**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Pennsylvania Public Utility Commission	)	
vs.	)	Docket No. R-2015-2468056
Columbia Gas of Pennsylvania, Inc.	)	

DIRECT TESTIMONY OF
MICHAEL J. DAVIDSON
ON BEHALF OF
COLUMBIA GAS OF PENNSYLVANIA, INC.

March 19, 2015

Columbia Gas Stmt.
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I. Introduction

Q. Please state your name and business address.

A. Michael J. Davidson, 121 Champion Way, Suite 100, Canonsburg, Pennsylvania.

Q. By whom are you employed and in what capacity?

A. I am employed by Columbia Gas of Pennsylvania, Inc., ("Columbia" or "the Company") as General Manager and Vice President.

Q. What are your responsibilities as General Manager and Vice President?

A. My responsibilities include overseeing:

- Delivery of safe and reliable gas distribution service to our customers;
- Leak detection, leak investigation, leak response and leak repair activities;
- Customer metering activities;
- Plant operations and system regulation;
- All required leakage surveys and system inspections, testing and inspection of cathodic protection systems for steel facilities, and performing underground facilities locating for third-party excavators;
- The day-to-day operations of Columbia's physical gas piping system; and
- Field customer service to Columbia customers including: odor complaints, pilot light-ups, meter turn-ons and turn offs, and all other customer interfacing field interactions.

Q. What is your educational background and professional experience?

A. I graduated from Pennsylvania State University, earning an Associate Degree in Electrical Engineering Technology. Following nearly five years of service in the United States Air Force, I attended Point Park College, earning a Bachelor's Degree in Electrical Engineering Technology and then earned a Master's Degree in Public Management from Carnegie Mellon University. I have also earned a Six Sigma Black Belt certification from the University of Michigan College Of Engineering.

Following my military service, I joined Equitable Gas as a Communications Specialist. My primary job duties were the installation and maintenance of pipeline SCADA systems, electronic measurement equipment and microwave communication systems (1991-1996). I then joined Columbia Gas in 1996 and have held a number of management roles of increasing responsibility. Functional areas that I have had the opportunity to lead include: operations planning, business improvement, applications support, integration center (operations workforce management), meter to cash, and customer contact centers.

Q. Have you testified before this or any other Commission?

A. No.

Q. Please describe your membership in, or affiliation with, any industry organizations.

A. My industry affiliations include: Membership in the American Gas Association, Southern Gas Association and the Energy Association of Pennsylvania.

Q. What is the purpose of your testimony?

A. I will provide an overview of Columbia's distribution system, and discuss Columbia's ongoing replacement activities and provide testimony in support of Columbia's plant additions through the Fully Forecasted Future Rate Year (twelve-months ending December 31, 2016). I will also discuss Columbia's historic operating performance, the initiatives taken to improve its overall safety and compliance efforts and the metrics that are used to track performance and progress, and the planned system enhancements to Columbia's operations.

Finally I will testify regarding Columbia's Distribution Integrity Management Program Plan ("DIMP Plan"), the strategic O&M activities that it has undertaken to improve its system, and the additional O&M activities that it is planning to undertake beginning in 2015.

II. Overview of Columbia's Pipeline Distribution System

Q. Please describe Columbia's distribution system.

A. Currently, Columbia serves more than 419,000 residential, industrial and government customers. The Company owns and operates a natural gas distribution system in 26 counties serving 450 communities in Pennsylvania. Columbia provides that service through approximately 7,443 miles of mains and approximately 420,733 services that it owns, operates, and maintains.[1] These facilities (as of

[1] I note that in compliance with Section 1510 of the Pennsylvania Public Utility Code, in Western Pennsylvania the Company does not own the service lines all the way to the building, but terminates its ownership at the curb valve, typically found at or near the property line. If there is no curb valve on the

January 1, 2015) are composed of approximately 1,504 miles of bare steel, 25 miles of cathodically protected bare steel, 34 miles of cast iron, 94 miles of wrought iron mains (in total, 1,657 miles of "first generation" main), and 56,766 bare steel services.[2] The balance of the system is comprised of cathodically protected coated steel, or plastic (polyethylene) mains and services, and 39.6 miles classified as other.[3]

Columbia's distribution infrastructure constitutes the final step in the delivery of natural gas to customers from the producing regions of the Southern United States, Western Canada, and in-state Pennsylvania-produced Marcellus supplies. Columbia distributes natural gas by taking it from delivery points (or "city gates") along interstate pipelines, then transporting it through relatively small-diameter distribution mains and services that network underground through cities, towns, and neighborhoods in order to meet the demands of end-use customers. After taking delivery of natural gas at the city gate, Columbia then steps down the transmission pressure to local distribution pressure, further filters the gas to remove moisture and particulates that may damage Columbia's system, and then in

service line, Columbia's ownership terminates at the property line itself. The customer then installs and maintains the remainder of the service line to the building.

[2] The terms "bare steel," "unprotected coated steel," "unprotected steel," and "wrought iron" as explained further below, are used interchangeably and all refer to steel pipe without cathodic protection that is susceptible to corrosion.

[3] It should be noted that in 2011 Columbia deployed a Geographical Information System ("GIS") Mapping System to provide both mapping and data retrieval capabilities on its system and facilities. The 39.6 miles of "other" main appear to be anomalies in the data conversion and through a scrubbing process have been reduced from over 43 miles in 2013.

some cases increases the amount of odorant known as mercaptan (the "rotten egg smell") to the natural gas before it is put into the distribution system. The gas then goes into the Columbia distribution system where the pressure is often further reduced to delivery pressure in a series of district regulator stations, before being delivered to each customer. Once the gas is delivered on the customer's side of the meter (or the property line in Western Pennsylvania), it is owned by the customer and becomes the responsibility of the customer. In sum, Columbia's distribution system moves relatively small volumes of natural gas at lower pressures over shorter distances to a far greater number of individual users than its interstate pipeline counterparts.

Q. Please describe the years, types, and operating characteristics of the various pipe materials that have historically been installed in Columbia's system.

A. The system is comprised of many different types of pipe. From the 1850s to the early 1900s, Columbia's predecessor companies installed cast iron pipe throughout the early distribution systems. Cast iron, wrought iron and wood were among the first materials available, and cast iron had the advantage in that it was relatively strong and was easy to install. However, it was vulnerable to breakage from ground movement. When the pipe was buried to typical depths of between two and five feet, if the soil beneath the pipe or to its side was disturbed and pressure exerted on the pipe, it could crack. Further, each pipe section was not easily joined, so joints were prone to leaks. Finally, it was determined that it was unsuitable for longdistance transportation of gas because it was unable to withstand high pressures.

Q. How did the industry react to the problems present with the use of cast iron?

A. By the early 1900s, the industry had adopted steel and wrought iron piping for mains. These were deemed to be stronger than cast iron and able to withstand greater pressure. During this time, bare steel and wrought iron began replacing cast iron pipe as the material of choice when building a natural gas distribution system. During the pre- and post-World War II construction boom, gas utilities like Columbia, along with developers and customers, installed a significant amount of bare steel mains and services. Bare steel is steel pipe that has no exterior coating and has no cathodic protection installed on the pipe. The use of bare steel and wrought iron was common until the 1950s and 1960s when the industry began to realize that, despite its strength, bare steel was subject to corrosion and, in order to increase long-term safety and reliability, coating and cathodic protection should be applied to all new piping systems. Both exterior coatings and cathodic protection were designed to inhibit corrosion. Columbia installed its last bare steel pipe in the 1960s. By 1970, the federal government prohibited the installation of bare steel for natural gas distribution system infrastructure.

