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December 2, 2020

Chairman Kenneth C. Hill
ATTN: Ectory Lawless, Docket Clerk
Tennessee Public Utility Commission
502 Deaderick Street, 4th Floor
Nashville, TN 37243

20-00131

Re: Chattanooga Gas Company
Petition for Approval of Pipe Replacement Program

Dear Chairman Hill:

Please find attached for filing a Petition by Chattanooga Gas Company to address a multiyear pipe replacement program and to seek approval for its implementation. The Petition is supported by the direct testimony from Paul Leath accompanied by 4 exhibits and supported by the direct testimony from Archie Hickerson accompanied with 1 exhibit.

The original and four copies of the filing will be placed in the mail to the TPUC Docket Clerk accompanied with a $25.000 check for the filing fee.

A courtesy copy of this filing has been provided to the Consumer Advocate.

Yours truly,

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I. WITNESS INTRODUCTION.

Q. I am Paul Leath, Regional Director of Operations, Chattanooga Gas ("Company" or "CGC"). My business address is 2207 Olan Mills Drive, Chattanooga, Tennessee, 37421.

Q. Is Chattanooga Gas a subsidiary of Southern Company Gas?

A. Yes, it is. When Southern Company acquired CGC's parent company AGL Resources in 2016, the name was changed to Southern Company Gas.

Q. What are your duties and responsibilities for Chattanooga Gas?

I am a resident in Chattanooga, and I am responsible for the day to day operation of the utility by the 50 employees we have working in Bradley and Hamilton Counties, including safety, construction and maintenance of the system, and regulatory compliance. Ultimately, it is my responsibility to ensure that Chattanooga Gas meets our commitment to deliver safe, reliable, and affordable natural gas service to approximately 68,000 customers.

Q. When did you assume responsibility for Chattanooga Gas?

A. I became the Regional Director of Operations in September of 2018.

Q. Please summarize your professional career and education.

A. I have lived and worked in Chattanooga since moving there in July 2012 when I became the director of external and regulatory affairs for Chattanooga Gas Company, the job I held until assuming my present position. I began my professional career in the United States Army after graduating from Loyola University Maryland in May 1989 with a BBA, Finance degree. During my nine years in the Army, I rose from the rank of second lieutenant to captain, and I served

as a logistics officer during my military career. I left the Army in 1998 to go to work with GE in their lighting division, where my primary duties included manager of distribution and logistics. I left GE in 2001 and began my career in the natural gas industry working for Atlanta Gas Light in Macon, GA. While in Macon, I was the region operations manager of South Metro Atlanta and Central Georgia. In 2012, I was asked to move to Chattanooga to serve as the local community and legislative affairs representative for the Company. Later, in 2016, I was given the additional responsibilities for regulatory affairs and I became CGC's community contact person.

During my time in Chattanooga I have become very invested in this community that I love. I serve on the boards of the Tennessee Chamber, Tennessee Gas Association, and the executive committee of the Chattanooga Area Chamber of Commerce. I have contributed significant time to furthering the economic development of the CGC service area by serving as the Chairman of the Greater Chattanooga Economic Partnership, Vice-Chairman of Economic Development for the Chattanooga Chamber, and member of the Economic Development Council for Bradley County. I have been a part of the regional economic development team that worked on multiple expansion projects for our two largest area employers resulting in Volkswagen investing $1.4 billion and creating 3,000 new jobs and McKee Foods investing $600 million and adding 530 jobs to our community. I have also been a part of the community team that helped to bring six large automotive part manufacturers to the area resulting in $375 million in investment and the creation of over 1,625 new jobs. I also assisted with one of Bradley

County's larger manufacturers, Mars Chocolate N.A., making two expansions worth $243 million that brought an additional 160 jobs. In the past few months, CGC extended its natural gas system into the Spring Branch Industrial Park in order to serve Cannon Automotive, which will invest $114 million and add 197 jobs in Bradley County. In addition, VW has announced hiring an additional 300 employees as part of its $800 million electric vehicle line expansion. When completed in 2021, VW will employ over 4,000 employees. In 2020, the year of COVID, when many communities have been devastated by job loss, Chattanooga has added over 1,000 jobs and over $600 million in new investment. I am also a member of the Chattanooga Downtown Rotary Club and I've served on the United Way of Greater Chattanooga's Funds Allocations Committee.

