



**Cascade Natural Gas Corporation
Revised Pipeline Replacement Program Plan
June 2019**

Docket No. UG-120715

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I. Introduction

On December 31, 2012, the Washington Utilities and Transportation Commission (WUTC) issued a policy statement, in Docket UG-120715, for the accelerated replacement of natural gas pipeline facilities with elevated risk. This policy statement requires each gas company requesting a special pipe replacement cost recovery mechanism (CRM) to file with the Commission a pipe replacement program plan containing the following elements:

1. *A “master” plan for addressing all pipes with an elevated risk of failure*
2. *A two-year plan that specifically identifies the goals for the upcoming two-year period*
3. *A plan for identifying the location of pipe that presents elevated risk of failure*

In accordance with this policy statement, Cascade Natural Gas Corporation (Cascade) has previously submitted pipeline replacement program (PRP) plans, beginning in 2013, for pipe that poses an elevated risk of failure. Through Cascade’s Distribution Integrity Management Program (DIMP) and Transmission Integrity Management Program (TIMP), Cascade continually analyzes the performance of its gas distribution systems and through a detailed analysis indicate certain categories of Cascade’s gas system which present an elevated risk of failure. These categories are included as part of Cascade’s PRP plan.

II. Cascade’s Distribution Integrity Management Program (DIMP)

The requirement for Cascade to have a DIMP became effective on February 12, 2010. Operators were given until August 2, 2011, to write and implement a DIMP that demonstrates an understanding of the distribution system design and material characteristics; describes the operating conditions and environment; provides the maintenance and operating history; identifies existing and potential threats; evaluates and rank risks; identifies and implements measures to address risks; measures program performance; monitors results; evaluates effectiveness; and periodically assesses and improves the plan. The threats that are identified and evaluated in DIMP include:

- Corrosion
- Natural Forces
- Excavation Damage

- Other Outside Force Damage
- Material, Weld, or Joint Failure
- Equipment Failure
- Incorrect Operation
- Missing Data
- Other – Forces unique to a particular area on the system

Cascade's DIMP Plan describes these risks and steps in greater detail. Cascade's DIMP Plan is on file with the WUTC's Pipeline Safety Division.

III. Cascade's Transmission Integrity Management Program (TIMP)

PHMSA rules required Cascade to create and implement a TIMP by December 17, 2004. The purpose of TIMP is to identify, prioritize, assess, evaluate, repair, and validate the integrity of transmission pipelines that could, in the event of a leak or failure, affect High Consequence Areas (HCAs). The threats that are identified and evaluated in TIMP include:

- Corrosion (External, Internal, Stress Corrosion Cracking)
- Material
- Construction
- Equipment
- Excavation Damage
- Incorrect Operations
- Vandalism
- Weather and Outside Forces
- Cyclical Fatigue

Cascade's TIMP Plan describes these risks and steps in greater detail. Cascade's TIMP Plan is on file with the WUTC's Pipeline Safety Division.

IV. Integrity Management Analysis and Quantification

As part of Cascade's DIMP and TIMP Plans, a risk analysis has been created and is maintained. Information collected as part of DIMP and TIMP are inputted into the risk analysis, where it is analyzed to find areas of concern and trends. This allows Cascade to quantify the risk associated with each pipeline based on factors that are pertinent to this PRP Plan. Cascade's DIMP and TIMP contains a more detailed explanation of this process.

V. Identification of Pipelines for Replacement

DIMP and TIMP risk analysis results and SME input are used to identify the locations of pipelines that should be addressed in the PRP Plan.

For pipelines identified by DIMP, samples of the DIMP risk analysis for the areas identified in the PRP Plan are included in Appendix A. Once replacement locations are identified, specific projects within these areas are planned and prioritized based on coordination with district and on-site personnel considered to be Subject Matter Experts (SMEs). This helps ensure the replacement of pipeline segments with an elevated risk within the identified areas.

