Avista Utilities

Two-Year Plan for Managing Replacement of Select Pipe in Avista Utilities' Natural Gas System in its Washington Service Area

May 28, 2021

Introduction

On December 31, 2012, the Washington Utilities and Transportation Commission ("Commission") issued a policy statement related to the accelerated replacement of natural gas pipeline facilities with elevated risk.[1] This policy statement requires each natural gas company to file with the Commission, for approval, a pipe replacement program plan consisting of the following:

1. *A "master" plan for replacing all pipes with an elevated risk of failure;*
2. *A two-year plan that specifically identifies the pipe replacement goals for the `upcoming two-year period; and*
3. *If applicable, a plan for identifying the location of pipe that presents elevated risk of failure.*

Avista Utilities ("Avista" or "Company") has previously filed with the Commission, in connection with this docket, its Master Plan for the two types of pipe in its system that exhibit elevated risk of failure: 1) select vintages of Aldyl-A pipe manufactured by DuPont, and 2) steel pipe isolated from cathodic protection. Since neither of these two Master Plans have materially changed since they were initially filed with the Commission (e.g. scope, schedule, risk, timeline, priority, etc.), they constitute, as previously filed, the Company's current Master Plans. In accordance with the Commission's policy statement, the following report is Avista Utilities' Two-Year Plan for Managing Pipe Replacement for these two types of piping, for the two-year reporting period commencing June 1, 2021.

Additionally, in response to item number 3 above, less than 0.01 percent of the natural gas piping in Avista's distribution system in Washington is of unknown material (e.g. plastic, steel, etc.). Avista is continuing its process of verifying these unknown segments and currently has 433 feet of unknown piping in its system remaining to be assessed. Until this piping has been classified, each unknown segment is being managed as if it does in fact, pose an elevated risk of failure. This conservative approach ensures any potential risk associated with these unknown segments is properly accounted for in Avista's management

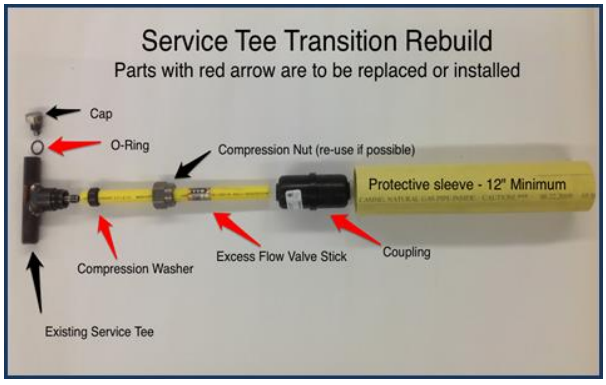
[1] Commission's Policy on Accelerated Replacement of Pipeline Facilities with Elevated Risk – Docket No. UG-120715.

of its natural gas facilities. In consideration of these facts, and consistent with the previous two-year reporting period, the Company is not preparing or filing a plan for identifying the location of pipe with an elevated risk of failure.

Two-Year Plan for Managing Pipe Replacement in Avista Utilities' Natural Gas System

I. Avista's Priority Aldyl-A Pipe Replacement Program

Avista is continuing its planned 20-year program to systematically remove and replace select portions of the DuPont Aldyl-A medium density polyethylene pipe in its natural gas distribution system. The Company's Master Plan for this program, titled "Protocol for Managing Select Aldyl-A Pipe in Avista's Natural Gas System," provides the background on this pipe, the vintages and types of pipe slated for replacement, as well as the rationale for the proposed 20-year replacement program. None of the subject pipe is "high pressure main pipe," but rather, consists of distribution mains at maximum operating pressures of 60 psi and pipe diameters ranging from 1¼ to 4 inches. As part of this program, Avista has also completed rebuilding thousands of transition fittings used to connect Aldyl-A service piping (one-half and three-quarter inch diameter) to steel tees that are welded to steel main pipe ("service tee transitions"). This Aldyl-A sub-program was known as the Service Tee Transition Rebuild (STTR) program. The illustration below shows the replacement components of a new service tee transition.



The Gas Facilities Replacement Program (GFRP) is the operational entity at Avista responsible for managing the Aldyl-A Pipe replacement activities throughout Avista's service territories.