Q. What did the industry do to combat the problem of corrosion in bare steel?

A. The fact is that all metals corrode as a result of the natural process of chemical interactions with their physical environment, most commonly caused by moist soil (which creates an electrolyte) around the pipe, causing corrosion. In these circumstances, direct electric current flows from the metal surface into the electrolyte and, as the metal ions leave the surface of the pipe, corrosion takes place. This current flows in the electrolyte to the site where oxygen or water is being reduced. This site is referred to as the cathode or cathodic site. In order to combat corrosion, natural gas distribution companies ("NGDCs") began using coated steel. Unprotected coated steel ("UPCS" or "coated steel") refers to steel pipe with an exterior coating (intended to electrically isolate the steel from the surrounding electrolytes in the soil).

Q. Did the use of UPCS solve the problem?

A. No, despite the best efforts of industry, and even though it was for a time an accepted industry standard, UPCS corroded as well. But for the period from the 1940s through the 1960s, as the industry assessed its options, it was one of just a few alternative piping materials available to meet the public demand for service. By 1970, Columbia had laid its last non-cathodically protected coated steel segment. Further, since that time Columbia has retrofitted all of its unprotected coated steel facilities with cathodic protection systems.

Q. What materials replaced bare steel and coated steel?

A. Coated steel pipe continues to be used, but it is cathodically protected with an electric current. The pipe breakthrough for the natural gas industry came in the mid-1960s with the introduction of plastic (polyethylene) pipe for gas distribution applications.

Q. What is "cathodic protection?"

A. Cathodic protection is a procedure by which underground metal pipe is protected against corrosion and deterioration (i.e., rusting and pitting) by applying an electrical current to the pipe. Cathodic protection reduces corrosion by making that surface the cathode and another metal the anode of an electrochemical cell. A primary function of a coating on a cathodically protected pipe is to reduce the surface area of exposed metal on the pipeline, thereby reducing the current necessary to cathodically protect the metal. At present, the principal methods for mitigating corrosion on underground steel pipelines are external coatings and cathodic protection.

Q. Has Columbia further improved the functionality of its piping since the introduction of cathodically protected steel?

A. Yes, it has. Cathodically protected steel has all the advantages of steel in terms of strength and, because of its impressed electrical current, is highly corrosion resistant. However, it is more costly to purchase and install, and requires more ongoing maintenance than the next generation pipe – plastic.

Q. What are the benefits of plastic pipe?

A. Plastic pipe has proven to be very good for distribution-level pressures. It has strength and flexibility, and, as a result, is generally immune to the stress of ground movement. Plastic is also less costly to purchase and easier to join and install than steel pipe. Plastic does not corrode and, therefore, does not require cathodic protection.

Q. Does plastic pipe have any drawbacks?

A. The two significant drawbacks to plastic are:

- Relative vulnerability to excavation damage as compared to cast iron or steel. As a result, excavators who do not dig by hand (despite being required to do so by One-Call laws) in the vicinity of plastic facilities are very likely to damage them. Cast iron and steel piping have greater tensile strength and thus are somewhat more likely to be able to resist external impact.
- "First Generation" plastic pipe, typically installed between 1970 and 1981 in most distribution systems and softer than today's "418 PE" material (due to the different composition of the base plastic material), has demonstrated itself to be prone to stress propagation cracking under some circumstances. Thus in certain limited cases, Columbia's first generation plastic pipe has generated Type-1 leaks due to significant longitudinal cracking along the pipe.

Q. What is Columbia doing to address these concerns?

A. Columbia has made significant progress in reducing facility damage rates. In 2007, damages per thousand locates were at 5.39. In 2014, damages per thousand were at 2.65 per thousand. Efforts to improve locator performance and improved techniques for finding difficult to locate facilities have proven to be effective.

However, overall damage prevention rates, while improved from historical levels, have plateaued over the last three years. Contractor negligence remains the highest cause of damages to our system and has increased from 47% of total damages in 2010, to nearly 61% of total damages in 2014. In an effort to further reduce damages in this area, Columbia has added four damage prevention coordinators to expand contractor outreach efforts. Columbia is continuing the practice of using "marker balls" when installing its new plastic facilities. These marker balls are placed in the ground above the pipe after it has been installed and enable Columbia to locate it later using electronic technology. Columbia is also deploying GPS mapping and locating technology that provides sub-decimeter accuracy in identifying the location of new or replacement facilities. This breakthrough technology will enable the Company to accurately locate its new facilities in the field. This will provide facility locators with a highly accurate, state-of-the-art ability to find facilities anywhere in the system that have been captured using this new technology. Thus, it has the clear potential to revolutionize our One-Call response procedures and the overall quality of facility locating. Columbia's plan is to capture all new and replacement installations using this new methodology, and simultaneously and systematically begin to capture existing system main and service information across the existing Columbia system, until we have captured detailed and accurate data on the entire system.

In order to address the issue that the industry has identified as "First Generation" plastic pipe, Columbia is replacing those sections of first generation pipe that are uncovered in the course of executing the bare steel and cast iron program. Further, depending on future failure rates of this first generation plastic pipe, and the relationship between those failure rates and other risks in the Columbia system at the time, Columbia's annual DIMP Plan risk evaluation may determine at some point in the future that a systematic program will be needed to replace the remainder of this softer, more vulnerable, first generation plastic material.

III. Columbia's Pipeline Replacement Efforts

Q. How many feet of bare steel and cast iron main has been eliminated from the Columbia system during its accelerated program, and how does that trend compare with the previous years?

A. Columbia began an accelerated replacement of bare steel and cast iron pipe in 2007. Between 2007 and 2015 Columbia has retired, or projects to retire, the following footages of bare steel, wrought iron, and cast iron by year:

2007	355,764 feet
2008	528,567 feet
2009	344,488 feet
2010	322,583 feet
2011	533,765 feet
2012	467,808 feet

	2013	449,856 feet
	2014	413,667 feet
	2015	402,109 feet (projected)
Total Actual	**(Through YE 2014)**	**3,416,498 feet**

From 2007 through 2014, the program has eliminated an average of 427,062 feet per year. During the 4 years from 2002 to 2005 the average annual rate of retirement was 196,948 feet, less than half the rate of retired footages of bare steel, wrought iron, and cast iron under the current program.

Q. How have replacement costs trended and what are the primary cost drivers?

A. Columbia has experienced upward cost pressure for replacement projects over the past six years. The average cost of main replacement in 2008 was $81.25 per foot, while the average cost of main replacement in 2013 (the last full year that data is available) was $151.62, an increase of nearly 87%. There are several factors creating the upward cost pressure:

- The location of projects has a significant impact on cost. Hard surface projects in urban areas normally have a higher replacement cost per foot than soft surface replacement in rural areas, given similar size and material of pipe are being installed. The increased cost of urban areas can be due in part to the need to coordinate replacement of Columbia's facilities with facilities of other utilities or municipalities. These higher cost urban areas often have higher risk and are increasingly being prioritized for replacement, contributing to the increasing average cost per foot.

