NW Natural®

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September 30, 2020

VIA ELECTRONIC FILING

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

Re: UM 1900: NW Natural's Annual Oregon Safety Project Plan in Compliance with OPUC Order No. 17-084

Northwest Natural Gas Company, dba NW Natural (NW Natural), hereby submits its 2021 Safety Project Plan in compliance with Commission Order No. 17-084 entered March 6, 2017. Please note that the report submitted last year was entitled "2019 Safety Project Plan." NW Natural has changed the naming convention starting with the enclosed report because we believe the report should reference the upcoming year's plan and better reflects the content of the report.

If you have any questions, please contact me at (503) 610-7326.

Sincerely,

/s/ Rebecca T. Brown

Rebecca T. Brown
Regulatory Consultant

Enclosure

2021 SAFETY PROJECT PLAN

OREGON

September 30, 2020

250 SW Taylor Street
Portland, Oregon 97204
503-226-4211

Contents

1. Introduction

In compliance with the Public Utility Commission of Oregon (Commission or OPUC) Order No 17-084 (Order) in docket UM 1722, this 2021 Safety Project Plan (SPP) outlines NW Natural's safety project investments for 2021. The 2021 SPP includes updated capital and O&M projects and programs and projects that carry over from 2020.

On October 1, 2019, the Pipeline and Hazardous Materials Safety Administration (PHMSA) published a rulemaking called "The Safety of Gas Transmission Pipelines: MAOP reconfirmation, Expansion of Assessment Requirements, and Other Related Amendments." This Plan includes work that NW Natural is implementing to comply with the rulemaking.

This SPP demonstrates NW Natural's commitment to pipeline safety by providing insight into NW Natural's safety activities, and identify NW Natural's response to regulatory changes that may drive safety program priorities or modify existing programs. In the event that NW Natural seeks approval for a Safety Cost Recovery Mechanism (SCRM), this SPP is intended to expedite the review process of safety investments.

Safety is a core value at NW Natural and we appreciate the opportunity to present this information to the Commission.

2. Background Information

NW Natural is a regulated natural gas utility conducting business in Oregon and southwest Washington. The Company serves ~770,000 customers and owns and operates 660 miles of natural gas transmission pipeline, and ~14,000 miles of distribution pipelines. In addition, NW Natural operates three energy storage facilities in Oregon – Portland and Newport LNG Plants and Mist Underground Storage.

NW Natural's pipelines and storage facilities are governed by the Code of Federal Regulations (CFR), the Oregon Administrative Rules (OAR), and the Oregon Revised Statutes (ORS):

- 49 CFR Part 192 – Minimum Safety Standard – Transmission & Distribution Systems
- 49 CFR Part 193 – LNG Safety Standards
- 49 CFR Part 196 – Protection of Underground Pipelines from Excavations Activity
- Additional OARs (OAR 860-024 – Safety, OAR 860-031 – Pipeline Inspections), and ORSs such as ORS 757.039 – Regulation of hazardous substance distribution and storage operations, and ORS 757.542-993 – One call notification.

In addition to the federal and state regulations identified above, NW Natural's safety program considers the findings of Oregon House Resolution 3 (HR 3, 2011) which directed the Oregon Seismic Safety Policy Advisory Commission to prepare the Oregon Resiliency Plan with the purpose of identifying recommendations for how Oregon's critical energy infrastructures could be made seismically resilient against a Cascadia subduction zone earthquake. Upon completion

of that work on February 28, 2013, the Oregon Senate passed Senate Bill 33 (SB 33, 2013), which established the Governor's Task Force on Oregon Resilience Plan (ORP) Implementation (Task Force). In October 2014, the Task Force issued a report recommending that the Commission require regulated energy providers to conduct seismic assessments of regulated facilities, and recommended that the Commission allow cost recovery for prudent investments related to assessments and mitigation of vulnerabilities identified during those assessments. 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 "protect 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."

3. Threat Identification

NW Natural's three highest ranking threats, as identified in the Distribution Integrity Management Program (DIMP) Plan are:

3.1 Excavation Damage

Excavation damage continues to be the principal threat to NW Natural's gas distribution system, comprising approximately 70 percent of all recorded leak repairs. Excavation damage is a system-wide threat brought on predominantly by improper excavation practices. NW Natural's efforts to reduce excavation damages are described below.