Q. Have you ever appeared before this Commission or any other Commission?

A. Yes, I provided testimony in Docket 02-00049, the Company's 2020 annual review mechanism or "ARM" docket, but we resolved that docket without a hearing or me providing oral testimony. I addressed the Commission in March 2020 as a part of the Company's undocketed annual capital investment budget presentation.

II. PURPOSE OF TESTIMONY.

Q. What is the purpose of your direct testimony?

A. I am testifying today to support the Company's overall pipe replacement program, or PRP as we call it. In that regard, I provide some history regarding CGC's prior cast iron and bare steel replacement programs; CGC's Distribution Integrity Management Program or "DIMP"; CGC's evaluation and response to the

Commission's Pipeline Safety Division's investigation regarding some vintage plastic pipe that it directed should be replaced; how CGC determined which pipe should be replaced under our PRP; information regarding CGC's overall construction plan and annual DIMP process and how that relates to the PRP information on the different proposed schedules; and why CGC believes the proposed 7-year schedule is the most appropriate for CGC's proposed PRP.

Q. Are you sponsoring any exhibits with your Direct Testimony?

A. Yes, my exhibits include:

- PCL -1, Bare Steel Protected (Ineffectively Coated) and Vintage Plastic Replacement Program Overview.
- PCL-2, System Map, CGC Aldyl-A Era Pipe.
- PCL-3, Estimated PRP Replacement Costs.
- PCL-4, PRP-DIMP Cost Split (Estimated).

Q. Please identify the other CGC witnesses who will be supporting the Company's case in this docket.

A. CGC is sponsoring one other witness in this case, Mr. Archie Hickerson, who is the Director of Rates and Tariff Administration at Southern Company Gas. Mr. Hickerson's testimony and exhibits address the estimated costs of the PRP, the estimated customer impacts of the four proposed schedules, and how and why the existing CGC ARM process should be utilized as the PRP cost recovery mechanism each year for the recovery of the prior year's actual costs.

III. CASE OVERVIEW.

Q. Please summarize CGC's PRP case and its impact on customers.

A. CGC is requesting that the Commission approve its plan to continue to replace aging pipeline infrastructure from its system that is considered to be of the highest potential risk for corrosion, cracks, breaks, and leakage with authorization for the actual costs incurred for each prior year to be recovered through CGC's ARM Docket. This case will not authorize the recovery of any specific costs. Rather, we are asking the Commission to approve the need to replace the identified pipe, a specific recovery schedule, and authorization to seek recovery of the actual prior year's cost through the annual ARM proceeding.

Q. Why is this matter being presented to the Commission at this time?

A. The immediate catalyst for this case is the actions of the Commission's Natural Gas Pipeline Safety Division ("Division"), but the Division is not the cause for this case, which is not unanticipated. With the conclusion of CGC's prior cast iron and bare steel replacement program and the Company's ongoing DIMP process, CGC was assessing what pipe it may need to remove sooner than what the DIMP process would have accomplished. As a result of our ongoing internal efforts and the work of the Commission's staff, CGC proposes to remove an additional 73 miles of vintage plastic, bare and ineffectively coated steel pipe, and any associated service lines made from one of the materials being replaced that run between the main and the customer meter over the next seven years. The total cost of this PRP is approximately $118 million, some amount of which will otherwise be recovered via the DIMP process depending upon the final schedule chosen, which I'll discuss

further later from the planning perspective. Mr. Hickerson will address the estimated customer impacts and cost recovery aspects of this case, but the cumulative increase for the average R-1 customer is estimated to be $7.26 per month over the seven years of the plan. My Exhibit PCL-1 provides an overview of key aspects of the PRP.

IV. HISTORY & BACKGROUND NATURAL GAS PIPE REPLACEMENTS.

Q. Does any of the pipe you are proposing to replace under your PRP present an immediate threat to public safety or danger?