- Changes in hard surface restoration requirements are a key component of the upward cost pressures being experienced. Municipalities are expanding restoration requirements on utilities. For example, six years ago it was typical that trench restoration would consist of simply paving the trench that was excavated for the main installation. Today that same project frequently requires curb to curb milling and overlay. On other projects, Columbia is required to locate its facilities under sidewalks rather than in the street where mains were historically located. On these projects, Columbia is required to replace the entire sidewalk, and to the extent that the sidewalk does not meet ADA (Americans with Disabilities Act) standards, Columbia is required to make them compliant with current standards. This can include wheelchair ramps and curb realignment or replacement work.
- Contractor cost is another key component of increased cost. Contractor cost increases have been driven by competition for resources as more natural gas local distribution companies in Pennsylvania and across the country undertake main replacement programs.
- The mix of plastic and steel mains and the diameter of the mains needed in the Company's system also can affect the average main replacement cost. The large, geographically dispersed nature of Columbia's system requires it

to have a relatively high number of higher pressure steel, larger diameter mains to carry gas across the very broad western and eastern Pennsylvania service territories that Columbia serves. As a result, far more of the facilities being replaced have to be designed and constructed of larger diameter pipe, with a larger percentage of steel (vs. lower cost plastic mains), compared to utilities that have smaller, more geographically compact service footprints. In fact, and by way of comparison, in 2012 Columbia had the largest average main diameter among all of the NiSource Gas Distribution Segment LDCs, and its installation of steel replacement mains (vs. Plastic mains) is also well above the NiSource Gas Distribution Segment average.

These combined factors have driven the unit cost for the Company's main replacements to increase materially over the last six years. This has necessitated greater capital spending by Columbia to keep pace with the program's retirement footage objectives.

Q. What is Columbia doing to manage cost increases?

A. Columbia is focused on managing costs and making prudent capital investments that benefit our customers. Columbia Gas of Pennsylvania is one of seven distribution companies in the NiSource family making infrastructure capital investments. This enables NiSource to negotiate at scale with contractors and suppliers, delivering competitive pricing for materials and services provided to Columbia Gas of Pennsylvania.

Columbia Gas of Pennsylvania continues to work with local governments in an effort to maintain reasonable permitting and restoration requirements for pipeline replacement projects. Our goal is to balance the requirements of local governments while delivering the best value for our customers.

Columbia Gas continues to engage local governments in an effort to maintain that balance. The following are some recent examples:

- Negotiated with the Redevelopment Authority of Washington County to obtain an easement on property they own for a needed pipeline replacement project. Cost was reduced from $50,000 to a fair market value of $20,000.
- The City of Pittsburgh's proposed a "Major Street Opening Permit" revision that would have increased costs and possibly delayed pipeline replacement projects in the City. Columbia Gas, working with the other utilities, was able to amend the bill so that it does not apply to utility infrastructure work.
- Working with the City of Washington, restoration costs were reduced by $70,000 in a one year period. The City has agreed that an ordinance requiring two police offers to provide pedestrian and vehicle safety on all pipeline replacement projects should only be enforced on major roads, not side streets with sparse vehicle and pedestrian traffic.

- Columbia continues to negotiate with the City of Pittsburgh on a final restoration plan for Dellrose Street. The City is asking Columbia to install water catch basins on the brick street at an estimated cost of $750,000.

Q. How does Columbia install pipe in its underground distribution system?

A. The initial installation of natural gas distribution pipe requires the excavation of a trench usually under or adjacent to a public street into which the pipe is laid. Then new or existing customer services are connected to the new main.

Installation of natural gas distribution pipe can be a major inconvenience for residents, business owners and municipalities. In some circumstances, where smaller diameter plastic facilities are installed to replace larger diameter steel piping, the cost and inconvenience associated with excavating a trench can be reduced by inserting the new pipe through the old piping. This involves smaller street cuts for the insertion plus smaller cuts associated with service line and intersecting main tie-ins. Further, even if a replacement main must be laid rather than inserted, the use of smaller plastic pipe, where viable, rather than larger steel or cast iron pipe will produce a savings in material costs.

Q. Why does Columbia need to continue to replace its bare steel and cast iron systems?

A. Columbia's Distribution Integrity Management Plan (DIMP) risk scoring continues to rank external corrosion on bare steel and bell joint failure on cast iron pipelines among our top system risks. Corrosion on first generation mains represents nearly 75% of all hazardous or potentially hazardous leakage cleared on mains in the

Columbia distribution system in 2014. Columbia has determined that there are an increasing number of leaks in areas where unprotected steel is concentrated. We believe that the accelerated replacement of the first generation system is not only prudent, but is a requirement under the federal DIMP rule that Columbia continues to address very aggressively in a consistent and programmatic way.

As a result, Columbia plans to maintain or increase its capital expenditures in the 2014 to 2018 timeframe, with a planned spending program ranging between $145 and $170 million budgeted annually for line replacement over the 5-year period. This budget includes the replacement of bare steel, cast iron, and wrought iron pipelines. (Please see the Company's response to Standard Data Request GAS-ROR-014.)

Q. Please explain Columbia's capital additions claimed for the Future Test Year and Fully Forecasted Rate Year.

A. The capital expenditures for the Future Test Year ending November 30, 2015 and the Fully Forecasted Rate Year ending December 31, 2016 are shown in Exhibit 108, Schedule 1. The amounts shown are taken from Columbia's capital budget, as developed by our operations group and engineering department. For a listing of replacement projects being constructed in 2015, please see Exhibit MJD – 1, which is attached to this testimony.

Further, for a detailed description of Columbia's age and condition actuals for 2014, and budgeted amounts for 2015, and 2016, please see the chart below.

Columbia Age & Condition Replacement Budgets ($000)

GPA	Description	Total 2014 Actual	Total 2015 Projected	Total 2016 Projected
354	Compressor Stations	415	250	250
376	Mains - Leakage Elimination	50,597	54051	53,750
380	Service Lines - Replaced	29,543	30500	30,500
376	Customer Servic e Lines Replaced	13,983	12500	12,500
381	Meters / 998 Int. Co. Meters	707	700	700
382	Meter Install - Replace	567	550	550
383	House Regulators - Replace	96	150	150
378	Plant Regulators - Replace	450	750	750
375	Reg Structures Replace	155	150	150
385	LV Excess Press Meas Sta	123	100	100
376	Corrosion Mitigation Ins	147	100	100
376	Large Projects / Specifics/Misc	51,514	44,799	47,500
		148,297	144,600	147,000

(*For greater detail on the total capital spend and the specific allocation breakdowns please see GAS-ROR-014.)

Taken in total, Columbia has made enormous progress since 2006 in delivering and maintaining a safe and reliable distribution system for its customers. The progress that I refer to is defined in more detail throughout this testimony, but includes initiating an annual leakage survey on all of its bare steel mains, identification and mitigation of system cross bores, reducing the number of inactive services in the system, reducing its Type-2 leak repair backlog, improving the locating process to reduce third-party damage, improving emergency response rates and on-time appointments for customers, and dramatically increasing the amount of bare steel and cast iron pipe that it removes from the system annually. Having said all of that, however, the system data is clear that as first generation bare steel and cast iron pipe continues to age, Columbia will have to continue to focus on the accelerated replacement of bare steel and cast iron to address the problems associated with aging infrastructure. Therefore, it is essential that Columbia continue to direct management effort and incremental capital resources toward this ongoing need. The synchronization of these replacement efforts with the enhanced focus on pipeline safety that Columbia has demonstrated over the last 8 years are integral parts of Columbia's DIMP Plan, and are essential planks of Columbia's ongoing efforts to enhance natural gas pipeline integrity management, and thus provide a safe, reliable distribution system for our customers, and the general public.