3.1.1 Excavation Practices and Education:

NW Natural actively engages in training and education for contractors, the general public, and other utilities, to promote safe excavation procedures and practices. These efforts include classes on Oregon dig laws, displays at public events, and the use of media including print, radio, television, and internet to promote safety, best practices, and the use of 811.

NW Natural's Damage Prevention Department works to reduce the number of excavation damages through investigation, cause analysis, and proactively works to identify and support contractors engaging in high risk construction activity.

3.1.2 One-Call Notification Practices:

NW Natural actively participates in local and state-level Utility Coordinating Councils as well as the One Call Utility Notification board. A primary function of these organizations is to reduce damages to underground utilities through excavation best practices, public awareness, and the use of the Oregon one call system (811).

NW Natural also maintains a robust Public Awareness Program which includes advertising, direct mailings and public event outreach to increase this awareness.

3.1.3 Locating Practices:

NW Natural is an active member of Oregon's one call system and responds to all locate requests. Due to the high volume of locate requests, this work is contracted. All locating is performed by NW Natural qualified personnel and oversight is performed by Company contract management personnel and NW Natural's Quality Assurance program to minimize the incidences of errors, mismarks, and missed due dates.

3.1.4 Incorrect Facility Marking:

Incorrectly marked facilities may be due to underground interference, equipment issues, inaccurate facility maps, or procedural issues. Locating personnel responsible for a mismark receive additional training and are required to re-qualify prior to being allowed to locate gas facilities. Review of mismarks are conducted by supervisor or other qualified personnel and the results are used to identify deficiencies, correct maps, and ensure the facility can be reliably located.

3.2 Material, Weld or Joint Failure

Material, weld, or joint failure is the second largest threat to the NW Natural gas distribution system, comprising approximately 19 percent of all recorded leak repairs. NW Natural is proactive in its efforts to reduce these occurrences, as described below.

3.2.1 Plastic Pipe Installed from 1960s to 1980s:

NW Natural makes every effort to identify all pre-1982 plastic pipe installations, analyze leak histories, evaluate any conditions that may threaten integrity of the pipe, and take appropriate remedial action, including replacement, to mitigate risks to public safety.

3.2.2 Acrylonitrile-Butadiene-Styrene (ABS):

NW Natural used ABS in the 1960s to reline or renew existing steel services. These services have been identified for replacement. NW Natural's use of ABS was limited to ½" pipe inserted into existing steel service lines mitigating the industry-identified risk of rock impingement and slow crack growth related to unsuitable backfill material and construction practices.

3.2.3 Plexco Service Tee Celcon Caps:

NW Natural is aware of industry issues regarding Plexco Service Tee Celcon Caps possibly leaking when over-tightened during installation. These caps exist within the gas distribution system and are replaced as found and scheduled for replacement if leaks are identified.

3.2.4 Polyethylene (PE) Fusion Failure:

NW Natural has a robust training and Quality Assurance/Quality Control program in place to ensure proper PE fusion quality. This program includes testing, biannual qualification, and ongoing training. All PE fusions are visually inspected and pressure tested prior to being placed in service.

3.2.5 Flat Back Risers:

NW Natural discovered in 2012 that a certain type of riser stop valve, internally known as a "Flat Back Riser" contained components prone to atmospheric corrosion in the coastal areas of NW Natural's service territory. The atmospheric corrosion at these locations was such that the Flat Back Risers could become inoperable and subject to leakage. NW Natural identified that corrosion on a retaining pin could sever during operation of the valve, resulting in a hazardous leak. NW Natural developed an Accelerated Action Plan to replace these valves in coastal areas.

3.3 Equipment Failure

Equipment Failure is the third largest threat to the NW Natural gas distribution system, comprising approximately 6 percent of all recorded leak repairs. NW Natural's efforts to reduce these occurrences are described below.

3.3.1 Valves:

Many valves are vital to the safe operation of a gas distribution system. NW Natural has in place a key operating valve inspection and maintenance program to ensure these valves are operable and available for use. Valves that are found to be inoperable, inaccessible, and/or paved over are identified and remediated as necessary.

3.3.2 Pressure Control / Relief Equipment:

NW Natural has an established inspection and maintenance program in place for pressure control/relief equipment to ensure reliable and safe operation.

3.3.3 Mechanical Couplings:

Pipe may pull out from compression couplings due to pullout forces that could include excavation damages, cyclic fatigue from changes in the temperature of natural gas as a result of the Joule-Thomson effect, ground movement from earthquakes or after heavy rains. Mechanical fitting failures are investigated, tracked, and reported per PHMSA and OPUC requirements.