VI. Obtaining New Information

Cascade obtains new information for their DIMP and TIMP risk analysis and PRP Plan through the following methods:

1. Observing trending – DIMP and TIMP are analyzed on a yearly basis. The analysis includes reviewing leak information, failure analysis, and system condition data to identify trends. The analysis provides insight into the risks associated with pipe identified as having an elevated risk of failure that are included in the PRP plan.
2. New information is gathered through normal activities. Gathering new information from forms or other methods used to collect information related to the physical attributes and/or operating and maintenance activities. Integrating newly collected information into DIMP and TIMP.
3. Subject Matter Expert (SME) panel meetings – SME panel meetings are held on an appropriate basis. Information from the panel meetings are used to validate the DIMP and TIMP risk analysis and new information is inputted into the DIMP and TIMP risk analysis.
4. Updating risk analysis – Cascade’s DIMP and TIMP risk analysis is updated annually. Results of the risk analysis are used to prioritize pipeline replacement projects.
5. Continuous improvement – The assessment, prioritization, and mitigation of system risks continue to be refined as new and additional risk knowledge is incorporated into DIMP and TIMP through normal O&M and DIMP and TIMP activities. Activities related to DIMP and TIMP could include gathering data, conducting targeted inspections and assessments, and

completing remediation and replacement work associated with integrity management driven programs.

Based on new information that is obtained, the Master Plan may be modified appropriately to further accelerate or decelerate the pipe replacement schedule. Additionally, Cascade is actively monitoring system threats and performance and may identify additional pipeline segments that have an elevated risk of failure. If any changes are made to the PRP plan, Cascade will submit the changes to the WUTC as required by the policy statement.

VII. Cascade's PRP Plan Progress

The following table summarizes the miles of main replaced under the replacement programs according to the Master Plan since 2013.

Table 1. Summary of Replacement Programs from 2013-2018

Year	Miles of Main
2013	3.0
2014	4.8
2015	5.9
2016	11.9
2017	16.1
2018	19.3
Total	61.0

VIII. Early Vintage Steel Pipe (EVSP)

Master Plan

This Master Plan will serve as the guide that Cascade will use to determine which pipelines should be addressed as part of the PRP plan. This Master Plan will describe the possible risks that can be associated with Early Vintage Steel Pipe (EVSP).

Risk Assessment

Cascade has identified an increased risk of failure on different subsets of early vintage steel pipe (EVSP). EVSP is steel mains, service lines, and associated fittings installed earlier than 1/1/1970. These pipeline segments present an increased risk of failure due to aging and/or obsolete pipelines.

The primary risks on EVSP include external corrosion, material, weld, or joint failure, equipment failure, and missing data. External corrosion on EVSP is

attributed to bare, disbonded, damaged or poorly performing pipe coatings, poor soil and backfill conditions, ineffective cathodic protection, and other factors. Material, weld, or joint failure on EVSP is typically associated with issues with pipe welds made during installation (lack of weld standards and welder qualification), vintage acetylene gas welds, or pipe and fitting material leaks. Equipment failures on EVSP are normally contributed to leaks at main to service connections were O-rings have failed, mechanical couplings and fittings, and on other aging equipment installed when the pipe was originally installed. EVSP also has increased risk associated with pipe with unknown attributes or missing data, which includes unknown physical infrastructure (i.e. pipe material, pipe specifications, construction information) and historical information (i.e. corrosion control records, maintenance records, leak records).

Ongoing analysis of EVSP continues to show this pipe has a greater likelihood to leak, have corrosion, and/or substandard pipe conditions. These segments of main and their associated service piping have an elevated risk of failure as validated by DIMP and TIMP risk analysis. The different subsets of EVSP include:

Pre-CNG

Cascade operates pipeline segments that are classified as Pre-CNG pipe segments. Pre-CNG pipe segments are distribution systems that were constructed to distribute manufactured gas or natural gas. These pipelines were originally installed, owned, operated, and maintained by others prior to 1955. Cascade acquired many of these systems in the late 1950s and throughout the 1960s. The condition of the Pre-CNG pipe is typically bare steel or coal tar wrapped. This pipe is of concern since it is over 60 years old and operated with no or inadequate cathodic protection until the early 1970s, leaving the pipe suspect to elevated corrosion risk. Pre-CNG pipe also has elevated risks associated with missing data with not fully knowing the physical infrastructure and historical information of the Pre-CNG pipe. The extent of this pipe varies throughout Cascade’s and depends on the history of the system and how it was acquired by Cascade. The total miles of Pre-CNG in Washington is shown in Table 2 below.