Q. How do Columbia's bare steel replacement rates compare with other Pennsylvania NGDCs?

A. Pennsylvania NGDCs' 7100 DOT reports provide data for an analytical comparison of changes in the amount of bare steel pipe in the systems during the years of 2009, 2010, 2011, 2112 and 2013 show the following (in miles):

Bare Steel miles of main from 7100 DOT reports (Note, 2014 data is not yet available for the other Pennsylvania NGDCs)

	Peoples	Equitable	UGI	PECO	Columbia	Nat'l Fuel
2009	1917	781	391	367	1958	1035
2010	1906	762	379	361	1902	999
2011	1884	737	368	355	1751	966
2012	1865	713	392	351	1674	1093

2013	1853	709	376	329	1597	1063
Total Change	64	72	15	38	361	69*
Aver. Per Year	16	18	4	9	90	34*

(*Note: Due to National Fuel's 2012 data, which showed an increase in bare steel inventory, which may be due to a reclassification of assets rather that an addition of bare steel facilities, this assessment uses the 2009 to 2011 period for comparison.)

As this chart demonstrates, in the five year period 2009 through 2013, Columbia has replaced nearly five times more bare steel main as the next highest NGDC among its peers in Pennsylvania. To further underscore this, as demonstrated in the chart above, between 2009 and 2013 Columbia has averaged approximately 90 miles of bare steel eliminated per year compared to approximately 34 miles for its next closest peer.

Q. Is there another solution for addressing the issues with bare steel and cast iron short of replacement?

A. No. Corrosion leakage on unprotected steel does not slow down and the rate of leakage will only accelerate as the unprotected steel facilities continue to deteriorate. First generation unprotected steel pipe, much of it dating to the turn of the last century, has reached or soon will reach the end of its useful life and must be replaced in a timely, cost-effective manner.

Q. Do safe and reliable system operations requirements demand replacement of

Columbia's unprotected steel facilities?

A. Yes. Continual system degradation due to unrelenting corrosion will challenge Columbia's ability to meet peak day needs and operate the system safely. Therefore, continuation of Columbia's main replacement program is an essential alternative to a high leakage rate and the associated public risks and additional strain on the system when required to meet peak day demands on the system.

Q. Are you saying Columbia's system is unsafe?

A. No, I am saying the system is safe right now, as evidenced by our ability to address Type-1 and Type-2 leaks appropriately, as well as all of the other operational improvements including more frequent leakage surveys, better emergency leak response, and a continued focus to reduce the backlog of open Type-2 leaks that are described in this testimony. The "system" is comprised of thousands of miles of wrought iron, cast iron, bare steel, cathodically-protected steel, and plastic pipe. The material initially at risk is first generation bare steel, cast iron, and wrought iron. Evidence further indicates that the corrosion with respect to unprotected coated steel is accelerating, gradually causing more leaks. Cast iron pipe also is quite old and is in need of replacement due to its age and vulnerability to fractures caused by ground movement. Wrought iron is a hybrid of cast iron and bare steel that demonstrates very similar corrosion characteristics to that of bare steel.

All of that said, while the system is currently safe, Columbia must, as a prudent operator, address the systemic problem of replacing its unprotected steel, cast iron, and wrought iron facilities. And finally, the issues that are manifesting themselves on first generation plastic (though the risks have not yet risen to the level of risk associated with bare steel, cast iron, or wrought iron), as discussed elsewhere in this testimony, also necessitate a measured replacement strategy geared to those locations where Columbia is uncovering this pipe in the course of replacing other facilities.

Q. How does Columbia classify leaks it detects on its system?

A. Columbia classifies each gas leak according to its severity: Type-1, Type-2, or Type-3. A Type-1 leak is hazardous and requires immediate remediation and repair. A Type-2 gas leak is non-hazardous at the time of detection, but requires a scheduled repair based on the potential for becoming a hazard. A Type-3 gas leak is defined as "non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous."

These gas leak classifications are defined in the Gas Piping Technology Committee ("GPTC") ANSI Z380.1 "Guide for Gas Transmission and Distribution Piping Systems." The Guide is commonly utilized by gas operators and State pipeline regulators, including the Commonwealth of Pennsylvania, as an interpretation of "DOT 192 2003 CFR Title 49, Part 192 Transportation Of Natural And Other Gas By Pipeline: Minimum Federal Safety Standards."

Q. Will Columbia's accelerated replacement program provide customers with any other benefits besides the replacement of bare steel and cast iron pipe with plastic and cathodically protected steel?

A. Yes. Columbia is replacing the segmented, 19th and early 20th century low-pressure designs of its first generation system with a more integrated, 21st century system design. This integrated, higher pressure system (up to a maximum of 99 pounds operating pressure, though will typically operate at 60 PSIG) will enable Columbia to substantially reduce the current need for district pressure regulator stations throughout its system, resulting in a safer, easier, and more reliable system to operate. Instead, each residence will have a small domestic sized regulator installed just up-stream of the meter to reduce the pressure before it enters the house. A distribution system operating at these higher pressures also will enable Columbia to install new safety devices in areas to be upgraded. As part of the upgrade, Columbia is installing excess flow valves on nearly all services connected to the replacement mains.[4] For approximately $25 per replaced residential service, or less than $150 for the average commercial service, these excess flow valves will shut off gas to a residence or business in the event of a large pressure differential, which is indicative of a major gas leak or a service damaged by excavation. Over time, this results in a system where services are much less vulnerable to safety risks from third-party damage.

Finally, this migration to higher pressure systems will provide customers with much

[4] The exception would be for those commercial and industrial customers whose consumption is over 5,000 cubic feet per hour.

more flexibility in adding new, high efficiency equipment, and in allowing for the installation of smaller, less expensive interior piping systems (such as CSST–Corrugated Stainless Steel Tubing), which is designed to operate at two pounds of inlet pressure (current low pressure systems typically operate at a maximum of 7 inches of water column, which is roughly $1/8^{th}$ of the 2 PSIG pressure required). Notably, the 60-pound system design discussed above provides the maximum flow capacity for a given size of medium density polyethylene pipe, and enables the Company to routinely provide 2-pound pressure delivery systems to customers. It should also be noted that as a result of the quarter pound of pressure associated with low pressure delivery systems, this type of service is not available to customers currently served from low pressure systems.

Q. How will main replacements affect the Company's leak repair experience?

A. The long term view is that as the percentage of bare steel and cast iron pipe is materially diminished, we expect to see a reduction in grade 1 and grade 2 leakage repair caused by corrosion. However, this impact is not anticipated in the near term. Cast iron and bare steel remaining to be replaced continues to drive grade 1 and grade 2 leakage repair activities. Currently, nearly 71% of the Company's current main Type-1 and Type-2 leakage is corrosion related (exclusive of excavator damage) and 75% of the leaks on service lines are also caused by corrosion. Additionally, Columbia is working to reduce the time that grade-2 leaks remain open, adding additional O&M expense.

Q. What benefits inure to the public from Columbia's ongoing replacement of its aging facilities?

A. Columbia is removing deteriorating portions of its system and enhancing the safety of its system by ensuring replacement of facilities with new, longer lasting and safer materials. Its system will continue to be able to provide deliverability at its maximum allowable operating pressure ("MAOP"), thus the public will receive better service, with fewer interruptions. Customers are currently experiencing the benefits of the investments being made to enhance the safe and reliable delivery of their natural gas service. During the "Polar Vortex" of 2014, Columbia's distribution system performed well and experienced no significant issues with service interruptions or curtailments of firm customers. The same has held true through the cold weather events of the 2014-2015 winter heating season. Further, this massive and structural system replacement program is adding jobs throughout Columbia's service territory, both in the ranks of full-time Columbia employees (these include engineers and engineering technicians, land agents, and construction inspectors), as well as the contractors who perform the actual pipe replacement (which includes laborers, equipment operators, crew leaders, and support staff) and associated support services such as: paving, traffic control, trucking, sand and gravel, and a myriad of other material purchases and support activities that are needed to execute this type of strategic replacement program. Finally, to underscore the magnitude of this program, at the peak of 2014 Columbia had 90 construction crews employing approximately 500 to 600 contractors and 20 to 25 restoration contractors employing approximately 200 employees.