Mechanical couplings on steel pipe may leak through the seal between the coupling and the pipe. Contributing factors may include a degradation of the seal material over time, improper installation, or a change in gas quality. NW Natural replaces these fittings as discovered during routine operations and maintenance activity.

3.3.4 Other:

Other types of equipment failure may occur in the gas distribution system. Failure reports are reviewed to detect trends or patterns of equipment failure occurring within the distribution system.

Many of the safety projects identified in this plan are in direct response to the above threats, and to maintain compliance with safety codes and regulations.

4. Safety Activities Performed by NW Natural

Safety activities at NW Natural can be divided into categories:

4.1 Prescriptive Regulatory Actions – Includes actions which must be performed to meet minimum federal safety standards.

49 CFR 192 includes multiple prescriptive activities, intended to safeguard public safety, and fall into broad categories such as “operations” (Subpart L) and “maintenance” (Subpart M). Most of these activities require inspections at prescribed intervals to confirm that a facility or asset is meeting operational requirements prescribed by federal code. These activities provide the baseline data for other performance-based activities and include, but are not limited to:

- Atmospheric corrosion surveys
- Leakage surveys
- Cathodic protection surveys
- Right of way (ROW) patrols
- Valve maintenance
- Water crossing inspections
- Odorization
- Odorometer Reads
- Line Marking
- Pressure Regulation Inspection
- Large Meter Inspections
- Record Keeping
- Control Room Management
- Bridgeline Inspections
- Equipment Calibration
- Houseboat Inspections
- Transmission Integrity

The safety activities from this category are prescriptive in nature and are not driven by risk analysis alone. Because these activities are required, they are not discussed further in this 2021 SPP, which instead focuses on projects and/or programs identified by NW Natural as essential to enhancing safety and reliability.

4.2 Proactive, Performance-Based Actions

Other sections of 49 CFR 192 include more proactive performance-based risk reduction activities, such as Subpart O – Transmission Integrity Management Program ("TIMP") and Subpart P – Distribution Integrity Management Program ("DIMP"), Damage Prevention, and Public Awareness. These programs focus on mitigating pipeline safety risk.

4.2.1 Transmission Integrity (TIMP)

Transmission Integrity refers to 49 CFR 192 Subpart O-Gas Transmission Pipeline Integrity Management. This federally mandated program covers natural gas transmission pipelines located in High Consequence (HCA) and Moderate Consequence (MCA) areas. NW Natural goes beyond code requirements in TIMP to address conditions outside of HCAs and MCAs.

Activities in this category include baseline assessments and reassessments of transmission lines using in-line inspection (ILI) and other direct assessment methods. They may also include pipeline replacements and modifications in compliance with integrity management rules and best practices and the relocation of pipelines and transmission facilities to mitigate threats posed by natural forces such as flooding, land movement, and erosion.

4.2.2 Distribution Integrity (DIMP)

Distribution Integrity is outlined in 49 CFR 192 Subpart P- Gas Distribution Pipeline Integrity Management. This federally mandated program requires operators to create a written Integrity Management Program that takes into consideration: system knowledge, threat identification, evaluation and risk ranking, identification and implementation of measures to address risk, measurement of results, and reporting.

Activities in this category include projects warranting Accelerated Action (AA) to address a system integrity risk. These AA projects are identified through risk modeling, industry identified threats, and by subject matter experts within the Company, and include:

- Replacement of vintage plastic services,
- Relocation of facilities under structures,
- Replacement of valves and fittings susceptible to leakage,
- Protection of above grade gas facilities,
- Crossbore investigation,
- Relocation of distribution gas lines to mitigate threats posed by natural forces such as:
  - Flooding
  - Land movement, and
  - Erosion
- Enhanced Excess Flow Valve (EFV) Installation – installation of EFVs on services that were installed prior to the EFV rule issued in 2006, and

- Dithiazine – a sulfur compound found in natural gas that has been known to cause equipment failure especially in district regulators.

