.7	3,916.7
% Ch	(1.9)	(2.0)	(1.4)	2.4	1.4	2.3	1.0	0.5	1.5	0.1	0.1	0.1

APPENDIX B: REVENUE FORECAST DETAIL

Table B.1a
General Fund Revenue Statement -- 2017-19

		Forecasts Dated: 5/15/2019			Forecasts Dated: 9/1/2019			Difference	
	Estimate at COS 2017	2017-18	2018-19	Total 2017-19	2017-18	2018-19	Total 2017-19	09/1/2019 Less 05/15/2019	09/1/2019 Less COS
Taxes									
Personal Income Taxes	17,147,386,000	8,860,793,000	9,726,251,000	18,587,044,000	8,893,055,000	9,812,082,000	18,705,137,000	118,093,000	1,557,751,000
Film and Video and Transfer to Counties	(32,956,000)	(20,576,000)	(21,670,000)	(42,246,000)	(20,576,000)	(21,670,000)	(42,246,000)	0	(9,290,000)
Corporate Income Taxes	1,076,977,000	736,786,000	956,082,000	1,692,868,000	754,980,000	997,769,000	1,752,749,000	59,881,000	675,772,000
Transfer to Rainy Day Fund (Minimum Tax)	(42,504,000)	(16,183,000)	(65,934,000)	(82,117,000)	(16,183,000)	(71,100,000)	(87,283,000)	(5,166,000)	(44,779,000)
Insurance Taxes	129,852,000	76,748,000	72,838,000	149,586,000	76,748,000	83,516,000	160,264,000	10,678,000	30,412,000
Estate Taxes	290,015,000	176,453,000	185,232,000	361,685,000	176,453,000	204,734,000	381,187,000	19,502,000	91,172,000
Cigarette Taxes	67,837,000	33,743,000	32,593,000	66,336,000	33,743,000	31,855,000	65,598,000	(738,000)	(2,239,000)
Other Tobacco Products Taxes	66,329,000	32,424,000	31,988,000	64,412,000	32,424,000	31,173,000	63,597,000	(815,000)	(2,732,000)
Other Taxes	1,676,000	891,000	833,000	1,724,000	891,000	1,084,000	1,975,000	251,000	299,000
Fines and Fees									
State Court Fees	114,733,000	59,623,000	63,505,000	123,128,000	59,623,000	64,895,000	124,518,000	1,390,000	9,785,000
Secretary of State Fees	64,707,000	35,773,000	35,339,000	71,112,000	35,773,000	37,709,000	73,482,000	2,370,000	8,775,000
Criminal Fines & Assessments	66,796,000	19,422,000	20,193,000	39,615,000	19,422,000	18,338,000	37,760,000	(1,855,000)	(29,036,000)
Securities Fees	23,008,000	11,488,000	12,082,000	23,570,000	11,488,000	11,763,000	23,251,000	(319,000)	243,000
Central Service Charges	10,876,000	5,438,000	5,438,000	10,876,000	5,438,000	5,438,000	10,876,000	0	0
Liquor Apportionment	326,090,000	142,612,000	150,293,000	292,905,000	142,612,000	151,767,000	294,379,000	1,474,000	(31,711,000)
Interest Earnings	35,279,000	30,171,000	48,874,000	79,045,000	30,171,000	57,011,000	87,182,000	8,137,000	51,903,000
Miscellaneous Revenues	19,027,000	5,089,000	6,000,000	11,089,000	5,089,000	5,099,000	10,188,000	(901,000)	(8,839,000)
One-time Transfers	111,340,000	3,125,000	0	3,125,000	3,125,000	1,895,000	5,020,000	1,895,000	(106,320,000)
Gross General Fund Revenues	19,551,928,000	10,230,579,000	11,347,541,000	21,578,120,000	10,281,035,000	11,516,128,000	21,797,163,000	219,043,000	2,245,235,000
Total Personal and Corporate Transfers	(75,460,000)	(36,759,000)	(87,604,000)	(124,363,000)	(36,759,000)	(92,770,000)	(129,529,000)	(5,166,000)	(54,069,000)
Net General Fund Revenues	19,476,468,000	10,193,820,000	11,259,937,000	21,453,757,000	10,244,276,000	11,423,358,000	21,667,634,000	213,877,000	2,191,166,000
Plus Beginning Balance	780,836,010			1,000,385,138			1,000,385,138	0	219,549,128
Less Anticipated Administrative Actions*	(21,472,000)			(10,369,772)			(10,369,772)	0	11,102,228
Less Legislatively Adopted Actions**	(180,120,396)			(179,424,096)			(179,424,096)	0	696,300
Available Resources	20,055,711,615			22,264,348,270			22,478,225,270	213,877,000	2,422,513,656
Appropriations	19,858,800,000			19,942,703,408			19,945,903,558	3,200,150	87,103,558
Estimated Ending Balance	196,911,615			2,321,644,862			2,532,321,712	210,676,850	2,335,410,098

Table B.1b
General Fund Revenue Statement -- 2019-21 -- Close of Session

	Forecasts Dated: 5/15/2019			Forecasts Dated: Close of Session			Difference
	2019-20	2020-21	Total 2019-21	2019-20	2020-21	Total 2019-21	COS 2019 Less 05/15/2019
Taxes							
Personal Income Taxes	8,731,368,000	9,973,700,000	18,705,068,000	8,534,499,000	9,749,009,000	18,283,508,000	(421,560,000)
Film and Video and Transfer to Counties	(22,230,000)	(23,032,000)	(45,262,000)	(22,230,000)	(23,032,000)	(45,262,000)	0
Corporate Income Taxes	614,871,000	630,913,000	1,245,784,000	580,370,040	610,434,960	1,190,805,000	(54,979,000)
Transfer to Rainy Day Fund & PERS UAL	(101,500,000)	(56,754,000)	(158,254,000)	(101,500,000)	(56,754,000)	(158,254,000)	0
Insurance Taxes	72,778,000	74,646,000	147,424,000	72,778,000	59,785,000	132,563,000	(14,861,000)
Estate Taxes	176,354,000	184,835,000	361,189,000	176,354,000	184,835,000	361,189,000	0
Cigarette Taxes	32,663,000	32,335,000	64,998,000	32,663,000	32,335,000	64,998,000	0
Other Tobacco Products Taxes	33,053,000	33,481,000	66,534,000	33,053,000	33,481,000	66,534,000	0
Other Taxes	823,000	813,000	1,636,000	823,000	813,000	1,636,000	0
Fines and Fees							
State Court Fees	61,797,000	61,962,000	123,759,000	69,281,000	69,449,000	138,730,000	14,971,000
Secretary of State Fees	35,392,000	35,445,000	70,837,000	35,392,000	35,445,000	70,837,000	0
Criminal Fines & Assessments	19,267,000	19,267,000	38,534,000	25,874,000	25,874,000	51,748,000	13,214,000
Securities Fees	13,512,000	13,757,000	27,269,000	13,512,000	13,757,000	27,269,000	0
Central Service Charges	5,438,000	5,438,000	10,876,000	5,188,000	5,188,000	10,376,000	(500,000)
Liquor Apportionment	164,802,000	178,535,000	343,337,000	167,298,000	181,239,000	348,537,000	5,200,000
Interest Earnings	51,477,000	51,488,000	102,965,000	51,477,000	51,488,000	102,965,000	0
Miscellaneous Revenues	6,500,000	7,000,000	13,500,000	6,500,000	7,000,000	13,500,000	0
One-time Transfers	0	0	0	0	155,200,000	155,200,000	155,200,000
Gross General Fund Revenues	10,020,095,000	11,303,615,000	21,323,710,000	9,805,062,040	11,215,332,960	21,020,395,000	(303,315,000)
Total Personal and Corporate Transfers	(123,730,000)	(79,786,000)	(203,516,000)	(123,730,000)	(79,786,000)	(203,516,000)	0
Net General Fund Revenues	9,896,365,000	11,223,829,000	21,120,194,000	9,681,332,040	11,135,546,960	20,816,879,000	(303,315,000)
Plus Beginning Balance			2,321,644,862			2,318,444,712	(3,200,150)
Less Anticipated Administrative Actions*			(21,472,000)			(21,472,000)	0
Less Legislatively Adopted Actions**			(199,427,034)			(199,459,036)	(32,002)
Available Resources			23,220,939,828			22,914,392,677	(306,547,151)
Appropriations			NA			22,409,455,625	NA
Estimated Ending Balance			NA			504,937,052	NA

Table B.1c
General Fund Revenue Statement -- 2019-21

	Estimate at COS 2019	Forecasts Dated: 5/15/2019			Forecasts Dated: 9/1/2019			Difference	
		2019-20	2020-21	Total 2019-21	2019-20	2020-21	Total 2019-21	09/1/2019 Less 05/15/2019	09/1/2019 Less COS
Taxes									
Personal Income Taxes	18,283,508,000	8,731,368,000	9,973,700,000	18,705,068,000	8,654,067,000	9,638,356,000	18,292,423,000	(412,645,000)	8,915,000
Film and Video and Transfer to Counties	(45,262,000)	(22,230,000)	(23,032,000)	(45,262,000)	(22,230,000)	(23,032,000)	(45,262,000)	0	0
Corporate Income Taxes	1,190,805,000	614,871,000	630,913,000	1,245,784,000	695,166,000	574,792,000	1,269,958,000	24,174,000	79,153,000
Transfer to Rainy Day Fund & PERS UAL	(158,254,000)	(101,500,000)	(56,754,000)	(158,254,000)	0	(151,541,000)	(151,541,000)	6,713,000	6,713,000
Insurance Taxes	132,563,000	72,778,000	74,646,000	147,424,000	73,071,000	59,321,000	132,392,000	(15,032,000)	(171,000)
Estate Taxes	361,189,000	176,354,000	184,835,000	361,189,000	179,554,000	185,935,000	365,489,000	4,300,000	4,300,000
Cigarette Taxes	64,998,000	32,663,000	32,335,000	64,998,000	32,663,000	32,335,000	64,998,000	0	0
Other Tobacco Products Taxes	66,534,000	33,053,000	33,481,000	66,534,000	33,053,000	33,481,000	66,534,000	0	0
Other Taxes	1,636,000	823,000	813,000	1,636,000	823,000	813,000	1,636,000	0	0
Fines and Fees									
State Court Fees	138,730,000	61,797,000	61,962,000	123,759,000	69,281,000	69,449,000	138,730,000	14,971,000	0
Secretary of State Fees	70,837,000	35,392,000	35,445,000	70,837,000	35,392,000	35,445,000	70,837,000	0	0
Criminal Fines & Assessments	51,748,000	19,267,000	19,267,000	38,534,000	25,874,000	25,874,000	51,748,000	13,214,000	0
Securities Fees	27,269,000	13,512,000	13,757,000	27,269,000	13,206,000	13,606,000	26,812,000	(457,000)	(457,000)
Central Service Charges	10,376,000	5,438,000	5,438,000	10,876,000	5,188,000	5,188,000	10,376,000	(500,000)	0
Liquor Apportionment	348,537,000	164,802,000	178,535,000	343,337,000	167,298,000	181,239,000	348,537,000	5,200,000	0
Interest Earnings	102,965,000	51,477,000	51,488,000	102,965,000	51,477,000	51,488,000	102,965,000	0	0
Miscellaneous Revenues	13,500,000	6,500,000	7,000,000	13,500,000	6,500,000	7,000,000	13,500,000	0	0
One-time Transfers	155,200,000	0	0	0	0	155,200,000	155,200,000	155,200,000	0
Gross General Fund Revenues	21,020,395,000	10,020,095,000	11,303,615,000	21,323,710,000	10,042,613,000	11,069,522,000	21,112,135,000	(211,575,000)	91,740,000
Total Personal and Corporate Transfers	(203,516,000)	(123,730,000)	(79,786,000)	(203,516,000)	(22,230,000)	(174,573,000)	(196,803,000)	6,713,000	6,713,000
Net General Fund Revenues	20,816,879,000	9,896,365,000	11,223,829,000	21,120,194,000	10,020,383,000	10,894,949,000	20,915,332,000	(204,862,000)	98,453,000
Plus Beginning Balance	2,318,444,712			2,321,644,862			2,532,321,712	210,676,850	213,877,000
Less Anticipated Administrative Actions*	(21,472,000)			(21,472,000)			(21,472,000)	0	0
Less Legislatively Adopted Actions**	(199,459,036)			(199,427,034)			(199,459,036)	(32,002)	0
Available Resources	22,914,392,677			23,220,939,828			23,226,722,677	5,782,849	312,330,000
Appropriations	22,409,455,625						22,409,455,625	NA	0
Estimated Ending Balance	504,937,052						817,267,052	NA	312,330,000

TABLE B.2

General Fund Revenue Forecast

September 2019

($Millions)

Fiscal Years	2017-18 Fiscal Year	2018-19 Fiscal Year	2019-20 Fiscal Year	2020-21 Fiscal Year	2021-22 Fiscal Year	2022-23 Fiscal Year	2023-24 Fiscal Year	2024-25 Fiscal Year	2025-26 Fiscal Year	2026-27 Fiscal Year	2027-28 Fiscal Year	2028-29 Fiscal Year
Taxes												
Personal Income	8,893.1	9,812.1	8,654.1	9,638.4	10,634.8	11,025.8	11,552.1	12,094.9	12,507.4	13,026.7	13,763.4	14,375.6
Offsets and Transfers	(20.6)	(21.7)	(22.2)	(23.0)	(23.3)	(26.7)	(24.8)	(24.0)	(24.4)	(24.9)	(25.3)	(25.7)
Corporate Excise & Income	755.0	997.8	695.2	574.8	618.3	665.5	701.8	740.9	800.6	842.8	891.5	929.6
Offsets and Transfers	(16.2)	(71.1)	0.0	(151.5)	0.0	(50.1)	0.0	(52.6)	0.0	(64.3)	0.0	(66.4)
Insurance	76.7	83.5	73.1	59.3	60.0	61.9	64.0	65.9	68.2	70.5	73.1	75.5
Estate	176.5	204.7	179.6	185.9	189.9	195.3	200.7	205.6	211.9	218.3	228.3	235.2
Cigarette	33.7	31.9	32.7	32.3	32.0	31.7	31.5	31.0	30.6	30.2	29.9	29.6
Other Tobacco Products	32.4	31.2	33.1	33.5	33.9	34.5	34.9	35.1	35.3	35.5	35.7	35.8
Other Taxes	0.9	1.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Other Revenues												
Licenses and Fees	126.3	132.7	143.8	144.4	145.6	146.3	147.0	147.6	148.3	148.9	149.9	150.5
Charges for Services	5.4	5.4	5.2	5.2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Liquor Apportionment	142.6	151.8	167.3	181.2	166.1	173.8	181.6	190.0	198.6	207.8	217.0	226.7
Interest Earnings	30.2	57.0	51.5	51.5	51.0	50.8	50.8	50.7	50.8	50.8	50.7	50.7
Others	8.2	7.0	6.5	162.2	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
Gross General Fund	10,281.0	11,516.1	10,042.6	11,069.5	11,945.3	12,399.7	12,979.2	13,577.1	14,067.5	14,647.8	15,456.2	16,126.5
Net General Fund	10,244.3	11,423.4	10,020.4	10,894.9	11,922.0	12,322.9	12,954.4	13,500.5	14,043.1	14,558.7	15,430.9	16,034.4

Biennial Totals	2017-19 BN	Change (%)	2019-21 BN	Change (%)	2021-23 BN	Change (%)	2023-25 BN	Change (%)	2025-27 BN	Change (%)	2027-29 BN	Change (%)
Taxes												
Personal Income	18,705.1	16.5%	18,292.4	-2.2%	21,660.6	18.4%	23,647.0	9.2%	25,534.1	8.0%	28,139.0	10.2%
Corporate Excise & Income	1,752.7	44.8%	1,270.0	-27.5%	1,283.8	1.1%	1,442.7	12.4%	1,643.4	13.9%	1,821.1	10.8%
Insurance	160.3	15.1%	132.4	-17.4%	121.9	-8.0%	129.9	6.6%	138.7	6.7%	148.6	7.1%
Estate Taxes	381.2	18.1%	365.5	-4.1%	385.1	5.4%	406.3	5.5%	430.2	5.9%	463.5	7.7%
Cigarette	65.6	-6.9%	65.0	-0.9%	63.7	-1.9%	62.5	-1.9%	60.8	-2.8%	59.4	-2.2%
Other Tobacco Products	63.6	2.0%	66.5	4.6%	68.4	2.8%	70.0	2.3%	70.8	1.2%	71.5	0.9%
Other Taxes	2.0	9.6%	1.6	-17.2%	1.6	-0.6%	1.6	0.0%	1.6	0.0%	1.6	0.0%
Other Revenues												
Licenses and Fees	259.0	5.2%	288.1	11.2%	291.9	1.3%	294.6	0.9%	297.2	0.9%	300.5	1.1%
Charges for Services	10.9	5.8%	10.4	-4.6%	10.9	4.8%	10.9	0.0%	10.9	0.0%	10.9	0.0%
Liquor Apportionment	294.4	12.4%	348.5	18.4%	339.9	-2.5%	371.7	9.4%	406.4	9.4%	443.7	9.2%
Interest Earnings	87.2	250.5%	103.0	18.1%	101.8	-1.1%	101.5	-0.3%	101.5	0.0%	101.5	-0.1%
Others	15.2	-89.8%	168.7	1009.3%	15.5	-90.8%	17.5	12.9%	19.5	11.4%	21.5	10.3%
Gross General Fund	21,797.2	17.5%	21,112.1	-3.1%	24,345.0	15.3%	26,556.3	9.1%	28,715.3	8.1%	31,582.7	10.0%
Net General Fund	21,667.6	17.0%	20,915.3	-3.5%	24,244.9	15.9%	26,454.9	9.1%	28,601.7	8.1%	31,465.3	10.0%

Table B.3 Summary of 2019 Legislative Session Adjustments

	19-21	21-23	23-25	Revenue Impact Statement
Personal Income Tax Impacts (millions)				
Tax Expenditure Extension - HB 2164	-$70.5	-$146.0	-$156.4	HB 2164
Rural Medical Provider – HB 2847	-$0.2	-$0.4	-$0.4	HB 2847
Corporate Activity Tax – HB 3427	-$352.0	-$548.0	-$599.0	HB 3427
DOR Tax Compliance – SB 523 & HB 5033	$1.1	$1.4	$1.4	SB 523 HB 3206
Personal Income Tax Total	**-$421.6**	**-$693.0**	**-$754.4**	
Corporate Income Tax Impacts (millions)				
Medical Provider Taxes - HB 2010	-$5.0	-$8.0	-$8.0	HB 2010
Medical Provider Taxes - SB 523	$1.20	$1.2	$1.2	SB 523
Corporate Activity Tax – HB 3427	-$71.0	-$151.0	-$163.0	HB 3427
Corporate Income Tax Total	**-$74.8**	**-$157.8**	**-$169.8**	
Other Tax/Revenue Impacts (millions)				
Court Filing Fees - HB 3447	$3.1	$3.6	$3.8	HB 3447
OLCC Fees - SB 248	$5.2	$5.6	$5.7	SB 248
DOR Collections - SB 980	$0.5	$0.5	$0.5	SB 980
DOR Tax Compliance - HB 5033	$0.2	$0.4	$0.4	HB 5033
Fund Shifts and Adjustments – HB 2377	$179.6	$26.5	$10.0	HB 2377
Other Tax Total	**$188.5**	**$36.6**	**$20.4**	

Table B.4 Oregon Personal Income Tax Revenue Forecast

TABLE B.4 **OREGON PERSONAL INCOME TAX REVENUE FORECAST - QUARTERLY COLLECTIONS**
Thousands of Dollars - Not Seasonally Adjusted **September 2019**

	2009:3	2009:4	2010:1	2010:2	FY 2010	2010:3	2010:4	2011:1	2011:2	FY 2011
WITHHOLDING	1,092,795	1,151,673	1,157,857	1,116,552	4,518,878	1,146,189	1,196,214	1,262,781	1,218,439	4,823,622
%CHYA	-6.0%	-2.6%	2.6%	2.5%	-1.0%	4.9%	3.9%	9.1%	9.1%	6.7%
EST. PAYMENTS	176,110	161,759	186,894	265,703	790,467	179,692	148,589	207,036	284,662	819,978
%CHYA	-33.4%	-7.5%	-14.0%	1.0%	-14.1%	2.0%	-8.1%	10.8%	7.1%	3.7%
FINAL PAYMENTS	63,363	77,013	105,745	515,262	761,383	62,259	81,728	114,877	607,592	866,456
%CHYA	-9.9%	-22.5%	1.6%	-2.8%	-5.3%	-1.7%	6.1%	8.6%	17.9%	13.8%
REFUNDS	96,477	188,704	459,550	380,459	1,125,190	92,291	151,515	432,478	340,652	1,016,937
%CHYA	4.8%	4.6%	2.6%	-5.9%	0.1%	-4.3%	-19.7%	-5.9%	-10.5%	-9.6%
OTHER	(138,521)	-	-	136,193	(2,328)	(136,193)	-	-	165,933	29,740
TOTAL	1,097,271	1,201,740	990,947	1,653,251	4,943,210	1,159,655	1,275,015	1,152,216	1,935,973	5,522,860
%CHYA	-10.2%	-5.9%	-1.2%	2.3%	-3.4%	5.7%	6.1%	16.3%	17.1%	11.7%
	2011:3	**2011:4**	**2012:1**	**2012:2**	**FY 2012**	**2012:3**	**2012:4**	**2013:1**	**2013:2**	**FY 2013**
WITHHOLDING	1,235,508	1,287,030	1,348,171	1,269,562	5,140,271	1,262,589	1,364,547	1,354,116	1,321,413	5,302,666
%CHYA	7.8%	7.6%	6.8%	4.2%	6.6%	2.2%	6.0%	0.4%	4.1%	3.2%
EST. PAYMENTS	194,674	185,239	199,238	299,646	878,797	205,533	159,104	278,341	321,896	964,874
%CHYA	8.3%	24.7%	-3.8%	5.3%	7.2%	5.6%	-14.1%	39.7%	7.4%	9.8%
FINAL PAYMENTS	85,889	87,233	117,628	627,762	918,512	72,224	91,338	123,456	785,542	1,072,560
%CHYA	38.0%	6.7%	2.4%	3.3%	6.0%	-15.9%	4.7%	5.0%	25.1%	16.8%
REFUNDS	64,687	156,272	530,800	360,618	1,112,377	52,211	109,503	536,506	383,176	1,081,397
%CHYA	-29.9%	3.1%	22.7%	5.9%	9.4%	-19.3%	-29.9%	1.1%	6.3%	-2.8%
OTHER	(165,933)	-	-	193,614	27,681	(193,614)	-	-	201,367	7,753
TOTAL	1,285,451	1,403,230	1,134,237	2,029,966	5,852,884	1,294,521	1,505,486	1,219,407	2,247,042	6,266,457
%CHYA	10.8%	10.1%	-1.6%	4.9%	6.0%	0.7%	7.3%	7.5%	10.7%	7.1%
	2013:3	**2013:4**	**2014:1**	**2014:2**	**FY 2014**	**2014:3**	**2014:4**	**2015:1**	**2015:2**	**FY 2015**
WITHHOLDING	1,333,946	1,435,630	1,442,755	1,420,313	5,632,644	1,455,822	1,523,453	1,576,188	1,505,337	6,060,801
%CHYA	5.7%	5.2%	6.5%	7.5%	6.2%	9.1%	6.1%	9.2%	6.0%	7.6%
EST. PAYMENTS	221,695	214,342	247,826	357,218	1,041,080	264,823	236,303	305,582	408,957	1,215,665
%CHYA	7.9%	34.7%	-11.0%	11.0%	7.9%	19.5%	10.2%	23.3%	14.5%	16.8%
FINAL PAYMENTS	83,096	112,495	139,923	730,795	1,066,309	92,647	144,239	156,188	847,330	1,240,403
%CHYA	15.1%	23.2%	13.3%	-7.0%	-0.6%	11.5%	28.2%	11.6%	15.9%	16.3%
REFUNDS	67,098	197,448	472,018	354,437	1,091,001	100,729	173,522	520,272	375,119	1,169,642
%CHYA	28.5%	80.3%	-12.0%	-7.5%	0.9%	50.1%	-12.1%	10.2%	5.8%	7.2%
OTHER	(201,367)	-	-	180,356	(21,011)	(180,356)	-	-	163,398	(16,959)
TOTAL	1,370,272	1,565,018	1,358,485	2,334,246	6,628,021	1,532,207	1,730,473	1,517,685	2,549,903	7,330,268
%CHYA	5.9%	4.0%	11.4%	3.9%	5.8%	11.8%	10.6%	11.7%	9.2%	10.6%
	2015:3	**2015:4**	**2016:1**	**2016:2**	**FY 2016**	**2016:3**	**2016:4**	**2017:1**	**2017:2**	**FY 2017**
WITHHOLDING	1,551,517	1,644,209	1,711,568	1,634,728	6,542,022	1,675,744	1,705,280	1,835,155	1,769,354	6,985,533
%CHYA	6.6%	7.9%	8.6%	8.6%	7.9%	8.0%	3.7%	7.2%	8.2%	6.8%
EST. PAYMENTS	309,470	141,009	327,008	423,839	1,201,325	300,866	319,225	382,445	450,241	1,452,777
%CHYA	16.9%	-40.3%	7.0%	5.7%	-0.5%	-2.8%	126.4%	17.0%	6.2%	20.9%
FINAL PAYMENTS[1]	99,618	321,345	141,818	813,132	1,375,913	103,631	144,248	175,235	919,186	1,342,301
%CHYA	7.5%	122.8%	-9.2%	-4.9%	10.2%	4.0%	-55.1%	23.6%	13.0%	-2.4%
REFUNDS	85,113	203,981	577,546	562,601	1,429,241	138,825	254,851	574,417	454,899	1,422,992
%CHYA	-15.5%	17.6%	11.0%	50.0%	22.2%	63.1%	24.9%	-0.5%	-19.1%	-0.4%
OTHER	(163,398)	-	-	236,108	72,710	(236,108)	-	-	192,251	(43,856)
TOTAL	1,712,094	1,902,583	1,602,848	2,545,205	7,762,729	1,705,308	1,913,902	1,818,419	2,876,134	8,313,763
%CHYA	11.7%	9.9%	5.6%	-0.2%	5.9%	-0.4%	0.6%	13.4%	13.0%	7.1%
	2017:3	**2017:4**	**2018:1**	**2018:2**	**FY 2018**	**2018:3**	**2018:4**	**2019:1**	**2019:2**	**FY 2019**
WITHHOLDING	1,748,844	1,836,249	2,011,564	1,851,177	7,447,834	1,925,880	2,039,120	2,079,900	1,999,015	8,043,914
%CHYA	4.4%	7.7%	9.6%	4.6%	6.6%	10.1%	11.0%	3.4%	8.0%	8.0%
EST. PAYMENTS	321,032	451,037	464,534	512,671	1,749,274	367,772	284,002	321,858	532,273	1,505,905
%CHYA	6.7%	41.3%	21.5%	13.9%	20.4%	14.6%	-37.0%	-30.7%	3.8%	-13.9%
FINAL PAYMENTS[1]	92,364	169,785	174,096	878,587	1,314,832	104,644	156,592	225,515	1,385,562	1,872,312
%CHYA	-10.9%	17.7%	-0.6%	-4.4%	-2.0%	13.3%	-7.8%	29.5%	57.7%	42.4%
REFUNDS	133,143	266,467	686,100	610,486	1,696,196	140,701	335,635	546,225	445,573	1,468,133
%CHYA	-4.1%	4.6%	19.4%	34.2%	19.2%	5.7%	26.0%	-20.4%	-27.0%	-13.4%
OTHER	(192,251)	-	-	237,300	45,049	(237,300)	-	-	222,477	(14,823)
TOTAL	1,836,845	2,190,604	1,964,094	2,869,249	8,860,793	2,020,295	2,144,078	2,081,049	3,693,754	9,939,176
%CHYA	7.7%	14.5%	8.0%	-0.2%	6.6%	10.0%	-2.1%	6.0%	28.7%	12.2%

Note: "Other" includes July withholding accrued to June.
Tax law impacts are reflected in the collections numbers to produce more meaningful projections.