Table 2. Total Miles of Pre-CNG in Washington

Total Miles of Pre-CNG Distribution Main	145.03 *
Total Miles of Pre-CNG Transmission Main	2.91

* Includes 144.97 miles with missing or unknown install date.

DIMP maps showing the 2013 and 2018 DIMP risk analysis for Longview/Kelso, Anacortes, and Shelton pipe replacement projects are shown in Appendix B. Through Pre-CNG pipe replacement projects Cascade has removed approximately 65 miles of Pre-CNG pipe as of the end of 2018.

FISH

Cascade operates pipeline segments that are classified as FISH pipe segments. FISH pipe segments are distribution systems that were installed by Fish Service & Management Corporation in the 1950's through the early 1960's. FISH pipe is normally coal tar wrapped. FISH pipe is of concern since it is around 60 years old and may have operated with no or inadequate cathodic protection until the early 1970s, leaving the pipe suspect to elevated corrosion risk. FISH pipe also tends to have an elevated likelihood to have leaks associated with material and welds. The extent of this pipe varies throughout Cascade's system and depends on the history of the system and how Cascade built out the system in the late 1950's and early 1960's. The total miles of FISH in Washington is shown in Table 3 below.

Table 3. Total Miles of FISH in Washington

Total Miles of FISH Distribution Main	205.99 *
Total Miles of FISH Transmission Main	0.00

* Includes 115.03 miles with missing or unknown install date.

Pre-1970

Cascade operates pipeline segments installed earlier than 1/1/1970 that are not classified as either Pre-CNG or FISH. These pipeline segments were originally installed by either Cascade employees or other contractors hired by Cascade. These pipeline segments are typically coal tar wrapped. This pipe is of concern due to its overall age may have had no or inadequate cathodic protection until the early 1970s, leaving the pipe suspect to corrosion risk. This pipe also has a elevated weld failure risk associated with leaks on vintage metal arc welds and acetylene gas welds. The total miles of Pre-1970 in Washington is shown in Table 4 below.

Table 4. Total Mile of Pre-1970 in Washington

Total Miles of Pre-1970 Distribution Main	1177.58 *
Total Miles of Pre-1970 Transmission Main	93.58

* Includes 242.83 miles with missing or unknown install date.

EVSP Replacement Program Plan

Cascade is actively replacing EVSP that poses an elevated risk of failure. Cascade will continue monitoring the performance of EVSP through DIMP and TIMP, and appropriately update the replacement schedule and timeframe as necessary. For pipe currently not identified as having an elevated risk of failure, Cascade will continue to incorporate new risk knowledge and evaluate whether this population warrants replacement under PRP in the future.

Two-Year Plan

The two-year plan is to continue replacing EVSP according to the Master Plan. The following table shows the planned replacement miles of EVSP for the next two years. Cascade’s two-year plan has been divided into two separate time periods. The time periods and the work that are proposed for each are listed below.