4.3 Safety Policy and Practices

NW Natural also implements risk reduction activities not explicitly required by the federal code. These actions have been identified as prudent safety practices intended to enhance public safety, improve system reliability and maintain the safe operation of NW Natural's above and below-ground facilities including LNG Plants and underground natural gas storage facilities. These risk reduction actions include:

- Seismic vulnerability assessments of LNG Plants, the Mist Underground Storage Facility, and Transmission Pipeline System as recommended by SB 33 (2013) and consistent with the Governor's Resiliency 2025 Plan
- Accelerated replacement of vintage materials
- Transmission inspection outside of high and moderate consequence areas.
- Development of a Pipe Safety Management System (PSMS)
- Proactive EFV installation
- Locate ticket risk modeling
- Natural forces assessments of NW Natural's transmission system as part of NW Natural patrol and surveillance programs.

5. Projected and Preliminary Costs Presented in this Plan

The 2021 Capital and O&M costs presented in this plan are projected based on current expenditures for each of the identified projects through the end of the year. Costs presented for the significant safety initiatives are preliminary for planning purposes and do not include NW Natural overhead costs. Costs for safety projects under consideration will be presented in future SPPs.

6. 2021 Capital Safety Investment

In 2021, NW Natural estimates it will invest $11 MM in capital to comply with DIMP, TIMP, and other regulations. Significant projects in this category include:

6.1 Eugene Transmission (ILI) (2020-21 estimate of $2.5 MM):

This project involves transition of the Eugene transmission line from direct assessment to ILI. The Eugene transmission line is the primary feed to downtown Eugene and the University of Oregon. This pipeline is approximately 4 miles and is routed along Coburg Road, which is a major thoroughfare in the City of Eugene. In 2019, NW Natural began work on this pipeline to transition this pipeline from direct assessment to ILI with a plan to conduct an ILI assessment in 2021. Review of data from the assessment and remediation activities will continue in 2021.

6.2 Springfield Transmission (ILI) (2020-21 estimate of $1.2 MM):

This project involves transition of the Springfield transmission line from direct assessment to ILI. The Springfield transmission line is the primary feed to downtown Springfield and large industrial customers in the area. This pipeline is approximately 3 miles and is routed along Harlow Road, which is a major thoroughfare between the cities of Eugene and Springfield. This line is connected to the Eugene Transmission line and work will start on this transition in 2020. Completion of work to transition the pipeline will continue into 2021.

6.3 Green Hill Transmission (ILI) (2020-21 estimate $1.4 MM):

This project involves transition of the South Eugene transmission line from direct assessment to ILI. The South Eugene transmission line is a portion of a loop system around the City of Eugene that supports residential and industrial customers primarily located in the Northwest area of Eugene. This pipeline mainly follows Clear Lake Rd. and Green Hill Rd. on the south and west side of Eugene. This pipeline is approximately 5 miles in length.

6.4 South Eugene Transmission (ILI) (2020-21 estimate $1.4 MM):

This project involves transition of the South Eugene transmission line from direct assessment to ILI. The South Eugene transmission line is a transmission line from the South Eugene gate that mainly supports the IP Springfield facility. As part of upgrades to the station that supports this facility the transition will begin in 2020. Completion of this work to transition this pipeline will continue into 2021. This pipeline is approximately 6.5 miles in length.

6.5 Pro-active EFV Installations (2021 estimate of $500,000):

On October 14, 2016, the U.S. Department of Transportation's (DOT's) Pipeline and Hazardous Materials Safety Administration (PHMSA) adopted code requiring the installation of EFVs or shut-off valves on all new or replaced branched service lines (Docket No. PHMSA-2011-009). While the code requires EFV installations be installed in all new or replaced branched service lines, it did not require retrofitting EFVs on existing services.

NW Natural believes a proactive EFV installation program is a prudent action that can mitigate the consequence of a gas release resulting from excavation damage to a gas service line. To mitigate the consequence of an excavation damage NW Natural is implementing a policy to retrofit EFVs on existing gas service lines when the buried portion of the service line is exposed and the work involves the interruption of gas service.

6.6 Seismic Vulnerability Assessment and Study of NW Natural's Transmission Line System (2021 estimate of $1MM):

The performance of this assessment and study is in compliance with the recommendations of SB 33 (2013) published on October 1, 2014. SB 33 (2013) and in furtherance of the Governor's Resiliency 2025 Plan.

NW Natural completed a study of the transmission and high-pressure distribution systems (operating above 60 psig) in 2020. Results of the study will be 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 TIMP mitigation programs, including but 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.