TABLE B.4 **OREGON PERSONAL INCOME TAX REVENUE FORECAST - QUARTERLY COLLECTIONS**

Thousands of Dollars - Not Seasonally Adjusted **September 2019**

	2019:3	2019:4	2020:1	2020:2	FY 2020	2020:3	2020:4	2021:1	2021:2	FY 2021
WITHHOLDING	2,094,931	2,156,447	2,181,048	1,981,972	8,414,397	2,071,601	2,185,219	2,291,709	2,094,583	8,643,113
%CHYA	8.8%	5.8%	4.9%	-0.9%	4.6%	-1.1%	1.3%	5.1%	5.7%	2.7%
EST. PAYMENTS	392,965	318,898	398,239	530,079	1,640,181	319,931	306,908	386,900	561,827	1,575,565
%CHYA	6.9%	12.3%	23.7%	-0.4%	8.9%	-18.6%	-3.8%	-2.8%	6.0%	-3.9%
FINAL PAYMENTS[1]	104,968	219,959	154,376	620,220	1,099,523	90,509	132,205	169,372	998,669	1,390,755
%CHYA	0.3%	40.5%	-31.5%	-55.2%	-41.3%	-13.8%	-39.9%	9.7%	61.0%	26.5%
REFUNDS	145,600	219,229	1,166,889	924,232	2,455,951	190,232	434,482	776,436	580,141	1,981,292
%CHYA	3.5%	-34.7%	113.6%	107.4%	67.3%	30.7%	98.2%	-33.5%	-37.2%	-19.3%
OTHER	(222,477)	-	-	178,393	(44,084)	(178,393)	-	-	188,608	10,215
TOTAL	2,224,786	2,476,075	1,566,774	2,386,432	8,654,067	2,113,415	2,189,850	2,071,545	3,263,546	9,638,356
%CHYA	10.1%	15.5%	-24.7%	-35.4%	-12.9%	-5.0%	-11.6%	32.2%	36.8%	11.4%

	2021:3	2021:4	2022:1	2022:2	FY 2022	2022:3	2022:4	2023:1	2023:2	FY 2023
WITHHOLDING	2,188,270	2,308,108	2,412,224	2,203,495	9,112,098	2,301,685	2,427,752	2,532,944	2,313,158	9,575,539
%CHYA	5.6%	5.6%	5.3%	5.2%	5.4%	5.2%	5.2%	5.0%	5.0%	5.1%
EST. PAYMENTS	338,965	325,167	409,286	586,268	1,659,687	353,651	339,255	427,003	611,444	1,731,353
%CHYA	5.9%	5.9%	5.8%	4.4%	5.3%	4.3%	4.3%	4.3%	4.3%	4.3%
FINAL PAYMENTS[1]	107,256	167,185	189,581	1,072,631	1,536,652	114,835	176,437	181,627	1,088,141	1,561,039
%CHYA	18.5%	26.5%	11.9%	7.4%	10.5%	7.1%	5.5%	-4.2%	1.4%	1.6%
REFUNDS	129,866	284,685	742,171	576,809	1,733,531	133,975	294,223	795,622	619,718	1,843,538
%CHYA	-31.7%	-34.5%	-4.4%	-0.6%	-12.5%	3.2%	3.4%	7.2%	7.4%	6.3%
OTHER	(188,608)	-	-	248,506	59,898	(248,506)	-	-	249,873	1,367
TOTAL	2,316,017	2,515,775	2,268,920	3,534,092	10,634,804	2,387,690	2,649,221	2,345,951	3,642,898	11,025,760
%CHYA	9.6%	14.9%	9.5%	8.3%	10.3%	3.1%	5.3%	3.4%	3.1%	3.7%

	2023:3	2023:4	2024:1	2024:2	FY 2024	2024:3	2024:4	2025:1	2025:2	FY 2025
WITHHOLDING	2,414,256	2,546,498	2,659,876	2,429,513	10,050,143	2,534,666	2,673,497	2,798,353	2,556,825	10,563,340
%CHYA	4.9%	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%	5.2%	5.2%	5.1%
EST. PAYMENTS	368,534	353,532	445,253	641,159	1,808,478	386,288	370,564	466,927	675,229	1,899,008
%CHYA	4.2%	4.2%	4.3%	4.9%	4.5%	4.8%	4.8%	4.9%	5.3%	5.0%
FINAL PAYMENTS[1]	109,673	173,792	196,090	1,132,988	1,612,543	118,873	185,448	205,773	1,193,895	1,703,988
%CHYA	-4.5%	-1.5%	8.0%	4.1%	3.3%	8.4%	6.7%	4.9%	5.4%	5.7%
REFUNDS	143,999	315,642	839,503	653,750	1,952,895	151,127	331,865	886,153	690,421	2,059,565
%CHYA	7.5%	7.3%	5.5%	5.5%	5.9%	4.9%	5.1%	5.6%	5.6%	5.5%
OTHER	(249,873)	-	-	283,720	33,848	(283,720)	-	-	271,857	(11,864)
TOTAL	2,498,591	2,758,180	2,461,716	3,833,631	11,552,117	2,604,979	2,897,644	2,584,900	4,007,384	12,094,907
%CHYA	4.6%	4.1%	4.9%	5.2%	4.8%	4.3%	5.1%	5.0%	4.5%	4.7%

	2025:3	2025:4	2026:1	2026:2	FY 2026	2026:3	2026:4	2027:1	2027:2	FY 2027
WITHHOLDING	2,650,100	2,795,241	2,922,519	2,669,807	11,037,668	2,762,647	2,913,959	3,046,455	2,783,001	11,506,063
%CHYA	4.6%	4.6%	4.4%	4.4%	4.5%	4.2%	4.2%	4.2%	4.2%	4.2%
EST. PAYMENTS	404,165	387,713	488,394	704,466	1,984,738	420,970	403,834	508,766	734,687	2,068,257
%CHYA	4.6%	4.6%	4.6%	4.3%	4.5%	4.2%	4.2%	4.2%	4.3%	4.2%
FINAL PAYMENTS[1]	124,005	193,659	214,259	1,249,887	1,781,809	128,785	201,543	223,002	1,301,619	1,854,949
%CHYA	4.3%	4.4%	4.1%	4.7%	4.6%	3.9%	4.1%	4.1%	4.1%	4.1%
REFUNDS	160,287	352,017	970,701	763,214	2,246,219	170,287	373,838	1,031,714	811,219	2,387,058
%CHYA	6.1%	6.1%	9.5%	10.5%	9.1%	6.2%	6.2%	6.3%	6.3%	6.3%
OTHER	(271,857)	-	-	221,240	(50,617)	(221,240)	-	-	233,083	(15,482)
TOTAL	2,746,125	3,024,596	2,654,471	4,082,186	12,507,379	2,920,874	3,145,498	2,746,509	4,241,171	13,026,728
%CHYA	5.4%	4.4%	2.7%	1.9%	3.4%	6.4%	4.0%	3.5%	3.9%	4.2%

	2027:3	2027:4	2028:1	2028:2	FY 2028	2028:3	2028:4	2029:1	2029:2	FY 2029
WITHHOLDING	2,899,179	3,057,969	3,197,992	2,921,573	12,076,713	3,047,055	3,213,943	3,363,315	3,072,920	12,697,232
%CHYA	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.2%	5.2%	5.1%
EST. PAYMENTS	441,986	423,995	534,088	770,246	2,170,315	463,915	445,031	560,641	809,248	2,278,835
%CHYA	5.1%	5.1%	5.1%	5.0%	5.1%	5.0%	5.0%	5.0%	5.1%	5.0%
FINAL PAYMENTS1	134,908	211,222	234,209	1,367,009	1,947,348	141,869	222,102	245,951	1,434,285	2,044,207
%CHYA	4.9%	4.9%	5.1%	5.1%	5.1%	5.2%	5.2%	5.0%	4.9%	5.0%
REFUNDS	179,758	394,652	1,083,998	852,198	2,510,606	188,709	414,170	1,144,099	899,626	2,646,603
%CHYA	5.4%	5.4%	4.9%	4.9%	5.1%	5.0%	4.9%	5.5%	5.6%	5.4%
OTHER	(233,083)	-	-	312,689	79,606	(312,689)	-	-	314,605	1,916
TOTAL	3,063,232	3,298,535	2,882,291	4,519,319	13,763,376	3,151,442	3,466,906	3,025,809	4,731,431	14,375,588
%CHYA	5.0%	5.0%	5.2%	6.7%	5.8%	2.9%	5.1%	5.0%	4.7%	4.4%

Note: "Other" includes July withholding accrued to June. Tax law impacts are reflected in the collections numbers to produce more meaningful projections.

Table B.5 Oregon Corporate Income Tax Revenue Forecast

TABLE B.5 **OREGON CORPORATE INCOME TAX REVENUE FORECAST - QUARTERLY COLLECTIONS**

Thousands of Dollars - Not Seasonally Adjusted **September 2019**

	2009:3	2009:4	2010:1	2010:2	FY 2010	2010:3	2010:4	2011:1	2011:2	FY 2011
ADVANCE PAYMENTS	79,579	163,877	66,451	147,313	457,220	115,286	175,561	76,405	165,354	532,606
%CHYA	-20.9%	12.8%	4.2%	51.3%	12.3%	44.9%	7.1%	15.0%	12.2%	16.5%
FINAL PAYMENTS	20,404	24,009	38,412	45,714	128,539	21,781	21,206	35,770	40,805	119,562
%CHYA	-13.2%	-10.2%	72.1%	109.5%	36.2%	6.8%	-11.7%	-6.9%	-10.7%	-7.0%
REFUNDS	29,072	137,244	40,080	25,774	232,170	23,130	89,877	39,065	31,489	183,562
%CHYA	3.3%	9.9%	-40.6%	-30.7%	-9.9%	-20.4%	-34.5%	-2.5%	22.2%	-20.9%
TOTAL	70,910	50,642	64,784	167,254	353,589	113,936	106,890	73,111	174,670	468,606
%CHYA	-26.1%	7.3%	247.5%	104.0%	45.1%	60.7%	111.1%	12.9%	4.4%	32.5%

	2011:3	2011:4	2012:1	2012:2	FY 2012	2012:3	2012:4	2013:1	2013:2	FY 2013
ADVANCE PAYMENTS	120,766	154,290	86,873	156,652	518,581	130,348	110,207	80,942	282,526	604,023
%CHYA	4.8%	-12.1%	13.7%	-5.3%	-2.6%	7.9%	-28.6%	-6.8%	80.4%	16.5%
FINAL PAYMENTS	19,117	26,841	32,512	33,322	111,792	16,387	21,377	36,660	34,009	108,433
%CHYA	-12.2%	26.6%	-9.1%	-18.3%	-6.5%	-14.3%	-20.4%	12.8%	2.1%	-3.0%
REFUNDS	34,927	91,252	55,051	18,153	199,384	33,212	17,832	25,595	182,929	259,568
%CHYA	51.0%	1.5%	40.9%	-42.4%	8.6%	-4.9%	-80.5%	-53.5%	907.7%	30.2%
TOTAL	104,955	89,878	64,335	171,820	430,989	113,524	113,751	92,007	133,606	452,888
%CHYA	-7.9%	-15.9%	-12.0%	-1.6%	-8.0%	8.2%	26.6%	43.0%	-22.2%	5.1%

	2013:3	2013:4	2014:1	2014:2	FY 2014	2014:3	2014:4	2015:1	2015:2	FY 2015
ADVANCE PAYMENTS	123,591	187,195	150,401	183,348	644,535	193,248	206,088	106,689	183,611	689,637
%CHYA	-5.2%	69.9%	85.8%	-35.1%	6.7%	56.4%	10.1%	-29.1%	0.1%	7.0%
FINAL PAYMENTS	27,794	18,162	32,218	52,283	130,456	28,815	73,552	57,268	71,415	231,051
%CHYA	69.6%	-15.0%	-12.1%	53.7%	20.3%	3.7%	305.0%	77.8%	36.6%	77.1%
REFUNDS	20,123	118,303	109,296	32,511	280,232	49,952	155,439	58,361	35,167	298,918
%CHYA	-39.4%	563.4%	327.0%	-82.2%	8.0%	148.2%	31.4%	-46.6%	8.2%	6.7%
TOTAL	131,262	87,054	73,323	203,120	494,759	172,111	124,202	105,597	219,860	621,770
%CHYA	15.6%	-23.5%	-20.3%	52.0%	9.2%	31.1%	42.7%	44.0%	8.2%	25.7%

	2015:3	2015:4	2016:1	2016:2	FY 2016	2016:3	2016:4	2017:1	2017:2	FY 2017
ADVANCE PAYMENTS	173,329	220,326	118,673	202,813	715,141	136,698	215,677	102,663	195,412	650,449
%CHYA	-10.3%	6.9%	11.2%	10.5%	3.7%	-21.1%	-2.1%	-13.5%	-3.6%	-9.0%
FINAL PAYMENTS	67,305	59,752	63,509	70,433	260,998	44,746	93,441	52,164	81,824	272,175
%CHYA	133.6%	-18.8%	10.9%	-1.4%	13.0%	-33.5%	56.4%	-17.9%	16.2%	4.3%
REFUNDS	42,388	156,984	85,446	81,453	366,271	39,680	166,537	73,066	57,733	337,016
%CHYA	-15.1%	1.0%	46.4%	131.6%	22.5%	-6.4%	6.1%	-14.5%	-29.1%	-8.0%
TOTAL	198,245	123,094	96,736	191,793	609,868	141,764	142,581	81,761	219,503	585,608
%CHYA	15.2%	-0.9%	-8.4%	-12.8%	-1.9%	-28.5%	15.8%	-15.5%	14.4%	-4.0%

	2017:3	2017:4	2018:1	2018:2	FY 2018	2018:3	2018:4	2019:1	2019:2	FY 2019
ADVANCE PAYMENTS	179,603	185,787	182,395	303,835	851,620	222,891	249,768	158,748	264,445	895,852
%CHYA	31.4%	-13.9%	77.7%	55.5%	30.9%	24.1%	34.4%	-13.0%	-13.0%	5.2%
FINAL PAYMENTS	42,600	66,460	46,270	108,539	263,869	74,735	102,942	68,818	174,861	421,356
%CHYA	-4.8%	-28.9%	-11.3%	32.6%	-3.1%	75.4%	54.9%	48.7%	61.1%	59.7%
REFUNDS	72,225	129,963	122,291	54,224	378,703	43,428	167,871	128,586	50,616	390,501
%CHYA	82.0%	-22.0%	67.4%	-6.1%	12.4%	-39.9%	29.2%	5.1%	-6.7%	3.1%
TOTAL	149,978	122,284	106,374	358,150	736,786	254,198	184,839	98,980	388,690	926,707
%CHYA	5.8%	-14.2%	30.1%	63.2%	25.8%	69.5%	51.2%	-7.0%	8.5%	25.8%

TABLE B.5 **OREGON CORPORATE INCOME TAX REVENUE FORECAST - QUARTERLY COLLECTIONS**

Thousands of Dollars - Not Seasonally Adjusted **September 2019**

	2019:3	2019:4	2020:1	2020:2	FY 2020	2020:3	2020:4	2021:1	2021:2	FY 2021
ADVANCE PAYMENTS	196,208	224,875	132,827	217,380	771,291	167,590	206,820	127,068	212,069	713,547
%CHYA	-12.0%	-10.0%	-16.3%	-17.8%	-13.9%	-14.6%	-8.0%	-4.3%	-2.4%	-7.5%
FINAL PAYMENTS	82,726	104,865	92,337	83,662	363,590	38,405	107,436	93,630	78,571	318,041
%CHYA	10.7%	1.9%	34.2%	-52.2%	-13.7%	-53.6%	2.5%	1.4%	-6.1%	-12.5%
REFUNDS	57,990	187,985	131,323	62,416	439,714	51,613	199,537	139,210	66,436	456,796
%CHYA	33.5%	12.0%	2.1%	23.3%	12.6%	-11.0%	6.1%	6.0%	6.4%	3.9%
TOTAL	220,944	141,755	93,841	238,626	695,166	154,382	114,719	81,488	224,203	574,792
%CHYA	-13.1%	-23.3%	-5.2%	-38.6%	-25.0%	-30.1%	-19.1%	-13.2%	-6.0%	-17.3%

	2021:3	2021:4	2022:1	2022:2	FY 2022	2022:3	2022:4	2023:1	2023:2	FY 2023
ADVANCE PAYMENTS	172,662	215,693	133,040	222,892	744,288	180,090	225,045	139,587	233,663	778,385
%CHYA	3.0%	4.3%	4.7%	5.1%	4.3%	4.3%	4.3%	4.9%	4.8%	4.6%
FINAL PAYMENTS	39,486	122,576	103,093	86,955	352,110	43,951	137,919	113,884	97,612	393,366
%CHYA	2.8%	14.1%	10.1%	10.7%	10.7%	11.3%	12.5%	10.5%	12.3%	11.7%
REFUNDS	52,593	211,161	145,347	69,001	478,102	54,569	224,945	153,979	72,753	506,246
%CHYA	1.9%	5.8%	4.4%	3.9%	4.7%	3.8%	6.5%	5.9%	5.4%	5.9%
TOTAL	159,556	127,108	90,786	240,847	618,296	169,473	138,019	99,492	258,522	665,505
%CHYA	3.4%	10.8%	11.4%	7.4%	7.6%	6.2%	8.6%	9.6%	7.3%	7.6%

	2023:3	2023:4	2024:1	2024:2	FY 2024	2024:3	2024:4	2025:1	2025:2	FY 2025
ADVANCE PAYMENTS	186,209	232,612	144,917	241,950	805,688	191,758	239,039	148,889	248,594	828,280
%CHYA	3.4%	3.4%	3.8%	3.5%	3.5%	3.0%	2.8%	2.7%	2.7%	2.8%
FINAL PAYMENTS	49,609	153,220	149,024	122,128	473,982	64,541	216,466	178,742	145,994	605,742
%CHYA	12.9%	11.1%	30.9%	25.1%	20.5%	30.1%	41.3%	19.9%	19.5%	27.8%
REFUNDS	57,845	243,610	188,840	87,562	577,856	67,072	307,181	218,631	100,223	693,108
%CHYA	6.0%	8.3%	22.6%	20.4%	14.1%	16.0%	26.1%	15.8%	14.5%	19.9%
TOTAL	177,973	142,222	105,101	276,516	701,813	189,227	148,324	108,999	294,364	740,915
%CHYA	5.0%	3.0%	5.6%	7.0%	5.5%	6.3%	4.3%	3.7%	6.5%	5.6%

	2025:3	2025:4	2026:1	2026:2	FY 2026	2026:3	2026:4	2027:1	2027:2	FY 2027
ADVANCE PAYMENTS	199,066	247,922	154,227	257,257	858,472	204,518	254,555	158,342	264,118	881,533
%CHYA	3.8%	3.7%	3.6%	3.5%	3.6%	2.7%	2.7%	2.7%	2.7%	2.7%
FINAL PAYMENTS	79,924	270,257	184,005	160,186	694,371	88,419	274,498	188,219	173,922	725,058
%CHYA	23.8%	24.8%	2.9%	9.7%	14.6%	10.6%	1.6%	2.3%	8.6%	4.4%
REFUNDS	74,143	356,404	220,511	101,196	752,254	75,596	361,188	223,982	102,976	763,741
%CHYA	10.5%	16.0%	0.9%	1.0%	8.5%	2.0%	1.3%	1.6%	1.8%	1.5%
TOTAL	204,847	161,775	117,721	316,247	800,589	217,341	167,865	122,579	335,064	842,850
%CHYA	8.3%	9.1%	8.0%	7.4%	8.1%	6.1%	3.8%	4.1%	6.0%	5.3%

	2027:3	2027:4	2028:1	2028:2	FY 2028	2028:3	2028:4	2029:1	2029:2	FY 2029
ADVANCE PAYMENTS	210,808	262,561	162,194	270,722	906,284	215,914	269,040	165,134	275,675	925,764
%CHYA	3.1%	3.1%	2.4%	2.5%	2.8%	2.4%	2.5%	1.8%	1.8%	2.1%
FINAL PAYMENTS	97,984	280,658	192,021	186,607	757,271	106,338	285,009	195,366	197,217	783,929
%CHYA	10.8%	2.2%	2.0%	7.3%	4.4%	8.5%	1.6%	1.7%	5.7%	3.5%
REFUNDS	76,969	365,242	225,898	103,972	772,081	77,994	368,536	228,334	105,199	780,064
%CHYA	1.8%	1.1%	0.9%	1.0%	1.1%	1.3%	0.9%	1.1%	1.2%	1.0%
TOTAL	231,823	177,977	128,317	353,357	891,474	244,257	185,514	132,166	367,693	929,630
%CHYA	6.7%	6.0%	4.7%	5.5%	5.8%	5.4%	4.2%	3.0%	4.1%	4.3%

Table B.6 Cigarette and Tobacco Tax Distribution

TABLE B.6 **September 2019**

Cigarette & Tobacco Tax Distribution (Millions of $)

	Cigarette Tax Distribution*							Other Tobacco Tax Distribution			
	General Fund	Health Plan	Tobacco Use Reduction	Mental Health	State Total	Cities, Counties & Public Transit	Total	General Fund	Health Plan	Tobacco Use Reduction	State Total
Distribution Forecast*											
2019-20	32.663	127.297	5.078	22.270	187.308	10.155	197.463	33.053	25.502	2.836	61.391
2020-21	32.335	126.018	5.027	22.047	185.426	10.053	195.480	33.481	25.832	2.873	62.186
2019-21 Biennium	64.998	253.315	10.104	44.317	372.734	20.208	392.942	66.533	51.334	5.709	123.576
2021-22	32.024	124.806	4.978	21.834	183.642	9.957	193.599	33.915	26.167	2.910	62.992
2022-23	31.709	123.580	4.929	21.620	181.839	9.859	191.698	34.485	26.607	2.959	64.051
2021-23 Biennium	63.733	248.386	9.908	43.454	365.481	19.815	385.296	68.400	52.774	5.869	127.043
2023-24	31.511	122.807	4.899	21.485	180.702	9.797	190.499	34.873	26.906	2.992	64.771
2024-25	31.025	120.913	4.823	21.153	177.914	9.646	187.560	35.119	27.096	3.014	65.228
2023-25 Biennium	62.536	243.720	9.722	42.638	358.616	19.443	378.059	69.991	54.001	6.006	129.999
2025-26	30.595	119.236	4.756	20.860	175.447	9.512	184.959	35.330	27.258	3.032	65.620
2026-27	30.213	117.749	4.697	20.600	173.259	9.394	182.653	35.510	27.398	3.047	65.955
2025-27 Biennium	60.808	236.985	9.453	41.460	348.706	18.906	367.611	70.840	54.656	6.079	131.574
2027-28	29.875	116.429	4.644	20.369	171.317	9.288	180.605	35.664	27.517	3.060	66.241
2028-29	29.573	115.256	4.597	20.164	169.590	9.195	178.785	35.796	27.618	3.072	66.486
2027-29 Biennium	59.448	231.685	9.241	40.533	340.907	18.483	359.390	71.460	55.135	6.132	132.727

TABLE B.7 **September 2019**

Liquor Apportionment and Revenue Distribution to Local Governments (Millions of $)

	Liquor Apportionment Distribution								
					City Revenue				
	Total Liquor Revenue Available	General Fund (56%)	Mental Health[1]	Oregon Wine Board	Revenue Sharing	Regular	Total	Counties	Cigarette Tax Distribution[2]
2019-20	294.383	167.298	9.518	0.336	53.287	37.301	90.587	26.643	10.155
2020-21	318.914	181.239	10.311	0.364	57.727	40.409	98.136	28.864	10.053
2019-21 Biennium	613.297	348.537	19.829	0.701	111.014	77.710	188.724	55.507	20.208
2021-22	307.245	166.083	10.258	0.364	59.337	41.536	100.873	29.668	9.957
2022-23	321.058	173.776	10.494	0.373	62.007	43.405	105.412	31.003	9.859
2021-23 Biennium	628.303	339.859	20.751	0.736	121.344	84.941	206.285	60.672	19.815
2023-24	335.143	181.627	10.735	0.382	64.727	45.309	110.036	32.363	9.797
2024-25	350.215	190.035	10.982	0.392	67.640	47.348	114.987	33.820	9.646
2023-25 Biennium	685.358	371.661	21.717	0.774	132.366	92.657	225.023	66.183	19.443
2025-26	365.608	198.627	11.234	0.401	49.428	70.611	120.039	35.306	9.512
2026-27	382.056	207.817	11.493	0.411	51.652	73.789	125.441	36.894	9.394
2025-27 Biennium	747.664	406.444	22.727	0.813	101.080	144.400	245.480	72.200	18.906
2027-28	398.875	216.959	12.010	0.430	53.924	77.034	130.958	38.517	9.288
2028-29	416.820	226.720	12.550	0.449	56.350	80.500	136.850	40.250	9.195
2027-29 Biennium	815.694	443.680	24.560	0.879	110.274	157.534	267.809	78.767	18.483

[1] Mental Health Alcoholism and Drug Services Account, per ORS 471.810

[2] For details on cigarette revenues see TABLE B.6 on previous page

Table B.8 Track Record for the May 2019 Forecast

Table B.8 Track Record for the May 2019 Forecast

(Quarter ending May 30, 2019)

Personal Income Tax	Forecast Comparison			Year/Year Change	
(Millions of dollars)	Actual Revenues	Latest Forecast	Percent Difference	Prior Year	Percent Change
Withholding	$1,999.0	$1,969.7	1.5%	$1,851.2	8.0%
Dollar difference		$29.3		$131.0	
Estimated Payments*	$532.3	$472.1	12.7%	$512.7	3.8%
Dollar difference		$60.2		$131.8	
Final Payments*	$1,385.6	$1,252.8	10.6%	$878.6	57.7%
Dollar difference		$132.8		$25.5	
Refunds	-$445.6	-$483.6	-7.9%	-$610.5	-27.0%
Dollar difference		$38.0		$164.9	
Total Personal Income Tax	**$3,471.3**	**$3,211.0**	**8.1%**	**$2,631.9**	**31.9%**
Dollar difference		$260.3		$839.3	

Corporate Income Tax	Forecast Comparison			Year/Year Change	
(Millions of dollars)	Actual Revenues	Latest Forecast	Percent Difference	Prior Year	Percent Change
Advanced Payments	$264.4	$330.8	-20.1%	$303.8	-13.0%
Dollar difference		-$66.4		-$39.4	
Final Payments	$174.9	$136.4	28.2%	$108.5	61.1%
Dollar difference		$38.5		$66.3	
Refunds	-$50.6	-$52.8	-4.1%	-$54.2	-6.7%
Dollar difference		$2.2		$3.6	
Total Corporate Income Tax	**$388.7**	**$414.4**	**-6.2%**	**$358.2**	**8.5%**
Dollar difference		-$25.8		$30.5	

Total Income Tax	Forecast Comparison			Year/Year Change	
(Millions of dollars)	Actual Revenues	Latest Forecast	Percent Difference	Prior Year	Percent Change
Corporate and Personal Tax	**$3,860.0**	**$3,625.4**	**6.5%**	**$2,990.1**	**29.1%**
Dollar difference		$234.6		$869.9	

* A new processing system for the personal income tax program was deployed in November. Data on estimated and other personal income tax payments has yet to become available.

Table B.9 Summary of Lottery Resources

TABLE B.9 **Sept 2019 Forecast**

Summary of Lottery Resources

(in millions of dollars)	2019-21 Current Forecast	2019-21 Change from May-19	2019-21 Change from COS 2019	2021-23 Current Forecast	2021-23 Change from May-19	2023-25 Current Forecast	2023-25 Change from May-19	2025-2027 Current Forecast	2025-2027 Change from May-19	2027-29 Current Forecast	2027-29 Change from May-19
LOTTERY EARNINGS											
Traditional Lottery	153.598	*(1.303)*	*(1.303)*	155.144	*(0.286)*	155.409	(0.586)	155.238	(0.658)	155.250	(0.670)
Video Lottery	1,309.709	*4.765*	*4.765*	1,417.334	*(0.689)*	1,547.480	1.553	1,650.357	4.208	1,750.356	4.462
Scoreboard (Sports Betting)[1]	8.252	*8.252*	*8.252*	29.425	*29.425*	42.198	42.198	46.404	46.404	49.901	49.901
Administrative Actions	0.000	*0.000*	*0.000*	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	0.000
Total Available to Transfer	**1,471.559**	*11.714*	*11.714*	**1,601.903**	*28.450*	**1,745.087**	43.164	**1,851.999**	49.953	**1,955.507**	53.694
ECONOMIC DEVELOPMENT FUND											
Beginning Balance	65.340	*0.000*	*0.000*	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	0.000
Transfers from Lottery	1,471.559	*11.714*	*11.714*	1,601.903	*28.450*	1,745.087	43.164	1,851.999	49.953	1,955.507	53.694
Other Resources[2]	5.731	*3.731*	*0.000*	2.000	*0.000*	2.000	0.000	2.000	0.000	2.000	0.000
Total Available Resources	**1,542.629**	*15.445*	*11.714*	**1,603.903**	*28.450*	**1,747.087**	43.164	**1,853.999**	49.953	**1,957.507**	53.694
ALLOCATION OF RESOURCES											
Constitutional Distributions											
Education Stability Fund[3]	264.881	*2.109*	*2.109*	288.343	*5.121*	314.116	7.770	333.360	8.992	351.991	9.665
Parks and Natural Resources Fund[4]	220.734	*1.757*	*1.757*	240.285	*4.268*	261.763	6.475	277.800	7.493	293.326	8.054
Veterans' Services Fund[5]	22.073	0.176	0.176	24.029	*0.427*	26.176	0.647	27.780	0.749	29.333	0.805
Other Distributions											
Outdoor School Education Fund[5]	45.306	(2.364)	0.000	49.722	*(0.408)*	52.133	(0.428)	54.661	(0.449)	57.313	(0.471)
County Economic Development	50.231	*(1.966)*	*0.000*	54.341	*(2.380)*	59.330	(2.507)	63.275	(2.571)	67.109	(2.727)
HECC Collegiate Athletic & Scholarships[6]	14.100	*(0.499)*	*0.000*	16.019	*0.285*	17.451	0.432	18.520	0.500	19.555	0.537
Gambling Addiction [7]	14.593	*(0.005)*	*0.000*	16.019	*0.285*	17.451	0.432	18.520	0.500	19.555	0.537
County Fairs	3.828	*0.000*	*0.000*	3.828	*0.000*	3.828	0.000	3.828	0.000	3.828	0.000
Other Legislatively Adopted Allocations[8]	879.210	*643.910*	*0.000*	238.900	*0.000*	234.300	0.000	234.300	0.000	234.300	0.000
Employer Incentive Fund (PERS)[1]	8.252	*8.252*	*8.252*	29.425	*29.425*	42.198	42.198	46.404	46.404	49.901	49.901
Total Distributions	**1,523.208**	*651.370*	*12.294*	**960.910**	*37.020*	**1,028.746**	55.018	**1,078.448**	61.616	**1,126.210**	66.30
Ending Balance/Discretionary Resources	**19.421**	*(635.924)*	*(0.579)*	**642.993**	*(8.570)*	**718.341**	(11.853)	**775.552**	(11.663)	**831.297**	(12.608)

Note: Some totals may not foot due to rounding.

