



Cascade Natural Gas Corporation Pipeline Replacement Program Plan

June 2023

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1. 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.

2. 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

DIMP requirements are outlined in 49 CFR Part 192 Subpart P - Gas Distribution Pipeline Integrity Management (IM). Cascade's DIMP consists of seven essential elements, these seven elements are as follows:

- Demonstrate knowledge of distribution system
- Identify threats
- Evaluate and prioritize risk
- Identify and implement measures to address risks
- Measure performance, monitor results, and evaluate effectiveness
- Perform periodic evaluation and improvement
- Report results

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.

DIMP activities may include performing additional or accelerated actions to address threats and associated risk to the Company's distribution system, this may include performing increased or additional maintenance activities (e.g. patrols, leak survey, regulator maintenance). They also include pipeline replacements, relocations, and modifications in compliance with integrity management rules, and to mitigate identified threats.

3. 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 (HCA). The threats that are identified and evaluated as part of TIMP include:

- Time-Dependent Threats (grow over time)
 - External Corrosion
 - Internal Corrosion
 - Stress Corrosion Cracking
- Stable Threats (threats that act when influenced by another condition or failure mechanism)
 - Manufacturing Related Defects
 - Construction Related
 - Equipment
- Time-Independent Threats (not influenced by time)
 - Third Party / Mechanical Damage
 - Incorrect Operations
 - Weather-Related and Outside Force
- Human Error Threats

TIMP requirements are outlined in 49 CFR Part 192 Subpart O - Gas Transmission Pipeline Integrity Management. Cascade's TIMP is divided into four major sections:

- Segment Identification
- Risk Assessment
- Baseline and Continuing Assessment Plan
- Supporting Processes

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.

TIMP activities include baseline assessments and reassessments of transmission lines using pressure testing, inline inspection, and other direct assessment methods. They also include pipeline replacements, relocations, and modifications in compliance with integrity management rules, and to mitigate identified threats.

4. 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.

5. 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.

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.

6. Obtaining New Information

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

- 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.
- 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.

- Subject Matter Experts (SME) – SMEs are consulted regarding operational knowledge of distributions systems, threat identification, risk evaluation and ranking, and risk mitigation.
- 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.
- 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.

7. 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 2013-2022

Year	Miles of Main
2013	3.0
2014	4.8
2015	5.9
2016	11.9
2017	16.1
2018	19.3
2019	7.2
2020	9.3
2021	6.3
2022	3.1
Total	86.9

8. Early Vintage Steel Pipe (EVSP)

8.1. 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).

8.2. 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 where 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), and sufficient information to establish MAOP.

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:

8.2.1. 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	132.66 *
Total Miles of Pre-CNG Service Line	0.00
Total Miles of Pre-CNG Transmission Main	0.00

* Includes 132.60 miles with missing or unknown install date.

8.2.2. 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	200.43 *
Total Miles of FISH Service Line	0.00
Total Miles of FISH Transmission Main	0.00

* Includes 112.18 miles with missing or unknown install date.

8.2.3. 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 an 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 Miles of Pre-1970 in Washington

Total Miles of Pre-1970 Distribution Main	1,123.74 *
Total Miles of Pre-1970 Service Line	490.06 **
Total Miles of Pre-1970 Transmission Main	53.03

* Includes 183.67 miles with missing or unknown install date.

** Includes 26.87 miles with missing or unknown install date.

8.3. 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.

8.4. System Safety & Integrity Program (SSIP)

Cascade’s SSIP is a structured replacement program for replacing EVSP. Cascade’s SSIP utilizes Cascade’s DIMP risk model and relative risk score to establish a weighted average risk score for each town within Washington. The weighted average risk score is then used to identify towns with increased risk related to EVSP.