6.7 Underground Storage – Well Integrity (2021 estimate of $3.0 MM)

PHMSA has issued an Interim Final Rule incorporating American Petroleum Institute (API) Recommended Practice 1171 referred to as the Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs by reference. NW Natural has developed a storage well integrity program and has begun work on the program incorporating all required provisions into operations at its Mist Underground Storage Facility. Work in 2021 will involve assessments of the production casings in 5-6 storage wells. The evaluations will include downhole wireline logging of the casings with a combination caliper and magnetic flux tool to identify deformations or metal loss.

6.8 Other safety projects and programs (2021 estimate of $1 MM):

Pipeline Replacement due to Natural Forces

Portions of the NW Natural distribution and transmission system cross through landslide faults or under water. Due to single weather events or the passage of time, it may be identified that pipelines at these locations are at risk or may be discovered as exposed during patrols. The Integrity Team develops plans to remediate these at-risk pipelines as they are discovered throughout the year.

Vintage Plastic

NW Natural installed ABS services from the 1960s. All known ABS services have been replaced; undocumented vintage plastic services are removed as found.

Meter Protection Installation

NW Natural continues a program to install guard posts adjacent to meter sets that are determined to be at risk of damage due to vehicle or equipment contact.

Pipeline Modification due to ROW Encroachment
Patrols on NW Natural Transmission Pipelines discover structures or other encroachments built adjacent to pipelines that impact the safe operation of the pipeline. This program works with landowners to remediate these encroachments.

6.9 ASV/RCV Installation (2021 estimate of $700k)

In order to efficiently close line valves on the transmission system in case of an incident, NW Natural is continually identifying key areas where ASV/RCV valves can be installed in order to efficiently isolate sections of the transmission system in case of an incident.

6.10 Historical Capital Expenditure - Safety Project Plan (System Integrity)

The Historical Capital Expenditures are actual expenditures for each of the presented year.

Year	Expenditure
2015	$17,190,356*
2016	$ 7,772,763
2017	$ 5,925,409
2018	$ 9,699,814
2019	$10,231,431
2020	$ 8,900,000

*Final year of known bare steel main replacement

Historical capital expenditures included:

- Work to modify pipelines to accept inline inspection devices. This work includes removal of non-piggable fittings and facilities required to launch and receive inline inspection devices.
- Pipeline relocations to mitigate threats including outside forces and natural forces. This work does not include relocations due to utility conflicts, or third-party improvement projects.
- Pipe replacements and testing in compliance with federal and state regulations.
- Ongoing DIMP AA programs/projects such as Vintage Plastic, Guardpost installations, Proactive EFV installations, etc.

7. 2021 O&M Expenditures

In 2021 NW Natural expects to spend $4.5MM in O&M to address and comply with DIMP, TIMP, damage prevention, and public awareness.

Activities that reflect expenditures in this category include costs for supplies (office/field), reference materials, education (conferences/workshops), vendor and contract costs associated with transmission assessments, sewer crossbore investigations and remediation, public awareness program materials, advertisements and mailings, and natural forces

investigation and remediation. This category also covers the Company's development of a Damage Prevention Risk Model to "risk rank" locate tickets based on the work performance of the excavator, the location of the excavation, the digging method and the pipeline pressure. The predictive rules will allow NW Natural to engage an excavator before they commence their work in order to mitigate potential damages to our facilities. Additionally, this category covers the development, initiation, and execution of studies and consulting fees related to integrity requirements, such as class location studies and third-party geotechnical site evaluations to address and mitigate risk.

In addition, O&M includes some non-capital internal labor in support of NW Natural's system integrity program (SIP). These costs include the Integrity Management staff (7 FTE), damage prevention specialists (3.5 FTEs plus proposed additional term limited additional FTEs to support pilot projects) involved in damage prevention/investigation, and a public information officer for safety outreach, training and program administration. The Integrity Management group may also utilize other internal resources in support of SIP activities which includes GIS analysts, Customer Service, Construction, and other subject matter experts. Significant O&M projects include:

7.1 Sewer Crossbore Inspections (2021 estimate of $1.6MM):

The sewer crossbore program involves the visual inspection of sanitary sewers for incidences of gas line crossbores. In installations where trenchless technology was used to install polyethylene pipe, there exists the possibility the gas line was bored through a sewer main or lateral. NW Natural's policy is to expose all foreign line crossings when performing trenchless work. Sewer crossbores typically occur when facility owners fail to locate their pipe, creating a situation where NW Natural is unable to expose facilities during construction. This is an industry-wide threat. Although sewer crossbores are not isolated to gas operators, the consequence when gas lines are involved can be high. This program identifies trenchless polyethylene installations and inspects the sewers in the vicinity to identify crossbores.