Nature of the Safety Risk – Early vintages of Aldyl-A pipe produced for natural gas service from the 1960s through the early 1980s are subject to "premature brittle-like cracking." This failure process results from a premature loss of 'ductility' or flexibility in the pipe material. Ductility is a fundamentally important property of polyethylene piping, and its loss allows small cracks to form on the inner wall of the pipe, which eventually propagate through the pipe wall, resulting in failure. Unfortunately, early industry tests did not diagnose these failures as resulting from this loss in ductility, so the phenomenon was poorly understood for many years. This tendency for brittle-like cracking renders the pipe more susceptible to failure over time than newer-generation polyethylene pipe, and this tendency to fail increases with time.

Completed Replacement Activities – Under guidance of the Master Plan, Avista began replacing select Aldyl-A piping in its Washington service territory in 2011. The Company's actual progress and investment in Washington for the period 2011 through 2020 is summarized in Table 1.

Table 1. Summary of Avista's Priority Aldyl-A Replacement Program in Washington, 2011 – 2020 (Replacement miles via construction).

Year	Miles of Main Pipe	Number of Tees[2]	Investment
2011	7.4	0	$2,710,248
2012	8.6	3	$2,980,449
2013	12.4	912	$8,854,998
2014	10.7	1,941	$8,295,520
2015	10.57	2,655	$9,855,791
2016	10.23	1,860	$10,832,447
2017	14.62	0	$8,961,009
2018	15.30	0	$10,288,541
2019	19.10	0	$10,048,740
2020	13.2	0	$9,363,482
Totals	114.9	7,371	$82,191,225

[2] By the end of 2016 the tee replacement work in Washington had been substantially completed, and Avista officially sun-downed the program system wide in December 2017. Approximately 61 tees remain and will be resolved by local district offices and tracked by the GFRP.

While the GFRP has been directly responsible for removing 114.9 miles of Aldyl-A main through construction activity, Avista's System of Record indicates an additional 50.1 miles have been removed for a total of 165 miles completed. The additional mileage of main pipe removed can be attributed to a combination of routine system repairs, mapping corrections, municipal road projects, Aldyl-A opportunity projects, and the Odessa project which occurred in 2011 prior to the formation of the GFRP. As of 2020, 46% of the original 355 miles are now complete.

Identification of Sections of Unknown Pipe – In 2011, the Company identified 734 segments of installed service pipe in its Washington service area that were of unknown material, with a cumulative length of 6.3 miles. Avista has been systematically identifying these unknown segments through the review of as-built service cards, exposed piping reports, and field employees noting mapping corrections. The number of segments properly identified each year are shown below in Table 2

Table 2. The Number of Unknown Pipe Segments Identified in Washington from 2011-2020.

Washington Unknown Pipe Segments		
Year	**Identified Segments**	**Miles**
2011	112	0.7
2012	266	2.2
2013	60	0.6
2014	82	0.8
2015	53	0.6
2016	69	0.8
2017	8	0.1
2018	41	0.4
2019	22	0.1
2020	2	0.01

Currently, there are six segments (433 feet) of unknown service piping in the Company's Washington natural gas system. Avista will continue to identify these remaining unknown segments through the ongoing course of operations by the means described above.

In addition to unknown pipe, the GFRP has actively worked to validate Aldyl-A pipe vintages prior to commencing construction activities. This is done by utilizing pre-

construction pipe verification in combination with map corrections. From 2018 through 2020, 9.12 miles of pipe have been verified as not needing to be replaced. Due to these proactive efforts, the GFRP estimates avoided construction costs of more than $6.3MM.

Program Goals for 2022 and 2023

During the next two-year period, the Company will focus on: 1) continuing its replacement activities in accordance with its Master Plan; 2) continuing to optimize its use of specialized contract crew resources; 3) continuing to refine its processes for project prioritization and detailed work planning; 4) continuing to evaluate and employ alternative construction methods and technologies to minimize expensive pavement restoration; and 5) incorporating any changes to the overall program that might be identified through the work of Avista's asset management group, and integrating emerging priorities that may be identified in the Company's Distribution Integrity Management Plan (DIMP).

Current Actions under the Program

Efficient Construction Resources – Avista's GFRP continues to complete the majority of its Aldyl-A replacement using contract crews and equipment. The work effort is specialized, subject to seasonal constraints, additive to the normal workload and staffing levels associated with the Company's ongoing natural gas operations, and consequently is much more cost efficient. In its previous two-year plans Avista reported on its competitive selection of the NPL Construction Company[3] ("NPL") to perform its primary Aldyl-A main pipe replacement and rebuilding of service tee transitions for a 5-year term. NPL's proven expertise and mastery of specialized construction techniques has been a real asset in our efforts to complete the work

[3] NPL Construction Company, formerly known as Northern Pipeline Construction Company, has a national reputation for safe, high quality and cost-effective construction services, including the installation or replacement of over ten million feet of pipe and other underground facilities each year.

on time and effectively manage costs. As discussed later in this report, the Company continues to work with NPL to refine its use of specialized construction technologies that allow us to be more efficient and cost effective. The image above shows the "keyhole" technology used to minimize the pavement impact associated with pipe identification and rebuilding STTRs.