<i>November 1, 2018 – October 31, 2019 - Capital Replacement Projects</i>			
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED	REASON FOR MODIFICATION
ANACORTES DP EVSP REPLACEMENT, PHASE 7	MT. VERNON	EVSP (PRE-CNG, FISH)	N/A
LONGVIEW DP EVSP REPLACEMENT, PHASE 8	LONGVIEW	EVSP (PRE-CNG)	N/A
KELSO DP EVSP REPLACEMENT, PHASE 2	LONGVIEW	EVSP (PRE-CNG)	N/A
KELSO DP EVSP GRADE ST. REPLACEMENT	LONGVIEW	EVSP (PRE-CNG)	N/A
SHELTON DP EVSP REPLACEMENT, PHASE 3	ABERDEEN	EVSP (PRE-CNG)	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2018 - OCTOBER 31, 2019 TIME PERIOD DUE TO PERMITTING DELAYS. PROJECT SCHEDULED TO BE COMPLETED IN THE NOVEMBER 1, 2019 - OCTOBER 31, 2020 TIME PERIOD.
WALLA WALLA DP EVSP 9 TH AVE MILL CREEK REPLACEMENT	WALLA WALLA	EVSP (FISH)	N/A
12" LONGVIEW KELSO HP DISTRIBUTION EVSP REPLACEMENT, PHASE 3	LONGVIEW	EVSP (PRE-CNG) *	N/A
4" OTHELLO HP EVSP REPLACEMENT	WENATCHEE	EVSP (PRE-1970) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2018 - OCTOBER 31, 2019 TIME PERIOD DUE TO DESIGN, PERMITTING, AND RIGHT OF WAY DELAYS. PROJECT SCHEDULED TO BE COMPLETED IN THE NOVEMBER 1, 2019 - OCTOBER 31, 2020 TIME PERIOD.

<i>November 1, 2018 – October 31, 2019 - Capital Replacement Projects - Continued</i>			
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED	REASON FOR MODIFICATION
6" ANACORTES HP DISTRIBUTION EVSP REPLACEMENT, PHASE 2	MT. VERNON	EVSP (FISH)*	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2018 - OCTOBER 31, 2019 TIME PERIOD DUE TO CONSTRUCTION DELAYS. PROJECT WAS IN-SERVICE ON NOVEMBER 20, 2019.
BELLINGHAM DP EVSP ALLEYWAY REPLACEMENTS	BELLINGHAM	EVSP (FISH, PRE-1970)	N/A
LYNDEN DP EVSP ALLEYWAY REPLACEMENTS	BELLINGHAM	EVSP (PRE-CNG)	N/A

* PIPELINE SEGMENT IDENTIFIED IN SETTLEMENT AGREEMENT DOCKET PG-150120.

<i>November 1, 2019 – October 31, 2020 - Capital Replacement Projects</i>			
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED	REASON FOR MODIFICATION
ANACORTES DP EVSP REPLACEMENT, PHASE 8	MT. VERNON	EVSP (PRE-CNG, FISH)	N/A
LONGVIEW DP EVSP REPLACEMENT, PHASE 9	LONGVIEW	EVSP (PRE-CNG)	PROJECT CANCELED FOR THE NOVEMBER 1, 2019 – OCTOBER 31, 2020 TIME PERIOD TO COMPLETE REPLACEMENT IN ANACORTES, WA. FUTURE REPLACEMENT IN LONGVIEW WILL OCCUR IN FUTURE PLAN YEARS.
KELSO DP EVSP REPLACEMENT, PHASE 3	LONGVIEW	EVSP (PRE-CNG)	PROJECT CANCELED FOR THE NOVEMBER 1, 2019 – OCTOBER 31, 2020 TIME PERIOD TO COMPLETE REPLACEMENT IN ANACORTES, WA. FUTURE REPLACEMENT IN KELSO WILL OCCUR IN FUTURE PLAN YEARS.
SHELTON DP EVSP REPLACEMENT, PHASE 4	ABERDEEN	EVSP (PRE-CNG)	PROJECT CANCELED FOR THE NOVEMBER 1, 2019 – OCTOBER 31, 2020 TIME PERIOD TO COMPLETE REPLACEMENT IN ANACORTES, WA. FUTURE REPLACEMENT IN SHELTON WILL OCCUR IN FUTURE PLAN YEARS.
6" ANACORTES HP DISTRIBUTION EVSP REPLACEMENT, PHASE 2	MT. VERNON	EVSP (FISH) *	PROJECT WAS MOVED FROM NOVEMBER 1, 2018 – OCTOBER 31, 2019 TIME PERIOD DUE TO CONSTRUCTION DELAYS. PROJECT WAS IN-SERVICE ON NOVEMBER 20, 2019.
SHELTON DP EVSP REPLACEMENT, PHASE 3	ABERDEEN	EVSP (PRE-CNG)	PROJECT WAS MOVED FROM NOVEMBER 1, 2018 – OCTOBER 31, 2019 TIME PERIOD DUE TO PERMITTING DELAYS.
4" OHELLO HP EVSP REPLACEMENT	WENATCHEE	EVSP (PRE-1970) *	PROJECT WAS MOVED FROM NOVEMBER 1, 2018 – OCTOBER 31, 2019 TIME PERIOD DUE TO DESIGN, PERMITTING, AND RIGHT OF WAY DELAYS.

