



# Avista Utilities

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

May 29, 2015

## 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.<sup>1</sup> 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 having isolated 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, 2015.

In addition, in response to item number 3 above, less than 0.02 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 has an estimated 1.6 miles of unknown piping remaining to be assessed. Until such time they are properly classified, however, each unknown segment is being managed as if it did, as in fact, pose an elevated risk of failure. This conservative approach ensures that

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<sup>1</sup> Commission’s Policy on Accelerated Replacement of Pipeline Facilities with Elevated Risk – Docket No. UG-120715.

any potential risk associated with these unknown segments is 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 re-making connections of Aldyl A service piping, one-half and three-quarter inch diameters, that are connected by transition fittings to steel tees on steel main pipe (transition tees or transition services).

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 2014 is summarized in Table 1, below.

**Table 1. Summary of Avista’s Priority Aldyl A Replacement Program in Washington, 2011 – 2014.**

Year	Miles of Main Pipe	Number of Tees	Investment
2011	7.4	0	\$2,710,248
2012	8.6	0	\$2,980,449
2013	12.4	1,219	\$8,854,998
2014	<u>10.7</u>	<u>1,854</u>	<u>\$8,295,520</u>
Totals	39.1	3,073	\$22,841,215

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 those unknown segments through the review of as-built service cards, exposed piping reports, and field employees noting mapping corrections. Through April 2015, it has identified 558 of those segments, with a cumulative length of 4.7 miles. The number of segments identified each year are provided as follows:

- 2011 – 112 segments (0.7 miles)
- 2012 – 266 “ (2.2 miles)
- 2013 – 77 “ (0.6 miles)
- 2014 – 65 “ (0.7 miles)
- 2015 – 38 “ (0.5 miles) through April

Currently, there are 176 segments (1.6 miles) of unknown service piping in the Company's Washington natural gas system, the majority of which are connected to steel mains. These segments are leak-surveyed annually, with the Aldyl A piping at transition service tees. Avista will continue to identify these remaining unknown segments through the ongoing course of operations by the means described above.

### **Program Goals for 2016 and 2017**

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 of 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, and is additive to the normal workload and staffing levels associated with the Company's ongoing natural gas operations. In its previous two-year plan, Avista reported on its competitive selection of Northern Pipeline Construction Company<sup>2</sup> ("Northern Pipeline") to perform its primary Aldyl-A main pipe replacement and transition tee rebuilds for a 5-year term. Northern Pipeline brought proven expertise and the capability to perform horizontal directional drilling, pipe splitting, also known as split & pull<sup>3</sup>, and keyhole<sup>4</sup> construction. In certain applications, as described below, these

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<sup>2</sup> 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.

<sup>3</sup> Pipe Splitting / Split and Pull is a technique that enables new plastic pipe to be inserted into an existing pipe pathway, while requiring only limited street cutting and excavation. This operation simultaneously

techniques can provide cost-effective alternatives to conventional practices requiring extensive street-cutting, excavation, and repaving. The Company continues to work with Northern Pipeline to refine the use of these and other cost-effective construction techniques to continue to drive efficiency into its replacement program.

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 exclusively with new construction. Avista has since gained significant experience in all its 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. 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 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 last two-year plan, the Company reported its unit costs in the range of \$69 to \$83 per foot of pipe. Its more recent cost experience, for projects using open trench construction in existing paved roadways, ranges from \$75 to \$110 per foot, to 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.

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splits the existing pipe and pulls the new pipe into position in its place along the length of the pipe section, without disturbing the surface.

<sup>4</sup> Keyhole technology provides access to work on underground facilities through a 24 inch-diameter hole that is carefully cut in the paved surface with the core removed intact. Following construction and backfilling, the street is restored by reinstating the 24-inch pavement core.

Optimizing Trenchless Technology – Given the high unit costs associated with open trenching and roadway restoration, the Company has continued to work with Northern Pipeline to optimize the use of trenchless technologies. 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 utilities, 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 a range of 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 adequate clearance along the pipe path to provide for adequate separation of utilities. Finally, in unpaved conditions where no road or other surface restoration is required, the method of open trenching is generally more cost-effective than horizontal drilling. Where conditions are favorable, however, horizontal drilling can provide a cost-effective alternative to open trench construction. In one project, for example, Northern Pipeline was able to use that technique extensively in the Woodrige Main Pipe Replacement Project. Horizontal drilling was used to complete 88% of the project, which resulted in a average unit cost of \$75 per foot of pipe.

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 transition tees 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 removed and remediated.

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. The Company plans to add hospitals and other medical facilities to this list in 2015. It will also continue researching other difficult to evacuate facilities, such as nursing homes and assisted living sites, for later addition to the heightened-risk priority list.