1. Per SB 1049 (2019), Sports Betting revenues are transferred to Economic Development Fund making them subject to the constitutional distributions, then an equal amount is transferred to the Employer Incentive Fund
2. Includes interest earnings on Economic Development Fund and reversions.
3. Eighteen percent of proceeds accrue to the Ed. Stability Fund, until the balance equals 5% of GF Revenues. Thereafter, 15% of proceeds accrue to the School Capital Matching Fund.
4. The Parks and Natural Resources Fund Constitutional amendment requires 15% of net proceeds be transferred to this fund.
5. Per Ballot Measure 96 (2016), 1.5% of net lottery proceeds are dedicated to the Veterans' Services Fund
6. Per Ballot Measure 99 (2016), the lesser of 4% of Lottery transfers or $22 million per year is transferred to the Outdoor Education Account. Adjusted annually for inflation.
7. Approximately one percent of net lottery proceeds are dedicated to each program. Certain limits are imposed by the Legislature.
8. Includes Debt Service Allocations, Allocations to State School Fund and Other Agency Allocations

Table B.10 Budgetary Reserve Summary and Outlook

Table B.10: Budgetary Reserve Summary and Outlook **Sep 2019**

Rainy Day Fund

(Millions)	2017-19	2019-21	2021-23	2023-25	2025-27
Beginning Balance	$376.4	$666.6	$902.4	$1,228.9	$1,598.1
Interest Earnings	$23.5	$36.4	$52.4	$73.8	$93.8
Deposits[1]	$266.7	$199.5	$274.1	$295.4	$314.5
Triggered Withdrawals	$0.0	$0.0	$0.0	$0.0	$0.0
Ending Balance[2]	**$666.6**	**$902.4**	**$1,228.9**	**$1,598.1**	**$2,006.3**

Education Stability Fund[3]

(Millions)	2017-19	2019-21	2021-23	2023-25	2025-27
Beginning Balance	$384.2	$621.1	$858.1	$920.0	$1,058.6
Interest Earnings[4]	$22.4	$34.8	$44.7	$53.6	$60.1
Deposits[5]	$235.9	$238.4	$61.9	$138.7	$109.7
Distributions	$21.0	$36.2	$44.7	$53.6	$60.1
Oregon Education Fund	$0.0	$0.0	$0.0	$0.0	$0.0
Oregon Opportunity Grant	$21.0	$36.2	$44.7	$53.6	$60.1
Withdrawals	$0.0	$0.0	$0.0	$0.0	$0.0
Ending Balance	**$621.1**	**$858.1**	**$920.0**	**$1,058.6**	**$1,061.0**

Total Reserves

(Millions)	2017-19	2019-21	2021-23	2023-25	2025-27
Ending Balances	**$1,287.7**	**$1,760.5**	**$2,148.9**	**$2,656.7**	**$3,067.3**
Percent of General Fund Revenues	5.9%	8.4%	8.9%	10.0%	10.7%

Footnotes:
1. Includes transfer of ending General Fund balances up to 1% of budgeted appropriations as well as private donations. Assumes future appropriations equal to 98.75 percent of available resources. Includes forecast for corporate income taxes above rate of 6.6% for the biennium are deposited on or before Jun 30 of each odd-numbered year.
2. Available funds in a given biennium equal 2/3rds of the beginning balance under current law.
3. Excludes funds in the Oregon Growth and the Oregon Resource and Technology Development subaccounts.
4. Interest earnings are distributed to the Oregon Education Funds (75%) and the State Scholarship Fund (25%), provided there remains debt outstanding. In the event that debt is paid off, all interest earnings distributed to the State Scholarship Fund.
5. Contributions to the ESF are capped at 5% of the prior biennium's General Fund revenue total. Quarterly contributions are made until the balance exceeds the cap.

Table B.11 Recreational Marijuana Resources and Distributions

TABLE B.11 **Sep 2019**

Summary of Marijuana Resources

(in millions of dollars)	2019-21 Current Forecast	2019-21 Change from May-19	2019-21 Change from COS 2019	2021-23 Current Forecast	2021-23 Change from May-19	2023-25 Current Forecast	2023-25 Change from May-19	2025-27 Current Forecast	2025-27 Change from May-19	2027-29 Current Forecast	2027-29 Change from May-19
MARIJUANA EARNINGS											
+ Tax Revenue [1]	241.514	*3.864*	*3.544*	298.841	*0.400*	326.435	0.400	352.873	0.400	379.312	0.400
- Administrative Costs [2]	14.193	*0.000*	*0.000*	14.193	*0.000*	14.193	0.000	14.193	0.000	14.193	0.000
Net Available to Transfer	**227.320**	*3.864*	*3.544*	**284.648**	*0.400*	**312.242**	*0.400*	**338.680**	*0.400*	**365.118**	*0.400*
OREGON MARIJUANA ACCOUNT											
Beginning Balance	28.765	*0.000*	*0.000*	3.091	*3.091*	0.000	0.000	0.000	0.000	0.000	0.000
Revenue Transfers	227.320	*3.864*	*3.544*	284.648	*0.400*	312.242	0.400	338.680	0.400	365.118	0.400
Other Resources	0.000	*0.000*	*0.000*	0.000	*0.000*	0.000	0.000	0.000	0.000	1.000	0.000
Total Available Resources	**256.085**	*3.864*	*3.544*	**287.739**	*3.491*	**312.242**	*0.400*	**338.680**	*0.400*	**366.118**	*0.400*
ALLOCATION OF RESOURCES											
State School Fund (40%)	103.765	*0.000*	*0.000*	115.096	*1.397*	124.897	0.160	135.472	0.160	146.447	0.160
Mental Health, Alcoholism, & Drug Services (20%)	51.882	*0.000*	*0.000*	57.548	*0.698*	62.448	0.080	67.736	0.080	73.224	0.080
State Police (15%)	38.912	*0.000*	*0.000*	43.161	*0.524*	46.836	0.060	50.802	0.060	54.918	0.060
Cities (10%)	22.732	*0.386*	*0.354*	28.774	*0.349*	31.224	0.040	33.868	0.040	36.612	0.040
Counties (10%)	22.732	*0.386*	*0.354*	28.774	*0.349*	31.224	0.040	33.868	0.040	36.612	0.040
Alcohol & Drug Abuse Prevention, Intervention & Treatment (5%)	12.971	*0.000*	*0.000*	14.387	*0.175*	15.612	0.020	16.934	0.020	18.306	0.020
Total Distributions	**252.994**	*0.773*	*0.709*	**287.739**	*3.491*	**312.242**	*0.400*	**338.680**	*0.400*	**366.118**	*0.400*
Ending Balance	**3.091**	*3.091*	*2.955*	**0.000**	*0.000*	**0.000**	0.000	**0.000**	0.000	**0.000**	0.000

Note: Some totals may not foot due to rounding.

1. Retailers pay taxes monthly, however taxes are not available for distribution to recepient programs until the Department of Revenue receives and processes retailers' quarterly tax returns. As such, there is a one to two quarter lag between when the initial monthly payments are made and when monies be come available to distribute.

2. Administrative Costs reflect monthly collection costs for the Department of Revenue in addition to distributions to the Criminal Justice Commission and OLCC per SB 1544 (2018)

Table B.12 Fund for Student Success (Corporate Activity Tax)

TABLE B.12 **Sept 2019**

Summary of Corporate Activity Tax Resources

(in millions of dollars)	2019-21 Current Forecast	2019-21 Change from May-19	2019-21 Change from COS 2019	2021-23 Current Forecast	2021-23 Change from May-19	2023-25 Current Forecast	2023-25 Change from May-19	2025-27 Current Forecast	2025-27 Change from May-19	2027-29 Current Forecast	2027-29 Change from May-19
Corporate Activity Tax											
+ Tax Revenue	1,596.267	*NA*	*0.000*	2,806.156	*NA*	3,063.290	*NA*	3,344.575	*NA*	3,657.172	*NA*
- Administrative Costs	9.520	*NA*	*0.000*	19.200	*NA*	21.312	*NA*	23.656	*NA*	26.259	*NA*
Net Available to Transfer	**1,586.747**	NA	0.000	**2,786.956**	NA	**3,041.978**	NA	**3,320.918**	NA	**3,630.913**	NA
Fund for Student Success											
Beginning Balance	0.000	*NA*	*0.000*	34.760	*NA*	0.000	*NA*	0.000	*NA*	0.000	*NA*
Revenue Transfers	1,586.747	*NA*	*0.000*	2,786.956	*NA*	3,041.978	*NA*	3,320.918	*NA*	3,630.913	*NA*
Other Resources	0.000	*NA*	*0.000*	0.000	*NA*	0.000	*NA*	0.000	*NA*	0.000	*NA*
Total Available Resources	**1,586.747**	NA	0.000	**2,821.716**	NA	**3,041.978**	NA	**3,320.918**	NA	**3,630.913**	NA
ALLOCATION OF RESOURCES											
State School Fund	643.000	*NA*	*0.000*	739.000	*NA*	796.686	*NA*	869.740	*NA*	950.927	*NA*
Student Investment Account	472.740	*NA*	*0.000*	1,041.358	*NA*	1,122.646	*NA*	1,225.589	*NA*	1,339.993	*NA*
Statewide Education Initiative Account	265.122	*NA*	*0.000*	624.815	*NA*	673.588	*NA*	735.354	*NA*	803.996	*NA*
Early Learning Account	171.125	*NA*	*0.000*	416.543	*NA*	449.058	*NA*	490.236	*NA*	535.997	*NA*
Total Distributions	**1,551.987**	NA	0.000	**2,821.716**	NA	**3,041.978**	NA	**3,320.918**	NA	**3,630.913**	NA
Ending Balance	**34.760**	NA	0.000	**0.000**	NA	**0.000**	NA	**0.000**	NA	**0.000**	NA

Note: Some totals may not foot due to rounding.

APPENDIX C: POPULATION FORECASTS BY AGE AND SEX

Table C.1 Oregon's Population Forecasts and Component of Change 1990-2029

Year (July 1)	Population	Population Change Number	Percent	Births Number	Rate/1000	Deaths Number	Rate/1000	Natural Increase	Net Migration Number	Rate/1000
1990	2,860,400	69,800	2.50	42,008	14.87	24,763	8.76	17,245	52,555	18.60
1991	2,928,500	68,100	2.38	42,682	14.75	24,944	8.62	17,738	50,362	17.40
1992	2,991,800	63,300	2.16	42,427	14.33	25,166	8.50	17,261	46,039	15.55
1993	3,060,400	68,600	2.29	41,442	13.69	26,543	8.77	14,899	53,701	17.75
1994	3,121,300	60,900	1.99	41,487	13.42	27,564	8.92	13,923	46,977	15.20
1995	3,184,400	63,100	2.02	42,426	13.46	27,552	8.74	14,874	48,226	15.30
1990-1995		**324,000**		**210,464**		**131,769**		**78,695**	**245,305**	
1996	3,247,100	62,700	1.97	43,196	13.43	28,768	8.95	14,428	48,272	15.01
1997	3,304,300	57,200	1.76	43,625	13.32	29,201	8.91	14,424	42,776	13.06
1998	3,352,400	48,100	1.46	44,696	13.43	28,705	8.62	15,991	32,109	9.65
1999	3,393,900	41,500	1.24	45,188	13.40	29,848	8.85	15,340	26,160	7.76
2000	3,431,100	37,200	1.10	45,534	13.34	28,909	8.47	16,625	20,575	6.03
1995-2000		**246,700**		**222,239**		**145,431**		**76,808**	**169,892**	
2001	3,470,400	39,300	1.15	45,536	13.20	29,934	8.67	15,602	23,698	6.87
2002	3,502,600	32,200	0.93	44,995	12.91	30,828	8.84	14,167	18,033	5.17
2003	3,538,600	36,000	1.03	45,686	12.98	30,604	8.69	15,082	20,918	5.94
2004	3,578,900	40,300	1.14	45,599	12.81	30,721	8.63	14,878	25,422	7.14
2005	3,626,900	48,000	1.34	45,892	12.74	30,717	8.53	15,175	32,825	9.11
2000-2005		**195,800**		**227,708**		**152,804**		**74,904**	**120,896**	
2006	3,685,200	58,300	1.61	46,946	12.84	30,771	8.42	16,175	42,125	11.52
2007	3,739,400	54,200	1.47	49,404	13.31	31,396	8.46	18,008	36,192	9.75
2008	3,784,200	44,800	1.20	49,659	13.20	32,008	8.51	17,651	27,149	7.22
2009	3,815,800	31,600	0.84	47,960	12.62	31,382	8.26	16,578	15,022	3.95
2010	3,837,300	21,500	0.56	46,256	12.09	31,689	8.28	14,567	6,933	1.81
2005-2010		**210,400**		**240,225**		**157,246**		**82,979**	**127,421**	
2011	3,857,625	20,325	0.53	45,381	11.80	32,437	8.43	12,944	7,381	1.92
2012	3,883,735	26,110	0.68	44,897	11.60	32,804	8.47	12,093	14,017	3.62
2013	3,919,020	35,285	0.91	44,969	11.53	33,168	8.50	11,801	23,484	6.02
2014	3,962,710	43,690	1.11	45,447	11.53	33,731	8.56	11,716	31,974	8.11
2015	4,013,845	51,135	1.29	45,660	11.45	35,318	8.86	10,342	40,793	10.23
2010-2015		**176,545**		**226,354**		**167,458**		**58,896**	**117,649**	
2016	4,076,350	62,505	1.56	45,647	11.28	35,339	8.74	10,308	52,197	12.90
2017	4,141,100	64,750	1.59	44,602	10.86	36,773	8.95	7,829	56,921	13.85
2018	4,195,300	54,200	1.31	42,906	10.29	36,900	8.85	6,006	48,194	11.56
2019	4,247,700	52,399	1.25	42,872	10.16	38,549	9.13	4,323	48,076	11.39
2020	4,299,400	51,701	1.22	42,867	10.03	39,169	9.17	3,699	48,002	11.23
2015-2020		**285,555**		**218,894**		**186,729**		**32,165**	**253,390**	
2021	4,349,800	50,400	1.17	42,861	9.91	39,880	9.22	2,981	47,418	10.96
2022	4,399,000	49,200	1.13	42,849	9.80	40,654	9.29	2,196	47,004	10.75
2023	4,447,100	48,100	1.09	42,822	9.68	41,490	9.38	1,332	46,768	10.57
2024	4,493,800	46,699	1.05	42,790	9.57	42,413	9.49	377	46,322	10.36
2025	4,539,300	45,500	1.01	42,750	9.47	43,364	9.60	-614	46,114	10.21
2020-2025		**239,899**		**214,073**		**207,801**		**6,272**	**233,627**	
2026	4,583,000	43,700	0.96	42,711	9.36	44,306	9.71	-1,596	45,296	9.93
2027	4,625,300	42,300	0.92	42,667	9.27	45,293	9.84	-2,625	44,926	9.76
2028	4,666,000	40,700	0.88	42,621	9.17	46,389	9.99	-3,768	44,468	9.57
2029	4,705,100	39,100	0.84	42,570	9.09	47,452	10.13	-4,883	43,983	9.39
1990-2000		**570,700**		**432,703**		**277,200**		**155,503**	**415,197**	13.10
2000-2010		**406,200**		**467,933**		**310,050**		**157,883**	**248,317**	6.83
2010-2020		**462,100**		**445,248**		**354,187**		**91,061**	**371,039**	9.19
2019-2029		**457,400**		**427,509**		**430,410**		**-2,901**	**460,301**	10.26

Sources: 1990-1999 population - U.S. Census Bureau; 2000-2009 population - intercensal estimates by Office of Economic Analysis; population estimates 2010-2018 by Population Research Center, PSU; births and deaths 1990-18/17: Oregon Center for Health Statistics.

Table C.2 Population Forecasts by Age and Sex: 2010-2029

	2010			2011			2012			2013			2014		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	122,327	116,130	238,457	121,092	115,088	236,180	119,516	113,359	232,875	118,293	111,850	230,143	117,872	111,493	229,365
5- 9	121,539	116,369	237,908	121,767	115,893	237,660	122,733	116,900	239,634	124,024	117,953	241,977	124,734	118,038	242,772
10-14	124,508	118,732	243,241	124,074	119,044	243,118	123,603	118,287	241,890	123,386	118,206	241,593	123,403	118,463	241,865
15-19	131,126	124,540	255,667	129,068	121,927	250,996	127,517	120,587	248,104	126,643	119,875	246,518	126,847	119,972	246,819
20-24	128,787	124,903	253,689	130,576	126,691	257,267	132,853	128,787	261,640	135,293	130,705	265,998	136,741	132,080	268,821
25-29	134,019	131,816	265,835	133,302	130,829	264,132	132,463	129,927	262,390	132,508	130,403	262,911	134,578	132,874	267,452
30-34	131,489	128,325	259,814	133,512	130,743	264,255	135,689	133,329	269,018	137,321	135,074	272,395	139,932	137,412	277,344
35-39	128,070	123,596	251,665	125,924	121,787	247,710	126,018	122,275	248,293	128,683	124,338	253,022	130,858	126,562	257,420
40-44	125,969	122,843	248,811	128,974	125,358	254,332	130,795	126,620	257,415	131,483	127,467	258,950	131,047	126,698	257,745
45-49	130,825	132,538	263,363	127,795	128,542	256,337	125,434	124,976	250,410	123,864	122,179	246,043	124,309	121,474	245,783
50-54	135,129	141,565	276,693	134,682	140,654	275,335	133,445	139,197	272,643	132,080	137,545	269,625	131,568	136,140	267,708
55-59	133,011	140,802	273,812	134,009	142,349	276,358	134,403	143,058	277,461	134,376	142,746	277,122	133,344	142,041	275,385
60-64	115,236	121,045	236,281	121,440	127,818	249,258	122,921	129,548	252,470	124,925	132,821	257,745	127,753	136,837	264,590
65-69	81,854	87,917	169,771	84,425	90,852	175,277	92,096	98,785	190,881	97,983	105,059	203,042	103,544	110,487	214,031
70-74	56,925	62,949	119,874	59,485	65,640	125,125	62,496	69,113	131,609	67,184	73,899	141,083	71,303	78,473	149,776
75-79	40,932	50,101	91,034	41,549	50,075	91,624	42,654	50,692	93,346	44,224	52,064	96,287	46,443	54,145	100,588
80-84	30,391	42,734	73,126	30,500	42,287	72,787	30,560	41,822	72,381	30,774	41,257	72,031	31,046	40,788	71,834
85+	26,800	51,458	78,258	27,598	52,275	79,874	28,360	52,915	81,276	28,995	53,538	82,533	29,522	53,890	83,411
Total	1,898,938	1,938,362	3,837,300	1,909,773	1,947,852	3,857,625	1,923,557	1,960,178	3,883,735	1,942,040	1,976,980	3,919,020	1,964,844	1,997,866	3,962,710
Mdn. Age	37.2	39.4	38.3	37.4	39.7	38.5	37.6	39.9	38.7	37.8	40.0	38.9	38.0	40.1	39.0

	2015			2016			2017			2018			2019		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	118,065	111,542	229,607	119,058	112,182	231,240	119,560	112,675	232,236	118,557	111,613	230,170	117,123	110,204	227,327
5- 9	125,502	118,321	243,824	125,540	118,120	243,660	125,253	117,281	242,534	124,926	116,377	241,303	125,067	116,397	241,464
10-14	122,975	118,328	241,303	123,807	118,633	242,441	125,568	120,566	246,133	127,404	122,223	249,627	128,481	122,681	251,162
15-19	127,735	120,633	248,368	128,448	121,638	250,085	129,149	121,889	251,038	129,338	122,073	251,411	129,610	122,533	252,143
20-24	137,304	132,672	269,977	137,526	132,652	270,178	138,151	133,323	271,474	137,916	133,230	271,146	138,362	133,523	271,885
25-29	137,959	137,056	275,015	143,647	143,914	287,560	149,363	150,285	299,649	154,128	155,225	309,353	156,940	158,424	315,365
30-34	141,525	138,707	280,232	144,070	140,722	284,792	146,205	142,880	289,086	148,173	145,415	293,588	151,745	149,552	301,297
35-39	134,484	129,808	264,292	138,181	133,110	271,291	142,320	136,983	279,303	145,127	139,407	284,534	148,589	142,255	290,844
40-44	130,040	125,302	255,342	129,051	124,315	253,366	130,216	125,672	255,887	133,595	128,185	261,780	136,251	130,713	266,964
45-49	127,060	123,545	250,606	131,246	126,804	258,051	134,157	128,892	263,049	135,475	130,160	265,635	135,400	129,637	265,037
50-54	129,981	133,569	263,550	127,847	130,622	258,469	126,391	127,711	254,102	125,327	125,340	250,667	126,116	124,882	250,998
55-59	133,245	142,271	275,516	133,803	142,713	276,516	133,264	142,249	275,513	132,346	141,198	273,544	132,091	140,121	272,213
60-64	130,407	139,689	270,096	132,872	142,414	275,286	134,431	144,220	278,651	135,166	144,565	279,730	134,545	144,218	278,764
65-69	109,922	117,550	227,472	116,860	124,952	241,812	119,222	127,460	246,681	121,835	131,164	253,000	124,984	135,379	260,363
70-74	74,860	82,510	157,370	77,688	85,607	163,296	85,391	93,610	179,001	91,329	99,843	191,172	96,745	105,107	201,852
75-79	48,615	56,084	104,698	51,000	58,692	109,692	53,744	62,024	115,768	57,958	66,449	124,407	61,575	70,575	132,149
80-84	31,707	40,809	72,517	32,509	40,934	73,443	33,587	41,566	75,152	35,014	42,755	77,768	36,838	44,438	81,275
85+	30,095	53,967	84,062	30,836	54,337	85,173	31,428	54,414	85,842	32,073	54,392	86,465	32,525	54,071	86,596
Total	1,991,483	2,022,363	4,013,845	2,023,989	2,052,361	4,076,350	2,057,401	2,083,700	4,141,100	2,085,686	2,109,614	4,195,300	2,112,990	2,134,710	4,247,700
Mdn. Age	38.1	40.2	39.1	38.2	40.2	39.2	38.3	40.2	39.2	38.5	40.3	39.4	38.7	40.4	39.5

	2020			2021			2022			2023			2024		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	115,485	108,642	224,127	113,931	107,176	221,107	112,949	106,283	219,232	112,889	106,251	219,140	112,803	106,195	218,998
5- 9	125,506	116,608	242,114	126,190	117,019	243,209	126,211	116,888	243,099	124,988	115,673	240,661	123,361	114,142	237,503
10-14	129,473	123,177	252,650	129,378	122,864	252,242	128,764	121,686	250,450	128,230	120,542	248,771	128,215	120,388	248,603
15-19	129,295	122,504	251,799	130,034	122,642	252,676	131,486	124,263	255,749	133,139	125,739	258,879	134,049	126,027	260,076
20-24	139,146	134,064	273,210	139,370	134,748	274,118	139,512	134,273	273,785	139,835	134,571	274,406	140,136	135,049	275,186
25-29	157,870	159,525	317,395	157,414	158,576	315,990	156,779	158,150	314,930	156,251	157,705	313,956	156,516	157,735	314,251
30-34	156,098	154,904	311,001	161,955	162,013	323,967	167,721	168,672	336,394	172,714	173,797	346,511	175,452	176,885	352,338
35-39	150,607	143,816	294,423	152,900	145,650	298,550	154,603	147,310	301,913	156,541	149,866	306,407	160,174	154,062	314,236
40-44	140,210	134,153	274,363	143,934	137,509	281,443	147,691	141,001	288,693	150,499	143,431	293,930	153,970	146,282	300,252
45-49	134,517	128,324	262,840	133,318	127,191	260,509	134,247	128,200	262,447	137,643	130,719	268,362	140,276	133,237	273,513
50-54	129,084	127,220	256,304	133,179	130,476	263,655	135,855	132,376	268,230	137,064	133,618	270,682	136,888	133,011	269,899
55-59	130,616	137,485	268,101	128,373	134,286	262,659	126,645	131,261	257,906	125,505	128,754	254,260	126,228	128,214	254,442
60-64	134,621	144,581	279,202	134,971	144,808	279,779	134,297	144,208	278,505	133,261	143,084	276,346	132,899	141,928	274,827
65-69	127,780	138,302	266,083	129,940	140,858	270,798	131,299	142,435	273,734	131,919	142,760	274,679	131,236	142,413	273,649
70-74	102,809	111,840	214,649	108,984	118,688	227,672	111,114	120,983	232,097	113,523	124,569	238,093	116,442	128,626	245,068
75-79	64,714	74,181	138,895	67,038	76,909	143,948	73,676	84,113	157,789	78,838	89,852	168,691	83,527	94,693	178,220
80-84	38,667	46,037	84,704	40,515	48,207	88,722	42,670	50,971	93,641	46,027	54,738	100,765	48,932	58,277	107,209
85+	33,399	54,141	87,540	34,186	54,570	88,756	35,142	55,265	90,407	36,273	56,291	92,564	37,774	57,757	95,530
Total	2,139,897	2,159,503	4,299,400	2,165,610	2,184,190	4,349,800	2,190,661	2,208,339	4,399,000	2,215,140	2,231,961	4,447,100	2,238,879	2,254,921	4,493,800
Mdn. Age	38.9	40.6	39.7	39.1	40.8	39.9	39.3	40.9	40.1	39.4	41.1	40.2	39.6	41.3	40.4

	2025			2026			2027			2028			2029		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	112,849	106,259	219,108	113,040	106,456	219,496	112,794	106,225	219,018	112,529	105,976	218,505	112,246	105,713	217,958
5- 9	121,576	112,500	234,076	119,869	110,936	230,805	118,861	110,042	228,903	118,823	110,049	228,872	118,777	110,042	228,819
10-14	128,492	120,426	248,918	129,121	120,774	249,895	129,069	120,567	249,636	127,746	119,241	246,988	126,029	117,601	243,630
15-19	134,884	126,367	261,251	134,602	125,881	260,483	133,923	124,649	258,572	133,312	123,437	256,749	133,192	123,201	256,393
20-24	139,711	134,915	274,626	140,121	134,643	274,764	141,542	136,257	277,800	143,145	137,675	280,820	144,006	137,877	281,883
25-29	157,247	158,154	315,401	157,457	158,830	316,288	157,373	157,968	315,341	157,400	157,909	315,309	157,406	158,080	315,486
30-34	176,119	177,691	353,811	175,265	176,281	351,545	174,295	175,587	349,881	173,453	174,845	348,298	173,529	174,663	348,192
35-39	164,655	159,512	324,167	170,666	166,728	337,394	176,543	173,422	349,965	181,557	178,505	360,063	184,225	181,516	365,741
40-44	155,941	147,798	303,739	158,206	149,599	307,804	159,866	151,219	311,085	161,772	153,757	315,529	165,431	157,973	323,404
45-49	144,264	136,695	280,959	147,998	140,046	288,043	151,780	143,535	295,315	154,589	145,940	300,529	158,079	148,781	306,860
50-54	135,950	131,591	267,541	134,708	130,357	265,065	135,620	131,333	266,952	139,013	133,853	272,866	141,624	136,382	278,007
55-59	129,128	130,549	259,676	133,184	133,813	266,997	135,841	135,705	271,546	137,050	136,926	273,977	136,875	136,256	273,132
60-64	131,330	139,208	270,538	129,020	135,892	264,913	127,255	132,778	260,032	126,088	130,210	256,298	126,808	129,660	256,467
65-69	131,275	142,779	274,054	131,595	142,970	274,564	130,940	142,351	273,291	129,936	141,223	271,159	129,585	140,055	269,640
70-74	119,041	131,463	250,504	121,043	133,873	254,917	122,350	135,370	257,721	122,985	135,711	258,696	122,399	135,406	257,805
75-79	88,750	100,822	189,571	94,063	106,930	200,993	96,042	109,098	205,140	98,274	112,447	210,721	100,930	116,168	217,099
80-84	51,439	61,345	112,783	53,304	63,620	116,924	58,785	69,792	128,577	63,134	74,723	137,858	67,034	78,830	145,864
85+	39,377	59,198	98,575	41,031	61,077	102,108	43,002	63,522	106,524	45,897	66,868	112,764	48,582	70,139	118,721
Total	2,262,028	2,277,271	4,539,300	2,284,293	2,298,706	4,583,000	2,305,881	2,319,419	4,625,300	2,326,704	2,339,296	4,666,000	2,346,756	2,358,344	4,705,100
Mdn. Age	39.9	41.4	40.6	40.1	41.6	40.8	40.3	41.8	41.0	40.5	42.0	41.2	40.7	42.2	41.4

Table C.3 Population of Oregon: 1990-2029

Year (July 1)	Total Population	Change from previous year Number	Percent
1990	2,860,400	-	-
1991	2,928,500	68,100	2.38%
1992	2,991,800	63,300	2.16%
1993	3,060,400	68,600	2.29%
1994	3,121,300	60,900	1.99%
1995	3,184,400	63,100	2.02%
1996	3,247,100	62,700	1.97%
1997	3,304,300	57,200	1.76%
1998	3,352,400	48,100	1.46%
1999	3,393,900	41,500	1.24%
2000	3,431,100	37,200	1.10%
2001	3,470,400	39,300	1.15%
2002	3,502,600	32,200	0.93%
2003	3,538,600	36,000	1.03%
2004	3,578,900	40,300	1.14%
2005	3,626,900	48,000	1.34%
2006	3,685,200	58,300	1.61%
2007	3,739,400	54,200	1.47%
2008	3,784,200	44,800	1.20%
2009	3,815,800	31,600	0.84%
2010	3,837,300	21,500	0.56%
2011	3,857,625	20,325	0.53%
2012	3,883,735	26,110	0.68%
2013	3,919,020	35,285	0.91%
2014	3,962,710	43,690	1.11%
2015	4,013,845	51,135	1.29%
2016	4,076,350	62,505	1.56%
2017	4,141,100	64,750	1.59%
2018	4,195,300	54,200	1.31%
2019	4,247,700	52,399	1.25%
2020	4,299,400	51,701	1.22%
2021	4,349,800	50,400	1.17%
2022	4,399,000	49,200	1.13%
2023	4,447,100	48,100	1.09%
2024	4,493,800	46,699	1.05%
2025	4,539,300	45,500	1.01%
2026	4,583,000	43,700	0.96%
2027	4,625,300	42,300	0.92%
2028	4,666,000	40,700	0.88%
2029	4,705,100	39,100	0.84%