IV. Federal Pipeline Safety Rules and Advisories

Q. Please describe the Federal Pipeline Safety Rules and Advisories that are affecting and will continue to affect Columbia's Pipeline Safety Strategy and Operational Execution.

A. Some of the more significant and impactful Final Rules or Advisories that have been issued in the last several years or are being considered for the future are as follows:

- Control Room Management (76 FR 35130) - This rule expedites the program implementation deadlines in the Control Room Management/Human Factors regulations in order to realize the safety benefits sooner than established in the original rule. This rule requires that Operators define the experience requirements, create training programs, and establish clear roles and responsibilities for Control Room Operators. Further, the rule mandates that appropriate shifts, and maximum hours of work be established for control room operations. The deadline for pipeline operators to implement the procedures for roles and responsibilities, shift change, change management, and operating experience, fatigue mitigation education and training was October 1, 2011, 16 months sooner than the original regulation.

- Mechanical Fitting Failure Reporting Requirements (76 FR 5494) - This final rule is an amendment to PHMSA's regulations involving DIMP. This final rule revises the pipeline safety regulations to clarify the types of pipeline fittings involved in the compression coupling failure information collection, and changes the term "compression coupling" to "mechanical fitting," which aligns a threat category with the annual reporting requirements and clarifies the Excess Flow Valve ("EFV") metric to be reported by operators of gas systems. (As a result of this change from "compression fitting" to "mechanical fitting" Columbia is likely to report more "mechanical fitting" failures in its system than it has historically reported.)
- Integrity Management Program for Gas Distribution Pipelines (74 FR 63906) - This final rule amends the Federal Pipeline Safety Regulations to require operators of gas distribution pipelines to develop and implement integrity management ("IM") programs. The IM programs required by this rule are similar to those required for gas transmission pipelines, but tailored to reflect the differences in and among distribution pipelines.

In addition to the final rules above, the following are proposed rules or recommendations that are currently being made by, or are under consideration by PHMSA:

- Pipeline Safety: Pipeline Damage Prevention Programs (PHMSA 2009-0192 RIN 2137-AE43) - This Advance Notice of Proposed Rulemaking seeks to revise the Pipeline Safety Regulations to: establish criteria and procedures for determining the adequacy of state pipeline excavation damage prevention law enforcement programs; establish an administrative process for making adequacy determinations; establish the Federal requirements PHMSA will enforce in states with inadequate excavation damage prevention law enforcement programs; and establish the adjudication process for administrative enforcement proceedings against excavators where Federal authority is exercised. This requirement continues to work its way through the PHMSA regulatory approval process, and is expected to be approved. Further, unless the Pennsylvania Legislature passes the One Call Enforcement Bill that has been introduced, we are likely to see this federal enforcement in Pennsylvania which would have material impact on all Pennsylvania gas utilities.

- Pipeline Safety: Expanding the Use of Excess Flow Valves in Gas Distribution Systems to Applications Other Than Single-Family Residences (PHMSA 2011-0009 RIN 2137-AE71) – The National Transportation Safety Board has made a safety recommendation to PHMSA that excess flow valves be installed in all new and renewed gas service lines, regardless of a customer's classification, when the operating conditions are compatible with readily available valves. This requirement continues to work its way through the PHMSA regulatory approval process, and is expected to be approved.

That said, Columbia has already modified its procedures to require its construction crews to install excess flow valves on all new and replacement commercial installations up to 5,000 Cubic Feet Per Hour.

- Pipeline Safety: Safety of Gas Transmission Pipelines (PHMSA 2011-0023 RIN 2137-AE72) – PHMSA is considering in this advance notice of proposed rulemaking whether changes are needed to the regulations governing the safety of gas transmission pipelines. In particular, PHMSA is considering whether IM requirements should be changed, including adding more prescriptive language in some areas, and whether other issues related to system integrity should be addressed by strengthening or expanding non-IM requirements. Among the specific issues PHMSA is considering concerning IM requirements is whether the definition of a high-consequence area should be revised, and whether additional restrictions should be placed on the use of specific pipeline assessment methods.
- NTSB Recommendation P-12-17 Safety management System (API Draft Recommended Practice 1173) – Conceptually this recommendation is built on the premise that managing the safety of a complex industry requires a system of efforts to address multiple, dynamic, changing activities, and circumstances. It further reflects the PHMSA view that if the industry is to achieve the goal of zero incidents, a highly structured and comprehensive effort is required. The broad components of these plans would include:

- Demonstrated management commitment
- Structured pipeline safety risk management decisions
- Increased confidence in risk prevention and mitigation
- Provide a platform for shared knowledge and lessons learned
- Promoting a pipeline safety oriented culture

The ultimate purpose of this initiative is intended to produce a continuous pipeline safety improvement cycle among pipeline operators of "Plan-Do-Check-Act."

Q. Will PHMSA's focus on Transmission Lines have any significant impact on Columbia operations?

A. Yes, "Transmission Line" is defined in CFR 49, Part 192 as "a pipeline, other than a gathering line, that: (1) transports gas from a gathering line or storage facility to a gas distribution center, storage facility, or large volume customer that is not down-stream of a distribution center; (2) operates at a hoop stress of 20 percent or more of SMYS [System Minimum Yield Strength]; or (3) transports gas within a storage field." Columbia has approximately 65 miles of transmission class facilities that meet this definition. Further, following the San Bruno California explosion which occurred on a PG&E Transmission Line in 2010, PHMSA has focused attention on the quality and comprehensiveness of system records for these lines, particularly around the pressure testing data, pipe design information, and wall thickness of existing transmission line systems. Columbia, like many other LDCs and transmission companies, is lacking certain data, particularly on segments installed prior to current code standards and the issuance of Federal Pipeline Safety Regulations instituted on August 1, 1971. Further, Columbia is waiting on specific federal guidelines for these segments that are expected to be issued soon, but believes this guidance will necessitate a program to replace many, if not all, of its pre-1971 transmission lines in Pennsylvania that lack data that was not federally mandated at the time of installation. The increased spending that is shown in the Company's response to Standard Data request GAS-ROR-014 in the capital budget category of "betterment" for 2015 and beyond reflects increased pipe replacement work that Columbia expects to have to conduct on these pre-1971 transmission lines. If, however, the federal guidance does not require the transmission line replacements that the Company anticipates, this money will be spent in Pennsylvania on the first generation pipe replacement program, as both of these categories of spend represent pipe replacement projects on older, potentially "at risk" facilities. PHMSA continues to focus heavily on Transmission Operations with a new Notice Of Proposed Rule-Making (NOPR) that would either change the definition to make the inspection procedures and safety requirements of the various class locations more rigorous, or to expand the classification of High Consequence Areas, requiring changes in both system design criteria as well as on-going maintenance in those areas.