<i>November 1, 2019 – October 31, 2020 - Capital Replacement Projects - Continued</i>			
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED	REASON FOR MODIFICATION
2" NOOKSACK HP DISTRIBUTION EVSP REPLACEMENT	BELLINGHAM	EVSP (PRE-1970)*	PROJECT REMOVED FROM THE NOVEMBER 1, 2019 – OCTOBER 31, 2020 TIME PERIOD. PIPE SEGMENT WILL BE PRESSURE TESTED IN CONJUNCTION WITH THE 4" SOUTH LYNDEN 2020 MAOP PRESSURE TESTING PROJECT.
3" ZILLAH HP EVSP REPLACEMENT	YAKIMA	EVSP (FISH)*	N/A
4" ARLINGTON HP EVSP REPLACEMENT	MT. VERNON	EVSP (FISH)*	PROJECT DELAYED TO AFTER NOVEMBER 1, 2020.
8" BREMERTON HP EVSP REPLACEMENT	BREMERTON	EVSP (PRE-1970)*	PROJECT DELAYED TO AFTER NOVEMBER 1, 2020.
12" LONGVIEW KELSO HP DISTRIBUTION EVSP REPLACEMENT, PHASE 4	LONGVIEW	EVSP (PRE-CNG)*	PROJECT DELAYED TO AFTER NOVEMBER 1, 2020. DUE TO DESIGN AND PERMITTING DELAYS.
6" ANACORTES HP DISTRIBUTION EVSP REPLACEMENT, PHASE 3	MT. VERNON	EVSP (FISH)*	N/A
8" MARCH POINT TRANSMISSION EVSP REPLACEMENT, PHASE 2	MT. VERNON	EVSP (PRE-1970)*	PROJECT DELAYED TO AFTER NOVEMBER 1, 2020. DUE TO PERMITTING AND RIGHT OF WAY DELAYS.
8" YAKIMA HP EVSP REPLACEMENT	YAKIMA	EVSP (FISH)*	PROJECT DELAYED TO AFTER NOVEMBER 1, 2020. DUE TO RIGHT OF WAY DELAYS.

* PIPELINE SEGMENT IDENTIFIED IN SETTLEMENT AGREEMENT DOCKET PG-150120.

The projects listed in these tentative schedules are based on the best information available at this time. As more information becomes available and risk analysis is updated, the prioritization of the projects may change. DIMP output for replacement projects is shown in Appendix A.

Summary of the previous two-year plan from November 1, 2016 – October 31, 2018 is shown in Appendix C.

Identification Plan

The location of EVSP that presents an elevated risk of failure is continually monitored by reviewing system information that includes leak repairs, active leaks, and exposed pipe condition reports. In conjunction with reviewing system performance data, the geographic information system (GIS) and risk analysis is being utilized to proactively identify any new areas that may present an elevated risk of failure.

IX. Public Interest

The pipe replacement plans for the portion of Cascade's gas distribution system that pose an elevated risk of failure included in this PRP plan have been developed considering many factors. These factors include:

- Improving the safety of the distribution system by replacing pipe based on the relative level of risk presented for each material and location.
- Minimizing the replacement costs by maximizing efficiencies and productivity.
- Minimizing the impacts to municipalities and the general public.