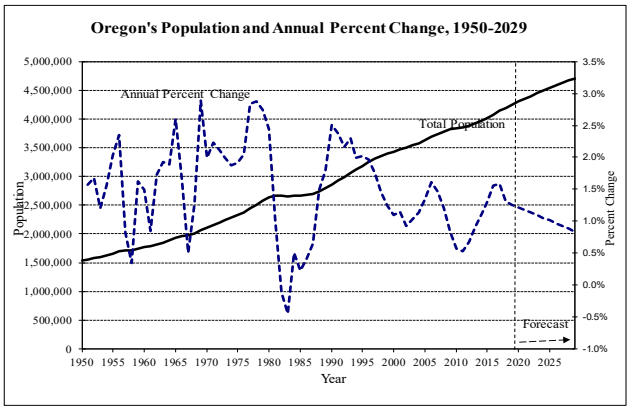


Table C.4 Children: Ages 0-4

Table C.5 School Age Population: Ages 5-17

Table C.6 Young Adult Population: Ages 18-24

Year (July 1)	Population	% Change from previous decade/yr. Number	Percent	Population	% Change from previous decade/yr. Number	Percent	Population	% Change from previous decade/yr. Number	Percent
1980	199,525	---	---	524,446	---	---	329,407	---	---
1990	209,638	10,113	5.07%	532,727	8,281	1.58%	268,134	-61,273	-18.60%
2000	223,207	13,569	6.47%	624,316	91,589	17.19%	330,328	62,194	23.20%
2001	224,645	1,438	0.64%	624,675	358	0.06%	336,660	6,333	1.92%
2002	225,084	439	0.20%	624,611	-64	-0.01%	340,778	4,118	1.22%
2003	226,652	1,568	0.70%	624,349	-262	-0.04%	345,266	4,487	1.32%
2004	228,353	1,701	0.75%	625,461	1,112	0.18%	349,138	3,873	1.12%
2005	230,008	1,655	0.72%	628,326	2,865	0.46%	351,076	1,938	0.55%
2006	231,882	1,874	0.81%	633,646	5,320	0.85%	354,328	3,252	0.93%
2007	236,160	4,278	1.85%	635,720	2,074	0.33%	356,311	1,983	0.56%
2008	239,340	3,180	1.35%	635,372	-348	-0.05%	358,967	2,656	0.75%
2009	239,929	589	0.25%	633,575	-1,797	-0.28%	360,134	1,166	0.32%
2010	238,457	-1,472	-0.61%	630,741	-2,835	-0.45%	359,764	-370	-0.10%
2011	236,180	-2,277	-0.95%	628,366	-2,375	-0.38%	360,675	911	0.25%
2012	232,875	-3,305	-1.40%	628,688	323	0.05%	362,580	1,904	0.53%
2013	230,143	-2,733	-1.17%	630,161	1,473	0.23%	365,925	3,346	0.92%
2014	229,365	-777	-0.34%	631,753	1,592	0.25%	368,525	2,600	0.71%
2015	229,607	242	0.11%	633,304	1,550	0.25%	370,167	1,642	0.45%
2016	231,240	1,632	0.71%	635,485	2,182	0.34%	370,880	712	0.19%
2017	232,236	996	0.43%	638,094	2,608	0.41%	373,086	2,206	0.59%
2018	230,170	-2,065	-0.89%	639,287	1,194	0.19%	374,200	1,114	0.30%
2019	227,327	-2,843	-1.24%	641,363	2,076	0.32%	375,292	1,092	0.29%
2020	224,127	-3,200	-1.41%	644,564	3,200	0.50%	375,209	-83	-0.02%
2021	221,107	-3,020	-1.35%	646,828	2,264	0.35%	375,418	209	0.06%
2022	219,232	-1,875	-0.85%	646,809	-19	0.00%	376,274	856	0.23%
2023	219,140	-92	-0.04%	645,104	-1,705	-0.26%	377,612	1,338	0.36%
2024	218,998	-142	-0.06%	642,387	-2,718	-0.42%	378,981	1,369	0.36%
2025	219,108	110	0.05%	638,308	-4,078	-0.63%	380,563	1,582	0.42%
2026	219,496	388	0.18%	633,913	-4,396	-0.69%	382,035	1,472	0.39%
2027	219,018	-478	-0.22%	630,474	-3,438	-0.54%	384,437	2,402	0.63%
2028	218,505	-513	-0.23%	627,201	-3,273	-0.52%	386,228	1,791	0.47%
2029	217,958	-547	-0.25%	624,676	-2,524	-0.40%	386,048	-180	-0.05%

Table C.7 Criminally At Risk Population (males): Ages 15-39

Table C.8 Prime Wage Earners: Ages 25-44

Table C.9 Older Wage Earners: Ages 45-64

Year (July 1)	Population	% Change from previous decade/yr. Number	Percent	Population	% Change from previous decade/yr. Number	Percent	Population	% Change from previous decade/yr. Number	Percent
1980	561,931	---	---	790,750	---	---	491,249	---	---
1990	544,738	-17,193	-3.06%	926,326	135,576	17.15%	531,181	39,932	8.13%
2000	616,988	72,250	13.26%	996,500	70,174	7.58%	817,510	286,329	53.90%
2001	618,906	1,918	0.31%	994,587	-1,913	-0.19%	847,276	29,766	3.64%
2002	620,252	1,347	0.22%	989,996	-4,591	-0.46%	876,242	28,966	3.42%
2003	622,211	1,959	0.32%	987,755	-2,241	-0.23%	903,499	27,257	3.11%
2004	626,423	4,212	0.68%	988,932	1,177	0.12%	930,032	26,533	2.94%
2005	633,901	7,478	1.19%	994,575	5,644	0.57%	957,826	27,793	2.99%
2006	644,210	10,309	1.63%	1,004,110	9,535	0.96%	985,638	27,813	2.90%
2007	652,287	8,077	1.25%	1,014,565	10,455	1.04%	1,008,986	23,348	2.37%
2008	657,248	4,961	0.76%	1,022,060	7,495	0.74%	1,025,501	16,515	1.64%
2009	657,327	79	0.01%	1,024,971	2,911	0.28%	1,039,689	14,188	1.38%
2010	653,491	-3,836	-0.58%	1,026,126	1,155	0.11%	1,050,150	10,461	1.01%
2011	652,382	-1,109	-0.17%	1,030,430	4,304	0.42%	1,057,288	7,138	0.68%
2012	654,540	2,158	0.33%	1,037,116	6,686	0.65%	1,052,983	-4,305	-0.41%
2013	660,449	5,909	0.90%	1,047,277	10,162	0.98%	1,050,536	-2,447	-0.23%
2014	668,956	8,507	1.29%	1,059,961	12,683	1.21%	1,053,466	2,930	0.28%
2015	679,008	10,051	1.50%	1,074,881	14,920	1.41%	1,059,767	6,301	0.60%
2016	691,871	12,863	1.89%	1,097,009	22,128	2.06%	1,068,321	8,554	0.81%
2017	705,188	13,317	1.92%	1,123,925	26,916	2.45%	1,071,315	2,993	0.28%
2018	714,682	9,493	1.35%	1,149,254	25,330	2.25%	1,069,577	-1,738	-0.16%
2019	725,247	10,565	1.48%	1,174,471	25,216	2.19%	1,067,011	-2,565	-0.24%
2020	733,015	7,768	1.07%	1,197,182	22,712	1.93%	1,066,447	-564	-0.05%
2021	741,672	8,657	1.18%	1,219,950	22,768	1.90%	1,066,602	155	0.01%
2022	750,102	8,430	1.14%	1,241,929	21,979	1.80%	1,067,088	486	0.05%
2023	758,480	8,378	1.12%	1,260,804	18,876	1.52%	1,069,649	2,561	0.24%
2024	766,327	7,848	1.03%	1,281,076	20,272	1.61%	1,072,681	3,032	0.28%
2025	772,617	6,289	0.82%	1,297,118	16,041	1.25%	1,078,714	6,034	0.56%
2026	778,111	5,494	0.71%	1,313,031	15,913	1.23%	1,085,018	6,304	0.58%
2027	783,676	5,565	0.72%	1,326,272	13,241	1.01%	1,093,846	8,828	0.81%
2028	788,868	5,192	0.66%	1,339,199	12,927	0.97%	1,103,670	9,824	0.90%
2029	792,357	3,489	0.44%	1,352,822	13,624	1.02%	1,114,465	10,796	0.98%

Table C.10 Elderly Population by Age Group

Year (July 1)	Ages 65+	%Change from previous decade/yr.	Ages 65-74	%Change from previous decade/yr.	Ages 75-84	%Change from previous decade/yr.	Ages 85+	%Change from previous decade/yr.
1980	305,841	---	185,863	---	91,137	---	28,841	---
1990	392,369	28.29%	224,772	20.93%	128,813	41.34%	38,784	34.48%
2000	439,239	11.95%	218,997	-2.57%	162,187	25.91%	58,055	49.69%
2001	442,558	0.76%	218,838	-0.07%	163,878	1.04%	59,843	3.08%
2002	445,890	0.75%	219,614	0.35%	165,109	0.75%	61,167	2.21%
2003	451,080	1.16%	222,361	1.25%	165,669	0.34%	63,050	3.08%
2004	456,984	1.31%	226,373	1.80%	165,842	0.10%	64,769	2.73%
2005	465,089	1.77%	231,926	2.45%	166,077	0.14%	67,087	3.58%
2006	475,596	2.26%	239,931	3.45%	165,787	-0.17%	69,877	4.16%
2007	487,657	2.54%	250,131	4.25%	165,148	-0.39%	72,379	3.58%
2008	502,959	3.14%	264,201	5.63%	164,354	-0.48%	74,403	2.80%
2009	517,502	2.89%	277,606	5.07%	163,513	-0.51%	76,383	2.66%
2010	532,062	2.81%	289,645	4.34%	164,159	0.40%	78,258	2.45%
2011	544,686	2.37%	300,402	3.71%	164,410	0.15%	79,874	2.06%
2012	569,493	4.55%	322,490	7.35%	165,727	0.80%	81,276	1.75%
2013	594,977	4.47%	344,125	6.71%	168,319	1.56%	82,533	1.55%
2014	619,639	4.15%	363,807	5.72%	172,422	2.44%	83,411	1.06%
2015	646,119	4.27%	384,842	5.78%	177,215	2.78%	84,062	0.78%
2016	673,416	4.22%	405,107	5.27%	183,136	3.34%	85,173	1.32%
2017	702,446	4.31%	425,682	5.08%	190,921	4.25%	85,842	0.79%
2018	732,812	4.32%	444,171	4.34%	202,175	5.89%	86,465	0.73%
2019	762,236	4.02%	462,215	4.06%	213,424	5.56%	86,596	0.15%
2020	791,871	3.89%	480,732	4.01%	223,599	4.77%	87,540	1.09%
2021	819,896	3.54%	498,470	3.69%	232,670	4.06%	88,756	1.39%
2022	847,668	3.39%	505,831	1.48%	251,431	8.06%	90,407	1.86%
2023	874,790	3.20%	512,771	1.37%	269,455	7.17%	92,564	2.39%
2024	899,677	2.84%	518,717	1.16%	285,429	5.93%	95,530	3.20%
2025	925,488	2.87%	524,558	1.13%	302,355	5.93%	98,575	3.19%
2026	949,507	2.60%	529,481	0.94%	317,918	5.15%	102,108	3.58%
2027	971,253	2.29%	531,012	0.29%	333,717	4.97%	106,524	4.32%
2028	991,198	2.05%	529,855	-0.22%	348,578	4.45%	112,764	5.86%
2029	1,009,129	1.81%	527,445	-0.45%	362,963	4.13%	118,721	5.28%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Tobin Davilla

OPERATIONS & MAINTENANCE / CAPITAL
EXHIBIT 904

December 30, 2019

Allocation of Building Space (250 Taylor)	*Sq. Ft.*	*Sq. Ft. %*
Utility Office Space Sq. Ft.	171,071	***95.2%***
Sublease Office Space Sq. Ft.	7,158	4.0%
Sublease Retail Space Sq. Ft.	1,456	0.8%
Total Sq. Feet of Office Space	179,685	100.0%

Reference	**(A)**		**(B)**	**(C)**	**(D)**	**(E)**	**(F)**	**(G)**	**(H)**
Calculation				= (A) * (B)		= (C) * (D)		= (E) * (F)	= (E) - (G)
	Test Year								
250 Taylor Test Year HQ Expense Detail	**Total O&M Expense**		**Utility Allocation %**	**Total Utility Exp.**	**OR State Allocation**	**OR Total Utility Exp.**	**Capital Admin. Transfer %**	**Capital Admin. Transfer $**	**Net OR O&M Expense**
Lease Expense (FERC 931)									
Office Building	$6,135,241	[1]	95.2%	$5,841,121	88.62%	$5,176,360	35.00%	$1,811,726	$3,364,634
Storage	$15,012	[2]	100.0%	$15,012	88.62%	$13,304	35.00%	$4,656	$8,647
Property Tax	$3,474,750	[3]	95.2%	$3,308,172	88.62%	$2,931,679	35.00%	$1,026,088	$1,905,591
Management/Administration Fees	$276,906	[4]	95.2%	$263,631	88.62%	$233,628	35.00%	$81,770	$151,858
Total Lease Exp.	$9,901,909			$9,427,937		$8,354,970		$2,924,240	$5,430,731
Tenant Improvement (TI) Amort. Exp. (FERC 931)	$1,130,914	[5]	100.0%	$1,130,914	88.62%	$1,002,208	35.00%	$350,773	$651,435
Operating Expense (FERC 935)									
Contract Work	$786,464	[6]	95.2%	$748,761	88.35%	$661,520	35.00%	$231,532	$429,988
Utilities	$193,484	[7]	95.2%	$184,209	88.35%	$162,746	35.00%	$56,961	$105,785
Repairs & Maintenance	$184,574	[8]	95.2%	$175,725	88.35%	$155,251	35.00%	$54,338	$100,913
Total Operating Expense	$1,164,522			$1,108,695		$979,518		$342,831	$636,686
Company Vehicle Parking (FERC 921)	$227,717	[9]	100.0%	$227,717	88.02%	$200,437	0.00%	$0	$200,437
Total Test Year Headquarters Expense	**$12,425,063**			**$11,895,264**		**$10,537,133**		**$3,617,844**	**$6,919,289**

[1] Exhibit I. Lease Agreement between Third and Taylor Office Owner LLC and Northwest Natural Gas Company
[2] Lease Agreement between Third and Taylor Office Owner LLC and Northwest Natural Gas Company. Page 6
[3] Test Year forecast based on comparative building tax rate times building valuation estimate.
[4] Mgmt. Fee: Article 5. Lease Agreement between Third and Taylor Office Owner, LLC. and NW Natural Gas Company. Page 9; Admin. Fee: Non-mgmt. staff percentage of labor allocated by Prop. Mgmt Firm.
[5] Tenant Improvement amortized over 20 year life of lease agreement
[6] Contract Work includes Janitorial, Landscaping & Security services. See *NW Natural/500* for more details
[7] Utilities: Waste Disposal: $12.2K; Electric: $164.0K; Water: $17.3K. (Electric and Water forecast from Glumac study: NW Natural 250 Taylor Utility Analysis) See *NW Natural/500* for more details
[8] Repairs & Maintenance: $0.65/sq. ft. annually 1st year of operations, $1.30/sq. ft./year beginning year 2
[9] Parking expense of 9 spots at new HQ building for visitor and company use parking and 60 parking spots at the Keller Auditorium parking garage for company vehicles. See *NW Natural/500* for more details.

BEFORE THE

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OPERATIONS & MAINTENANCE / CAPITAL EXHIBIT 905

REDACTED VERSION

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December 30, 2019

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OPERATIONS & MAINTENANCE / CAPITAL EXHIBIT 906

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OPERATIONS & MAINTENANCE / CAPITAL EXHIBIT 907

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BEFORE THE

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NW Natural

Direct Testimony of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1000

REDACTED VERSION

December 30, 2019

EXHIBIT 1000 – DIRECT TESTIMONY - TEST YEAR / REVENUE REQUIREMENTS

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position at Northwest Natural Gas Company ("NW Natural" or the "Company").

A. My name is Kyle T. Walker. My current position is Manager of Rates. My responsibilities for preparation of the revenue requirement for this rate case included development of Company revenues, calculation of gas costs, derivation of depreciation expense, rate base development, coordination of tax issues, and forecasting of miscellaneous revenues and other taxes.

Q. Please describe your education and employment background.

A. I received a Bachelor of Science Degree in Business Administration with an emphasis in Finance from Oregon State University and a Masters of Business Administration from Willamette University. In addition, I received an accounting certificate from the University of Washington and I am a licensed certified public accountant in the State of Oregon. Prior to my employment with NW Natural, I held positions at the Bonneville Power Administration ("BPA"), including Risk Analyst, Derivative Accountant, Internal Auditor and Finance Analyst. Prior to BPA, I was a Credit Manager for Wells Fargo. In early 2015, I started at NW Natural as a Rates/Regulatory Analyst and was later promoted to Manager of Rates. In my current role, I am responsible for regulatory reporting, revenue requirement, ratemaking and other regulatory duties as assigned.

Q. Please summarize your testimony.

A. In my testimony, I:

- Provide an overview of how revenue requirement is calculated;

- Explain the historical base year of calendar year 2019 ("Base Year") and the test year of November 1, 2020 to October 31, 2021 ("Test Year");
- Present the revenue requirement needed to yield NW Natural's proposed overall rate of return ("ROR") of 7.298 percent and return on equity ("ROE") of 10.0 percent, and detail the increase required;
- Present the adjusted results of operations for the Test Year and explain the Company's projected revenues at current rates, projected operations and maintenance expense ("O&M"), and other expenses for the Test Year;
- Describe routine updates to our weather adjusted rate mechanism ("WARM") and decoupling mechanism as well as propose a minor adjustment in our partial decoupling mechanism;
- Describe the development of the industrial load forecast;
- Explain how rate base was calculated for the Test Year;
- Describe the allocation or assignment of revenues, costs, and rate base elements to the Oregon jurisdiction; and
- Explain our proposal for including historical amortization of gas reserves excess deferred income taxes ("EDIT") into the gas reserves purchased gas adjustment ("PGA").

Q. Can you please provide a brief overview of the elements of revenue requirement, and why the determination of revenue requirement is principal to a general rate case?

A. The Company's revenue requirement, or cost of service, represents the total annual cost to serve its customers. Costs primarily consist of gas costs (i.e., cost of goods sold), operating and maintenance costs, revenue-related costs, and investment-related costs.

Gas costs include commodity and upstream pipeline gas costs.[1] Operating and maintenance costs include payroll and other non-capital costs of serving customers. Revenue-related costs are primarily comprised of franchise taxes, but also include the statutory commission fee and uncollectible revenues. Investment-related costs include the return of investment, or depreciation, and the return on investment, which includes the costs of long-term debt and equity to finance our investments.[2] The ROE is the amount of return that shareholders of the Company are expecting, given the Company's risk and how it compares to alternative investments available to the shareholder.

Investment costs are related to our rate base, which includes a number of components, but is primarily net plant. Net plant represents the assets that have been acquired by the Company for purposes of serving its customers, and which

[1] Although gas and upstream gas supply costs are a major cost for the Company, and form a part of NW Natural's revenue requirement, these costs are recovered through the Company's PGA, and not as part of the Company's base rates, which we seek to modify through this general rate case proceeding.

[2] Investment related costs also include income and property taxes associated with earnings and plant balances, respectively.

are being financed by the Company. Rate base also includes certain other items that are financed, such as gas in storage, and inventories. There are also amounts that are received by the Company that reduce the amount of financing required. The largest of those amounts is deferred income taxes, primarily where our depreciation expense differs between book accounting and tax accounting. That difference has historically created a financing benefit, by lowering the current income tax liability for the Company. Therefore, we factor that benefit in as a reduction to the total amount of investments, or rate base. The overall rate base, including all of these components, represents the amount that requires financing from shareholders and bondholders.

The aggregation of gas costs, operating and maintenance costs, revenue-related costs, and investment-related costs represents the amount that is needed to be recovered from the Company's customers in a year. Our incremental revenue requirement is the amount of additional revenue needed over the amount already generated by existing rates, so that the Company can recover its costs, including long-term debt service, and have the opportunity to earn its authorized return on equity.

Q. Can you please describe how the testimony presented in this rate case establishes NW Natural's revenue requirement?

A. Yes. NW Natural's required return on rate base is established in the testimony of Brody J. Wilson, Vice President, Treasurer, Chief Accounting Officer and Controller (*NW Natural/200, Wilson*), and Dr. Bente Villadsen, Principal of The Brattle Group (*NW Natural/300, Villadsen*). Mr. Wilson's testimony provides

evidence of NW Natural's cost of debt, and the amount of debt and equity the Company uses to finance its investments and operations. Dr. Villadsen's testimony provides evidence of the returns that NW Natural should pay shareholders in order to continue to attract their investments in the Company through purchasing common stock.

The testimonies of Melinda Rogers, Vice President and Chief Human Resources and Diversity Officer (*NW Natural/700, Rogers*), Cory Beck, Senior Manager of External Communications and User Experience (*NW Natural/800, Beck*), Wayne Pipes, Director of Facilities, Security and Emergency Management (*NW Natural/500, Pipes*), Jim Downing, Vice President and Chief Information Officer (*NW Natural/600, Downing*), and Tobin Davilla, Manager of Budget and Financial Analysis (*NW Natural/900, Davilla*), along with my description of taxes, establish our operating expenses. Ms. Rogers' testimony demonstrates NW Natural's costs of labor, including compensation and benefits for our non-bargaining unit employees, bargaining unit employees and executives. Mr. Beck's testimony describes the costs associated with our customer communications. Mr. Pipes describes the operating expenses associated with our new headquarters, including the twenty year lease. Mr. Downing describes the Company's operating expenses related to Information Technology & Services (IT&S). Mr. Davilla's testimony describes all other operations and maintenance expense, and the total level of expense the Company will incur in the Test Year. Finally, I describe the Company's income tax expense and the proposed EDIT amortization resulting from federal income tax reform in 2017.

With respect to our capital investments, the testimonies of Wayne Pipes, Jim Downing and Joe Karney, Senior Director of Engineering and Chief Engineer (*NW Natural/400, Karney*), provide descriptions of the Company's recent projects related to NW Natural's facilities, IT&S, and distribution and storage infrastructure, respectively. In conjunction with these pieces of testimony, my calculations demonstrate NW Natural's rate base that is used in serving our Oregon customers.

My testimony provides the summation of all of these costs, and the calculations of revenue requirement in accordance with established methodologies for calculating the Company's revenue requirement for the Test Year.

II. BASE YEAR AND TEST YEAR

Q. Why did NW Natural use calendar year 2019 as the Base Year?

A. The Company chose calendar year 2019 as the Base Year because it is the most recent calendar year ahead of the Company's filing. While the last three months of 2019 shown in this filing are forecast data, the actual information will be available within a few months of our filing.

Q. Why did NW Natural choose the period of November 1, 2020 to October 31, 2021 as the Test Year in this case?

A. The Company chose the 12-month period from November 1, 2020 to October 31, 2021 because it best reflects the conditions expected when new rates from this rate case will be in effect. Given a filing date of late December 2019 for the rate case, the normal timeline for the rate case process would mean that rates would

be expected to be effective by November 1, 2020. This matches the Test Year used to calculate the revenue requirement in this case, and also coincides with the effective date of the annual PGA rate change, which minimizes the frequency of rate changes for customers.

III. TEST YEAR REVENUE REQUIREMENT

Q. What is the Test Year revenue requirement needed to achieve the rate of return proposed in this case?

A. To achieve the proposed rate of return of 7.298 percent in the Test Year, a revenue requirement increase of $71.4 million, or 11.5 percent, is needed over the revenues expected for the Test Year at present rates.

Q. What would NW Natural's rate of return on equity be in the Test Year absent the requested rate increase?

A. At current rate levels, the Company's ROE would be 3.11 percent. This is significantly below the 10.0 percent ROE proposed in this case.

Q. Please describe the changes to revenue requirement elements since the last rate case that combine to cause NW Natural to under-earn at current rate levels in the Test Year.

A. *NW Natural/1001, Walker* shows a side-by-side comparison of the results of operations from UG 344, the Company's last case in 2018[3] and the Test Year results from this rate case. Of particular note in this detailed comparison are three specific areas:

[3] Phase II of UG 344 was completed and rates became effective April 1, 2019.

1) Line 6 shows a growth in margins (revenues net of cost of gas) of $10.9 million during the period;

2) Line 9 shows total operating and maintenance expenses increasing by $42.9 million; and

3) Line 19 shows an increase in net plant of $260.0 million.

In summary, NW Natural has generated revenue growth over the period, but that growth has been insufficient to offset costs for O&M and investments in rate base.

IV. RESULTS OF OPERATIONS

Q. Please explain how NW Natural calculated the Test Year revenue requirement.

A. The Company began with actual and forecasted results from the Base Year. We made normalizing and known and measurable changes to Base Year revenues, expenses, and capital (rate base) to reflect conditions anticipated to be in effect in the Test Year. This testimony and the related exhibits explain how these adjustments are reflected in the Test Year revenue requirement.

Q. Have you prepared NW Natural's Oregon-allocated results of operations for the Test Year?

A. Yes. See *NW Natural/1002, Walker* for a summary of NW Natural's Oregon-allocated Results of Operations for the Test Year.

Q. Please describe Exhibit *NW Natural/1002, Walker.*

A. Column "a" of *NW Natural/1002, Walker* shows the Oregon-allocated results for the Base Year, including operating revenues, operating revenue deductions,

taxes, and rate base. Column "b" shows the adjustments to Base Year results for each of these categories. Column "c" shows Test Year results at present rates based on the adjustments to Base Year results. Column "d" indicates the proposed revenue increase necessary to reach the requested ROE. Finally, column "e" shows Test Year results that reflect the requested ROE.

Q. Please explain the adjustments set forth in Column "b."

A. The amounts in Column "b" show the adjustments from the Base Year to the Test Year. These adjustments impact operating revenues, operating revenue deductions, including taxes, and changes in rate base.

A. Sales of Gas Revenues and Transportation Revenues

Q. Please explain the adjustments to Base Year operating revenues.

A. The first two adjustments to operating revenues are for Sale of Gas and Transportation revenues, shown on lines 1 and 2 of *NW Natural/1002, Walker*. These adjustments are calculated as the difference between Base Year and Test Year volumes and customers multiplied by current rates that were effective during the months within the Base Year and Test Year.[4]

Q. How did you calculate Base Year Sale of Gas and Transportation revenues?

A. Base Year revenues were projected using the latest available actual volumes and customers for the year to date at September 30, 2019, as well as a forecast for the remaining three months of 2019, multiplied by rates that were effective

[4] Rates for the months of January through March 2019 became effective November 1, 2018, and the remaining months of 2019 through the Test Year are using rates that became effective April 1, 2019.

during the applicable month. This calculation is shown in *NW Natural/1003, Walker*.

Q. How did you forecast Test Year Sale of Gas and Transportation revenues?

A. Test Year revenues reflect Test Year forecast volumes and customers multiplied by current rates, which are the rates that became effective November 1, 2019.

Q. How did you forecast Test Year customers and volumes?

A. The load forecast methodology is explained in Robert Wyman's testimony in *NW Natural/1100, Wyman*.

Q. Are there any rate mechanisms that use the output from Mr. Wyman's models referenced above for their routine update?

A. Yes. Both the decoupling mechanism and WARM use the statistical co-efficient and normalized heating degree days (HDD) in their calculations. It is important that both rate mechanisms are aligned with the use per customer ("UPC") model output that builds revenue requirement for the Test Year. This alignment will ensure that the mechanisms will normalize customer usage back to the rate case UPCs derived in Mr. Wyman's model. The UPCs and statistical co-efficients are shown in *NW Natural/1004, Walker.*

Q. Are there any other updates being proposed for NW Natural's rate mechanisms?

A. Yes, we have a minor adjustment to the Company's partial decoupling mechanism.

Q. What is the proposed adjustment to the Company's partial decoupling mechanism?

A. NW Natural proposes the same decoupling calculation treatment for the month of April that it already is authorized to use for the months of November and May. In November and May, the weather adjustment within the partial decoupling mechanism takes the WARM mechanism's calculated therms as the weather adjustment. In the months of December through April, the weather adjustment calculation is done in full, and, therefore, is identical to the WARM mechanism's weather calculation for those months.

The Company has discovered, however, that a portion of the therms used in April is not being fully decoupled as designed because some cycle bills that start in mid-April do not bill until after the WARM period ends on May 15th. The Company refers to this unintended situation as the "decoupling gap." The "decoupling gap" occurs because the current decoupling calculation assumes that all therms consumed in the month of April are under the WARM mechanism. In fact, however, any April consumption that is billed after May 15th is not covered by the WARM mechanism and, therefore, is not decoupled from weather. The "decoupling gap" originally existed in the months of November and May, but the Commission remedied the situation in Order No. 06-570 for November and Order No. 12-408 for May. The Company is seeking similar treatment for the month of April.

Q. What is the third adjustment to operating revenues?

A. The third adjustment is to the decoupling amount. Decoupling was adjusted to remove credits produced by the mechanism in the Base Year. This adjustment effectively creates no decoupling revenues in the test period, due to test period revenues being developed with newly created UPCs, effectively normalizing usage that will become the baseline for the decoupling mechanism at the rate effective date of this proceeding.

Q. What is the fourth adjustment to operating revenues?

A. The fourth adjustment is to remove the WARM revenue (a credit due to colder than normal weather) that was related to the Base Year. Because the Test Year is based on normal weather, no WARM amount is applicable to that period.

B. Miscellaneous Revenues

Q. What is the fifth and last adjustment to operating revenues?

A. The last adjustment is to Miscellaneous Revenues, identified on line 5 of *NW Natural/1002, Walker*. This adjustment reflects the difference between Base Year Miscellaneous Revenue, which was based on actual totals for the 12-months ended September 30, 2019 as a proxy for the Base Year, and the forecast for the Test Year. The adjustment was calculated by adjusting specific categories of Miscellaneous Revenues to reflect levels of operating activity, based on three years of historical data. If the amounts for a particular category were trending upward or downward, the most recent year was taken as representative for the forecast. If there was no apparent trend to the historic amounts, a simple three-year average was used. The adjustments to specific

categories of Miscellaneous Revenues are set forth in *NW Natural/1005, Walker*. Compressed natural gas related to Schedule H and all non-utility miscellaneous revenues have been removed.

Q. Please explain any extraordinary miscellaneous revenues identified in the Base Year.

A. The recent winter of 2018/19 began with the rupture of Enbridge's T-South pipeline on October 9, 2018, which caused a shortfall of supply into the Pacific Northwest throughout the entire winter. Weather was generally mild October through January; however, February weather was the third coldest on record in Portland and the coldest since 1989. The supply shortage required the Company to curtail our interruptible customers on two occasions:

1. During the initial T-South rupture event, regional pipeline pressures were dropping or in danger of dropping rapidly, and so all interruptible sales and interruptible transportation customers were ordered to curtail service starting early morning on October 10. The curtailment was lifted the following morning (October 11, 2018).
2. During the nine gas days from February 25 through March 5, 2019, all Interruptible sales customers were curtailed due to cold weather, declining storage inventories, and restrictions on British Columbia supplies resulting from Enbridge's T-South repair efforts.

When some of these customers used natural gas against the curtailment orders, miscellaneous revenue in the form of curtailment penalties was generated. The Company believes this incident is rare and not expected nor planned in the

future. For example, the last system-wide curtailment event occurred in December 2009, precipitated by two separate equipment outages on the same day on regional interstate pipelines. Therefore, because these penalties are not anticipated during the Test Year, we have excluded the miscellaneous revenues related to curtailments for purposes of Test Year rate making.

C. Cost of Gas

Q. Please explain the adjustments to Operating Revenue Deductions.

A. The first adjustment to Operating Revenue Deductions is for Gas Purchased, shown on line 7 of *NW Natural/1002, Walker*. This adjustment reflects the difference between Base Year and Test Year sales volumes multiplied by current commodity and demand rates.

Q. Is the cost of gas included in base rates?

A. No. The annual PGA filing revises billing rates to include the cost of gas for the upcoming year through a mechanism outside of base rates. As a result, the gas cost pricing issue is addressed in the PGA rather than in a general rate case. Although gas costs are not included in base rates, gas costs are included in the total revenue calculation to provide an appropriate expense level relative to the revenues that are forecasted for the rate case. This ensures that base rates in the rate case are calculated based on an accurate matching of costs and revenues.