7.2 Transmission Inline Reassessment and Remediation (2021 estimate of $1.1MM):

This work includes the federally prescribed seven-year reassessment of transmission pipelines in HCAs and is comprised of both inline inspection and direct assessment of transmission assets and associated repairs.

7.3 Natural Forces (2021 estimate of $300,000):

Where the threat of natural forces can be mitigated without pipe replacement or rerouting, NW Natural may choose to address the threat through site work. This option can be critical in situations where a reroute is not feasible due to environmental restrictions or where a pipeline serves a critical customer or provides a single feed to a distribution system. Work may include armoring of slopes, re-grading of sites, culvert improvements, and retaining structures to address land movement and drainage issues.

7.4 Damage Prevention (2021 estimate of $800,000):

In compliance with DIMP regulations, and to address the single largest threat to gas facilities, NW Natural maintains a damage prevention department. The department consist of a supervisor and 2.5 FTE damage prevention specialists whose responsibilities include damage prevention through training, attendance at pre-construction meetings, participation in Utility Coordinating Councils, and support of the 811 One-call system. Damage prevention specialists are also responsible for the investigation, enforcement, and contractor training related to excavation and third-party damage.

NW Natural plans to enhance its damage prevention program through development of a Locate Ticket Risk Model. The goal of the risk model is to prevent third-party damages by engaging contractors prior to high risk excavation work unlike traditional damage prevention work involved responding to damages and providing training. The risk model uses algorithms, historical data, and machine learning to identify high risk jobs, thus allowing NW Natural personnel and contractors to visit construction sites prior to the start of work.

7.5 Public Awareness (2021 estimate of $500,000):

NW Natural's Public Awareness program meets the requirements mandated in API RP 1162, adopted by reference by PHMSA into Part 192.616(a),(b), and (c). This program promotes public safety through communication and outreach focused on educating customers and the general public about natural gas safety. The program includes customer correspondence, mailers, advertisements, community events, mobile phone applications, and brochures to excavators, contractors, public officials, dwellings and businesses along pipeline rights-of-way and in high consequence areas, floating homes, and schools.

The Public Awareness Plan utilizes television and radio advertising, bill inserts, social media, and events to promote natural gas safety awareness. Targeted outreach and public awareness materials are provided annually to customers near transmission pipelines, contractors, excavators, and first responders within NW Natural's service territory.

7.6 Right-of-Way Encroachments (2020 estimate of $200,000):

Pipeline patrols are used to identify changes in site conditions. An example of such a change is the installation of structures over pipelines, and inside dedicated pipeline rights-of-way, or easements. In some instances, the remediation may involve the relocation of structures and other non-gas facilities.

7.7 Historical O&M Expenditure - Safety Project Plan (System Integrity):

The historical O&M expenditures are actual expenditures for each of the presented years (not including PSMS or public awareness expenditures).

Year	Expenditure
2015	$ 4,034,218
2016	$ 4,889,618
2017	$ 4,771,267
2018	$ 4,000,000
2019	$ 3,052,000
2020	$ 3,100,000

Historic O&M expenditure included:

- Regulatory transmission assessments including the investigation and remediation of identified anomalies resulting from inline inspection and external corrosion direct assessment (ECDA).
- Sewer crossbore inspection program.
- Investigation and remediation of natural forces including landslides, flooding, erosion, etc.
- Buildover remediation where structures encroach into pipeline right-of-way.
- Digital conversion of historical facility records to facilitate system knowledge.
- Remediation of difficult to operate valves.
- Maintenance of Integrity Risk model as a result of geographical and system changes.

These above costs do not reflect those related to ongoing maintenance of facilities including right-of-way clearing, patrols, leakage, cathodic protection, and other ongoing routine O&M work.

8. 2021 Significant Safety Initiatives

8.1 Changes in TIMP Assessment Methodology

In 2021 NW Natural will extend the use of inline inspection (ILI) for integrity assessment of transmission pipelines. Transmission lines are assessed at seven-year intervals using one of three methodologies: inline inspection, direct assessment, or pressure testing. Inline inspection tools have the advantage of assessing the entire length of maintaining contact with the inner wall of the pipeline providing data that allows for the discovery of interacting anomalies such as pipe deformation and metal loss. In 2021 NW Natural will change the assessment methodology of four pipelines planned for reassessment in the Eugene-Springfield area.