8.5. Two-Year Plan

The two-year plan is to continue replacing EVSP according to the Master Plan. The following table shows the planned replacement 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, 2022 – October 31, 2023 - Capital Replacement Projects</i>		
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED
SHELTON SSIP REPLACEMENT	ABERDEEN	EVSP (PRE-CNG, PRE-1970)
KELSO SSIP REPLACEMENT	LONGVIEW	EVSP (PRE-CNG, PRE-1970)
12” LONGVIEW KELSO HP DISTRIBUTION REPLACEMENT, PHASE 7	LONGVIEW	EVSP (PRE-CNG) *
8” WALLA WALLA HP REPLACEMENT	WALLA WALLA	EVSP (FISH) *
8” BREMERTON HP REPLACEMENT	BREMERTON	EVSP (PRE-1970) *

<i>November 1, 2022 – October 31, 2023 - Capital Replacement Projects</i>		
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED
3" SOUTH TOPPENISH REPLACEMENT	YAKIMA	EVSP (FISH) *
6" TOPPENISH-ZILLAH HP REPLACEMENT SECTION 1	YAKIMA	EVSP (FISH) *
2"3/4" SUNNYSIDE HP REPLACEMENT	YAKIMA	EVSP (FISH) *
6" TOPPENISH-ZILLAH HP REPLACEMENT SECTION 2	YAKIMA	EVSP (FISH) *

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

<i>November 1, 2023 – October 31, 2024 - Capital Replacement Projects</i>		
PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED
KELSO SSIP REPLACEMENT	LONGVIEW	EVSP (PRE-CNG, PRE-1970)
3" PROSSER HP REPLACEMENT	WENATCHEE	EVSP (PRE-CNG, PRE-1970) *
8" YAKIMA HP REPLACEMENT	YAKIMA	EVSP (FISH) *
3" BURLINGTON HP REPLACEMENT	MOUNT VERNON	EVSP (PRE-1970) *
2"3/4" WHEELER HP REPLACEMENT	WENATCHEE	EVSP (PRE-1970) *
4" MONTESANO HP REPLACEMENT	ABERDEEN	EVSP (PRE-1970) *

* 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 (design, permitting, easements, etc.) and risk analysis is updated, the prioritization and schedule of the projects may change.

Summary of the previous two-year plan from November 1, 2020 – October 31, 2022 is shown in Appendix A.

8.6. 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.

9. 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.

APPENDIX A
PREVIOUS TWO-YEAR PLAN SUMMARY

NOVEMBER 1, 2020 – OCTOBER 31, 2021

FUNDING PROJECT(S)	WO#(S)	PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED	PIPE SIZE / PIPE MATERIAL	REPLACED MILEAGE	NEW MILEAGE	PIPE SIZE / PIPE MATERIAL	REPLACED MILEAGE	NEW MILEAGE
FP-318186 FP-318187	274769 274770	ANACORTES SSIP REPLACEMENT, PHASE 8	MT. VERNON	EVSP (PRE-CNG, FISH, PRE-1970)	2/4" STL	0.91	0	2/4" PE	0	0.86
FP-318186 FP-318187 FP-317528	284792 284794 266102	SHELTON SSIP EVSP REPLACEMENT, PHASE 4	ABERDEEN	EVSP (PRE-CNG, PRE-1970)	2/4" STL	2.36	0	2/4" PE	0	2.32
-----	-----	LONGVIEW EVSP REPLACEMENT	LONGVIEW	EVSP (PRE-CNG)	PROJECT NOT COMPLETED DURING NOVEMBER 1, 2020 – OCTOBER 31, 2021 TIME PERIOD. FUTURE REPLACEMENT WILL TAKE PLACE IN FUTURE PLAN YEARS.					
FP-316033	282253	3" ZILLAH HP EVSP REPLACEMENT	YAKIMA	EVSP (FISH) *	3" STL	0.16	0	4" STL	0	0.15
FP-316570	276206	12" LONGVIEW KELSO HP DISTRIBUTION EVSP REPLACEMENT, PHASE 4	LONGVIEW	EVSP (PRE-CNG) *	12" STL	0.92	0.93	--	--	--
FP-316571	284449	12" LONGVIEW KELSO HP DISTRIBUTION EVSP REPLACEMENT, PHASE 5	LONGVIEW	EVSP (PRE-CNG) *	12" STL	0.77	0.78	--	--	--
FP-316580	283405	6" ANACORTES HP DISTRIBUTION EVSP REPLACEMENT, PHASE 3	MT. VERNON	EVSP (FISH) *	6" STL	0.55	0.58	--	--	--
FP-316923 FP-320458	280309 284821	8" MARCH POINT TRANSMISSION EVSP REPLACEMENT, PHASE 2	MT. VERNON	EVSP (PRE-1970) *	8" STL	0.61	0.58	--	--	--
FP-319502 FP-319503	278429 278431	8" CENTRAL WHATCOM TRANSMISSION EVSP REPLACEMENT	BELLINGHAM	EVSP (PRE-1970) *	8" STL	0.03	0.03	--	--	--