Q. Please explain the Uncollectable Accrual for Gas Sales adjustment.

A. The expense amount for uncollectible accounts is shown on line 8 of *NW Natural/1002, Walker* in summary, and in detail in *NW Natural/1006, Walker*.

The adjustment for Uncollectible Accrual for Gas Sales reflects the difference between the Base Year expense and the Test Year expense derived by taking the three-year historical average of write-offs as a percent of total revenues times Test Year sales revenue.

D. Operations and Maintenance Expense

Q. Please explain the Other O&M Expenses adjustment.

A. The Oregon and System O&M expense excluding Uncollectible Accrual for Gas Sales is set forth in detail for the Base Year in *NW Natural/1007, Walker/1-2,* for the Test Year in *NW Natural/1007, Walker/3-4,* and in summary at line 9 of *NW Natural/1002, Walker*. The Direct Testimony of Tobin Davilla (*NW Natural/900, Davilla*) explains in more detail how NW Natural calculated its Test Year O&M.

Q. Please describe any other adjustments to O&M to determine the overall Test Year expense level.

A. The only change to O&M as presented in Mr. Davilla's testimony was for the addition of an equity flotation cost. When a company issues common equity, some of the cash associated with the issuance is not realized. Instead, a portion of the issuance is provided to third parties for underwriting fees, legal fees, audit fees, and registration fees.

For example, if the Company issues two million shares at $50 per share, the total issuance would be $100 million. However, the Company would actually receive something less, closer to $93 million. The difference between the gross amount raised of $100 million and the amount received by the Company, $93 million, are equity flotation costs. These costs directly reduce the amount of

capital raised for investment. The Direct Testimony of Dr. Villadsen describes equity flotation costs in greater detail.[5] [redacted]

E. Income Taxes

Q. Please explain the adjustments to income taxes.

A. The first two adjustments to income taxes, included on lines 11 and 12 of *NW Natural/1002, Walker,* reflect changes to Federal and State Income Taxes between the Base Year and the Test Year. The adjustments are a function of 1) the impact of statutory income tax rates on the changes to revenues and expenses from the Base Year to the Test Year, and 2) the inclusion of higher EDIT benefits for customers in the test year. The calculations of income tax expense are included in *NW Natural/1008, Walker*. The applicable statutory income tax rates are 21 percent for federal and 7.6 percent for Oregon. The combined statutory rate for both federal and Oregon State income taxes is 27 percent, derived by adding the federal rate to the state rate net of the federal

[5] See *NW Natural/300, Villadsen/73-76.*

benefit of state income tax. A summary of the tax rates used in the case are included in *NW Natural/1009, Walker.*

Q. What are the primary differences between income tax expense calculated using only the combined statutory rate and the income tax expense included in the Base Year and the Test Year?

A. NW Natural has included historical regulatory income tax flow through items related primarily to tax benefits that were originally flowed through to customers prior to 1981. NW Natural has also included the regulatory benefits of EDIT that were established as a result of federal tax reform in 2017.

Q. What are the historical regulatory income tax flow through items?

A. The historical regulatory flow through items relate to accelerated income tax depreciation benefits that occurred prior to 1981 and plant removal costs for income tax. The amortization schedule for the accelerated income tax depreciation benefits previously flowed through to customers was set in Accounting Order UM 1335 on December 8, 2008. The amortization schedule for the income tax cost of the plant removal costs was set in General Rate Case UG 221. The amortization of both of these items is anticipated to conclude in calendar year 2027.

Q. What are the regulatory benefits of EDIT, associated with 2017 federal income tax reform, that are included in income tax expense?

A. In Order No. 19-105, which concluded NW Natural's General Rate Case UG 344 in March of 2019, the Commission concurred with the agreement of all parties that NW Natural would provide three different categories of regulatory EDIT

benefits to customers: Plant, Non-Plant, and Gas Reserves. The full benefit of Non-Plant EDIT was provided to customers in March of 2019 consistent with Order No. 19-105. The Plant benefits continue to be provided to customers subject to the timing limitations of the average rate assumption method (ARAM). The Gas Reserves benefits continue to be provided to customers over a shorter amortization period.

Q. Are the continuing regulatory benefits of Plant and Gas Reserves EDIT included in Test Year income tax expense the same annual dollar amounts documented in Order No. 19-105?

A. No. The annual amortization dollar amounts included in the test year income tax expense have been increased relative to those documented in Order No. 19-105 providing a greater annual benefit to customers. The increased annual amortization amounts, along with additional notes regarding the increases, is included at *NW Natural/1010, Walker.*

F. Taxes Other Than Income Taxes

Q. Please explain the adjustment to Property Taxes.

A. The adjustment to property taxes is included on line 13 of *NW Natural/1002, Walker*. The supporting calculation is disclosed in *NW Natural/1011, Walker.* The Base Year property tax expense equals the Oregon property taxes paid (cash basis) in November of 2019, less amounts capitalized or otherwise excluded. The determination of Test Year property tax expense is performed in two steps. First, an average percentage rate of Oregon property tax expense (cash basis) relative to Oregon net plant is determined using the actual results for

2017, 2018 and 2019. This average rate (1.375 percent) is then applied to net plant for year-end 2019 and 2020 to provide forecasted assessments for 2020 and 2021, respectively. The forecast assessments for the two years were then combined at a ratio of eight months of 2020 and four months of 2021 to arrive at an appropriate tax expense to include for the Test Year. This is because the ratio is based on property tax assessments occurring on a July to June cycle.

Q. Please explain the adjustment to Other Taxes.

A. The adjustment to Other Taxes is shown on line 14 of *NW Natural/1002, Walker*. This adjustment was calculated as follows for the different categories within Other Taxes, the detail of which is shown in *NW Natural/1011, Walker*:

- Franchise fees were derived by applying the effective rate of 2.393 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.
- Payroll taxes were tied to the payroll tax credit that is calculated within the O&M methodology. The credit within O&M is made to extract the payroll taxes associated with payroll for O&M, with the commensurate charge to the payroll tax expense line item under the Other Tax category.
- The regulatory fee was calculated using the current rate of three tenths of 1 percent multiplied by total revenues for both the Base Year and Test Year.

- The Oregon Department of Energy fee is a function of gross revenues. For both the Base Year and Test Year, this fee was calculated by first calculating an average effective rate for the two-year period of 2018 and 2019, and then applying the average effective rate to total operating revenues.
- Other taxes, such as permit and licensing fees, were forecast for the Test Year based on an average of 12-months ended September 2017, 2018, and 2019 amounts. The amounts for the 12-months ended September 30, 2019 were used as a proxy for the Base Year. The system-related other taxes were allocated to Oregon based on a three-factor allocation of 88.59 percent.

G. Depreciation and Amortization

Q. Please explain the adjustment to Depreciation and Amortization.

A. The Depreciation and Amortization adjustment is shown on line 15 of *NW Natural/1002, Walker* and in detail in *NW Natural/1012, Walker.* This adjustment reflects the difference in depreciation expense for the Base Year and Test Year. Depreciation expense was developed by using utility plant as of September 30, 2019, as a base and increasing plant accounts for capital expenditures from October 2019 through the end of the Test Year. Applicable account balances were then decreased for expected retirements, and depreciation rates were applied to generate expense.

Q. Please describe how depreciation rates for each asset category were determined.

A. Depreciation rates, by Federal Energy Regulatory Commission ("FERC") account, used by NW Natural have been at the current level since November 1, 2018, the last time a depreciation study for a revision of rates was approved by the Commission (UM 1808).[6] The new rates were implemented at the same time as rates from our previous rate case, UG 344.

H. Recovery of ASC 715 (previously known as FAS 87) Pension Expense

Q. Please describe the treatment of ASC 715 pension expense in the revenue requirement.

A. ASC 715 expense is forecasted by our actuary, Fidelity. The Company used the latest forecast provided to us prior to filing this rate case for pension expense. We took two-twelfths of the 2020 and ten-twelfths of the 2021 forecasted ASC 715 pension expense to align the forecast with the Test Year. The service and non-service components of ASC 715 are included in revenue requirement.

Q. Is this treatment of pension expense consistent with the outcome of NW Natural's last general rate case?

A. Yes. It was ordered in our last rate case to freeze our pension balancing account and no longer hold the Company's pension expense collected in rates at a constant amount, regardless of our actual pension expense. Under Order No.

[6] *In re Northwest Natural Gas Company's Updated Depreciation Study*, Docket No. UM 1808, Order No. 18-007 (January 5, 2018).

18-419, we were directed to resume a traditional ratemaking approach for pension expense, which is reflected in the Test Year pension expense provided by our actuary.[7]

V. RATE BASE

Q. Describe the calculation of rate base.

A. The components of rate base are shown in *NW Natural/1002, Walker* at lines 18-27 and at *NW Natural/1012, Walker.* Rate base is made up of Utility Plant in Service, net of Accumulated Depreciation, with additions and subtractions for Aid in Advance of Construction, Customer Deposits, Gas Inventory, Leasehold Improvements, Materials and Supplies, and Accumulated Deferred Income Taxes. These components are described in detail below.

Q. How were amounts for Utility Plant in Service calculated?

A. The Company starts with actual plant account balances as of September 30, 2019. We then forecast additions, retirements and transfers for all FERC accounts. Additions to plant reflect customer additions (mains, services, and meters) as well as recurring replacement of capital assets, and also larger planned projects. As future plant balances are then developed, depreciation expense associated with each asset class is able to be calculated, which also provides for a projection of the accumulated depreciation reserve. Consistent with mass-asset accounting, both the gross plant and accumulated depreciation amounts are lowered to reflect forecasted asset retirements. Detail on the

[7] *In the Matter of Northwest Natural Gas Company, Request for a General Rate Revision*, Docket No. UG 344, Order No. 18-419 at 18-19 (October 26, 2018).

various capital projects that are included in the plant projection are described in the Direct Testimonies of Wayne Pipes (*NW Natural/500, Pipes*), Jim Downing (*NW Natural/600, Downing*) and Joe Karney (*NW Natural/400, Karney*).

Q. Please describe the remaining components of rate base.

A. The following components complete the calculation of total rate base:

- **Aid in Advance of Construction –** This reduction to rate base represents the amounts of customer-provided contributions toward construction costs. The Test Year balance is calculated using the trended amounts based on historic balances for the remaining months. A 13-month average of monthly averages is used for the Test Year.
- **Customer Deposits –** This reduction to rate base represents amounts that customers are required to provide to comply with credit requirements under our tariff. The Test Year balance is calculated using trended amounts based on historic balances for the remaining months. A 13-month average of monthly averages is used for the Test Year.
- **Gas Inventory –** This component of rate base includes a 13-month average of stored gas supplies and is composed of two categories. The first, cushion gas, assumes a continuation of the September 30, 2019 balance. The second element, working gas inventory, was derived by starting with October 2019 storage volume and price balances and by then modeling injections and withdrawals on a

monthly basis through the end of the Test Year. Withdrawals reflected the PGA pattern of cycling the gas facilities. Injections of gas volumes were priced at forward prices per closing information at November 13, 2019. Monthly balances of the two categories were projected for the Test Year to calculate the 13-month average included in rate base.

- **Leasehold Improvements –** All leasehold improvements as of September 30, 2019, are related to NW Natural's current headquarters, One Pacific Square. These leasehold improvements will be fully amortized by the time our lease expires in May 2020. However, we are expecting new leasehold improvements associated with our new headquarters at 250 Taylor. These leasehold improvements will be amortized over a 20-year period, consistent with the length of the new lease. Leasehold amortization will begin when the building is complete, prior to the rate effective date of this proceeding. The forecasted balance of the leasehold improvements have been reduced by $3.3 million to reflect the sale of the Truck Lot.[8] The new headquarters leasehold improvements have been included in rate base for the Test Year based on our current projections and using a 13-month average.

[8] *In the Matter of Northwest Natural Gas Company, Application for Authorization to Sell Real Property Commonly Known as Block 24 – Couch's Addition to the City of Portland*, Docket No. UP 400, Order No. 19-312 (September 24, 2019).

- **Materials and Supplies –** The Test Year amount of $14.5 million is derived using trended amounts based on historic balances of actual Material and Supplies inventory. A 13-month average of monthly averages is used for the Test Year.
- **Deferred Income Taxes –** The Test Year amount of deferred income tax is produced by taking the balances for plant and other utility deferred taxes at December 31, 2018, and forecasting forward for incremental amounts. For plant, new capital expenditures were considered as well as previous basis amounts in generating book-tax differences and consequent tax effects. These deferred income taxes are inclusive of EDIT, taking into account the amount of amortization from April 1, 2019 through October 31, 2020. For the other utility federal and state deferred taxes, projections were made for various sub-categories of utility operations.
- **EDIT Rate Base Adjustment** – Due to re-measurement of deferred income taxes following the 2017 federal income tax reform, EDIT amortization is being flowed through to benefit customers. This amortization reduces the EDIT regulatory liability and has an increasing effect on rate base. For specifics on gas reserves EDIT, see section VII. Gas Reserves Excess Deferred Income Taxes, below.

Q. How did you calculate average rate base balances?

A. Average rate base balances were calculated by utilizing monthly forecast

amounts to construct a 13-month average of monthly amounts for all rate base components. The EDIT adjustment reflects one half of the EDIT amortization being provided to customers during the Test Year and the following two years.[9]

Q. Are there other items from UG 344 related to the EDIT Adjustment?

A. Yes. The Company is also proposing to provide to customers the true-up based on filing a rate case prior to the five-year amortization and subsequent reduction in deferred income taxes in the amount of $1.0 million, as a credit in the 2020-2021 PGA year as a temporary adjustment (see *NW Natural/1013, Walker)*[10].

Q. Please describe the treatment in this rate case for the North Mist Expansion Project (Schedule 90), as well as for other cost of service schedules.

A. The North Mist Expansion Project went into service in May 2019. All revenues, expenses and rate base associated with North Mist have been removed from the revenue requirement calculation. In addition, all Schedule 4 (multi-family), Schedule H (Compressed Natural Gas) and gas reserves revenues, expenses and rate base have been removed from the revenue requirement calculation.[11] The ratemaking related to these schedules are self-contained and administered either through a cost of service schedule or the PGA filing.[12]

[9] This is similar to the adjustment made in the Company's last rate case, except that the Company is using a three-year average in this case. *See* UG 344, Order No. 19-105, page 4 (6. Rate Base and Revenue Requirement Impact).

[10] The $1.0 million true-up includes both gas reserves and plant (protected) EDIT. Language regarding the true-up can be found in footnote 8, page 4, of the All-Party Stipulation in Order No. 19-105, issued in UG 344 (Phase 2).

[11] Gas reserves future amortization of EDIT and rate base impact are included in this proceeding.

[12] Gas reserves are included in the weighted average cost of gas, but it has no effect on incremental revenue requirement.

VI. STATE ALLOCATION

Q. Please describe NW Natural's state allocation methodology.

A. NW Natural has used the same methodology since 2000, approved in the Company's filing under Tariff Advice 00-18. Revenues, costs, and rate base are directly assigned, if applicable, and if elements are allocated, several different allocation factors are available to apply as needed. These factors are typically based on customers, volumes, plant, or labor. The allocation factors used in this case are presented in *NW Natural/1014, Walker.*

Q. How did you allocate revenues to Oregon?

A. Gas Sales and Transportation Revenues and Miscellaneous Revenues attributed to Oregon customers are directly assigned to Oregon. Utility property rental income within the Miscellaneous Revenue category is allocated based on a three-factor formula.

Q. How did you allocate the various categories of expense to Oregon?

A. Gas costs correspond precisely with gas costs collected in billing rates over the Test Year, based on forecasted therms sold. The gas costs are the same as the rates currently in effect at the time of filing this rate case. Gas costs, including demand and commodity components, are changed every year in the PGA filing. Because those costs are fully considered in the PGA filing process, gas costs have not been an issue in general rate cases, and costs at the time of the rate case filing have been accepted as appropriate for inclusion in the general rate case revenue requirement.

The allocation of O&M expense is accomplished by allocating common costs, along with a direct assignment of non-common costs to the appropriate jurisdiction. The common costs are considered with respect to specific drivers, such as volumes or customers that have a causative effect on costs. The O&M costs in this rate case were allocated to the appropriate jurisdictions by applying this methodology to the trailing 12-months ended September 30, 2019. The resulting jurisdictional allocation by FERC account was then applied to the forecasted O&M expenses developed for this case. For more information on O&M development, please see Mr. Davilla's testimony *(NW Natural/900, Davilla)*.

Q. Please describe the jurisdictional allocation of Utility Plant in Service, Depreciation Expense, and Accumulated Depreciation.

A. Intangible software is allocated between Oregon and Washington on the basis of the "all customers" allocation factor; other intangible, production, non-storage related transmission, and distribution plant are directly assigned; storage plant including related transmission plant has been allocated to both Oregon and Washington on the basis of firm volume deliveries; compressed natural gas and liquefied natural gas refueling facilities and most general plant are allocated using the three-factor allocation factor; and land and structures are allocated on a mix of direct and other allocation factors.

Q. Please explain the method for allocating other rate base items.

A. The allocation of rate base items differs by category. For aid in advance of construction, the rate base amount was derived specifically for Oregon. Gas inventory, including both cushion and working gas, was forecast on a system

basis and allocated using the firm volumes allocation factor. The Materials and Supplies amount was allocated using the gross distribution plant factor. Finally, deferred income taxes were allocated using an accumulated book depreciation factor since the majority of the deferred income tax balance is related to depreciation book-tax timing differences.

VII. GAS RESERVES EXCESS DEFERRED INCOME TAXES

Q. How is gas reserves rate making incorporated into customer bills?

A. Gas reserves ratemaking is addressed in the Company's PGA. Gas reserves represent a hedge to gas supplies and the cost of the hedge is incorporated into the Company's weighted average cost of gas ("WACOG") each year.

Q. What is NW Natural seeking in regards to gas reserves excess deferred income taxes?

A. The Company is proposing that we include all historical amortization of EDIT related to gas reserves in the gas reserves model that is used to calculate the cost of service and gas reserves rates used in the PGA. This effectively would transfer all historical EDIT amortization to the gas reserves model where the impact to rate base will flow through the gas reserves rate in WACOG. The Company would also like to discuss with the parties to this proceeding the possibility of moving prospective EDIT amortization from base rates to temporary rates due to the few years left of gas reserves amortization.

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Q. What are the impacts of the Company's gas reserves proposals to both the Company and customers?

A. The Company will realize less administrative issues and will begin to align the original intent of gas reserves ratemaking to keep all gas reserves items in the PGA. The Company will not benefit by moving amortized EDIT to the model. Customers will have no overall impact with this proposal, but would see a direct transfer from base rates to WACOG. Customers will benefit by receiving larger EDIT amortization credits due to reducing the amortization period, as discussed above in section E. Income Taxes.

Q. Does this conclude your direct testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBITS 1001 - 1014

December 30, 2019

EXHIBITS 1001 - 1014 – TEST YEAR / REVENUE REQUIREMENTS

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TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1001

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
Comparison of Test Year to Prior Rate Case
($000)

Line No.		UG 344 Order 19-105 (a)	Current Test Year at Present Rates (b)	Change from Last GRC (c)
	Operating Revenues (net of Cost of Gas)			
1	Sale of Gas (net of Cost of Gas)	$358,022	$368,421	$10,399
2	Transportation	16,647	17,285	638
3	Decoupling	0	0	0
4	WARM	0	0	0
5	Miscellaneous Revenues	3,496	3,372	(124)
6	Total Operating Revenues	378,165	389,078	10,913
	Operating Revenue Deductions			
7	Uncollectible Accrual for Gas Sales	738	598	(140)
8	Other Operating & Maintenance Expenses	145,636	188,714	43,078
9	Total Operating & Maintenance Expense	146,374	189,311	42,937
10	Federal Income Tax	17,007	1,566	(15,441)
11	State Excise	6,761	2,856	(3,905)
12	Property Taxes	22,047	23,104	1,057
13	Other Taxes	23,639	24,265	626
14	Depreciation & Amortization	74,407	91,270	16,863
15	Total Operating Revenue Deductions	290,235	332,371	42,136
16	Net Operating Revenues	$87,930	$56,706	($31,224)
	Average Rate Base			
17	Utility Plant in Service	2,769,173	3,189,091	419,918
18	Accumulated Depreciation	(1,212,124)	(1,372,032)	(159,908)
19	Net Utility Plant	1,557,049	1,817,059	260,010
20	Aid in Advance of Construction	(3,476)	(4,294)	(818)
21	Customer Deposits	(3,849)	(2,691)	1,158
22	Gas Inventory	35,373	29,758	(5,615)
23	Leasehold Improvements	0	18,923	18,923
24	Materials & Supplies	10,108	14,474	4,366
25	Accumulated Deferred Income Taxes	(393,414)	(401,534)	(8,120)
26	Total Rate Base	$1,201,791	$1,471,695	$269,904

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1002

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
Increase in Revenue Requirement
($000)

Line No.		Base Year at Present Rates (a)	Adjustments to Base Year (b)	Test Year at Present Rates (c)	Required Increase (d)	Proposed Total (e)
	Operating Revenues					
1	**Sale of Gas**	$604,894	$248	$605,142	$71,447	$676,588
2	**Transportation**	17,715	(430)	17,285	0	17,285
3	**Decoupling**	(4,998)	4,998	0	0	0
4	**WARM**	(4,652)	4,652	0	0	0
5	**Miscellaneous Revenues**	6,283	(2,911)	3,372	0	3,372
6	**Total Operating Revenues**	619,242	6,557	625,799	71,447	697,245
	Operating Revenue Deductions					
7	**Gas Purchased**	237,624	(904)	236,721	0	236,721
8	**Uncollectible Accrual for Gas Sales**	614	(16)	598	70	667
9	**Other Operating & Maintenance Expenses**	156,110	32,603	188,714	0	188,714
10	**Total Operating & Maintenance Expense**	394,348	31,684	426,032	70	426,102
11	**Federal Income Tax**	9,194	(7,628)	1,566	13,477	15,043
12	**State Excise**	6,316	(3,461)	2,856	5,278	8,134
13	**Property Taxes**	20,252	2,851	23,104	0	23,104
14	**Other Taxes**	23,626	639	24,265	1,924	26,189
15	**Depreciation & Amortization**	76,843	14,427	91,270	0	91,270
16	**Total Operating Revenue Deductions**	530,579	38,513	569,092	20,749	589,841
17	**Net Operating Revenues**	$88,663	($31,956)	$56,706	$50,698	$107,404
	Average Rate Base					
18	**Utility Plant in Service**	2,805,289	383,803	3,189,091	0	3,189,091
19	**Accumulated Depreciation**	(1,237,623)	(134,409)	(1,372,032)	0	(1,372,032)
20	**Net Utility Plant**	1,567,665	249,394	1,817,059	0	1,817,059
21	**Aid in Advance of Construction**	(3,939)	(355)	(4,294)	0	(4,294)
22	**Customer Deposits**	(2,894)	203	(2,691)	0	(2,691)
23	**Gas Inventory**	36,104	(6,346)	29,758	0	29,758
24	**Leasehold Improvements**	0	18,923	18,923	0	18,923
25	**Materials & Supplies**	12,780	1,694	14,474	0	14,474
26	**EDIT Adjustment to Rate Base**	15,379	(6,917)	8,462	0	8,462
27	**Accumulated Deferred Income Taxes**	(410,685)	689	(409,996)	0	(409,996)
28	**Total Rate Base**	$1,214,410	$257,285	$1,471,695	$0	$1,471,695
29	**Rate of Return**	7.301%		3.853%		7.298%
30	**Return on Common Equity**	10.01%		3.11%		10.00%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1003

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019 (Actual and Estimate)
Derivation of Forecasted Test Period Revenue

		BASE YEAR			TEST YEAR		
		Actual Therms Sales	Average Class Price Per Therm	Revenues and Margin at present rates	Normalized Therms Sales	Average Class Price Per Therm	Normalized Revenues and Margin
		(a)	(b)	(c)	(d)	(e)	(f)
Revenues							
	Sales Volumes and Revenues						
1	Residential	396,439,476	0.97727	$387,429,535	397,528,668	0.98284	$390,706,141
2	Commercial	248,839,282	0.73777	$183,585,299	242,915,660	0.74070	$179,928,185
3	Industrial Firm	33,046,649	0.56057	$18,525,080	33,933,073	0.55712	$18,904,671
4	Interruptible	45,048,487	0.34083	$15,353,734	46,751,244	0.33374	$15,602,587
5	Total Sales of Gas Revenues	723,373,894		$604,893,648	721,128,645		$605,141,584
	Transportation Volumes and Revenues						
6	Firm	98,782,857	0.09342	$9,228,760	100,588,635	0.08906	$8,957,942
7	Interruptible	192,612,949	0.03504	$6,748,515	194,812,966	0.03371	$6,566,209
8	Special Contracts - Firm	61,874,643	0.02334	$1,444,098	61,714,809	0.02373	$1,464,215
9	Special Contracts - Interruptible	13,875,839	0.02116	$293,563	13,608,775	0.02181	$296,835
10	Total Transportation	367,146,288		$17,714,937	370,725,185		$17,285,201
11	Total Deliveries and Revenues	1,090,520,182		$622,608,584	1,091,853,830		$622,426,784
12	Decoupling Base Period			($4,997,829)			
13	WARM Base Period			($4,651,624)			
14	Total Revenue			$612,959,132			$622,426,784
Gas Costs							
15	Demand Charges			$72,450,200			$72,053,303
16	Commodity Charges			165,174,098			164,667,455
17	Total Cost of Gas			$237,624,298			$236,720,758
18	Total Margin			$375,334,834			$385,706,026

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1004

December 30, 2019

Decoupling Baselines

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANNUAL	
02 - Residential	Base	17.1	15.4	17.1	16.5	17.1	16.5	14.1	14.1	13.6	17.1	16.5	17.1	192.2	
	Heat	87.2	69.7	57.9	37.2	15.1	3.4	0.3	0.2	2.1	24.0	59.5	89.6	446.3	
	Total	104.2	85.1	75.0	53.7	32.2	20.0	14.3	14.3	15.7	41.1	76.0	106.7	638.5	TOTAL
03 - Small Commercial	Base	102.8	92.8	102.8	99.5	102.8	99.5	93.1	93.1	90.1	102.9	99.3	102.7	1,181.5	
	Heat	342.2	272.2	222.9	139.8	53.6	10.8	0.9	0.8	6.6	86.7	229.6	353.1	1,719.2	
	Total	445.0	365.0	325.7	239.3	156.4	110.3	94.0	93.9	96.7	189.6	328.9	455.8	2,900.7	TOTAL
31CFS - Commercial	Base	1,537.6	1,389.2	1,538.7	1,489.2	1,538.6	1,489.5	1,149.4	1,149.3	1,112.3	1,539.5	1,485.2	1,536.4	16,954.9	
	Heat	3,350.7	2,664.7	2,182.1	1,368.9	524.5	105.3	8.8	8.1	64.5	848.9	2,248.1	3,456.9	16,831.7	
	Total	4,888.3	4,054.0	3,720.8	2,858.1	2,063.1	1,594.8	1,158.2	1,157.4	1,176.8	2,388.4	3,733.3	4,993.3	33,786.6	TOTAL

WARM and Decoupling Coefficients

02 - Residential	0.16318
03 - Small Commercial	0.67477
31CFS - Commercial	6.98693

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1005

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Miscellaneous Revenues Detail
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended September 30, 2019 (Proxy for Base)

Line No.		12 Months Ended September 2017 (a)	12 Months Ended September 2018 (b)	12 Months Ended September 2019 (c)	Test Year (d)
1	FORFEITED DISCOUNTS-LATE PAYMENT CHARGE	2,061,492	1,952,953	1,914,530	1,914,530
2	MISC SERV REV- Scheduled CNG Main Rev	-	20,223	18,108	-
3	MISC SERV REV- Unscheduled CNG Main Rev	-	17,096	5,750	-
4	MISC SERVICE REVENUES-AUTOMATED PAYMENT	38,858	34,640	31,275	31,275
5	MISC SERVICE REVENUES-DELINQ RECONN FEE	273,040	271,840	264,270	264,270
6	MISC SERVICE REVENUES-FIELD COLLECTION C	321,595	346,530	325,020	331,048
7	MISC SERVICE REVENUES-GAS DIVERSIONS	9,222	20,842	25,997	25,997
8	MISC SERVICE REVENUES-RECONN CHG-CR-AFTE	2,700	2,870	1,860	2,477
9	MISC SERVICE REVENUES-RECONN CHG-CR-DURI	231,620	257,776	216,424	235,273
10	MISC SERVICE REVENUES-RECONN CHG-SEAS-AF	240	160	80	80
11	MISC SERVICE REVENUES-RECONN CHG-SEAS-DU	12,720	8,910	9,150	10,260
12	MISC SERVICE REVENUES-RETURNED CHECK CHA	101,355	106,545	110,100	110,100
13	MISC SERVICE REVENUES-SEAS RECONN FEE	16,300	13,500	11,100	11,100
14	MISC SERVICE REVENUES-SUMMARY BILL SVCS	12,333	12,080	13,126	12,513
15	OTHER GAS REVENUES-METER RENTALS	178,602	169,005	170,078	172,561
16	OTHER GAS REVENUES-MULTIPLE CALL OUT FEE	38,376	58,651	48,499	48,509
17	OTHER GAS REV-LNG SALES & OTHER MISC REV	10,749	59,326	14,305	28,127
18	OTHER GAS REVENUES-CNG METER RENTALS	-	230	866	-
20	OTHER GAS REVENUES-CURTAILMENT UNAUTH TA	290	-	2,736,628	-
21	RENT FROM GAS PROPERTY-RENT - UTILITY PR	251,746	697,742	168,492	168,492
22	RENT FROM GAS PROP - Schedule H CNG Reve	-	184,961	191,972	-
23	Non-AMR Install/Remove Charge	-	1,376	688	688
24	Non-AMR Read Charge	2,044	3,027	4,514	4,514
	Total Miscellaneous Revenues	**3,563,282**	**4,240,283**	**6,282,831**	**3,371,814**

Note: Excludes Billing Amortization Offsets, WARM deferrals, Washington Misc Revenues

Line 21 Detail		12 Months Ended September 2017	12 Months Ended September 2018	12 Months Ended September 2019	Test Year
RENT FROM GAS PROPERTY-RENT - UTILITY PR	PORTLAND	178,952	78,181	78,000	78,000
RENT FROM GAS PROPERTY-RENT - UTILITY PR	SALEM	55,493	59,702	62,468	62,468
RENT FROM GAS PROPERTY-RENT - UTILITY PR	ASTORIA	42,000	42,000	42,000	42,000
RENT FROM GAS PROPERTY-RENT - UTILITY PR	COOS BAY	7,725	7,725	7,725	7,725
RENT FROM GAS PROPERTY-RENT - UTILITY PR	INCOME STA	-	600,000	-	-
Subtotal System		284,170	787,608	190,193	190,193
Oregon Allocation - 3-factor		88.59%	88.59%	88.59%	88.59%
Total Oregon		251,746	697,742	168,492	168,492