The Eugene transmission line is the primary feed to downtown Eugene and the University of Oregon. The 4-mile pipeline is routed along Coburg Road.

The Springfield transmission line is the primary feed to downtown Springfield and large industrial customers in the area. The 3-mile long pipeline is routed along Harlow Road.

The Green Hill transmission line supports residential and industrial customers in the northwest area of Eugene. The 5-mile pipeline is a portion of a loop system around the City.

The South Eugene transmission line is the primary feed from the South Eugene Gate to the IP Springfield facility and the City of Springfield. The pipeline is approximately 6.5 miles long.

8.2 Pro-active EFV Installations

NW Natural has installed EFVs on all new single-family services since February of 1999. In 2016, Federal Code was modified to require the installation of EFVs on all new residential and small commercial services. In 2021, NW Natural will extend its EFV policy to include installation of EFVs on existing residential and small commercial services when the buried portion of the service line is exposed and service to the customer is interrupted. NW Natural believes proactive installation of EFVs is a prudent and pragmatic approach that can mitigate the consequence of an excavation damage to a service line.

8.3 System Wide Seismic Assessment

Building upon the seismic study of transmission and high-pressure distribution lines (operating greater than 60psig) a system wide seismic evaluation of the distribution system will be completed in 2020. The distribution system seismic study will support NW Natural's commitment to the Governor's Resiliency 2025 Plan; helping to identify and prioritize projects and programs based on understanding of land features and topography and how they interact with the distribution system. Projects as a result of this comprehensive report will begin in 2021.

8.4 Enhanced Damage Prevention

To address the single largest threat to natural gas facilities, NW Natural is developing a Locate Ticket Risk Model. The model aligns historical data and locate requests along with machine learning to analyze locate tickets and identify excavation work posing an elevated risk of excavation damage. Because third party excavation damage is largely behavioral, assigning a risk score to an individual locate requests will allow damage prevention personnel to focus efforts on educating contractors before beginning high risk work.

9. Safety Projects/Programs Being Evaluated at this Time – Tracking and Traceability

NW Natural is currently developing a roadmap to meet the proposed requirements of the Plastic Pipe Rule (Docket No. PHMSA–2014–0098). The DOT has designated the Plastic Pipe Rule a "significant rulemaking" due to economic impact; compliance with the Plastic Pipe Rule

will require new equipment, software, and process changes by NW Natural to meet tracking and traceability requirements.

When the roadmap is completed and the impact of the rule on current operations is understood, the Company will develop a program that will be included in future SPPs.

10. Cost Benefit Analyses & Alternative Analysis

The performance of a cost benefit analysis and alternatives analysis is difficult in the context of safety programs mandated by regulation. As a result, a cost benefit analysis has not been a primary consideration in this report because these safety projects are mandated by CFR, dictated by industry best practices, or driven by operational requirements. The assigned risk and prioritization for implementing these projects are based on in-depth studies and analysis of NW Natural's transmission and distribution systems as well as plant and storage assets. Studies performed as part of normal operations provide measurable and continual feedback needed to perform safety related work for which there are few practicable alternatives.

Alternative analysis and in-depth studies are useful when they identify threats and risks that can be mitigated or eliminated through the application of performance-based best practices, engineering analysis, operational knowledge, and subject matter experts. Where the Code of Federal Regulations prescribe compliance activity or mandate programs, the use of cost benefit, or alternative, analysis is not warranted.

When a pipeline safety initiative requires a cost benefit or alternative analysis NW Natural may select a qualified external resource to perform the analysis.

11. Legislative Update

11.1 Docket No. PHMSA-2011-0023 - the Safety of Gas Transmission and Gathering Lines

11.1.1 Rulemaking No. 1

Regulatory Mandate – involves MAOP reconfirmation, expansion of assessment requirements outside of high consequence areas, material verification, seismicity, reporting requirements, other related items. This rulemaking was published in October of 2019. NW Natural has reviewed the rule for impacts and is in full compliance as the first elements of the rule went into effect on July 1, 2020.

11.1.2 Rulemaking No. 2

Non-Regulatory Mandate – involves repair criteria, integrity management improvements, cathodic protection, and management of change, risk modeling requirements, external corrosion, internal corrosion, risk assessment requirements, safety of launchers and receivers, surveillance after weather events, and other related rules. This rulemaking is expected to be published in 2020.

11.1.3 Rulemaking No. 3

Safety of Gas Gathering Pipelines – involves gathering lines and is expected to be published in in 2020.