Managing the Unit Costs of Replacement – At the time the Company developed its Aldyl-A Master Plan, its experience with the cost of main pipe installation was almost exculsively with new construction. Avista has since gained several years' experience in our jurisdictions with the actual costs of pipe replacement. By its nature, replacement is substantially more complex than new construction because it most frequently takes place in established municipal areas and neighborhoods with existing paved roadways, sidewalks, landscaping, and other underground facilities. The illustration at left shows the pavement cut required for open trench installation of new main pipe.

In addition to the added cost of installing the pipe, the pavement cutting and remediation policies of local jurisdictions have had a significant impact on the scheduling, logistics, operational methods, extent of the area to be repaved, and the ultimate cost of pipe replacement. In Avista's experience, there appears to be a continuing trend among jurisdictions to enforce restrictive moratoria on cutting in newer arterials and streets, to require more expansive requirements for backfill and compaction, and for patching or repaving of streets cut for pipe replacement. These requirements include rules on the export and import of trench backfill materials, significant soil compaction, and the width of pavement restoration, which averages 4 feet and can range from 2 feet up to 8 feet along segments of the project.

The GFRP has been tracking project costs since its inception and recognizes that no two projects are alike. Each individual project has its own scope of work and a unique set of physical conditions that drive a varitation on the cost per linear foot and total cost. Some

primary scope variables include quantities such as; miles to be replaced, service tie-overs, main tie-ins, valves, and main pipe abandonment segments. Furthermore, each project has physical variables including; road surface type (paved/non-paved), surface obstructions, sub-surface obstructions, utilities, pipe routing, soil type, soil conditions, municipal restoration and inspection requirements, and installation methods employed. In prior projects, the Company has experienced a range of costs for replacing its Aldyl-A pipe. Projects with minimal road restoration have been reported to cost $35 per liner foot, while other more complex projects with extensive road restoration can average as much as $163 per linear foot. In 2019, the GFRP reported an average cost of $106 per linear foot. In 2020, the GFRP reported an average cost of $159 per linear foot, with a wide variation from $98 per linear foot for pipe installed in Reardan, WA (3.76 miles completed) , to $266 per linear foot on the South Hill in Spokane, WA (0.40 miles completed), which included extensive road restoration work. For comparison, in 2020, Washington projects averaged a cost for replacement at $159 per linear foot. Oregon projects averaged $257 per linear foot and Idaho projects averaged $123per linear foot. A comparison of average cost per foot for GFRP regions is listed in Table 3 below:

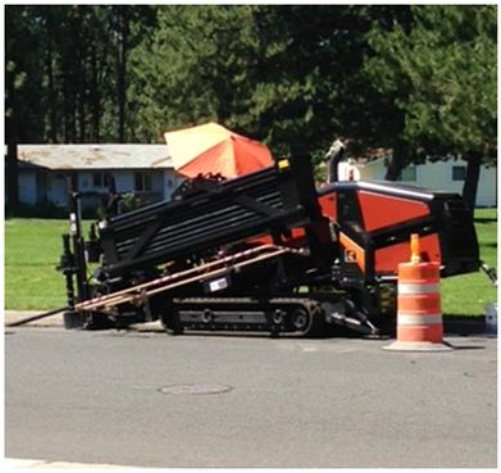
Table 3. Average Cost Per Foot Comparison for GFRP Regions 2017-2020

Average Cost Per Foot Comparison for GFRP Regions

Year	WA Average CPF	Miles Completed	OR Average CPF	Miles Completed	ID Average CPF	Miles Completed
2017	$132	14.6	$122	7.1	$123	5.40
2018	$105	15.3	$153	9.2	$115	7.54
2019	$106	9.1	$125	7.4	$137	12.74
2020	$159	13.2	$257	2.6	$123	8.45

It is important to note that projects subject to onerous municipal road restoration requirements simply cost more. Aldyl-A projects typically occur within the right-of way under paved surfaces and experience a road restoration range of 27% - 30% of the total project cost.