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1006

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Uncollectible Accounts Adjustments
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019 (Actual and Estimate)
($000)

Line No.		12 Months Ended September Amounts 2017 - 2019 Total (a)	2017 Actual (b)	2018 Actual (c)	2019 Actual (d)
	Gas Revenues				
1	**Residential**	1,293,995	454,168	422,700	417,127
2	**Commercial**	643,347	227,808	208,618	206,921
3	**Industrial**	64,496	22,808	21,528	20,160
4	**Interruptible**	59,506	22,240	20,395	16,871
5	**Total**	2,061,343	727,024	673,240	661,079
	Net Write-Offs				
6	**Residential**	1,626	695	431	500
7	**Commercial**	316	95	86	134
8	**Industrial**	45	27	2	16
9	**Interruptible**	20	-	-	20
10	**Total**	2,007	817	519	671
	Write-Off % - 3-Year Average				
11	**Residential**	0.126%	0.153%	0.102%	0.120%
12	**Commercial**	0.049%	0.042%	0.041%	0.065%
13	**Industrial**	0.070%	0.119%	0.011%	0.079%
14	**Interruptible**	0.034%	0.000%	0.000%	0.119%
15	**Weighted Total**	0.097%	0.112%	0.077%	0.101%
	Oregon Normalized Revenues (Test Year)				
16	**Residential**	390,706			
17	**Commercial**	179,928			
18	**Industrial**	18,905			
19	**Interruptible**	15,603			
20	**Total**	605,142			
	Normalized Uncollectible				
21	**Residential**	$491			
22	**Commercial**	88			
23	**Industrial**	13			
24	**Interruptible**	5			
25	**Total Normalized Uncollectible**	$598			
26	**In Base O&M**	$0			
27	**Adjustment (Test Year)**	$598			
28	**Uncollectible rate for normalizaing adjustments**	0.097%			
29	**Uncollectible expense in Base Year (estimated)**	614			

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1007

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
Operations and Maintenance Expense

NWN/Exhibit 1007
Walker/ Page 1

Line No.	FERC Acct.	Description	BASE YEAR System (a)	BASE YEAR Oregon (b)
1		**Natural Gas Storage**		
2		**Underground Storage Expense**		
3		**Operation**		
4	816	**Wells Expense**	$337,263	$301,378
5	818	**Compressor Station Expense**	111,133	99,308
6	819	**Compressor Station Fuel**	0	0
7	820	**Measuring and Regulator Station Expense**	3,012,209	2,693,304
8	821	**Purification Expense**	(422)	(377)
9		**Maintenance**		
10	832	**Wells Expense**	188,490	168,434
11	834	**Compressor Expense**	272,215	243,252
		Total Underground Storage Expense	3,920,887	3,505,299
12		**Other Storage Expense**		
13		**Operation**		
14	840	**Supervision and Engineering**	126,423	112,971
15		**Total Other Storage Expense**	126,423	112,971
16		**Liquified Natural Gas Expense**		
17		**Operation**		
18	844	**Supervision and Engineering**	1,925,748	1,720,848
19	845	**LNG Fuel**	(183,906)	(164,339)
20		**Maintenance**		
21	847	**Supervision and Engineering**	1,112,825	994,421
22		**Total Liquified Natural Gas Expense**	2,854,667	2,550,930
23		**Total Natural Gas Storage**	6,901,977	6,169,201
24		**Transmission Expense**		
25		**Operation**		
26	856	**Mains Expense**	2,551,886	2,383,041
27		**Maintenance**		
28	863	**Maintenance of Mains**	420,819	373,332
29		**Total Transmission Expense**	2,972,705	2,756,373
30		**Distribution Expense**		
31		**Operation**		
32	870	**Supervision and Engineering**	3,547,716	3,243,253
33	874	**Mains and Services Expense**	12,535,183	11,074,667
34	875	**Measuring and Regulator Station Expense - General**	217,774	195,844
35	877	**Measuring and Regulator Station Expense - City Gate**	603,135	549,333
36	878	**Meter and House Regulator Expense**	6,235,312	5,529,629
37	879	**Customer Installation Expense**	10,507,707	9,319,732
38	880	**Other Expense**	1,455,923	1,312,301
39	881	**Rents**	218,783	189,551

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
Operations and Maintenance Expense

NWN/Exhibit 1007
Walker/ Page 2

Line No.	FERC Acct.	Description	BASE YEAR System (a)	BASE YEAR Oregon (b)
40		Maintenance		
41	885	Supervision and Engineering	7,251,323	6,925,299
42	887	Mains	3,040,039	2,950,403
43	889	Measuring and Regulator Station Expense - General	1,694,557	1,538,902
44	891	Measuring and Regulator Station Expense - City Gate	187,479	175,689
45	892	Services	641,747	613,173
46	893	Meters and House Regulators	3,364,061	3,022,304
47	894	Other Equipment	45,524	42,003
48		Total Distribution Expense	51,546,263	46,682,083
49		Customer Accounts Expense		
50		Operation		
51	901	Supervision	1,984,389	1,759,360
52	902	Meter Reading Expenses	983,115	871,733
53	903	Customer Records and Collection Expense	17,235,326	15,294,496
54	904	Uncollectible Accounts (per adjustment calculation)	-	-
55		Total Customer Accounts Expense	20,202,830	17,925,588
56		Customer Service and Informational		
57		Operation		
58	907	Supervision	3,492	3,092
59	908	Customer Assistance Expense	3,513,801	3,172,529
60	909	Customer Information Expense	2,836,295	2,514,659
61	910	Miscellaneous Customer Service Expense	196,564	174,058
62		Total Customer Service and Informational	6,550,152	5,864,339
63		Sales Expense		
64		Operation		
65	911	Supervision	17,029	15,098
66	912	Demonstration and Selling Expense	1,841,171	1,630,385
67	913	Advertising	604,758	536,176
68	916	Miscellaneous Sales Expense	-	-
69		Total Sales Expense	2,462,958	2,181,659
70		Administrative and General Expense		
71		Operation		
72	921	Office Salaries and Expense	61,958,050	54,535,518
73	922	Administrative Expenses Transferred - Credit	(20,513,243)	(18,204,922)
74	924	Property Insurance Premium	3,430,372	3,039,996
75	925	Injuries and Damages	207,592	183,968
76	926	Employee Pensions and Benefits	21,048,928	19,284,253
77	928	Regulatory Commission Expense	-	-
78	930	Miscellaneous General Expense	3,046,897	2,700,161
79	931	Rents	4,676,697	4,144,455
80		Maintenance		
81	935	Maintenance of General Plant	4,282,799	3,847,795
82		Total Administrative and General Expense	78,138,092	69,531,224
83		Total O&M Expense	168,774,976	151,110,467
84	407	Environmental Rider	5,000,000	5,000,000
85		Total O&M Expense including Environmental Rider	173,774,976	156,110,467

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
Operations and Maintenance Expense

NWN/Exhibit 1007
Walker/ Page 3

Line No.	FERC Acct.	Description	TEST YEAR System (a)	TEST YEAR Oregon (b)
1		**Natural Gas Storage**		
2		**Underground Storage Expense**		
3		**Operation**		
4	816	**Wells Expense**	$352,135	$314,668
5	818	**Compressor Station Expense**	169,075	151,086
6	819	**Compressor Station Fuel**	0	0
7	820	**Measuring and Regulator Station Expense**	3,250,755	2,906,595
8	821	**Purification Expense**	(439)	(393)
9		**Maintenance**		
10	832	**Wells Expense**	205,480	183,617
11	834	**Compressor Expense**	1,035,990	925,761
		Total Underground Storage Expense	5,012,996	4,481,334
12		**Other Storage Expense**		
13		**Operation**		
14	840	**Supervision and Engineering**	137,095	122,508
15		**Total Other Storage Expense**	137,095	122,508
16		**Liquified Natural Gas Expense**		
17		**Operation**		
18	844	**Supervision and Engineering**	2,078,449	1,857,302
19	845	**LNG Fuel**	(192,169)	(171,722)
20		**Maintenance**		
21	847	**Supervision and Engineering**	1,367,800	1,222,266
22		**Total Liquified Natural Gas Expense**	3,254,081	2,907,846
23		**Total Natural Gas Storage**	8,404,172	7,511,688
24		**Transmission Expense**		
25		**Operation**		
26	856	**Mains Expense**	2,707,756	2,528,598
27		**Maintenance**		
28	863	**Maintenance of Mains**	445,314	395,063
29		**Total Transmission Expense**	3,153,069	2,923,661
30		**Distribution Expense**		
31		**Operation**		
32	870	**Supervision and Engineering**	3,869,341	3,537,276
33	874	**Mains and Services Expense**	15,654,843	13,830,845
34	875	**Measuring and Regulator Station Expense - General**	204,054	183,506
35	877	**Measuring and Regulator Station Expense - City Gate**	646,322	588,667
36	878	**Meter and House Regulator Expense**	6,808,902	6,038,302
37	879	**Customer Installation Expense**	12,621,915	11,194,913
38	880	**Other Expense**	1,591,346	1,434,365
39	881	**Rents**	228,920	198,334

NW Natural **NWN/Exhibit 1007**
Oregon Jurisdictional Rate Case **Walker/ Page 4**
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
Operations and Maintenance Expense

Line No.	FERC Acct.	Description	TEST YEAR System	TEST YEAR Oregon
			(a)	(b)
40		Maintenance		
41	885	Supervision and Engineering	8,163,639	7,796,597
42	887	Mains	3,296,336	3,199,142
43	889	Measuring and Regulator Station Expense - General	1,834,542	1,666,029
44	891	Measuring and Regulator Station Expense - City Gate	200,471	187,864
45	892	Services	694,470	663,548
46	893	Meters and House Regulators	3,776,600	3,392,934
47	894	Other Equipment	48,568	44,812
48		Total Distribution Expense	59,640,270	53,957,134
49		Customer Accounts Expense		
50		Operation		
51	901	Supervision	2,177,536	1,930,604
52	902	Meter Reading Expenses	1,075,349	953,517
53	903	Customer Records and Collection Expense	23,044,142	20,449,195
54	904	Uncollectible Accounts (calculated separately)	-	-
55		Total Customer Accounts Expense	26,297,027	23,333,316
56		Customer Service and Informational		
57		Operation		
58	907	Supervision	3,621	3,206
59	908	Customer Assistance Expense	3,932,913	3,550,936
60	909	Customer Information Expense	3,223,403	2,857,869
61	910	Miscellaneous Customer Service Expense	213,575	189,122
62		Total Customer Service and Informational	7,373,512	6,601,133
63		Sales Expense		
64		Operation		
65	911	Supervision	19,006	16,851
66	912	Demonstration and Selling Expense	1,969,089	1,743,659
67	913	Advertising	-	-
68	916	Miscellaneous Sales Expense	-	-
69		Total Sales Expense	1,988,095	1,760,509
70		Administrative and General Expense		
71		Operation		
72	921	Office Salaries and Expense	71,224,731	62,692,057
73	922	Administrative Expenses Transferred - Credit	(23,924,955)	(21,232,719)
74	924	Property Insurance Premium	3,832,743	3,396,577
75	925	Injuries and Damages	236,810	209,861
76	926	Employee Pensions and Benefits	24,042,677	22,257,736
77	928	Regulatory Commission Expense	-	-
78	930	Miscellaneous General Expense	3,686,499	3,266,976
79	931	Rents	8,131,117	7,205,738
80		Maintenance		
81	935	Maintenance of General Plant	5,483,930	4,926,928
82		Total Administrative and General Expense	92,713,553	82,723,153
83		Total O&M Expense	199,569,699	178,810,595
84	407	Environmental Rider	5,000,000	5,000,000
85		Total O&M Expense including Environmental Rider	204,569,699	183,810,595

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1008

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Tax Provision
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
($000)

Line No.		BASE YEAR State Taxes (a)	BASE YEAR Federal Taxes (b)	TEST YEAR State Taxes (c)	TEST YEAR Federal Taxes (d)
1	**Operating Revenues**	$619,242	$619,242	$625,799	$625,799
2	**Operating Revenue Deductions**	394,348	394,348	426,032	426,032
3	**Property & Other Taxes**	43,878	43,878	47,368	47,368
4	**Book Depreciation**	76,843	76,843	91,270	91,270
5	**Interest (Rate Base * Cost of Debt)**	27,907	27,907	33,820	33,820
6	**Remove Equity Flotation**			(3,430)	(3,430)
7	**State Tax Deduction**	0	6,316	0	2,856
8	**Subtotal**	76,266	69,949	30,739	27,883
9	**Permanent Differences 1/**	6,844	6,844	6,836	6,836
10	**Taxable Income**	83,110	76,793	37,575	34,719
11	**Tax Rate**	7.60%	21.00%	7.60%	21.00%
12	**Tax Before Credits**	6,316	16,127	2,856	7,291
13	**Tax Credits & EDIT Amortization 2/**	0	(6,933)	0	(5,725)
14	**Total Tax**	$6,316	$9,194	$2,856	$1,566

1/ Primarily amortization of regulatory flow-through items allocated using accumulated depreciation factor
2/ Oregon excess deferred income taxes (EDIT) amortization and Oregon allocated research credit

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1009

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Proforma Cost of Capital and Revenue Sensitive Costs

NWN/Exhibit 1009
Walker/ Pages 1

	Weighted Average Cost of Capital	% of Total Capital	Average Cost	Weighted Cost
1	**Long Term Debt**	50.0%	4.596%	2.298%
2	**Common Stock**	50.0%	10.000%	5.000%
3	**Total**	100.0%		7.298%

Revenue Sensitive Costs

4	**Gas Sales**	96.70%
5	**Transportation**	2.76%
6	**Other**	0.54%
7	**Subtotal**	100.00%
8	**O & M - Uncollectible**	0.10%
9	**Franchise Taxes at**	2.39%
10	**OPUC Fee**	0.30%
11	**State Taxable Income**	97.21%
12	**State Income Tax**	7.39%
13	**Federal Taxable Income**	89.82%
14	**Federal Income Tax**	18.86%
15	**Utility Operating Income**	70.96%
16	**Total Revenue Sensitive Costs**	29.04%
17	**Net-to-gross factor**	140.93%
18	**Rate of Return on Equity**	10.00%
19	**Federal Tax Rate**	21.00%
20	**State Tax Rate**	7.60%
21	**Combined Tax Rate (Test Year)**	27.00%
22	**Franchise Fees**	2.393%
23	**Uncollectible Accounts**	0.097%
24	**Regulatory Fees**	0.300%
25	**Interest Coordination Factor**	2.298%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1010

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Excess Deferred Income Tax (EDIT) Amortization
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
($000)

2017 TCJA EDIT Benefit		Oregon Allocated EDIT Benefit A	EDIT Amortization: March 2019	April 2019 - December 2019	January 2020 - October 2020	November 2020 - October 2021	November 2021 - October 2022	November 2022 - October 2023	Total Amortization	
			(base year)			(test year)				
Plant	B	$ 128,406.8	$ -	$ (1,559.3)	$ (1,727.2)	$ (3,000.0)	$ (3,000.0)	$ (3,000.0)	$ (12,286.4)	*ongoing*
Non-Plant Other	C	3,998.1	(3,998.1)	-	-	-	-	-	(3,998.1)	*complete*
Non-Plant Gas Reserves	D	10,766.8	-	(1,292.0)	(1,550.3)	(2,641.5)	(2,641.5)	(2,641.5)	(10,766.8)	*complete*
		$ 143,171.8	$ (3,998.1)	$ (2,851.2)	$ (3,277.5)	$ (5,641.5)	$ (5,641.5)	$ (5,641.5)	$ (27,051.4)	
			$(6,849.3)			$ (5,641.5)				
			Base Year Total			*Test Year Total*				

A Per Oregon Public Utility Commission (OPUC) Order No. 19-105, Attachment UG 344 - Third Stipulation, Exhibit A

B Plant EDIT, amortized to the benefit of all Oregon customers, subject to the average rate assumption method (ARAM). Increasing amortization from annual $2,399 (approx. $3.4 million with full revenue gross up) per OPUC Order No. 19-105 to annual $3,000 (approx. $4.25 million with full revenue gross up). Increasing amortization in test year to utilize available ARAM amortization.

C Non-Plant Other EDIT, fully amortized in March of 2019 per OPUC Order No. 19-105

D Non-Plant Gas Reserves, amortized to the benefit of Oregon sales customers. Increasing amortization from annual $2,153 (approx. $3.0 million with full revenue gross up) per OPUC Order No. 19-105 to annual $2,641 (approx. $3.68 million with full revenue gross up). Increasing amortization in test year to ensure full balance is amortized at end of October 2023.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1011

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019 (Actual and Estimate)
Forecast of Other Taxes

NWN/Exhibit 1011
Walker/ Page 1

Line No.		Actual 2017	Actual 2018	Actual 2019	Average	Test Year Normalized	Base Year Normalized
		(b)	(c)	(d)	(e)	(f)	(g)
	Property Taxes						
1	Taxes Paid	20,118,416	20,201,655	20,303,165			**20,252,410**
2	Net Plant December 31 of prior year	1,409,613,917	1,460,811,786	1,545,148,819			
3	Effective Rate on Prior Year-End Net Plant	1.427%	1.383%	1.314%	1.375%		
4	Net Plant 12/31/19					1,617,727,995	
5	2020 Payment Forecast (line 4 * line 3e)					22,239,063	
6	Net Plant 12/31/20					1,806,414,755	
7	2021 Payment Forecast (line 6 * line 3e)					24,832,958	
8	Test Period Expense 1/					**23,103,695**	
9	Other Taxes						
10	Franchise					14,975,360	15,049,372
11	Payroll					6,314,767	5,571,360
12	Regulatory Fee					1,877,396	1,886,674
13	Department of Energy					893,093	897,507
14	Other					204,095	220,598
15	Other Taxes Excluding Property Taxes					**24,264,711**	**23,625,510**

16 1/ eight twelfths is taken from year 2020 and four twelfths from 2021

NW Natural/1011
Walker/Page 1

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1012

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Rate Base & Depreciation Expense - Oregon and System
Test Year Twelve Months Ended October 31, 2021
Base Year Twelve Months Ended December 31, 2019
($000)

Line No.	Rate Base	Test Year Oregon (a)	Test Year System (b)	Base Year Oregon (c)	Base Year System (d)
1	Utility Plant in Service	3,189,091	3,603,963	2,805,289	3,175,647
2	Accumulated Depreciation	(1,372,032)	(1,535,958)	(1,237,623)	(1,383,900)
3	Net Utility Plant	1,817,059	2,068,005	1,567,665	1,791,747
4	Aid in Advance of Construction	(4,294)	(5,427)	(3,939)	(4,839)
5	Customer Deposits	(2,691)	(2,975)	(2,894)	(3,199)
6	Gas Inventory (Working and Cushion)	29,758	33,301	36,104	40,403
7	Leasehold Improvemets	18,923	21,361	0	0
8	Materials & Supplies	14,474	16,907	12,780	14,928
9	Accumulated Deferred Income Taxes - Depreciation	(402,798)	(442,765)	(398,757)	(438,490)
10	Accumulated Deferred Income Taxes - Other	(7,198)	(7,963)	(11,928)	(13,071)
11	EDIT Rate Base Adjustment	8,462	9,062	15,379	15,541
12	Total Rate Base	1,471,695	1,689,506	1,214,410	1,403,020

1/ Test Year Depreciation DTL per Proration Methodology

	Depreciation Expense	Test Year Oregon	Test Year System	Base Year Oregon	Base Year System
13	Intangible - Software	8,774	9,896	5,036	5,680
14	Transmission	4,395	4,433	3,441	3,463
15	Distribution	58,888	67,450	54,356	62,260
16	General	12,726	14,297	8,009	8,994
17	Storage and Storage Transmission	6,488	7,159	6,000	6,613
18	Subtotal	91,270	103,235	76,843	87,011
19					
20					
21	Total	91,270	103,235	76,843	87,011

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1013

December 30, 2019

NW Natural
UG 388
EDIT Rate Base True-Up from UG 344

NWN/Exhibit 1013
Walker/ Page 1

Rate Base Adjustment Related to EDIT Amortization - UG 344:[1]

Unprotected EDIT	$	5,437,344	
Protected EDIT	$	8,156,493	=> (3,262,597 * 5)/2 = 8,156,493
Gas Reserves EDIT	$	7,321,400	=> (2,928,560 * 5)/2 = 7,321,400
Gross Down Factor[2]		1.36	
Rate Base Adj.		**15,378,850**	
Revenue Requirement Impact		**1,432,760**	

[1] Amounts can be referenced from Order No. 19-105 section III., part A., numbers 2,3, 4 and in total 6
[2] EDIT figures have already been grossed up for income taxes, therefore they need to be grossed down for EDIT Adjustment

Rate Base Adjustment on 19 months (4/1/2019 - 10/31/2020):

Unprotected EDIT	$	5,437,344	
Protected EDIT[3]	$	2,183,901	=> =(3,262,597*(1+.3387))/2 = 2,183,901
Gas Reserves EDIT[3]	$	1,960,305	=> =(2,928,560*(1+.3387))/2 = 1,960,305
Gross Down Factor[2]		1.36	
Rate Base Adj.		**7,045,257.02**	
Revenue Requirement Impact		**656,478**	

[3] 133.87% represents the amount of volume that is realized for the 19-mo period (100% would represent one year)
[2] EDIT figures have already been grossed up for income taxes, therefore they need to be grossed down for EDIT Adjustment

Effect on Revenue over 19-mo. Period:

UG 344 Revenue Requirement Impact	$1,918,036
19mo. Revenue Requirement Impact	$878,827
Proposed True-Up	**$1,039,209**

NW Natural/1013
Walker/Page 1

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Kyle T. Walker

TEST YEAR / REVENUE REQUIREMENTS
EXHIBIT 1014

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
State Allocation Factors

Line No.	Allocation Factors - Summary	Oregon	Washington
1	**Customers-all**	88.66%	11.34%
2	**Customers-Residential**	88.55%	11.45%
3	**Customers-Commercial**	89.67%	10.33%
4	**Customers-Industrial**	92.17%	7.83%
5	**Customers-The Dalles**	74.78%	25.22%
6	**3-factor**	88.59%	11.41%
7	**firm volumes**	89.36%	10.64%
8	**sales volumes**	89.83%	10.17%
9	**sendout volumes**	91.41%	8.59%
10	**sales/sendout volumes**	90.62%	9.38%
11	**Customers Portland/Vancouver**	84.45%	15.55%
12	**Customers Portland/Vancouver 80%**	87.56%	12.44%
13	**Customers Portland/Vancouver Commercial**	84.66%	15.34%
14	**Payroll**	89.65%	10.35%
15	**Admin Transfer**	88.28%	11.72%
16	**Employee Cost**	89.40%	10.60%
17	**Regulatory**	70.00%	30.00%
18	**Telemetering**	87.76%	12.24%
19	**Direct-Wa**	0.00%	100.00%
20	**Direct-Or**	100.00%	0.00%
21	**Gross plant direct assign**	88.11%	11.89%
22	**Transmission**	98.79%	1.21%
23	**Depreciation**	88.41%	11.59%
24	**Rate Base**	87.11%	12.89%
25	**Distribution**	85.61%	14.39%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Direct Testimony of Robert J. Wyman

CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD EXHIBIT 1100

December 30, 2019

EXHIBIT 1100 – DIRECT TESTIMONY – CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD

Table of Contents

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company ("NW Natural" or the "Company").

A. My name is Robert J. Wyman. My current position is Rates and Regulatory Analyst for NW Natural. I am responsible for economic analysis, short-term load forecasting for residential and commercial customers, cost of service, and rate design. I have supported witnesses and created technical work papers on multiple rate and advice filings with the Oregon and Washington utility commissions.

Q. Please summarize your educational background and business experience.

A. I hold a Bachelor of Science in Economics from the Robert D. Clark Honors College at the University of Oregon and a Master of Arts in Applied Economics from the University of Michigan. Prior to attending graduate school, I was employed by ECONorthwest, an economic consultancy, and worked in the firm's transportation and land use practice area. I was responsible for the technical analysis and consultation for dozens of projects, largely in the Pacific Northwest and Western states. When I joined NW Natural in 2016 as a Rates and Regulatory Analyst, I had a cumulative eight years of professional consulting experience with a focus on public finance and policy, urban economics, and financial feasibility (benefit-cost) analysis.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe the methodology for NW Natural's weather normalized use-per-customer ("UPC") forecast for the Residential and

Commercial rate classes, and present the Long-Run Incremental Cost ("LRIC") study and rate spread proposal. At the end of this testimony, I describe how the rate spread proposal will allocate incremental revenue requirement to each NW Natural Oregon Tariff rate schedule ("RS"), excluding special contract schedules.

Q. Would you please summarize your testimony?

A. My testimony is made up of three distinct sections covering the Company's UPC forecasting methodology, the LRIC study, and the proposed rate spread for this case. First, I will detail the UPC forecasting methodology (referred here as the "UPC Forecast") and explain how it is used in conjunction with the Company's customer forecast to create a short-term weather normalized volume forecast. The volume forecast is used to support the determination of the proposed revenue requirement presented in *NW Natural/1000, Walker.* Second, I will outline NW Natural's LRIC study methodology and will show the incremental cost inputs by capital investment and operations expense categories, on a rate schedule basis. Third, I will show how the Company's incremental revenue requirement is proposed to be spread across rate schedules.

My testimony explains how the UPC Forecast was derived using an autoregressive model specification to interpret the relationship between temperature and natural gas usage to create weather normalized revenues for the Residential and Commercial rate classes for the test year of November 1, 2020 through October 31, 2021 ("Test Year"). I also explain how the Company derived Test Year revenues for the Industrial rate class.

This testimony also explains how the LRIC study is used to assign incremental revenue requirement to rate schedules based on "cost causality" (i.e., how much of the capital investment costs and operations and maintenance ("O&M") expenses required to serve the Company's customers can be attributable to each rate schedule). The LRIC study filed with this case indicates that the Large Commercial and Industrial rate schedules are paying more than their determined cost of service under present rates, which is consistent with past rate case results. The study also indicates that the Residential and Small Commercial rate schedules are paying less than their determined cost of service, a result that is consistent with the results from the Company's last rate case, UG 344. Notably, as described later in my testimony, I find that the Small Commercial rate schedule is underpaying its cost of service by the greatest ratio of all schedules (i.e., it has the lowest relative margin cost parity) at the Company's current rates.

Finally, I describe the methodology by which NW Natural proposes to spread the incremental revenue requirement. The rate spread section also shows how the proposed spread of incremental revenue requirement will impact rate schedules and customers' average bills. Based on insights from the results of the LRIC study, the Company proposes a three-step process to administer the rate spread. First, the Company proposes to spread the incremental revenue requirement on an equal percent of margin basis to all rate schedules. Next, the Company proposes to increase revenue generated from the RS 3 Commercial rate schedule through a $5.00 increase to the base monthly charge adjusting it

from $15.00 to $20.00 per month. Lastly, the Company proposes to reduce the revenue spread allocated to the RS 3 Industrial rate schedule and RS 31 and RS 32 rate classes in the first step by the equivalent amount generated from the $5.00 base charge increase to rate schedule RS 3 Commercial, and spread this to these schedules on an equal percent of margin basis.

As a result of this proposal, the RS 3 Industrial rate schedule and the RS 31 and 32 rate classes will receive an increase that is less than what would otherwise be spread to all schedules on an equal percent of margin basis at current rates, and the RS 3 Commercial rate schedule will receive a greater increase. The RS 2 Residential and RS 27 Residential Dry-Out rate schedules will receive an equal percent of margin increase at current rates based on the full incremental revenue requirement.

Q. Are you introducing any exhibits with your testimony?

A. Yes. I am sponsoring Exhibits 1101, 1102, and 1103. *NW Natural/1101, Wyman* is a summary of the Company's long-run incremental costs and revenue requirement allocation by rate schedule. *NW Natural/1102, Wyman* and *NW Natural/1103, Wyman* indicate the total revenue increases by rate schedule, as well as the bill impact and rate increase by rate schedule.

II. TEST YEAR CUSTOMER AND VOLUME FORECAST

Q. What is the Test Year customer and volume forecast?

A. The Test Year customers and volumes are forecasted separately. The volume forecast is a short-term load forecast that is built using the following steps:

1. Weather data are collected to produce a 25-year historic benchmark for normal weather.
2. Actual weather data are paired with actual load data on a billing cycle and rate schedule basis. The paired data are used in a statistical regression analysis, as described below, to produce weather normalized UPCs for the Residential and Commercial rate classes for the Test Year period (i.e., the UPC Forecast).
3. For these rate classes, the UPC Forecast is multiplied by the customer forecast to derive the weather normalized volume forecast.

The weather normalized volume forecast is used to calculate revenues at existing rates in the proposed revenue requirement presented in *NW Natural/1003, Walker.* In addition to being a revenue requirement input, the UPC Forecast is also used to create the design day load factor, which is an important input to the LRIC study.

Q. Please describe the customer forecast methodology.

A. For Residential and Commercial rate classes, Test Year forecasted customer counts were developed by adding new customers to the existing customer base. Customer attrition, or loss of customers, was deducted from the existing customer base. New customers are based on historical regional growth trends, housing starts forecasts and other economic factors. The customer growth forecast used for purposes of developing additional volumes and revenues is the same forecast used for producing capital expenditures that go into gross plant in rate base.

Q. Please describe the UPC Forecast methodology.

A. The purpose of the UPC Forecast is to estimate weather normalized usage. The forecast relies on the relationship between temperature (measured in heating degree days, or "HDDs") and load by rate schedule and time of year (measured in daily increments). The UPC Forecast was developed as described below:

- I collected daily high and low temperature data from weather stations identified in Rule 24, Sheet RR-24.1, of NW Natural's Oregon Tariff for the period June 1, 1994 through May 31, 2019 for two purposes. The first was to have recent actual weather data to statistically analyze against recent actual usage, and the second was to produce a 25-year historic benchmark for normal weather.
- I matched actual therm usage and actual HDDs for the period of September 2013 through May 2019. As part of this process, I used load data on a billing cycle basis, and matched actual weather observations with the days between cycle meter read dates. I then created a weighting of the number of days, customers, and HDDs associated with each billing cycle for each schedule in the Residential and Commercial customer classes. I used a 59-degree Fahrenheit base for residential schedules and a 58-degree Fahrenheit base for Commercial schedules as our temperature set points to convert temperature observations to HDDs.
- After aggregating therm usage and weights on a monthly basis, I used these aggregates to regress therm use per premise per day against HDDs per day,

using a type of linear regression specification. The result of the regression was a set of three usage coefficients for each customer class and rate schedule in the analysis: One coefficient each for heating usage, base usage, and a summer base usage adjustment.

