Avista Utilities

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

June 1, 2017

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 has 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, 2017.

In addition, 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.) or age. Avista is continuing its process of verifying these unknown segments and currently has less than one mile (0.6 miles) of unknown piping in its system remaining to be assessed. Until all of this piping has been classified, however, each unknown segment is being managed as if it did, in fact, pose an elevated risk of failure. This conservative approach ensures that any potential risk associated with these unknown segments is

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

properly accounted for in Avista's management 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 twenty-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 twenty-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 is also rebuilding 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"). The illustration below shows the replacement components of the new service tee transition.

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 2016 is summarized in Table 1.

Table 1. Summary of Avista's Priority Aldyl A Replacement Program in Washington, 2011 – 2016.

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
Totals	59.9	7,371	$43,541,149

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

[2] In its Two Year Pipe Replacement Plan filed in 2015, for the number of tees remediated for the years 2013 and 2014, the Company inadvertently listed the "planned number to be rebuilt" and not the actual numbers that were done each year. This table reflects the corrected number rebuilt for these years.

reports, and field employees noting mapping corrections. The number of segments properly identified each year are shown below.

2011 – 112	segments	(0.7 miles)
2012 – 266	"	(2.2 miles)
2013 – 77	"	(0.6 miles)
2014 – 65	"	(0.7 miles)
2015 – 53	"	(0.6 miles)
2016 – 69	"	(0.8 miles)
2017 – 7	"	(0.1 miles) through April

Currently, there are 85 segments (0.6 miles) of unknown service piping in the Company's Washington natural gas system. These segments are leak-surveyed annually, along with the Priority Aldyl A main pipe and the service tee transitions. Avista will continue to identify these remaining unknown segments through the ongoing course of operations by the means described above.

Program Goals for 2018 and 2019

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 repair; and 5) incorporating any changes to the overall program that might be identified through the work of its asset management group, and integrating emerging priorities that may be identified in the Company's Distribution Integrity Management Plan.

Current Actions under the Program

Efficient Construction Resources – Avista continues to complete the majority of its Aldyl-A replacement using contract crews and equipment since this effort is specialized, is subject to seasonal constraints, is 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 get the work done on time and to effectively manage our 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 illustration at right shows the "keyhole" technology used to minimize the pavement impact associated with rebuilding service tee transitions.

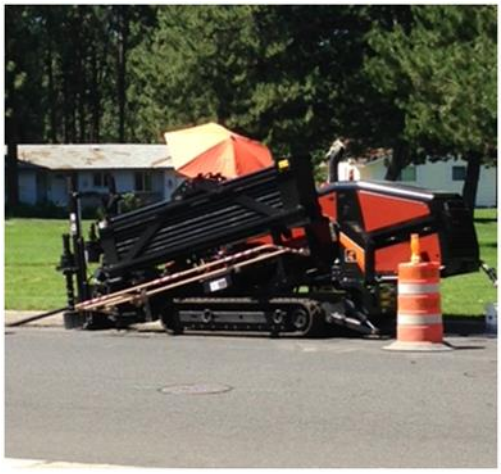
Managing the Unit Costs of Replacement – At the time the Company developed its Aldyl-A Master Plan, its experience with the cost of main pipe installation was almost exculsively with new construction. Avista has since gained several years' experience in all our jurisdictions with the actual costs of 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,

[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.

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 four feet and can range from two feet up to 8 feet along segments of the project. In its its prior two-year plans, the Company reported unit costs in the range of $69 to $83 per foot of pipe, and for projects using open trench construction in existing paved roadways, ranging from $75 to $110 per foot, and as high as $123 or more for short sections of main pipe. By contrast, Avista had one project in 2014 that employed an open trench in unpaved open soil conditions, with very few service tie-ins, that averaged $35 per foot. Avista's systemwide average cost in 2016 was $106 per linear foot. In Washington, the average per foot cost was $99, with projects ranging from $55 per foot in unpaved areas to $108 per foot where extensive road restoration was required.