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

NOVEMBER 1, 2021 – OCTOBER 31, 2022

FUNDING PROJECT(S)	WO#(S)	PROJECT	DISTRICT	PROJECT DESCRIPTION	PIPE SIZE / PIPE MATERIAL	REPLACED MILEAGE	NEW MILEAGE	PIPE SIZE / PIPE MATERIAL	REPLACED MILEAGE	NEW MILEAGE
FP-318186 FP-318187	284792 284794	SHELTON DP EVSP REPLACEMENT, PHASE 5	ABERDEEN	EVSP (PRE-CNG, PRE-1970)	2" STL	1.48	0.01	2/4" PE	0.07	1.56
FP-316897 FP-322126	291428 292375	12" LONGVIEW KELSO HP DISTRIBUTION EVSP REPLACEMENT, PHASE 6	LONGVIEW	EVSP (PRE-CNG) *	12" STL	0.70	0.70	--	--	--
FP-321243	292003	8" WALLA WALLA HP EVSP REPLACEMENT	WALLA WALLA	EVSP (FISH) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2021 - OCTOBER 31, 2022 TIME PERIOD DUE TO DESIGN, PERMITTING, AND CONSTRUCTION DELAYS. PROJECT IN-SERVICE ON DECEMBER 30, 2022.					
FP-316044	291429	8" BREMERTON HP EVSP REPLACEMENT	BREMERTON	EVSP (PRE-1970) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2021 - OCTOBER 31, 2022 TIME PERIOD DUE TO DESIGN, PERMITTING, AND CONSTRUCTION DELAYS. PROJECT IN-SERVICE ON MARCH 16, 2023.					
FP-316046 FP-322165 FP-322173	268461 292701 292715	8" YAKIMA HP EVSP REPLACEMENT	YAKIMA	EVSP (FISH) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2021 - OCTOBER 31, 2022 TIME PERIOD DUE TO DESIGN, PERMITTING, AND CONSTRUCTION DELAYS. PROJECT MOVED TO NOVEMBER 1, 2023 – OCTOBER 31, 2024 TIME PERIOD.					
FP-316018	-----	2" WHEELER HP EVSP REPLACEMENT	WENATCHEE	EVSP (PRE-CNG, PRE-1970) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2021 - OCTOBER 31, 2022 TIME PERIOD DUE TO DESIGN, PERMITTING, AND CONSTRUCTION DELAYS. PROJECT MOVED TO NOVEMBER 1, 2023 – OCTOBER 31, 2024 TIME PERIOD.					
FP-316031	292522	3" SOUTH TOPPENISH EVSP REPLACEMENT	YAKIMA	EVSP (FISH) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2021 - OCTOBER 31, 2022 TIME PERIOD DUE TO DESIGN, PERMITTING, AND CONSTRUCTION DELAYS. PROJECT IN-SERVICE ON FEBRUARY 22, 2022.					
FP-316032	2292980	3" SUNNYSIDE HP EVSP REPLACEMENT	YAKIMA	EVSP (FISH) *	PROJECT NOT COMPLETED IN THE NOVEMBER 1, 2021 - OCTOBER 31, 2022 TIME PERIOD DUE TO DESIGN, PERMITTING, AND CONSTRUCTION DELAYS. PROJECT MOVED TO NOVEMBER 1, 2022 – OCTOBER 31, 2023 TIME PERIOD.					
FP-316035 FP-321832	285585 289530	4" ARLINGTON HP EVSP REPLACEMENT	MT. VERNON	EVSP (FISH) *	4" STL	0.96	0	6" STL	0	1.03

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