Optimizing Trenchless Technology – Given the high unit costs associated with open trenching and roadway restoration, the Company has continued to work with NPL to optimize the use of trenchless technologies. The image at right shows the horizontal directional drilling (HDD) machine used to install main pipe. Where conditions are favorable, horizontal directional drilling can provide a cost-effective alternative to open trench construction. In 2019 and 2020, the Company was able to cost effectively increase the use of horizontal drilling. In this period, drilling represented an average of 65% of all pipe replaced within the program. In some projects, the successful use of horizontal drilling accounted for as much as 86% of the pipe replaced. Not all projects, however, are suitable for the use of horizontal drilling or split and pull technologies. There are many instances where split and pull replacement cannot be performed, due to safety issues associated with joint-trench utilites, when the existing pipe makes a restrictive curve as in a cul-de-sac, or when the system has only one source of supply and downstream customers would lose their natural gas service. The latter case requires the coordination and logistics of an all-day customer outage, and the ability to perform the procedure within the time required to restore customer's service the same day. There are also conditions where horizontal directional drilling cannot be employed. Some of these include prohibitive subsurface conditions (solid rock or heavy cobble), or cases where there is not sufficient clearance along the pipe path to provide for adequate separation of utilites. Avista is committed to optimizing the utilization of trenchless technology whenever it is a feasible method of installation.



Continuing Annual Leak Survey – The Company has continued to conduct annual leak surveys on priority Aldyl-A main pipe since 2011, and on its Aldyl-A service tee transitions since 2012. The Company is planning to continue the annual survey of these facilities, though much more costly than the required survey frequency of five years, to provide a prudent margin of added safety while these facilities are being replaced and rebuilt.

Heightened Risk Prioritization within High-Consequence Areas – A key tool developed by the Company for better managing the risk associated with its priority Aldyl-A piping, is its risk consequence model. The model predicts areas in the system where leaks are most likely to occur and then incorporates information on the density of development (high-consequence areas) to assess relative priorities for pipe replacement. In 2014, Avista updated its model to distinguish schools and daycare facilities from other types of development. These were identified as sites that would be difficult to evacuate in the event of a natural gas emergency. Though these sites were already included in designated high-consequence areas, this new designation provides them an additional layer of priority. The model highlights those instances where the Company has Aldyl-A facilities within 150 feet of the center point of the building or within 500 feet for larger properties, to encompass outdoor play areas or other areas of congregation. Avista is continuing to list and map other potential sites to determine whether they might warrant this higher-level prioritization.

Current-Year Replacement Activities – In 2020, the Company replaced a total of 13.02 miles in Washington for Major Main projects. The project totals for last year are listed in Table 4 below:

Table 4. Avista main pipe replacement projects completed in Washington in 2020.

Completed 2020 Washington Major Main Projects			
Location	**Miles**	**Start**	**End**
South Hill Spokane 2019 Carry Over	2.03	July	November
NC Spokane 2019 Carry Over	2.89	April	October
NW Spokane 2020	1.27	July	November
South Hill (Ferris to High Dr.) Spokane 2020	0.40	May	August
Reardan 2020	3.76	March	September
Columbia Dr, Spokane 2020	0.45	March	June
Clarkston 2020	0.95	January	June
Deer Park 2020	1.26	March	November
Total Miles	**13.02**		

In 2021, the Company is replacing main pipe in Deer Park, North West Spokane, South Hill Spokane, Downtown Spokane, and various capital road projects throughout the city of Spokane for an expected total of approximately 14.81 miles. These current-year projects are listed in Table 5 below:

Table 5. Avista current main pipe replacement projects in Washington for 2021.

Planned 2021 Washington Major Main Projects			
Location	**Miles**	**Start**	**End**
NW Spokane (9 Mile) 2020 Carry Over	6.15	April	November
South Hill (Ferris to High Dr.) 2020 Carry Over	6.50	April	November
Downtown Segments (North of I-90), WA 2021	0.58	April	November
WA Capital Road Projects	0.50	March	November
Deer Park	1.07	June	September
Total Miles	**14.81**		

Replacement Activities Scheduled for 2022 and 2023

The Company's replacement projects for the next two-year planning period continue to be focused in the the Spokane area, but with an increasing effort in our outlying communities, including Kettle Falls and Goldendale, WA. In order to remain on pace to complete the program within a 20 year time frame, Avista plans to conduct 18 to 19 miles of pipe replacement per year. Currently, planned main pipe replacement projects for 2022 and 2023, are presented below in Tables 6 and 7, respectively.

Table 6. Planned main pipe replacement projects in Washington for 2022.