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 illustration at right shows the horizontal drilling machine used to replace main pipe. Not all projects, however, are suitable for the use of split and pull or horizontal drilling technologies. There are many instances where split and pull replacement cannot be performed, for example, 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 isn't sufficient clearance along the pipe path to provide for adequate separation of utilites. Where conditions are favorable, however, horizontal drilling can provide a cost-effective alternative to open trench construction. In 2015 and 2016 the Company was able to cost effectively increase the use of horizontal drilling to complete 67% of all pipe replacements. In some projects, the successful use of horizontal drilling accounted for as much as 83% to 95% of the pipe replaced. The illustration at right shows new main pipe being installed in the bore created by horizontal drilling.

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 2017, the Company is replacing main pipe in North Spokane, South Spokane Valley, and the town of Harrington, for an expected total of approximately 14.8 miles. These current-year projects are listed in Table 2.

Table 2. Avista main pipe replacement projects in Washington for 2017.

Location	Miles of Main Pipe	Start	End
North Spokane	3.63	April	November
South Spokane Valley	6.78	April	November
Harrington	3.5	April	November
Various Locations	0.85	April	November
Total Miles	14.76		

As reported in our previous two-year plans, Avista's rebuilding of its Aldyl A service tee transitions commenced in 2013 and was planned for completion in 2017. The Company's prior plan for this year included rebuilding 246 tee transitons in Ritzville and 110 tee transitions in Goldendale and Spokane. Avista is currently ahead of plan largely becasue we were able to complete the work in Ritzville in 2016. Projects underway for 2017 include various areas of Spokane, inlcuding the city center, as well as the communities of Goldendale and Colville, as shown in Table 3.

Table 3. Planned rebuild of Aldyl A service tee transitions in Washington for 2017.

Location	Number of Tees	Start	End
Spokane (Downtown area)	49	April	October
Spokane (Multiple locations)	108	April	October
Colville	1	April	October
Goldendale	7	April	October
Total Tees	**165**		

The Company's 2015 forecast of planned investment for 2017 ($8,766,229) has been revised upward to $ 9,792,045, as a result of having more refined information on project scoping, specific working conditions, and completed project designs.

Replacement Activities Scheduled for 2018 and 2019

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 Pullman and Reardan. With the aticipated completion of the service tee rebuilding effort in 2017, Avista's activities will shift to replacement of main pipe alone. Accordingly, we expect to roughly double the amount of main pipe we replace each year in our Washington service area (from approximately 10 miles to 20 miles). Currently planned main pipe replacement projects for 2018 and 2019, are presented below in Tables 4 and 5, respectively.

Table 4. Currently planned main pipe replacement projects in Washington for 2018.

Location	Miles of Main Pipe	Start	End
South Spokane Valley 2	10.34	April	November
Pullman, WA	9.99	April	November
Total Miles	20.33		

Table 5. Currently planned main pipe replacement projects in Washington for 2019.

Location	Miles of Main Pipe	Start	End
North Central Spokane	12.3	April	November
South Hill Spokane	4.10	April	November
Reardan	3.7	April	November
Total Miles	20.11		

The Company's currently-planned investments for Aldyl A replacement in 2017, and for the planning period 2018 and 2019, are provided in Table 6.

Table 6. Currently planned Aldyl-A replacement costs in Washington for 2017 – 2019.

Year	Miles of Main Pipe	Number of Tees[4]	Investment
2017	14.76	165	$9,792,045
2018	20.33	0	$10,985,458
2019	21.11	0	$10,334,255
Totals	56.20	165	$31,111,758

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

Beyond the capital costs that have been estimated for this program through the year 2019, the Company has forecast an ongoing level of annual capital investment of approximately $10.4 million[5] for its Washington service area. This level of expected annual investment is naturally very preliminary, but it was necessary to derive an estimate for the purpose of this rate impact analysis. 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 of the program. The Company used the Producer Price Index[6] 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 forecast 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

[4] This number may vary nominally during the course of the year as a result of ongoing data conversion and mapping updates of the system.
[5] This value is the average of the investments expected to be made by the Company for the period 2017 – 2019.
[6] 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.

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.[7] 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 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

[7] Docket No. PG-100049

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 2017, the Company had replaced approximately 3,637 isolated risers, and approximately 1,044 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 2018 and 2019

Avista will continue its replacement activities through 2019, with planned annual expenditures of approximately $2 million per year. Avista will continue to provide semiannual update reports to the Commission's Pipeline Safety Staff covering the current progress of the program.