V. Strategic O&M Initiatives

Q. Please summarize the results of your assessment of Columbia's pipeline safety risks and opportunities.

A. In 2006, 2007, 2008 Columbia undertook safety initiatives which included the following activities, among others:

- Conducting frequent leakage surveys on "first generation" facilities;
- Launching a structural "first generation" pipe replacement program;
- Undertaking a focused process to reduce third-party damage;
- Initiating a program to reduce the backlog of open Class-2 leaks; and
- Eliminating the backlog and accelerating the abandonment of inactive services.

In 2013 Columbia initiated the following additional safety initiatives to further enhance the safety of its distribution system:

- Aggressive management of right-of-way vegetation;
- Continued acceleration of the repair rate of open Type-2 leaks;
- Continued efforts to remediate atmospheric corrosion on above ground structures;
- Ensuring exposed mains have appropriate cover;
- Increased use of camera-based technology to identify cross-bore conflicts;
- Began to implement Hi-Accuracy GPS program;

- Expanded use of Vac Trucks to dig test holes on facilities where the existing tracer wires have either been broken or suffered degradation to the point there is no longer electrical continuity.
- Ensure MAOP documentation in compliance with federal requirements; and
- Enhanced damage prevention advertising and contractor outreach, with a particular emphasis on educational outreach to children through targeted educational programs

Q. Please discuss Columbia's strategy regarding O&M safety initiatives going forward.

A. Columbia's strategic DIMP Plan, and the impact that it will have on O&M policy for safety initiatives, remains unchanged. The Company continues to focus its efforts and resources on the top risks to the Company's system as enumerated in its DIMP Plan and as modified based on the annual DIMP data review, which sometimes results in risk reprioritizations or other updates to the plan. Columbia is expanding focus in several critical areas to maintain and enhance its operational capabilities:

- As Columbia works to build the pipeline of the future we also find ourselves in the midst of building the workforce of the future. With the ramp up of our capital program we have experienced the transfer of employees from O&M positions to construction positions; in addition we continue to see an increase in the number of employees who are eligible to retire. We see both opportunity and risk in the current and future transition of our workforce. Columbia's historical methods of training were developed in an era of very low turnover and well-established institutional knowledge. These traditional training methods will not address the increased risk of human error to our system introduced by this large scale workforce transition. We must adjust our methods of training to reduce that risk for new and existing employees. Columbia is currently creating formal employee training and qualification program to address the DIMP and system risks associated with human error in the field. These programs will not only include more classroom time and far more stringent testing procedures, but will, where appropriate, require hands on demonstrations of necessary skills to validate employee or contractor qualification competency. Columbia has made additional organizational changes to focus on training and development of employees. While this adds to current O&M expenses, it is vital that we are effective in preparing the next generation of employees, so as to minimize risk both to employees and the general public

- Columbia is constructing a new training center that will provide the facilities needed to conduct classroom training and enhanced hands on training. The facility will be used for multiple training purposes including; new employee training, employees transitioning into higher skilled positions, and for annual refresher training for the existing workforce. A great deal of thought, research and best practices were considered when developing the new training approach and designing the training facility. Trainers traveled to industry leading training facilities and natural gas organizations across the country. Best practices of organizations outside the natural gas distribution industry who are trained to respond to crisis and emergency situations were also studied. Focus groups were formed to gain insight and obtain feedback from front-line employees about their perceptions of and experiences with training, as well as the accessibility of standards while performing on-the-job tasks. The curriculum being developed will incorporate end to end training of Columbia's field technology, such as mobile data terminal units and work management systems, to technical training for operator qualifications. This end to end training will educate employees on every aspect of the job and its importance, from physical work performed to its accurate documentation. This facility will replace the Jeanette Pennsylvania facility that was severely damaged in a tornado March of 2011.

- With the current and anticipated entry of new employees to the workforce, Columbia has also made adjustments to the span of control for frontline leaders. Historically higher spans of control were manageable because of low turnover and a high level of workforce experience and tenure. The increased number of new employees entering the workforce requires frontline leaders to spend additional time providing guidance and supervision. To achieve an effective span of control Columbia has added four frontline leader positions.

- As mentioned previously in my testimony, damage prevention continues to be a focus in reducing ongoing system risk. Columbia has made significant progress in reducing facility damage rates. In 2007 damages per thousand locates were at 5.39, which had been reduced in 2014 to 2.65 damages per thousand locates. Efforts to improve locator performance and improved techniques for finding difficult to locate facilities have proven effective. However, overall damage prevention rates, while improved from historical levels, have plateaued over the last three years. Contractor negligence remains the highest cause of damages to our system and has increased from 47% of total damages in 2010, to nearly 61% of total damages in 2014. In an effort to further reduce damages in this area Columbia has added four damage prevention coordinators to expand contractor outreach efforts.
- During the winter of 2014-2015, failures were experienced with field assembled risers and have been identified as a DIMP risk. Columbia is developing a program to address the risk of field assembled riser failures. The program will included a survey of customer owned and company

owned service lines to identify and quantify field assembled risers in use. Columbia will use the collected data to further asses DIMP risk and prioritize efforts. Columbia has begun replacing field assembled risers identified on company owned service lines.

The pipeline safety DIMP Plan accelerated action enhancement items identified above, in conjunction with the Company's ongoing bare steel, cast iron, and wrought iron accelerated replacement program, are designed to address the key risks identified in Columbia's DIMP Plan, and continue to reduce the pipeline safety risks that are inherent in the Columbia operating system. The costs of these incremental O&M activities are included in Columbia's cost of service calculations filed in this case, and sponsored by Company witness Miller.

Q. What additional detail is available to demonstrate how Columbia has improved its system operations?

A. Some of the results from DIMP driven practice enhancements or procedure changes include:

- Reduction in the number of open Type-2 leaks in the Columbia distribution system as measured by the annual Federal DOT report. It is worth noting that corrosion on bare steel is identified as a high level DIMP Plan risk in the Columbia system, and that roughly 75% Type-2 leaks in the system are caused by corrosion on bare steel. Further, this is a significant undertaking in assuring safe and reliable service to customers, as the greater the number of leaks in a system and the longer they are left unattended, the greater the potential risk of gas migrating into a structure or other underground facility. The result of this focused effort was that at the end of 2007 (the first full year of Columbia's annual system wide bare steel survey), Columbia reported a total of 3,755 open Type-2 leaks in its Distribution System. As of December 31, 2014, Columbia had reduced that number to 1,702 open Type-2 leaks, which equates to a nearly 55% reduction in open Type-2 leaks over the last seven years. In addition, as indicated in our DIMP Plan initiatives Columbia intends to continue to accelerate its Type-2 leak repairs in order to further reduce the number of open Type-2 leaks.

- Improve Columbia's locating performance as measured by third-party damage per thousand locates. This operational safety metric is particularly critical, as third-party damage is the leading cause of federally reportable pipeline incidents (e.g. Death, Injury requiring hospitalization, or Property Damage over $50,000) in the United States. In addition, it is a high level risk identified in Columbia's DIMP Plan. Since 2006, Columbia has undertaken a comprehensive process designed to improve locating performance and reduce third-party damage to Company facilities. This process has included tighter management and more stringent performance standards for locators, and resulted in a pilot program initiated in 2009 to bring the locating function back in-house for two large operating centers in Pennsylvania. In early 2012, Columbia decided to bring all locating back in-house. The Company made this decision because the data from the pilot program consistently showed that in-house locators delivered better third-party damage results than those of any of the contract locators who were performing this work for Columbia. Combined with improved techniques to locate difficult to locate facilities, locator error has significantly improved over time. Locator error in 2010, as a percent of damages, was 16.62% compared to 2014 performance of 10.27%.