- Normal daily HDD amounts were developed using daily HDD values derived from the benchmark 25-year weather data set.
- Finally, the estimated coefficients were used to build the weather normalized UPC Forecast on a daily basis using the 25-year HDD benchmark.

Q. Please describe the specification for the regression model.

A. I used an Autoregressive Integrated Moving Average ("ARIMA") time series model, with one lagged disturbance, to estimate UPC per day as a function of HDD per day. An ARIMA model is a type of time series model specification for data observations that occur across equal intervals of time. The model is used to help forecast future values in the series by each value against a chosen number of lagged values (the autoregressive term); lags of moving averages may be chosen as well. The UPC Forecast model was estimated using one lagged disturbance in the autoregressive time variable (e.g., one month). I chose this model specification because it produced superior test statistics (Durbin-Watson, and mean squared error and r-squared value) relative to other ARIMA specifications for this case. Additionally, I find that the ARIMA model specification performs slightly better than a simple linear regression, as used in UG 344, when compared on mean squared error and r-squared value metrics.

Q. How are the results of the ARIMA model interpreted?

A. The intercept value from the regression represents customer base load use, and was further specified for differences in summer and winter base use. The slope is multiplied by the daily normal HDD value to calculate the heating load for each day. The sum of the base load and heat load provides a daily UPC value, and the aggregation of the 365 daily results produces monthly and annual UPCs. This process was repeated for every rate schedule in the Residential and Commercial customer classes.

Q. Were any post-estimation adjustments made to the UPC Forecast?

A. Yes. The calculated UPCs for each customer class were reduced by the estimated demand side management ("DSM") savings forecast from the Company's current Integrated Resource Plan ("IRP") to project the final Test Year UPCs.

Q. What is the purpose of this adjustment?

A. While we recognize that the UPC ARIMA regression model does account for declining usage due to energy efficiency measures over time, the model cannot fully capture that decline at the Test Year because it cannot anticipate future programmatic energy efficiency projects that have been planned and budgeted. It is appropriate to incorporate the assumed DSM savings in the UPC model so that our weather normalized UPC load aligns with DSM assumptions that are built into the long-term IRP load forecast. The UPC model converts the annual DSM savings to assumed daily savings to match the daily UPC ARIMA estimated

load. We have used this methodology in the past, most recently to build our weather normalized UPC load in our last Oregon general rate case.

Q. Please summarize the results of the UPC Forecast.

A. After applying the DSM adjustment, the estimated ARIMA coefficients produced a Test Year UPC of 638.5 therms for the Residential class and 3,829.0 therms for the Commercial class. The UPC for the Commercial class was further defined for each of the rate schedules within the class, to allow for the calculation of revenues using rates from each class. A ratio was used to equate the aggregation of the rate schedule UPCs to the overall Commercial class UPC.

Q. How are the customer and UPC forecasts used to create Test Year volumes that generate revenues at existing rates for the proposed revenue requirement?

A. Residential and Commercial class Test Year monthly volumes were calculated by multiplying the weather normalized forecasted UPCs for each rate schedule by the forecasted customer counts for each month.

Q. How are Test Year volumes built for the Industrial class?

A. For the Industrial class, the Test Year forecast of volumes was developed using a customer-specific methodology ("Industrial Forecast"). The customer-specific forecast begins with a recent 12-month period of actual usage and customer counts and is then adjusted for changes in projected load usage, and customer additions, losses, and rate schedule changes.

Q. Where are the Test Year volumes used to build the revenues for the revenue requirement?

A. The derivation of Test Year revenues from the customer and volume forecasts is presented in detail by customer class as *NW Natural/1000, Walker* and is shown in summary at *NW Natural/1002*, *Walker,* on lines 1 and 2.

Q. Were there any changes in the UPC Forecast methodology from NW Natural's latest rate case, UG 344?

A. Yes. I used consistent data collection, actual weather, load data alignment, and weighting methods, but began using the ARIMA statistical model specification used to produce the final UPC Forecast regression coefficients beginning with the 2019-20 Purchased Gas Adjustment ("PGA") and continuing with this rate case filing. For our last rate case, UG 344, the Company employed a simple linear regression to fit the relationship between therm load and HDDs using the same 59- and 58- degree Fahrenheit set points. For this rate case, I have used an ARIMA time series model specification for the reasons described above. The choice of model specification, in this case ARIMA, is one of the final steps in the UPC Forecast methodology; each step prior is consistent with UG 344. Further, I updated the weather and usage inputs to reflect more recent data points so that the actual data observations can be aligned as closely as possible to the Test Year forecast period.

Q. What are the Company's other uses for the UPC Forecast?

A. The Company used the UPC Forecast to develop the design day load factor for the LRIC study, as discussed below. The UPC Forecast is also used to estimate

throughput volumes for the annual PGA. The methodology for calculating the UPC Forecast is consistent between the PGAs and rate case filings. Certain inputs and outputs of the UPC Forecast are also used for calculating the WARM and Decoupling rate mechanism adjustments, as described in Mr. Walker's testimony *NW Natural1000, Walker*.

III. LONG-RUN INCREMENTAL COST (LRIC) STUDY

A. LRIC Study Purpose, Principles, and Inputs

Q. What purpose does a cost of service study serve?

A. The overall objective of a cost of service study, including an LRIC study, is to apportion the incremental revenue requirement to rate schedules based on each schedule's specific cost to serve (whether it is embedded or long run cost). By understanding the long run incremental costs by rate schedule, the LRIC study methodology is able to apportion a utility's distribution costs or revenue requirement based on cost causation. As a general rule, cost causation is an influential factor in parties' discussions on how to allocate costs to specific rate schedules for rate spread; therefore, it serves the utility well to understand the engineering and economic cost differences between customer classes and/or rate schedules.

Q. Has the Public Utility Commission of Oregon ("Commission") stated its preference for cost of service study methodology?

A. Yes. The Commission, in Order No. 85-832 (docket No. UG 14), directed that an LRIC study is "preferable" to an embedded cost approach because the methodology for developing long-run incremental costs better estimates the point

that a *Pareto Optimal* outcome for price setting and spreading rates is achieved.[1] In other words, the LRIC study methodology best estimates a situation where customers, either individually or as part of a rate class, are paying the costs associated with their service.

Q. Please describe the economic principles that underlie an LRIC study.

A. Economic principles for price setting say that price ("P") must equal marginal cost(s) ("MC") in order for customers to maximize consumer surplus and for firms to earn their fair rate of return (i.e., P = MC). In the long-run all inputs for MC are changing and in the short-run, one or more inputs are non-variable. However, in practice, the LRIC is neither a short nor long-run cost. Incremental costs coincide with the Company's Test Year so that system costs are evaluated at a reasonable future point in time and are also consistent with the Company's Test Year revenue requirement.

LRIC studies and cost of service studies in general allocate costs based on cost causation to identify how the incremental revenue requirement should be allocated to rate schedules in order to move closer to *Pareto Optimality*. The reasonable allocation of costs is determined by understanding the specific long-run incremental investments and customer characteristics associated with each class and rate schedule in order to equitably allocate costs. LRIC deviates from embedded cost studies through the evaluation of future incremental costs, while

[1] *Pareto Optimality* is a state of allocation equilibrium where participants cannot be made collectively or individually better off given a change in cost or price, without also making other participants worse off.

embedded cost studies evaluate only historical costs. In general, an embedded cost study will generate the average historical cost per customer but it does not help to achieve the state where P = MC, because it does not anticipate the cost of adding new customers based on short- to long-term marginal costs, but rather assumes historical costs for ongoing customer additions. Therefore, a disparity would exist between the welfare of the consumer and the firm (where a firm is earning less than a reasonable return and consumer surplus is too large, or vice versa).

As noted above, cost causation in general is the guiding principle for allocating costs; however, theoretical economists have derived the principles of "subsidy-free prices" and "stand-alone costs" ("SAC") as a means for achieving *Pareto Optimality*. Subsidy-free pricing is achieved when the price of a good or service exceeds its MC but is less than the SAC. Prices set at a subsidy-free level provide customers an economy of scale given that all customers are paying a portion of the fixed system costs (P > MC) and an equitable cost sharing for fixed costs. While the sharing of fixed system costs is the most equitable outcome for customers, local distribution companies ("LDC") must be aware that price does not exceed the SAC to serve customers because customers would in theory be unwilling to take service if prices exceed SAC. The concept of SAC says that if price exceeds the SAC of a good or service, customers will not be willing to pay that price, and customers will seek out an alternative good or service instead. Therefore, the level of price is key to ensuring customer equity

is achieved between rate classes/schedules with common utility costs fairly distributed.

Q. Please describe the specific purpose of the LRIC study methodology presented in this testimony.

A. The LRIC study methodology presented in this testimony is an engineering economics exercise that evaluates the Company's future incremental capital and operations costs by rate schedule, along with the capital carrying costs to derive the total cost to serve customers.

The LRIC study uses estimations of the incremental capital investment and O&M expense per customer by rate schedule, which were developed through various studies of customer load profiles, main extensions and services, storage, meter sets, and account services (meter reading, billing, etc.) costs. The incremental capital investment is also based upon forecasted therm deliveries and customers by rate schedule for the Test Year, which were developed using the UPC Forecast methodology described earlier. The incremental capital costs and O&M expenses are used as a basis for allocating the long run incremental system cost to each rate schedule. The Test Year proposed cost allocation to each schedule is based on this incremental system cost, and is further informed by the classification of the proposed Test Year revenue requirement into the following five buckets of costs: Commodity, meter reading and billing, meters and services, system core, and gas storage. The process of classifying the revenue requirement into these buckets is called functionalization; how specifically the revenue requirement is functionalized is

based on the allocation of Test Year O&M costs and plant investment to each cost bucket.

The functionalized revenue requirement is then allocated to each rate schedule based on each category of incremental costs estimated for the LRIC study. Finally, the LRIC study calculates the relative ratio of margin revenue to incremental costs for each rate schedule at present rates. This ratio is used to understand cross-subsidies between rate schedules at current rates and is used by the Company to inform its rate spread proposal.

Q. Please describe the incremental cost categories estimated for this LRIC study.

A. The incremental cost categories evaluated in the LRIC study include capital investments and O&M expenses. The individual capital investments include:

- Main extensions
- System core mains
- System reinforcements
- Service lines
- Meter sets & regulators
- Storage

The incremental categories of O&M expense include:

- Gas Scheduling
- Gas Planning

- Account services (consisting of):
  - Meter reading
  - Billing
  - Account management (e.g., costs associated with the call center, service technicians, and major account service and customer field services teams)
  - Payment processing
  - Treasury (e.g., collections)

Q. Please discuss what is considered incremental and non-incremental for purposes of the LRIC study.

A. The term "incremental" refers to the cost categories that are attributable to the addition of a single new customer. As noted above, the LRIC study cost categories are capital investments and O&M expenses. An example of incremental capital cost versus a non-incremental capital cost would be a meter set and regulator, versus service center buildings or field vehicles. The reason a meter set is an incremental cost is because each customer requires a meter in order to be served. Service center buildings and field vehicles do not fall into the incremental cost category because they serve large areas of service territory and are not a direct function of the number of customers or customer growth. Further, O&M expenses can be incremental and non-incremental. For every new customer, there are incremental costs associated with generating monthly bills and processing payments. Each call center employee serves many customers; however, one incremental customer does not equate to the onboarding of a fraction of a full-time equivalent ("FTE") position. After some amount of

incremental customer growth, however, a decision must be made whether to onboard an additional FTE position. The LRIC study does apportion O&M costs on a per customer basis as explained in testimony below.

B. NW Natural's LRIC Study Inputs and Methodology

Q. Have you prepared an LRIC study for this proceeding?

A. Yes. *NW Natural/1101, Wyman* presents NW Natural's LRIC study. The exhibit shows the indicated LRIC summary results and the LRIC-indicated spread of NW Natural's proposed revenue requirement by rate schedule. NW Natural's LRIC study methodology is similar to the methodology used in the Company's last rate case filing, UG 344, with one exception. The Company has updated its design day load factor methodology, as described below, to be consistent with its UPC Forecast, which is also used in the development of the Company's annual PGA and the revenue requirement presented in *NW Natural/1000, Walker*.

The individual LRIC study inputs and methodology discussion sections are as follows:

1. Design Day Load Factor
2. Incremental Plant Investment
3. Incremental Operations and Maintenance Expense
4. LRIC Study Insights and Outcomes

1. Design Day Load Factor

Q. What is the design day load factor?

A. The load factor is a ratio measure of each rate schedule's contribution to the design day peak load. For purposes of this LRIC study, I consider design day

load on an Oregon basis and attributable to Oregon customers only. While load could potentially peak for other reasons on other systems, load peaks for NW Natural is a matter of space heating requirements, and so is related to weather.

Q. How is the design day load factor value interpreted?

A. The load factor is the ratio of normalized average usage to the estimated design day peak usage. A low load factor ratio indicates that a rate schedule has high peaking load relative to normalized average usage (i.e., it indicates the rate schedule has high weather sensitivity as load peaks during cold weather events). A high load factor indicates less weather sensitivity and more predicable base load usage throughout the year. Residential rate schedules, which use gas most significantly for heating purposes, are expected to have lower load factors relative to Industrial rate schedules that are more heavily comprised of processing load customers.

Q. How does the LRIC study use the design day load factor?

A. The LRIC study uses the design day load factor to allocate incremental storage investment to each rate schedule. It is also used to apportion incremental system reinforcement capital investment to the firm rate schedules. Rate schedules with lower load factor ratios require more excess storage and capacity investment to meet design day load relative to higher load factor schedules, assuming equivalent annual load.

Q. How is the design day load factor calculated for this LRIC study?

A. The design day load factor for each rate schedule was estimated using the UPC Forecast for the Residential and Commercial customer classes, and the

Company's Industrial Forecast for the remaining schedules.

The UPC Forecast produced a base and heat load coefficient for each rate schedule in the Residential and Commercial customer classes. The 25-year HDD average was multiplied by the heating coefficient, and by adding base load usage, I calculated the normalized load numerator for the load factor ratio. As part of its resource planning processes, the Company has estimated an 11-degree Fahrenheit design day temperature which I converted to HDDs, and using the UPC Forecast derived heating coefficient, I estimated the design day load factor denominator.[2]

Large Commercial and Industrial schedules in rate classes RS 31 and RS 32 are not included in the UPC Forecast, as well as schedule RS 3 Industrial. Customers in these classes were not included in the UPC Forecast because the Company maintains a separate customer-specific Industrial Forecast that is routinely updated by its subject matter experts. The Industrial Forecast Test Year volumes are the basis for the normalized load numerator for the load factor ratio. Next, I queried three years of historic load data plus the Test Year forecast by month and by day (where available) for all customers in these rate classes. I calculated a maximum daily delivered volume ("MDDV") for each customer by year, and aggregated these volumes by rate schedule. Finally, I took the median

[2] For NW Natural's 2018 IRP, the Company used a probabilistic planning standard to forecast peak load as function several key drivers. This planning standard sets a daily resource capacity requirement such that the company would be 99% certain it would be capable of meeting load going into any winter. Using this methodology, the Company has calculated an average system weighted temperature around this planning standard of roughly 11-degrees Fahrenheit.

aggregate MDDV value from two historic years (2018-2019) plus the forecasted Test Year. This value is the basis for the design day load factor denominator.

Q. What were the results of the design day load factor analysis?

A. For the purposes of this LRIC study, I estimate an overall load factor for Oregon customers of 27.8%, with a firm load factor of 24.0%. The RS 2 Residential load factor is about 20.9%, meaning normal load for this schedule is about one-fifth of its design day load. The RS 3 Commercial load factor is about 22.7%, while the larger RS 31 and RS 32 Commercial and Industrial rate classes have estimated load factors ranging from 24.4% to 59.7%.

2. Incremental Plant Investment

Q. Please outline the specific components of incremental plant investment evaluated in your study.

A. The plant cost categories evaluated in this study include:

a) Distribution main, which is required for various purposes over time as the system grows, including: mains to serve new customers, and mains installed for safety and reliability purposes.

b) System reinforcements, which are mains related to capacity increases.

c) System core mains, which are the balance of mains not attributable to categories (a) and (b) above. System core mains, for the purpose of this LRIC study, constitute the distribution pipeline that transport gas from the interstate pipeline to delivery points on the Company's system (e.g., gate stations) and interconnect with smaller diameter mains used to serve neighborhoods.

d) Service lines, which includes costs associated with the piping and trenching from meter set to distribution main, and distribution main tie-in.

e) Meter set and regulator assemblies, which includes the cost of the meter and regulator, as well as the pipe fittings, bracket assemblies labor, and shop time required for assembly.

f) Storage, which includes the incremental costs associated with underground storage.

Q. What were the inputs used to calculate the distribution main costs?

A. The main extension costs were evaluated using five calendar years (2014 – 2018) of historical accounting data of Oregon main extension job orders. The accounting data include the total cost (excluding construction overhead) and footage installed per job, pipe size and material, and are delineated by service type (conversion vs new construction), and market segment. The market segments analyzed are as follow:

- Residential-single family new construction ("Residential New")
- Residential-single family conversion ("Residential Conversion")
- Commercial / Industrial ("Com/Ind")

In addition to the five years of job orders data, I used a main extension forecast for 2019 that is produced by the Company's Business Analytics team. This forecast uses three categories of extensions: Commercial mains, Residential mains, and system expansion main extensions. The latter category is overwhelmingly made up of new construction residential connections.

Neither the main extension jobs order data nor the forecast include a rate schedule breakout. We can delineate by market segment based on several factors, including: Location of the main extension, pipe size, and the type of customers most likely to take service on the extension.

Q. How were the distribution mains costs calculated?

A. I used the main extension jobs order data to calculate the 5-year median cost per foot and median main length installed by market segment. Additionally, I used the same dataset to calculate the 5-year median cost per foot and median main length installed by pipe size (less than 4 inches, or greater than or equal to 4 inches) and material (polyethylene or wrapped steel). The accounting data used in the calculation of the average cost of main extension are in nominal dollars. Therefore, for purposes of the Test Year, the nominal main extension costs per foot were escalated to forecasted Test Year values using the Handy Whitman Index of Public Utility Construction Cost ("Handy Whitman Index") as published in the IHS Markit Power Planner for the Second Quarter 2019.[3] The escalated values were used to create the median Test Year cost per foot input for the LRIC study.

Q. How did you assign the median distribution main extension cost for each market segment and pipe size to a rate schedule?

A. I used a weighting methodology that employs three inputs: (1) the Company's main extension forecast; (2) the job orders data by market segment; and (3) the

[3] Mains costs were inflated to Test Year values using the IHS Markit Power Planner Table A20: *Cost Trends of Gas Utility Construction: Pacific Region*. Mains; plastic value. Second Quarter, 2019.

job orders data by pipe size. For every rate schedule, I used a 50-50 weight ("Segment Weight") to assign costs based on the forecast and the 5-year actual median cost per foot by market segment. For the commercial and industrial schedules, I further assigned costs by pipe size and type. I used pipe sizes and type for the large customer schedules as a method for further weighting main costs across schedules with wide variations in customer sizes, loads, and physical location off-main.

I directly assigned the Residential Conversion market segment to RS 2 Residential. For RS 27 Dry-Out, I assigned the Residential New market segment as well as the system mains expansion segment costs.

The Com/Ind market segment was assigned to both RS 3 Commercial and RS 3 Industrial customers. I used Company Geographic Information System ("GIS") data to query the pipe size of the main that customers in the RS 3 rate class have been connected to in the past 10 years. Using this GIS data, I calculated the ratio of customers connected to mains of less than 4 inches and greater than or equal to 4 inches and used this ratio to assign costs once the Segment Weight had been applied.

RS 3 rate class customers were assigned mains costs using the same method because the sizing and overall characteristics of an RS 3 Industrial customer are the same as those of an RS 3 Commercial customer.

For the RS 31 and RS 32 rate classes, I applied the same Com/Ind Segment Weight as used for the RS 3 rate class. Mains costs were further delineated by rate schedule using the 10-year GIS pipe size data. For these

larger schedules, I categorized main connections by both pipe size and material due to the large variations in mains sizes and types connected to these customers. A 10-year period was used to increase sample size due to the low numbers of customers connected to these large schedules in any given year.

Q. How did you assign the median distribution main extension length for each market segment and pipe size to a rate schedule?

A. I used a similar methodology as described above to calculate the median main extension length (in feet) for each schedule. For RS 2 Residential and RS 27 Dry-Out, I used the Company's main extension and customers forecasts. For the Commercial and Industrial schedules, I used 5-year median installed feet of mains by pipe size and material type to estimate main extension lengths for three categories: Small Com/Ind, Large Commercial, and Large Com/Ind.

Q. How were the system core mains costs calculated?

A. First, I estimated the feet of Oregon mains on the Company's system not attributable to main extensions serving customers. I used the feet of mains greater than or equal to four inches reported in the Company's FERC Distribution Report as a basis for total mains footage.[4] Next, I used the 10-year GIS pipe size data to estimate what percentage of customers in the Commercial and Industrial rate classes are connected to distribution mains of equal or greater than 4 inches. Using the distribution main extension median installed feet described

[4] The FERC Distribution Report is created by the NW Natural Engineering Department; it is used by the Plant Accounting team to validate that the feet of mains reported in the Company's asset management accounting databases is correct.

above, I calculated the feet attributable to these customer classes. The remaining unattributable feet were classified as system core mains. I used a median cost of installed mains, weighted by pipe material, to get an estimated cost per foot. I multiplied the unattributable system core main footage by the weighted cost, and grossed it up by the investment carrying charge cost for mains to get the total system core mains costs.

Q. How did you assign the system core mains costs to each rate schedule?

A. I used an average and excess method for distributing the system core mains costs to the rate schedules based on two allocations: total throughput and firm demand. The total throughput allocator is based on the system design day load factor (e.g., the "average") and distributes costs across all schedules. The firm demand allocator is based on one minus the system design day load factor (i.e., the "excess") and distributes costs across only firm service schedules.

Q. How are service line installation costs and average footage installed by rate schedule determined?

A. The calculation of average services cost per foot and the average footage installed was derived using 10 years of historical accounting data of Oregon services job orders data (2009 – 2018) for customer service installations by market segment. These jobs order data are very similar to that of the mains order data; the orders include the total cost (excluding construction overhead) and footage installed per job, and pipe size and material. The important distinction is that the services orders are associated with customers on specific rate schedules.

Service costs for RS 2 Residential, RS 3 Commercial, and RS 27 Dry-Out were calculated using a five-year median of job costs per foot. Due to the small job sample size for the remaining Commercial and Industrial schedules, I used the 10-year historic data to calculate a weighted median cost per foot. Using a GIS data query for services connection footage by rate schedule over the past 10 years, I was able to estimate a service cost by customer per rate schedule by multiplying the median footage by median cost per foot. I used the Handy Whitman Index to inflate nominal dollars to Test Year values.

Q. Please outline how costs were calculated for meters and regulators.

A. A customer query was run out of NW Natural's customer information system ("CIS") that included each actively billed customer's meter set model number and delivery pressure. A summary of the CIS information provided the counts of meter set models by rate schedule. NW Natural's Engineering Department maintains an engineering cost memo that provides the assembly and capital cost for each assembled meter set (by meter model number) with regulator. A weighted-average cost was calculated using the costs from the engineering cost memo and meter counts by rate schedule to derive the capital investment cost by rate schedule included in the incremental investments and also escalated to the Test Year using the Handy Whitman Index.

Q. What is the source of the incremental storage cost included in the study?

A. In 2015, the Company recalled and transferred Mist underground storage capacity at a rate of 30,000 Dth/day. At the time, the Company calculated a gross Oregon recall investment cost. I used the recall investment cost per therm

as a proxy for incremental storage costs since this represents a recent market cost of procuring the Company's underground storage capacity. I escalated the investment cost to the Test Year using the Handy Whitman Index.

Q. How is the incremental storage cost applied to each rate schedule?

A. The incremental storage cost is applied to sales customers only. The calculated incremental storage cost of $0.01636 per therm is applied to each sales rate schedule by dividing this value by each rate schedule's load factor to account for each schedule's load requirements and cost to serve. This calculation creates a rate that I multiplied by the customer average annual usage for each sales rate schedule to derive the incremental investment for underground storage.

Q. What are the methods used to calculate the incremental system capacity and commodity main investment?

A. Incremental system reinforcement costs were calculated using five years of system reinforcement capital spend (2015 – 2019), with the 2019 value being forecasted from August through the remainder of the year. For each year, the system reinforcement capital investment was multiplied by an allocation factor based on Oregon volumes to calculate the Oregon-only system reinforcement expenditures.

Then, I calculated an incremental investment cost per therm based on the incremental customers and estimated design day load added to the system over the same period. Using the load factor, I weighted each schedule's contribution to the design day load and apportioned the incremental investment thusly. The Oregon-only amount of system reinforcement costs were divided by firm sales

and transportation volumes; incremental investment was not apportioned to interruptible rate schedules.

Q. How are incremental capital costs applied in the LRIC study for rate making and rate allocation purposes?

A. Incremental capital investments are implemented in the LRIC study by applying the "investment carrying charge" to calculate the incremental revenue requirement associated with each category of investment by rate schedule. The investment carrying charge includes cost of capital (debt and equity), taxes, and depreciation to calculate the carrying percentage assigned to each category of investment. The investment carrying charge percentage is multiplied by each category of capital investment to calculate each rate schedule's annual revenue requirement. This indicated revenue requirement by rate schedule for all incremental capital investment categories is an important factor for allocating the revenue requirement to each rate schedule based on cost causation.

3. Incremental O&M Expenses

Q. What are the categories of O&M expenses that were evaluated in this study?

A. The study incorporates the following categories of O&M expenses that are incremental costs associated with customer additions:

- Gas Scheduling, which includes departments that schedule underground storage injections/withdrawals, as well as control the distribution system's daily operations.

- Gas Planning, which are operations that include, short- and long-term gas acquisitions, planning, and analysis (e.g., of gas purchasing and hedging activities).
- Major Account Services, which is the team that interacts primarily with large commercial and industrial customers through the service election process, coordinates billing and addresses billing issues, as well as coordinates new large customer acquisitions.
- Account Services, including billing, payment processing, metering, collections, and construction field services.

Q. How were gas planning and gas scheduling costs evaluated and assigned to each rate schedule?

A. The gas scheduling and gas planning cost centers were evaluated using the O&M budget cost center for the Gas Scheduling and Planning Department. Cost categories including total salaries, administrative costs, and FTE counts are forecasted to the Test Year for each cost center. These forecasts are used to evaluate incremental costs for the LRIC study, based on average hours spent on each customer at a calculated average labor rate.

The gas scheduling cost center was broken out into two functions: gas storage operations and gas control operations. Costs associated with gas storage operations were allocated to firm sales rate schedules only. Gas control operations costs were allocated to all schedules based on three factors: (1) service type (sales firm, sales interruptible, or transportation); (2) normalized

annual throughput; and (3) the amount of time gas management staff estimate they spend working with customers of each service type.

The gas planning cost center was allocated to all service types based on the amount of time gas management staff estimate they spend working with customers of each service type. Costs are largely allocated to sales customers since little staff time is devoted to transportation customers who are responsible for procuring their own gas.

Q. How did NW Natural evaluate incremental account service costs?

A. Major Accounts Services costs were allocated only to the large RS 31 and RS 32 Commercial and Industrial rate classes. Costs were further allocated to sales and transportation rate schedules based on reported staff time spent interfacing with each service type.

For all other accounts service costs, NW Natural conducted a "Meter-to-Cash" study, that evaluated the incremental costs associated with providing these services to customers. The study evaluated the following cost center groups in the Company that directly serve customers:

- Account Services (meter reading scheduling, payment processing, collections)
- Contact Center (customer call center)
- Resource Management Center (field services scheduling/dispatch)
- Construction Field Services (field technicians and field scheduling)
- Office Services (bill printing)

- Treasury (costs that pertain only to payment processing)

Q. What is the purpose of the Meter-to-Cash study?

A. The Meter-to-Cash study was first developed by the Company in 2015. It was developed to estimate the incremental costs of customer additions associated with the account services functions listed above. The 2015 analysis was developed over several months, through meetings with managers and subject matter experts associated with each of the account services functions. These meetings helped to determine what individual cost centers and expense items should be associated with each activity, as well as what costs and activities are associated with three categories of rate schedules: Residential, Small Commercial, and Large Commercial / Industrial. Data were collected after these informational interviews were complete.

Q. Has the Meter-to-Cash study been updated?

A. Yes. The Meter-to-Cash study was updated in 2018. This updated study is the basis for incremental account services costs for this LRIC study. The 2018 update was built off of the 2015 study, where 2018 O&M dollars for each of the cost centers used in the prior study were used to develop a multiplier to walk 2015 O&M expenses to 2018. This multiplier was applied to each of the cost centers identified in the 2015 analysis, such that the dollars identified in the 2015 study were appropriately inflated for this 2018 update. The cost centers and categorization of activities by rate schedule remain consistent from the 2015 study. The 2018 nominal values were inflated to the Test Year using the Handy Whitman Index.

Q. What data were collected and what criteria was used for its inclusion in the Meter-to-Cash study?

A. Incremental O&M cost estimates in the Meter-to-Cash study were based on data collected from the Company's engineering, accounting, and customer contact teams. Data were vetted with the help of supervisors and managers of these teams as well as individual cost centers. The expenses identified as part of the Meter-to-Cash process were identified by cost center and were determined to be appropriate for inclusion in this incremental cost study based on the following criteria: If it were determined an additional forecasted customer would make a direct cost change within the cost center associated with these groups, and this direct cost were measurable, the cost would be included. Costs that are not necessarily tied to new customer additions such as computer software were not included in the Meter-to-Cash study (e.g., software upgrades are not necessarily correlated to customer additions).

Q. How were the incremental Meter-to-Cash costs allocated to the rate schedules for the LRIC study?

A. After identifying the incremental costs, the study broke out each cost center's budget into four categories:

1. Meter Reading
2. Billing
3. Payment Processing
4. Collections (costs that pertain to payment processing)

Within each category of budget, costs are evaluated as payroll versus non-payroll. An incremental cost per customer was derived by taking the above categories and apportioning the cost into the three broad categories of rate schedules. Total incremental O&M expense was derived by multiplying the cost per customer amount for the appropriate rate schedule category by the number of customers in each individual rate schedule. For instance, all the RS 32 rate class customer costs were allocated using the Large Commercial / Industrial incremental cost category.