Planned 2022 Washington Major Main Projects			
Location	**Miles**	**Start**	**End**
South Hill (Ferris to High Dr.) '20 Carry Over	5.10	April	November
Kettle Falls	4.63	April	November
West Spokane Valley	5.00	April	November
Downtown Spokane and Lower South Hill	2.00	April	November
WA Capital Road Projects	0.50	April	November
Total Miles	**17.23**		

Table 7. Planned main pipe replacement projects in Washington for 2023.

Planned 2023 Washington Major Main Projects			
Location	**Miles**	**Start**	**End**
South Hill (Ferris to High Dr.) '20 Carry Over	2.00	April	November
West Spokane Valley	5.00	April	November
Downtown Spokane and Lower South Hill	2.00	April	November
Millwood	5.87	April	November
Goldendale / Stevenson	3.53	April	November
WA Capital Road Projects	0.50	April	November
Total Miles	**18.90**		

The Company's currently-planned investments for Aldyl-A replacement in 2021 , and for the planning period 2022 and 2023, are provided in Table 8.

Table 8. Current and Planned Aldyl-A replacement costs in Washington for 2021-2023

Year	Miles of Main Pipe	Investment
2021	14.81	$9,604,456
2022	17.23	$11,299,704
2023	18.90	$12,713,818
Totals	**50.94**	**$33,617,978**

Analysis of the Rate Impacts of the Company's Aldyl-A Replacement Program

The Company has forecasted an ongoing level of annual capital investment of approximately $11.2 million[4] for its Washington service area. This level of expected annual investment is preliminary, however it was necessary to derive an estimate for the purpose of this report. Avista understands that the expected annual level of investment must also be indexed over time to account for the increase in costs that will occur over the life

[4] This value is the average of the investments expected to be made by the Company for the period 2021 – 2023.

of the program. The Company used the Producer Price Index[5] for this purpose, and made the first such adjustment to the expected annual investment for the year 2021. The expected level of capital investment each year was used to derive a corresponding revenue requirement, which was allocated by rate class to determine the level of rate impact for the customers in each class. The analysis includes the known and forecasted capital costs for the expected duration of the Program, but for those years where the costs are already included in rates, there is no (new) incremental rate impact. The results of this analysis include the annual average dollar amount expected to be paid by each customer in each rate class, as well as the percentage increase in annual average natural gas costs paid by each customer in each rate class. The spreadsheet containing this analysis is attached to this report as Appendix A.

II. Avista's Isolated Steel Identification and Replacement Program

Avista is also engaged in an "identification and replacement program" for sections of isolated steel pipe in its natural gas pipeline system. The genesis of this program was an agreement between Avista and the Safety Staff of the Commission that was aimed at reducing the risks associated with sections of isolated steel that may be 'cathodically unprotected' or otherwise unknown to Avista.[6] The program objective is to identify and document isolated steel sections, including isolated risers, and to replace each riser or pipeline section within a specified timeframe after its identification. The program began in November 2011 and established the completion dates of November 2016 for the identification phase of the program and November 2021 for the replacement phase of the program.

Nature of the Safety Risk – Steel pipe that is cathodically unprotected is subject to corrosion to varying degrees, depending on pipe coating, type and condition, soil type and acidity, ground moisture, the presence of foreign utilities, and other factors. Corrosion

[5] The Producer Price Index is a wholesale price or commodity index used to adjust the forward wholesale cost of goods and services purchased by businesses. The index is published by the U.S. Bureau of Labor Statistics.
[6] Docket No. PG-100049

causes the loss of metal from the pipe wall, which over time can result in a gas leak. This program locates and removes steel sections that could be subject to such corrosion.

Survey Methods and Program Status – The approach for identifying sections of isolated steel is based on a programmatic survey of the natural gas system that involves recording measurements of pipeline to soil potential at approximately 144,000 points. The Company's system is divided into sub-areas that are defined by Avista's established cathodic protection zones. The survey team first obtains 'native' measurements of the potential with the cathodic protection system de-polarized. Measurements are then taken with the system polarized and switched on and off with current interrupters installed. Data is captured using a Trimble handheld device. The readings are downloaded and then tracked and processed using a Geographic Information System-based model. Survey results determine the locations of sections of steel pipe in need of replacement. Notably, the Company completed the inspection phase of the program on schedule in November 2016.

Current Actions

As of first quarter 2021, the Company had replaced approximately 4,763 segments, and approximately 36 will still need to be replaced. Avista is on track to complete the replacement phase of the program on schedule in 2021.

Program Goals for 2021

Avista will continue its replacement activities through 2021, with a planned annual expenditure of approximately $250,000 this year. Avista will continue to provide semiannual update reports to the Commission's Pipeline Safety Staff covering the current progress of the program.