Columbia continues to routinely conduct face-to-face meetings with excavators who are frequent damagers and has added resources to accelerate this activity. Damage prevention coordinators educate contractor employees in safe excavating practices, as well remind them of the potential consequences of damaging natural gas facilities. These efforts have resulted in a 51.5% reduction in third-party damage on the Columbia system between 2006 and 2014, from a damage per thousand (locate requests) rate of 5.47 in 2006 to a damage per thousand rate of 2.65 through December 31, 2014.

- Columbia began a cross bore program in September of 2013 as a result of identifying cross bores as a potential risk in its DIMP plan. Working with local municipalities, Columbia has inspected over 67 miles of sanitary and sewer mains, and 4,800 customer laterals. During this inspection, 111 cross bores were identified, with 75 of those involving Columbia's system. Given program results, cross bores have moved from a potential risk to a high risk in Columbia's DIMP plan. The cross bore program is an example of how DIMP can be used in identifying and mitigating system risk.

VI. Columbia's Operating Performance

Q. In addition to Columbia's intense focus on pipeline safety, what are some of the practice enhancements or procedure changes regarding operating performance that are specific to customer delivery performance?

A. Customer service initiatives that Columbia has undertaken over the last 5 years include:

- Columbia has recently initiated a number of customer service improvement efforts. These efforts include piloting a two hour appointment window, implementing a customer ambassador program, and an increased focus on customer communications. These efforts, combined with improved customer service options, have positively impacted the customer experience. In 2014, Columbia Gas of Pennsylvania was awarded by JD Power for ranking first in customer satisfaction among all midsize utilities in the east region, reflecting our customers' recognition of the improvements being made on their behalf.

- Increase Columbia's 60-minute or less Emergency Response Rates. Emergency response rates are integral to public safety. The sooner the first Columbia responder arrives at a possible emergency, the quicker the situation can be stabilized, made safe, and ultimately remediated. Since 2006, Columbia has undertaken a very structured approach to improving its emergency response times, including the addition of field operations positions, additional off hours shifts, the use of GPS technology to enable dispatching the closest/quickest responder to emergencies, and driving an increased focus with all employees on the need to respond to reported emergencies as quickly and as safely as possible. In addition, Columbia continues to make enhancements in an effort to keep emergency response rates down. Starting in 2011, Columbia implemented an automated crew call out and resource management system to call the service technician located closest to an issue that requires a response after hours. Columbia also negotiated additional language to our labor contracts which requires a service technician to be on Emergency Responder Rotation so that we have an initial responder available 24 hours a day, 365 days a year. The results of these focused efforts have resulted in improved performance. A comparison of the data showing the 60-minute or less response rates from 2006 to 2014 is as follows:

	2006	2014

➢ Normal Hours	98.13%	99.69%
➢ After Hours	92.34%	96.67%
➢ Weekends & Holidays	88.99%	94.98%
➢ Total Performance	97.00%	98.12%

- Increase the number of Columbia's on-time customer appointments, as measured by the overall annual percentage of on-time appointments met. As more and more customers need to take time off from work to provide access to their homes for routine meter turn-on, turn-off, and other service related activities, it is incumbent upon the Company to be as efficient as possible with the customers' time. Therefore, in 2007 Columbia began to focus specific attention on improving its percentage of on-time appointments. It did so by tasking the Integration Center (Columbia's Centralized Scheduling and Dispatch Center) to improve field employees' daily schedules to align more closely with the needs of customer appointments, and to shift non-emergency work when possible to meet appointments that, for a variety of reasons, might otherwise be missed. As a result of these efforts, Columbia has been able to improve its on-time appointment rates from 97% in 2006, to a rate of 97.77% in 2014.

Q. Please describe the Company's reduction in OSHA recordable injuries.

A. Columbia continues to enhance its culture of safety for customers, communities, and employees. Employee safety has significantly improved and has achieved top decile performance in OSHA Recordable Injuries, as measured by AGA benchmarking, for the second year. For comparison, at the end of 2006, Columbia had 48 Occupational Safety and Health Administration ("OSHA") recordable injuries, in 2014 that number declined to 5 OSHA recordable injuries. Columbia received industry awards in 2014 from the American Gas Association and the Energy Association of Pennsylvania in recognition of its industry leading performance. Our goal is for every employee to go home safe and healthy every day. Columbia achieved this performance through multiple cultural building efforts:

- In 2014 Columbia implemented Safety Telematics across its operations. This program provides real time feedback to drivers on their driving performance. It also provides detailed reporting to enable analysis of driving trends and habits providing actionable information to improve driver safety.
- Local and state-wide safety teams made up of engaged front line workers, leaders, and managers. These teams make recommendations on, and implement, safety improvement opportunities.
- Root cause analysis of every OSHA recordable injury and preventable vehicle accident that involves a Columbia employee. Near miss discussions are also conducted.

- Safety training is delivered to all employees. This training spans skills from driving maneuverability to office ergonomics.
- An employee safety audit program in which leaders perform safety audits on field activities, and provide feedback to employees' on their safety performance.
- Employees evaluate the hazards at each jobsite prior to beginning work and complete a safety check list which is reviewed with each employee.

Q. Regarding Columbia's operating performance, does the Company meet or exceed state and federal requirements for leak surveying?

A. Yes, in 2007 Columbia began an accelerated leakage survey program to inspect all bare steel mains annually, instead of the three-year interval which is required in the leakage survey requirements of CFR 49, Part 192. The result of this is that Columbia routinely exceeds the requirements of existing Code of Federal Regulations, which provides the Company the ability to discover system leakage on a much timelier basis than if it were only meeting the minimum federal standards. In addition, as a result of the Commission's Tentative Order regarding Natural Gas Pipeline Replacement and Performance Plans, at Docket No. M-2011-2271982, Columbia agreed, and has continued to perform a second annual business district survey during each winter period.

Q. Does this conclude your direct testimony?

A. Yes, it does.

Project Name	Installation Pipe Size (inches)	Install Footage (feet)
D8542	6	4,200
D1254	8	4,725
Pennsylvania Ave	8	3,000
D7007 Gate Nest	4, 8	2,997
Grandview	2, 4, 6, 8	2,360
South Mt Vernon	2, 4, 6	4,050
Broadway (Meyersville)	2, 4, 6, 8	1,977
SR 0088	2, 6	1,313
Pennsyvania Ave (Gregg)	2	3,000
Walnut	2, 6	1,475
North	4, 6	954
Vine	2, 4, 6, 8	2,875
Broadway (Berlin)	2, 4	893
West Main	4	250
Ash Street	2, 4	3,585
Pittsburgh St bet N. Mt Vernon and Johnson	6, 8	836
Pittsburgh St bet Enamel St and Fairview St	6	750
F Alley	2	370
Wood St (California)	2, 4, 6	5,377
East Main	6	650
Wood St (Monongahela)	2	802
8th Street	2, 4	535
Fayette Street	8	650
Yough River Crossing	8" St, 8" Pl	2,700
Mulberry	2, 4	1,270
D7194 - Warwick Mine	2, 6	3,460
New Stanton North	2, 4	7,800
Route 31	4	2,700
Baileys Crossroads	2, 4	1,000
Brownsville Area School Relocation	8	590
Glencoe Avenue	4	1,900
Mclain Street	4	340
Stowe Avenue	2, 4	1,155
Bell Avenue	2, 4, 6	2,750
Parkfield Road	4	1,900
Mitchell Avenue	4	2,030
Mansfield Avenue	2, 4	2,050
Wylie Avenue	2	1,800
Parker and Beverly	2	1,000
Highgrove Drive	2, 4	4,531
Hamilton Road	6	450
Steubenville Pike	6	1,320
Arlington (Sterling to Eleanor)	4	1,222
McLaughlin Run Road MP	4	1,150