Schedule for Rebuilding Service Tee Transitions – In Avista’s Master Plan, the Company initially expected that the activities of replacing main pipe and remediating transition tees would be conducted together. As reported in our previous two-year plan, it became clear that due to the disparate nature and locations of the two activities, including the specialized crews and equipment needed, that these activities should be conducted separately. In addition, because the Company’s forecast of failure rates for the transition tees was greater than for main pipe, it chose to accelerate the schedule for remediation of the transition tees. This work commenced in 2013 and was slated for completion in five years (2013-2017). The original forecast anticipated the remediation of 1,219 tees in 2013 (as the specialized crews were ramped up), followed by the remediation of up to 1,854 per year until the Program was completed. Coincident with this effort, Avista used employees from other areas of the Company, on an ‘as available’ basis, to review its original paper construction records to verify its initial classification of the service tees in need of remediation. Through this work, Avista was able to remove approximately 1,816 work orders for tees (system) from its initial work plan. In Washington, a total of 638 work orders were removed. Additionally, these employees were used to field-check the actual ground surface conditions at each tee location (e.g. solid pavement, broken pavement or soft surface). Avista has used this information to refine its project scoping



and budgeting with Northern Pipeline, and to improve customer communications and municipal agency coordination, permitting and inspection.

Re-Publishing Avista's Forecast Model – Avista's Priority Aldyl A Master Plan proposed an initial time horizon for the replacement program of twenty years. This was based on the results of the Company's initial reliability modeling (Availability Workbench), which produced a forecast of Aldyl A failures expected to occur over time under different replacement regimes. Twenty years represented an optimization of the program that allowed Avista to prudently manage the leaks expected to occur on its system, while managing the rate impact to customers. A stated objective of the Master Plan was the periodic re-evaluation of new leak survey data and other information, to test whether the twenty-year horizon was still prudent in Avista's assessment. Accordingly, the Company had an independent contractor perform the reliability modeling in 2013 using cumulative data then available since the last formal publishing of the model results. Results from the modeling confirmed the initial selection of a twenty-year replacement horizon, and also validated the reliability of service tees tapped to steel main, and the Company's decision to accelerate that portion of the program.

Current-Year Replacement Activities – The Company is currently engaged in the replacement of main pipe in the Woodridge and Fairwood neighborhoods of the City of Spokane, where it expects to complete 9.3 miles in 2015. Remediation of tees in 2015 is focused in the City of Spokane Valley and adjacent areas. The expected number of tees to be completed for the year is 1,854. The Company's expected capital investment for 2015 is \$ \$8,072,366.

### **Replacement Activities Scheduled for 2016 and 2017**

The Company's replacement projects for the next two-year planning period continue to be focused in the City of Spokane, but with increasing effort in some of the outlying communities in our service area. Currently planned main pipe replacement projects for 2016 and 2017, are presented in Tables 2 and 3, below.

**Table 2. Avista’s currently planned main pipe replacement projects in Washington for 2016.**

Location	Miles of Main Pipe	Start	End
North Spokane	5.56	April	November
Fairwood Neighborhood (East)	4.14	April	November
Various Locations	0.84	April	November
Total Miles	10.54		

**Table 3. Avista’s currently planned 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	2.80	April	November
Various Locations	0.85	April	November
Total Miles	14.06		

The Company’s currently planned activities for remediating service tees in 2016 and 2017 are dispersed among several communities across our service territory, as shown in the Tables 4 and 5, below.

**Table 4. Avista’s currently planned projects for remediation of Aldyl A transition tees in Washington for 2016.**

Location	Number of Tees	Start	End
Clarkston and Adjacent	359	February	March
Pullman and Adjacent	414	March	May
Colville / Chewelah	227	June	July
Spokane - South Hill	569	June	July
Deer Park	81	September	October
Various Locations	135	April	October
Total Tees	1,785		

**Table 5. Avista’s currently planned projects for remediation of Aldyl-A transition tees in Washington for 2017.**

Location	Number of Tees	Start	End
Ritzville and Adjacent	246	April	October
Spokane / Goldendale	110	April	October
Total Tees	356		

A summary of the Company’s currently planned investments for Aldyl A replacement in 2015, and for the planning period 2016 and 2017, is provided in Table 6 below.

**Table 6. Summary of Avista’s currently-planned priority Aldyl-A replacement program in Washington for 2015 – 2017.**

Year	Miles of Main Pipe	Number of Tees	Investment
2015	9.30	1,854	\$8,072,366
2016	10.54	1,785	\$8,344,931
2017	14.06	356	\$8,766,229
Totals	33.90	3,995	\$25,183,526

### **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 2017, the Company has forecast an ongoing level of annual capital investment of approximately \$9,936,00 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<sup>5</sup> for this purpose, and made the first such adjustment to the expected annual investment for the year 2019. 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 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.<sup>6</sup> 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

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<sup>5</sup> 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.

<sup>6</sup> Docket No. PG-100049

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 tracked and processed using a Geographic Information System-based model. Survey results determine the locations of sections of steel pipe in need of replacement.

As of first quarter 2015, Avista had completed over 127,000 of the required survey points, and is on track to complete the survey and identification phase of the program as required in 2016. The Company has replaced approximately 2,500 isolated risers to date, and is also on track to complete this phase of the program as required in 2021.

## **Current Actions**

The Company is focusing inspections on the smaller communities in our western service areas, in addition to ongoing work in the city and vicinity of Spokane. The expected program cost for 2015 is approximately \$2.6 million.

## **Program Goals for 2016 and 2017**

Avista will continue and complete the programmatic survey and inspection phase of the program in 2016 and plans to continue its replacement activities in both 2016 and 2017. The Company's program expenditures are currently planned to be approximately \$2.7 million in 2016 and \$2.5 million in 2017. Avista will continue to provide semiannual update reports to the Commission's Pipeline Safety Staff covering the current progress of the program.