NW Natural will assess the full impact of all new or amended rules once published to understand the impact on operations and engineering practices. NW Natural will update programs and existing safety projects as needed to comply with new mandated requirements.

11.2 Docket No. PHMSA-2016-0016 – Underground Storage Facilities for Natural Gas

On February 12, 2020 the Final Rule incorporating API Recommended Practice 1171 referred to as the Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs by reference was published. NW Natural developed a storage well integrity program in compliance with API 1171 incorporating all required provisions into operations at Mist. NW Natural's program is in compliance with the final rule as published.

12. Completed Projects (or scheduled to be completed in 2020)

12.1 Central Coast Inline Inspection (ILI) ($5 MM):

This project is the completion of 2018 work which involves transitioning the central coast feeder from direct assessment to ILI. The central coast feeder will be NW Natural's longest and most complicated inline inspection to date. The portion of the central coast feeder that has a diameter of 10" which runs from Salem to Perrydale was completed in 2018. This inspection resulted in the discovery of no immediate repair conditions and prudent operator direct assessments were completed in 2019. The inspection of 12" portion which runs from Perrydale along Hwy 18 and Hwy 101 to Toledo was completed in 2019. This inspection resulted in the discovery of 10 immediate repair conditions. The pressure was lowered in the pipeline and these conditions were addressed in 2019. NW Natural has completed a comprehensive review of the assessment data for the 12" section and will complete Prudent Operator direct assessments in 2020.

12.2 Underground Storage - Well Integrity ($2.7MM – Actual)

This project involved the re-work and baseline assessment of nine wells in the Mist storage field. The 2020 projects are year two of NW Natural's well integrity baseline assessment work that includes down hole assessment of production casing and re-work of well tubing as at regular intervals. The program was developed to meet compliance with PHMSA's adoption of APR RP 1171 - Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs. This is a multiyear project which will be completed in 2027.

12.3 Locate Ticket Risk Model ($100,000 – Actual)

NW Natural is currently conducting a pilot program to understand resource requirements of a new Locate Ticket Risk Model Program. NW Natural expects to increase the footprint of the Damage Prevention department in future years to support increased damage prevention efforts. Locate ticket risk programs are an industry best practice to address third party excavation damages and will require additional resources to proactively reduce third party excavation damages.

12.4 Central Valve Automation ($166,238 - Actual):

This project involves the installation of remotely operated shutoff valves at the NW Natural Central Station. One of the valves at this location is the east side valve for the 20" – 400 MAOP Willamette River Crossing near downtown Portland. Other valves at this location will also be automated to allow for future installation of remote operated valves in the east side of Portland. Design and planning for this project was completed in 2019, however due to procurement lead times commissioning of valves was delayed to 2020. Theses valves were commissioned in 2020.

12.5 Underground Storage Integrity – Mist Reliability (Estimate $300,000):

As part of a mist reliability study and in anticipation of PHMSA's adoption of RP 1171, NW Natural performed inline inspection of four transmission pipelines that transport natural gas between storage wells at Mist into the NW Natural transmission system.

12.6 Labish Shallow Pipe Remediation (Estimate $600,000):

As a result of NW Natural's regularly scheduled patrols of the transmission pipeline system it was discovered that a 1200' section of 12" transmission pipe north of Salem had insufficient ground cover. Due to the shallowness of the pipe and the farming activities in the area the decision was made to replace the pipe in this area and have the pipe installed at a proper depth. The pipe replacement project is scheduled for the fall of 2020.

12.7 12" Willamette River Crossing (Estimate $900,000):

In 2014 an inline inspection was performed on Pipeline S02 from Aurora to Tualatin. This pipeline included a 10" Willamette River Crossing. During the inspection of the river crossing the inspection tool became damaged and the section was determined to be un piggable. This project replaces this unpiggagle 10" section with a 12" river crossing to allow the line to be inline inspected. This crossing is scheduled to be installed in the fall of 2020.

13. Conclusion

This SPP provides an overview of NW Natural's pipeline safety initiatives and commitment to the safe and reliable delivery of natural gas to the communities we serve. Through its 161-year history, NW Natural has been committed to identifying threats to pipeline safety and taking steps to address and mitigate those threats. Looking forward to the role natural gas will play in our energy future, and as members of the communities we serve, NW Natural recognizes the

trust placed on us by our neighbors and customers. NW Natural will continually work to ensure public safety and maintain the integrity of our natural gas system.