McLaughlin Run Road HP	8	1,140
McRoberts Road Valve	8, 20	200
Old Clairton Road	6	1,154
Sunnyfield Drive	4	3,200
Sprucewood Drive	4	390
Donati	6	350
Rennie Drive	4, 6	2,010
Walnut Street	2	150
Orchard Drive	2, 4, 8	10,540
Southside Phase 1	2, 4	4,755
Castle Shannon Boulevard	6, 8	1,660
D584 (Deerfield Road)	2	6,225
S. Main Street Extension	4	3,600
Fawcett Church Road	2	710
Ridgewood Drive	6	900
Vista Valley Drive	2	6,300
Western	2	1,750
Wylie Avenue	2	140
Bower Hill Road	2	2,060
Industrial Park/Noblestown Rd	6	2,880
Archer Street	6	60
Country Club Road	6	780
Becker Street	2	795
101 Trenton Circle	2	54
Elm Street	2, 4, 6	9,291
Broad Street	2, 4, 6, 8	26,620
Wylie Avenue	2, 8	12,030
D1581 (USC to Hastings Mill)	12	7,400
Battleridge	2, 4	475
Island	6	208
Cedar	2, 6, 8	965
25 Holt St	2	140
W College St	6	690
Arnold St.	2	330
Oak Rd	2	1,520
Forest Road	2	1,600
Gateway Ave	2, 4	1,000
D-272 from Branch Rd and Edgewater	8	1,800
Highland Ave	4	2,953
Merriman Rd	6	1,720
Norwood Ave	4, 6	2,340
Johnson	4, 6	3,027
Roosevelt Rd and Bradshaw Dr	2, 4	2,880
7th Ave	2, 4, 8	2,825
Amsler	4	820
D-81 between Wexford Rd and Tierra Vista Dr	2, 6	3,820
Winterburn	4	750

High St off of Chapel Rd	2	2,720
11th Ave from 7th St to Allegheny	4	1,320
McMillen Ave	2	2,000
Camp Meeting Rd bet Skymark Ln and Young Rd	2, 4	2,600
6700 Church Ave	2	300
9th Avenue	2, 4, 6	2,160
Hoenig Rd	2	760
Fairlane between Careywood & Big Beaver	4	2,080
Kenyon Avenue Replacement Project	2, 4	4,120
Glenfield Rd, Ferry Rd Replacement	2	2,780
Thawmont Dr Replacement	2	2,400
Cochran St between Nevin & Beaver	4, 6	2,825
6th Avenue - Replacement Job	2	2,000
Broad Street Between Kost/Mohawk	4	1,700
5th St, Beaver	4	850
40th St, Beaver Falls	2	600
Lincoln Rd, Bradford Woods	2	350
Elm Rd from 5th St To Wilson Ave	4	3,800
D-1680 Bet Lacock Av and Locust Ln	10	8,000
Franklin Ave	2	400
Falls Ave Replacement Project	2, 4	2,942
Furnace St	2, 10	2,700
Rhodes Place Replacement & Uprate	4	1,300
Court St at Ray St	2, 4	750
Pearson St Between Fairview & Taylor	2, 4	1,350
Montgomery Replacement Project	2, 4, 6	2,150
Harrison St Replacement Project	4	870
Blue Jay Portersville Rd	2, 4	3,175
Vista Ln Replacement Project	2	1,115
4th St Ellport Replacement Project	4	1,200
Lundys Lane	8	80
Hamilton St Replacement Project	4, 6	2,000
Wurtemburg Rd Replacement Project	2, 4, 6	5,285
D-22 At Countryview Road Replacement	2, 8	10,400
Home St-New Castle	2	660
Laurel Replacement Project	2, 4, 6	3,078
Mt Herman Church Rd At Mill Bridge	4	1,080
Clearview @ Reynolds St/ N-C	2	170
Palo Alto Dr (D-500) Replacement	4, 6	2,400
Burns St at Scotland Lane New Castle	2, 4	690
Sumner Av - New Castle	2	800
McClelland	4	1,200
D-1601 Phase IV	8, 12	5,600
Avalon Park Betterment D-213	6	1,300
Mt Pleasant Rd	6	2,342
D-1009 Gottlieb - Street Improvement	2, 8	3,000
Pine Twp Rd Widening	4, 6	1,860

D-5242 Clintonville Replacement Project	4	4,700
Palmer	2	1,000
SR 208 and Dog Leg Rd Replacement	2, 4	2,800
SR 208 @ Ron McHenry Replacement	4	1,500
Popetown Road Replacement	2	970
SR2011 Nickleville Road Replacement	2	4,030
Knox AMRP Phase 1	2, 4	9,625
D-22 Between SR 308 and Goff Rd	2, 8	7,620
SR 66 Replacement Project	2, 6	1,400
Carwick Road Replacement	2	1,290
High St Replacement Project	2	2,760
Pleasant/Bennett St Replacement Project	4, 8	3,460
Bank St Area Replacement	4	1,000
Wagner Ave Replacement	6	1,000
E Main Replacement	2	1,860
Pleasant and Hillview Dr Replacement	2	4,670
Bradley St Replacement	2	350
Hickory St Area Replacement	2	1,850
D-4227 Buena Vista Dr	2, 8	11,000
Harbaugh St, Chestnut to Logan	6, 8	330
Dean Rd, Warrendale Bakerstown to Dean	2	3,920
Larry St Replacement	2, 4	7,502
601-609 Wayne Ave	4	160
Clinton St bet McCaslin and Lincoln	6	2,000
N Carver St Area Replacement	2, 6, 8	6,190
Park Forest	2, 4	4,200
University	2	2,086
Beaver	4	940
Pike Alley	2	720
Atherton St	2, 4, 6	4,570
Church Rd Farm Tap Elim	2	935
W Monroe St	2, 4	3,655
Greenwood Rd	2, 4, 8	5,185
W Market St	2, 4, 6, 8	8,720
Lee St	2, 4	1,535
E Market St / York City	2, 4	1,735
D1661 North York WHP	12	5,100
Strathcona	2	2,620
Pinehurst	2	3,099
S. Queen St (Revised)	2, 6	8,596
Valley Road	2, 4, 6	7,680
Clover Lane	2	3,140
Vander & Boundary	2	500
East Queen Street	2	650
S. Howard St.	2	275
Paul St.	2	4,270
Locust St. (Hanover)	2, 4	4,104

Winter Ave. Glen Rock	2	1,420
Center St.	2, 4, 6	1,522
Carlisle St.	2, 4, 6	6,626
Mt. Rose Southern Bore	2, 8	2,500
Mt. Rose Ave. Western Replacement	6	2,235
Haines Rd.	8	2,075
Baltimore St.	6	543
E Middle St	2, 8	3,160
Zerfing Alley	2, 4	325
Hanover St Eastern Gettysburg Project	2, 8	4,886
Rampike Hill Rd	4	950
Seminary Ave	2	1,314
Fohl St	4	2,010
Linden Ave	4	1,500
Franklin St	2, 4	3,380
Seminary St. Mercersburg	2, 4	1,999
S Fayette St	2	1,315
Franklin Farm Ln	4	1,250
Greendale	2, 8	558
Southern	8	5,000