4. LRIC Study Insights and Outcomes

Q. Upon what basis is margin revenue at current rates compared against the margin revenue with the proposed incremental revenue requirement?

A. The LRIC study compares the ratio of Test Year Margin Revenue at Current Rates (see line 26 of the LRIC study results) against the LRIC Based Target Margin (line 24), which is the margin revenue amount including the proposed incremental revenue requirement. This ratio is used to derive Relative Margin-to-Cost Ratio at Present Rates (line 28a), which indicates each rate schedule's position relative to cost parity (i.e., the point that the schedule as a whole is neither over- or under-paying its LRIC study determined cost of service).

Q. Does the Margin Revenue at Current Rates figure contain any commodity-related revenues for any of the rate schedules?

A. No. The Margin Revenue at Current Rates figure presented on line 26 does not contain any commodity-related revenues, including commodity cost related to "line loss" (e.g., unaccounted for gas).

Q. What do the results of the LRIC study indicate?

A. The indicated Relative Margin-to-Cost Ratio for the firm sales rate schedules is illustrated in Table 1 below. A Relative Margin-to-Cost Ratio below the value of 1.00 indicates that customers on a given schedule are underpaying their LRIC study determined cost of service. A value over 1.00 indicates that customers on a given rate schedule are paying more than their cost of service at margin rates. Per Table 1 below, the results of the LRIC study indicate that RS 2 Residential and RS 3 Commercial customers are not paying their cost of service at present rates while the remaining rate schedules are paying more.

Q. How do these results compare with the Company's last filed LRIC study?

A. This LRIC study and the Company's last filed study, as part of UG 344, both indicate that RS 31 and RS 32 rate class customers are paying more than their determined cost of service under present rates. Both studies also indicate that RS 2 Residential and RS 3 Commercial customers are paying less than their determined cost of service, with the main difference being by how much each study indicates these schedules are underpaying. Based on the data and methods used to calculate incremental cost for this LRIC study, as described earlier in this testimony, I find that RS 3 Commercial customers have the lowest Relative Margin-to-Cost Ratio at the Company's current rates.

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Table 1
Relative Margin-to-Cost Parity Ratio at Present Rates, by Rate Schedule

RATE SCHEDULE	02R	03C	03I	27R	31CSF	31CTF	31ISF	31ITF
LRIC Study Determined Parity Ratio	**0.99**	**0.76**	**1.82**	**1.06**	**1.72**	**1.81**	**1.80**	**2.01**
RATE SCHEDULE	32CSF	32ISF	32CTF	32ITF	32CSI	32ISI	32CTI 32ITI	33T
LRIC Study Determined Parity Ratio	**1.96**	**2.53**	**2.18**	**1.66**	**2.38**	**1.98**	**1.87**	**0.00**

IV. RATE SPREAD

A. Summary

Q. What is the purpose of the rate spread section?

A. The purpose of this section is to show and summarize:

- NW Natural's incremental revenue requirement request;
- Discuss the results of the LRIC and how it relates to rate spread;
- Show the methodology for how the Company proposes to spread incremental revenue; and
- Show the revenue requirement spread by rate schedule and the corresponding average bill impact.

Q. Is NW Natural proposing any changes to its rate structure or to its current rate schedule offerings?

A. No. NW Natural is not proposing any additions or removals of rate schedules in Oregon, nor is it changing any block rate structures or intra-schedule optionality that is currently offered.

Q. What is NW Natural's total incremental revenue requirement?

A. NW Natural has filed for an incremental revenue requirement of $71.4 million in this case. See *NW Natural/1000, Walker*.

Q. Is any of the $71.4 million of incremental revenue requirement attributable to special contract customers?

A. No. The special contract customers are not allocated any of the incremental revenue requirement given they are under fixed cost contracts.

B. The LRIC Study and Rate Spread

Q. How does the LRIC study relate to rate spread?

A. The LRIC study provides the incremental capital investment and O&M costs, by functional category, and gives insights into cost causation across customer classes. In theory, spreading the incremental revenue requirement such that all schedules have a Relative Margin-to-Cost Ratio of 1.00 would align all customers to their indicated level of cost causation. In practice, rate spread (and rate design) tends to deviate from this strict application of cost study results, given such a change in the short-run would violate principles of rate shock and smoothing, neither of which are in the Company's or the customer's interests. It is also important to balance the interests of rate equity with rate volatility. The LRIC study does, however, provide a baseline for incremental revenue requirement allocation by rate schedule.

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Q. What are NW Natural's thoughts on using the LRIC study results to spread revenue requirement?

A. NW Natural values the LRIC study outputs as a baseline for understanding the basis of cost causality among the rate classes. Of course, as stated above, there are other important factors that should be considered, most importantly the idea that equitable distribution of the rate spread should be balanced against customer rate impacts. If the Company were to spread revenue requirement across rate schedules strictly in a way that results in each rate schedule paying its share of LRIC (i.e., if all schedules were suddenly brought to parity with their indicated cost causality), such a shift would result in rate shock for many customers and perhaps inadvertently signal rate volatility. Table 2 below shows the amount of dollars that would need to be spread to each rate schedule in order to put each class in line with paying its long-run incremental costs per the results of this LRIC study.

Table 2
Target Revenue Change, by Rate Schedule

RATE SCHEDULE	02R	03C	03I	27R	31CSF	31CTF	31ISF	31ITF
LRIC Study Determined Target Revenue	**$48,036,861**	**$42,707,533**	**($696,032)**	**$70,937**	**($2,514,871)**	**($353,509)**	**($1,080,358)**	**($50,546)**
RATE SCHEDULE	32CSF	32ISF	32CTF	32ITF	32CSI	32ISI	32CTI 32ITI	33T
LRIC Study Determined Target Revenue	**($4,318,578)**	**($1,296,170)**	**($534,232)**	**($1,893,772)**	**($1,960,304)**	**($2,286,834)**	**($2,383,552)**	**$0**

As seen in Table 2 above, RS 2 Residential customers would bear the largest share of the incremental revenue requirement increase, followed by RS 3

Commercial, if the Company were to adhere strictly to the indicated LRIC study results. The customers within the RS 31 and RS 32 rate classes would all realize rate reductions under such a scenario.

NW Natural believes that the factors of fairness and minimizing rate impact weigh in favor of not realigning rates completely to their indicated cost causality based on the results of the LRIC study in this rate case, which would require large rate increases for some schedules while others receive decreases. Further, the Commission has stated that it is not inclined to raise some rates while reducing others without compelling evidence that immediate action is warranted.[5]

The Company does propose, however, to spread incremental revenue requirement such that costs will be more closely aligned to the indicated LRIC study results across all rate classes. For RS 2 Residential and RS 27 Dry-Out, NW Natural proposes to maintain relative position with respect to the LRIC study results, because these two schedules are close to parity at current rates. The Company proposes to increase the relative position for RS 3 Commercial in recognition of the fact that the indicated LRIC study results place this schedule well below parity at current rates. As a result of this proposal, the relative position to parity of the RS 31 and RS 32 rate classes with respect to the overall indicated LRIC study results will decrease, reflecting the fact that these classes are above parity at current rates. The Company's proposal equitably distributes

[5] *In the Matter of Avista Corporation, Request for a General Rate Revision*, Docket No. UG 284, Order No. 15-054 at 5 (February 23, 2015).

the incremental revenue requirement such that the rate classes as a whole are moved closer to parity based on their indicated cost causation, without causing rate shock.

C. Rate Spread Methodology

Q. What method does NW Natural propose to use to spread the $71.4 million incremental revenue requirement?

A. NW Natural proposes a three-step process for spreading the $71.4 million incremental revenue requirement:

1. Calculate the revenue spread on an equal percent of margin basis for all rate schedules. Retain this revenue allocation for the RS 2 Residential, RS 3 Commercial, and RS 27 Dry-Out rate schedules.
2. Add an additional $3.6 million in revenue spread to the RS 3 Commercial rate schedule amount calculated in Step 1. This is the amount of revenue generated by increasing the RS 3 Commercial base charge $5.00, from $15.00 per month to $20.00 per month.
3. Reduce the revenue spread allocated to the RS 3 Industrial rate schedule and the RS 31 and RS 32 rate classes in Step 1 by $3.6 million on an equal percent of margin basis.

Q. Please describe how this revenue spread proposal impacts each rate class relative to an equal percent of margin spread.

A. The RS 2 Residential and RS 27 Dry-Out rate schedules would receive a revenue spread equal to an equal percent of margin calculated across all rate schedules. RS 3 Commercial would receive a revenue spread greater than an

equal percent of margin share. The RS 3 Industrial rate schedule, and the RS 31 and RS 32 rate classes would all receive a revenue spread less than an equal percent of margin share.

Q. Please discuss the rates that NW Natural proposes to change to recover the change in revenue.

A. The Company proposes increasing the RS 3 Commercial rate schedule base charge $5.00, from $15.00 per month to $20.00 per month. NW Natural proposes to apply all other revenue changes to the volumetric rate for each customer rate schedule and block based on the method described above.

D. Results and Bill Impacts

Q. What is the rate impact to firm sales customers?

A. Table 3 below shows the incremental revenue requirement and average bill increase for firm sales customers.

Table 3
Incremental Revenue Requirement and Average Bill Increase,
Firm Sales Customers Only

Rate Schedule	Revenue Req. Increase	Pct. Increase to Avg. Cust. Bill*
02R	$ 48,081,092	11.9%
03C	$ 18,290,650	12.8%
03I	$ 212,077	5.3%
31C Firm Sales	$ 858,261	6.6%
31I Firm Sales	$ 331,359	5.2%
32C Firm Sales	$ 1,151,490	5.8%
32I Firm Sales	$ 254,564	4.1%

NOTE: The average customer bill impact figure calculation excludes pipeline capacity charges for RS 31 and RS 32 rate classes, and thus the rate impacts for these schedules are overstated.

Q. Does your testimony present the revenue and rate changes applicable to all other rate schedules as well?

A. Yes. *NW Natural/1102, Wyman* shows the revenue increases and average bill impacts by rate schedule, and *NW Natural/1103, Wyman* contains the volumetric rate increases by rate schedule and block.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibits of Robert Wyman

CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD EXHIBITS 1101-1103

December 30, 2019

EXHIBITS 1101-1103 – CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD

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BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Robert Wyman

CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD EXHIBIT 1101

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Long-Run Incremental Cost Study
LRIC Study Summary of Results

Line No.			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	CUSTOMER CLASS		Residential Sales	Commercial Sales	Industrial Sales	Commercial Sales	Commercial Sales	Commercial Transportation	Industrial Sales	Industrial Transportation	Commercial Sales	Industrial Sales	Commercial Transportation	Industrial Transportation	Commercial Sales	Industrial Sales	Transportation	Transportation	
	SERVICE TYPE		Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Interruptible	Interruptible	Interruptible		Special
	RATE SCHEDULE		02	03CSF	03ISF	27R	31CSF	31CTF	31ISF	31ITF	32CSF	32ISF	32CTF	32ITF	32CSI	32ISI	32CTI / 32ITI	33T	Contracts
	STATISTICS	Totals																	
1	2021 TY ANNUAL THERM DELIVERIES	1,016,530,246	397,528,668	173,857,392	5,083,337	1,267,136	22,839,728	3,157,897	12,897,578	518,703	44,951,403	15,952,158	7,875,844	89,036,191	20,355,295	26,395,950	194,812,966	-	75,323,584
2	2021 TY AVG CUSTOMERS - END OF PERIOD	687,722	623,209	59,995	350	2,299	676	59	206	5	526	66	33	106	49	59	84	-	8
3	AVERAGE ANNUAL THERM DELIVERIES PER CUSTOMER	1,478	638	2,898	14,524	551	33,787	53,524	62,610	103,741	85,459	241,699	238,662	839,964	415,414	447,389	2,319,202	-	9,415,448
4	ESTIMATED DESIGN DAY LOAD FACTOR	27.8%	20.9%	22.7%	21.4%	18.4%	24.4%	36.8%	35.9%	44.1%	27.4%	53.4%	41.0%	51.8%	44.8%	42.2%	59.7%	51.8%	
4a	Average Firm Daily Deliveries	2,123,195	1,089,120	476,322	13,927	3,472	62,575	8,652	35,336	1,421	123,155	43,705	21,578	243,935	-	-	-	-	
4b	Peak Firm Day Deliveries	8,834,993	5,217,751	2,098,024	64,961	18,855	256,379	23,534	98,312	3,224	448,752	81,862	52,677	470,661	-	-	-	-	
4c	System Firm Load Factor	24.0%																	
5	Demand Charges	$72,053,303	$42,126,113	$18,423,667	$538,681	$134,278	$2,420,326	$0	$1,366,758	$0	$4,763,499	$1,690,451	$0	$0	$256,680	$332,850	$0	$0	$0
6	Cost of Gas	$235,324,042	$132,130,579	$57,786,719	$1,689,598	$421,171	$7,591,468	$0	$4,286,899	$0	$14,940,946	$5,302,179	$0	$0	$4,865,323	$6,309,160	$0	$0	$0
7	Total Cost of Gas	$307,377,345	$174,256,692	$76,210,386	$2,228,279	$555,449	$10,011,794	$0	$5,653,657	$0	$19,704,445	$6,992,630	$0	$0	$5,122,003	$6,642,010	$0	$0	$0
8	Account Services (Meter Reading, Billing, etc.)	$28,506,817	$23,142,068	$2,776,956	$16,200	$106,413	$616,236	$194,043	$187,788	$16,444	$479,497	$60,165	$108,532	$348,619	$80,574	$97,017	$276,264	$0	$26,311
	Customer Capital Investment LRIC Costs																		
9	Meter & Regulators	$35,491,962	$27,545,764	$6,006,160	$173,414	$100,164	$437,127	$35,941	$172,651	$3,517	$525,239	$88,485	$34,213	$109,898	$67,020	$75,451	$116,918	$0	$11,135
10	Services	$225,069,642	$189,088,442	$32,950,253	$444,453	$290,324	$703,469	$71,970	$244,896	$5,533	$613,343	$85,309	$40,170	$197,346	$41,165	$90,692	$202,276	$0	$19,264
11	Main Extensions	$275,897,718	$170,782,543	$97,463,314	$605,026	$262,602	$1,968,484	$113,287	$721,146	$17,504	$1,572,351	$162,676	$71,512	$798,507	$106,185	$361,634	$890,947	$0	$84,852
12	System Core Mains -- Total Throughput Allocation	$15,735,192	$6,153,471	$2,691,193	$78,687	$19,614	$353,543	$48,882	$199,646	$8,029	$695,817	$246,928	$121,913	$1,378,219	$315,086	$408,591	$3,015,571	$0	$0
13	System Core Mains -- Firm Demand Allocation	$40,909,580	$24,160,288	$9,714,698	$300,797	$87,307	$1,187,140	$108,973	$455,225	$14,926	$2,077,901	$379,056	$243,916	$2,179,352	$0	$0	$0	$0	$0
14	Storage Costs	$6,216,184	$3,780,249	$1,519,737	$47,054	$13,654	$185,706	$0	$71,215	$0	$325,030	$59,288	$0	$0	$90,147	$124,103	$0	$0	$250,347
15	Total Customer Capital Investment Costs	$599,320,277	$421,510,758	$150,345,355	$1,649,430	$773,665	$4,835,469	$379,054	$1,864,779	$49,509	$5,809,681	$1,021,742	$511,724	$4,663,322	$619,603	$1,060,471	$4,225,713	$0	$365,599
16	Total System Reinforcement Cost	$1,968,596	$1,162,690	$467,440	$14,473	$4,199	$57,119	$5,243	$21,903	$718	$99,977	$18,238	$11,736	$104,858	$0	$0	$0	$0	$0
17	Long Run Incremental Distribution Cost	$937,173,034	$620,072,208	$229,800,137	$3,908,382	$1,439,726	$15,520,618	$578,340	$7,728,127	$66,672	$26,093,600	$8,092,775	$631,993	$5,116,799	$5,822,180	$7,799,499	$4,501,977	$0	$391,909
	Proposed Cost by Functional Classification																		
18	Cost of Gas Commodity	$237,009,905	$134,364,366	$58,763,655	$1,718,162	$428,291	$7,719,809	$0	$4,359,374	$0	$15,193,536	$5,391,818	$0	$0	$3,949,430	$5,121,464	$0	$0	$0
19	Account Services (Meter Reading, Billing, etc.) Costs	$59,203,626	$48,061,990	$5,767,248	$33,645	$221,000	$1,279,813	$402,992	$390,002	$34,152	$995,831	$124,952	$225,403	$724,020	$167,337	$201,488	$573,752	$0	$91,809
20	Meters & Services Costs	$74,250,323	$61,732,656	$11,101,122	$176,069	$111,274	$325,027	$30,751	$118,985	$2,579	$324,453	$49,525	$21,196	$87,553	$30,829	$47,345	$90,959	$0	$14,555
21	Core Main Costs	$299,465,323	$181,093,758	$98,940,791	$886,583	$332,768	$3,160,119	$244,172	$1,239,148	$36,435	$3,913,776	$710,214	$393,840	$3,922,790	$379,368	$693,613	$3,517,947	$0	$153,647
22	Storage Costs	$22,183,131	$13,490,233	$5,423,348	$167,917	$48,726	$662,713	$0	$254,140	$0	$1,159,905	$211,576	$0	$0	$321,698	$442,875	$0	$0	$1,501,039
23	Proposed Cost	$692,112,308	$438,743,003	$179,996,165	$2,982,377	$1,142,059	$13,147,481	$677,916	$6,361,649	$73,166	$21,587,501	$6,488,085	$640,439	$4,734,363	$4,848,663	$6,506,785	$4,182,657	$0	$1,761,050
24	**LRIC Based Target Margin**	**$450,014,366**	**$304,378,637**	**$121,232,510**	**$1,264,214**	**$713,768**	**$5,427,672**	**$677,916**	**$2,002,275**	**$73,166**	**$6,393,966**	**$1,096,268**	**$640,439**	**$4,734,363**	**$899,233**	**$1,385,320**	**$4,182,657**	**$0**	**$1,761,050**
25	Revenue at Current Rates	$620,665,735	$390,706,141	$137,288,632	$3,678,408	$1,071,122	$15,662,353	$1,031,425	$7,442,007	$123,711	$25,906,079	$7,784,255	$1,174,671	$6,628,135	$6,808,968	$8,793,619	$6,566,209	$0	$1,761,050
26	**Margin Revenue at Current Rates**	**$378,567,792**	**$254,772,129**	**$77,838,498**	**$1,940,175**	**$637,828**	**$7,852,361**	**$1,031,425**	**$3,031,708**	**$123,711**	**$10,535,052**	**$2,329,451**	**$1,174,671**	**$6,628,135**	**$1,803,595**	**$2,302,847**	**$6,566,209**	**$0**	**$1,761,050**
27	Current Revenue to Proposed Cost (Includes Cost of Gas)	**0.90**	**0.89**	**0.76**	**1.23**	**0.94**	**1.19**	**1.52**	**1.17**	**1.69**	**1.20**	**1.20**	**1.83**	**1.40**	**1.40**	**1.35**	**1.57**	-	-
28	Current Margin Revenue to LRIC Based Target Margin	**0.84**	**0.84**	**0.64**	**1.53**	**0.89**	**1.45**	**1.52**	**1.51**	**1.69**	**1.65**	**2.12**	**1.83**	**1.40**	**2.01**	**1.66**	**1.57**	-	-
28a	**Relative Margin to Cost Ratio at Present Rates**	**1.00**	**0.99**	**0.76**	**1.82**	**1.06**	**1.72**	**1.81**	**1.80**	**2.01**	**1.96**	**2.53**	**2.18**	**1.66**	**2.38**	**1.98**	**1.87**	-	-
29	Component LRIC Target Increase by Schedule	$71,446,573	$48,036,861	$42,707,533	($696,032)	$70,937	($2,514,871)	($353,509)	($1,080,358)	($50,546)	($4,318,578)	($1,296,170)	($534,232)	($1,893,772)	($1,960,304)	($2,286,834)	($2,383,552)	$0	$0
30	Target Increase as Percent of Total Present Revenue	11.51%	12.29%	31.11%	-18.92%	6.62%	-16.06%	-34.27%	-14.52%	-40.86%	-16.67%	-16.65%	-45.48%	-28.57%	-28.79%	-26.01%	-36.30%	0.00%	0.00%
30a	Target Increase as Percent of Present Margin Revenue	18.87%	18.85%	54.87%	-35.87%	11.12%	-32.03%	-34.27%	-35.64%	-40.86%	-40.99%	-55.64%	-45.48%	-28.57%	-108.69%	-99.30%	-36.30%	0.00%	0.00%

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Robert Wyman

CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD EXHIBIT 1102

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Long-Run Incremental Cost Study
Proposed Incremental Revenue Requirement Allocation by Rate Schedule

Line No.	Rate Schedule	Margin Revenue at Present Rates	Total Revenue at Present Rates	Proposed Margin Revenue Increase	Margin Revenue at Proposed Rates	Total Revenue at Proposed Rates	Margin Revenue Percentage Increase	Total Revenue Percentage Increase	Average Bill Percentage Increase
		A	B	C	D = A+C	E = B+C			
1	02	$ 254,772,129	$ 390,706,141	$ 48,081,092	$ 302,853,221	$ 438,787,234	18.87%	12.31%	11.90%
2	03CSF	$ 77,838,498	$ 137,288,632	$ 18,290,650	$ 96,129,148	$ 155,579,281	23.50%	13.32%	12.80%
3	03ISF	$ 1,940,175	$ 3,678,408	$ 212,077	$ 2,152,251	$ 3,890,485	10.93%	5.77%	5.30%
4	27R	$ 637,828	$ 1,071,122	$ 120,378	$ 758,205	$ 1,191,500	18.87%	11.24%	10.80%
5	31CSF	$ 7,852,361	$ 15,662,353	$ 858,261	$ 8,710,622	$ 16,520,614	10.93%	5.48%	6.60%
6	31CTF	$ 1,031,425	$ 1,031,425	$ 112,723	$ 1,144,148	$ 1,144,148	10.93%	10.93%	13.40%
7	31ISF	$ 3,031,708	$ 7,442,007	$ 331,359	$ 3,363,067	$ 7,773,366	10.93%	4.45%	5.20%
8	31ITF	$ 123,711	$ 123,711	$ 13,523	$ 137,234	$ 137,234	10.93%	10.93%	12.50%
9	32CSF	$ 10,535,052	$ 25,906,079	$ 1,151,490	$ 11,686,542	$ 27,057,569	10.93%	4.44%	5.80%
10	32ISF	$ 2,329,451	$ 7,784,255	$ 254,564	$ 2,584,015	$ 8,038,819	10.93%	3.27%	4.10%
11	32CTF	$ 1,174,671	$ 1,174,671	$ 128,397	$ 1,303,068	$ 1,303,068	10.93%	10.93%	14.10%
12	32ITF	$ 6,628,135	$ 6,628,135	$ 724,278	$ 7,352,413	$ 7,352,413	10.93%	10.93%	13.60%
13	32CSI	$ 1,803,595	$ 6,808,968	$ 197,093	$ 2,000,688	$ 7,006,061	10.93%	2.89%	2.70%
14	32ISI	$ 2,302,847	$ 8,793,619	$ 251,684	$ 2,554,531	$ 9,045,303	10.93%	2.86%	2.60%
15	32CTI / 32ITI	$ 6,566,209	$ 6,566,209	$ 717,102	$ 7,283,311	$ 7,283,311	10.92%	10.92%	11.60%
16	33T	$ -	$ -	$ -	$ -	$ -	0.00%	0.00%	0.00%
	Total	$ 378,567,792	$ 620,665,735	$ 71,444,672	$ 450,012,465	$ 692,110,407	18.87%	11.51%	

NOTE: The average customer bill percentage impact figure calculation excludes pipeline capacity charges for RS 31 and RS 32 rate classes, and thus the bill rate impacts for these schedules are overstated.

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 388

NW Natural

Exhibit of Robert Wyman

CUSTOMER AND VOLUME FORECAST, LONG RUN INCREMENTAL COSTS, AND RATE SPREAD EXHIBIT 1103

December 30, 2019

NW Natural
Oregon Jurisdictional Rate Case
Test Year Twelve Months Ended October 31, 2021
Long-Run Incremental Cost Study
Proposed Base Charges and Base Rates by Rate Schedule and Rate Block

Line No.	Schedule	Block	Block Volumes	Test Year Volumes	Test Year Customers	Current Rates: Margin Revenue	UG 388 Proposed: Revenue Increase	Current Monthly Base Charge	UG 388 Proposed Monthly Base Charge	Current Rates: Base Rate	UG 388 Proposed Increase: Base Rates	UG 388 Proposed Base Rates
1	2R		N/A	397,528,668	623,209	$254,772,129	$48,081,092	$ 8.00	$ 8.00	$0.49039	$0.12095	$0.61134
2	3C Firm Sales		N/A	173,857,392	59,995	$77,838,498	$18,290,650	$ 15.00	$ 20.00	$0.38560	$0.08450	$0.47010
3	3I Firm Sales		N/A	5,083,337	350	$1,940,175	$212,077	$ 15.00	$ 15.00	$0.36928	$0.04172	$0.41100
4	27 Dry Out		N/A	1,267,136	2,299	$637,828	$120,378	$ 6.00	$ 6.00	$0.37273	$0.09500	$0.46773
5	31C Firm Sales	Block 1	2,000	12,134,053	676	$7,852,361	$858,261	$ 325.00	$ 325.00	$0.23815	$0.03919	$0.27734
6		Block 2	all additional	10,705,676						$0.21729	$0.03575	$0.25304
7	31C Firm Trans	Block 1	2,000	1,237,478	59	$1,031,425	$112,723	$ 575.00	$ 575.00	$0.20857	$0.03766	$0.24623
8		Block 2	all additional	1,920,419						$0.19070	$0.03443	$0.22513
9	31I Firm Sales	Block 1	2,000	4,148,074	206	$3,031,708	$331,359	$ 325.00	$ 325.00	$0.18515	$0.02753	$0.21268
10		Block 2	all additional	8,749,504						$0.16690	$0.02482	$0.19172
11	31I Firm Trans	Block 1	2,000	118,697	5	$123,711	$13,523	$ 575.00	$ 575.00	$0.18577	$0.02816	$0.21393
12		Block 2	all additional	400,006						$0.16790	$0.02545	$0.19335
13	32C Firm Sales	Block 1	10,000	33,364,119	526	$10,535,052	$1,151,490	$ 675.00	$ 675.00	$0.11429	$0.02698	$0.14127
14		Block 2	20,000	9,992,148						$0.09648	$0.02277	$0.11925
15		Block 3	20,000	1,397,941						$0.06688	$0.01579	$0.08267
16		Block 4	100,000	197,195						$0.03721	$0.00878	$0.04599
17		Block 5	600,000	-						$0.01588	$0.00375	$0.01963
18		Block 6	all additional	-						$0.00577	$0.00136	$0.00713
19	32I Firm Sales	Block 1	10,000	6,000,723	66	$2,329,451	$254,564	$ 675.00	$ 675.00	$0.10799	$0.01962	$0.12761
20		Block 2	20,000	6,072,266						$0.09116	$0.01656	$0.10772
21		Block 3	20,000	2,271,665						$0.06307	$0.01146	$0.07453
22		Block 4	100,000	1,607,504						$0.03503	$0.00637	$0.04140
23		Block 5	600,000	-						$0.01550	$0.00282	$0.01832
24		Block 6	all additional	-						$0.00565	$0.00103	$0.00668
25	32C Firm Trans	Block 1	10,000	3,279,561	33	$1,174,671	$128,397	$ 925.00	$ 925.00	$0.10964	$0.01973	$0.12937
26		Block 2	20,000	2,720,836						$0.09317	$0.01676	$0.10993
27		Block 3	20,000	1,048,244						$0.06579	$0.01184	$0.07763
28		Block 4	100,000	814,825						$0.03839	$0.00691	$0.04530
29		Block 5	600,000	12,377						$0.02191	$0.00394	$0.02585
30		Block 6	all additional	-						$0.01099	$0.00198	$0.01297
31	32I Firm Trans	Block 1	10,000	10,055,646	106	$6,628,135	$724,278	$ 925.00	$ 925.00	$0.10964	$0.01694	$0.12658
32		Block 2	20,000	15,265,458						$0.09317	$0.01439	$0.10756
33		Block 3	20,000	10,449,168						$0.06579	$0.01016	$0.07595
34		Block 4	100,000	22,599,870						$0.03839	$0.00593	$0.04432
35		Block 5	600,000	24,971,483						$0.02191	$0.00338	$0.02529
36		Block 6	all additional	5,694,567						$0.01099	$0.00170	$0.01269
37	32C Interr Sales	Block 1	10,000	4,466,990	49	$1,803,595	$197,093	$ 675.00	$ 675.00	$0.10896	$0.01527	$0.12423
38		Block 2	20,000	5,267,214						$0.09199	$0.01289	$0.10488
39		Block 3	20,000	3,055,988						$0.06367	$0.00892	$0.07259
40		Block 4	100,000	6,002,700						$0.03535	$0.00495	$0.04030
41		Block 5	600,000	1,562,403						$0.01835	$0.00257	$0.02092
42		Block 6	all additional	-						$0.00593	$0.00083	$0.00676
43	32I Interr Sales	Block 1	10,000	5,945,061	59	$2,302,847	$251,684	$ 675.00	$ 675.00	$0.10860	$0.01498	$0.12358
44		Block 2	20,000	7,316,869						$0.09168	$0.01264	$0.10432
45		Block 3	20,000	3,444,126						$0.06345	$0.00875	$0.07220
46		Block 4	100,000	6,661,250						$0.03522	$0.00486	$0.04008
47		Block 5	600,000	3,028,643						$0.01828	$0.00252	$0.02080
48		Block 6	all additional	-						$0.00589	$0.00081	$0.00670
49	32C Interr Trans	Block 1	10,000	7,321,550	84	$6,566,209	$717,102	$ 925.00	$ 925.00	$0.10762	$0.01371	$0.12133
50	32I Interr Trans	Block 2	20,000	12,197,978						$0.09148	$0.01165	$0.10313
51		Block 3	20,000	8,859,459						$0.06459	$0.00823	$0.07282
52		Block 4	100,000	27,792,967						$0.03767	$0.00480	$0.04247
53		Block 5	600,000	57,196,530						$0.02154	$0.00274	$0.02428
54		Block 6	all additional	81,444,481						$0.01079	$0.00137	$0.01216
55	33		N/A	-	-	$0	$0	$ 38,000.00	$ 38,000.00	$0.00574	$0.00000	$0.00574

Totals	1,016,530,246	687,722	$378,567,792	$71,444,672