A. No. It is imperative to state that while the vintage plastic and steel pipe CGC is proposing to replace by this Petition may be susceptible to premature leaking issues, this does not mean that CGC's system is currently in imminent danger or that the system is unsafe to operate. Rather, much as was the case with the cast iron and bare steel previously removed over the last 15 years or so, removal of certain Aldyl-A pipe and other vintage plastic pipe manufactured through 1983 along with the bare and ineffectively coated steel pipe in CGC's system needs to be done in a reasonable and responsible manner to help ensure the overall long-term integrity of the system. In the interim, CGC's leak detection program will increase its frequency of surveying as directed by the Division. As always, CGC will timely address identified leaks as circumstances require. As the PRP progresses, CGC will reprioritize pipe replacement projects based upon the Company's periodic DIMP analysis and other operational considerations.

Q. Please provide a high-level overview of natural gas pipe systems.

A. The pipeline system used in the distribution of natural gas by CGC to its customers is the culmination of an extensive national pipeline network owned and operated by multiple entities that begins at the well head and ends at the customer's meter. This natural gas pipeline infrastructure is engineered to last for decades, and the long useful lives of this infrastructure are reflected in long depreciation schedules for most pipeline assets. This is especially important from a customer standpoint since most of the natural gas system is buried underground, and the cost of initially trenching or directionally boring to build out the system can be expensive, especially in established commercial and residential communities. Moreover, replacing aging pipeline systems can be more costly and complicated undertakings, especially since replacements should not unnecessarily interrupt service to customers or otherwise interfere with roadways and other utility infrastructure.

Q. What kind of pipe is used in CGC's system?

A. As pipeline networks have grown over the decades, the manufacturing processes and materials used for those pipelines have also evolved. Over time, this has meant a progression in pipeline materials. CGC's system has reflected the use of different pipeline materials over time, from cast iron pipe that was utilized for much of the twentieth century, to various forms of uncoated steel pipe and later coated and cathodically protected steel, to different types of plastic pipe. CGC over the years has generally sought to use cost-effective and appropriate materials and technologies for the construction of its natural gas system.

Q. What does this mean for the longevity of the pipe in CGC's system?

A. While designed for long life, at some point the pipeline infrastructure must be replaced. The materials used in the pipe can naturally break down or decline with age and usage. The interaction of the pipe with moisture and other underground elements, along with the effects of seasonal weather freezing and contractions, can have negative effects over time. Iron pipe is subject to graphitization – the degradation of iron into softer elements leading to leaking from joints or cracks.[1] Similarly, bare steel pipe is susceptible to corrosion.[2]

Above the ground, activities such as vibration from vehicles on roads, vehicle weight loadings, road or building construction, and trenching or boring by other utilities installing or repairing underground facilities can also impose inadvertent stress or damage to pipes or their coating.

Cumulatively, stress, corrosion, and other environmental impacts can lead to cracks or breaks in the pipe that can result in gas leaks, which raise potential safety concerns as well as adverse environmental impacts. Modern materials and construction practices can prevent or mitigate many of these problems. Further, CGC participates in the Tennessee811 locate program, we utilize various public awareness programs to "call before you dig," and CGC employs an extensive leak detection program all for the purpose of helping to protect and maintain the integrity

[1] *See*, the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration, "Cast and Wrought Iron Inventory, What Causes Iron Pipe Leaks," available at https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory.

[2] *See*, the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration, "Bare Steel Inventory, Background and History," available at https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/bare-steel-inventory.

of its natural gas pipe system. We do many things to help prevent or slow down damage, but time and the environment eventually take its toll.

Q. So how does CGC address these various impacts on the different kinds of pipe in its system?

A. Recognizing new information regarding the longevity and reliability of pipeline materials, many natural gas companies, including CGC, in the 1990s and 2000s began to implement more focused and extensive pipeline replacement programs to address aging infrastructure and specific types of materials considered to be higher risk for failure, especially cast and wrought iron as well as bare steel.[3] A 1971 federal directive made coatings for steel pipe mandatory, effectively obsoleting bare steel. In 1991, the National Transportation Safety Board recommended that the U.S. Department of Transportation's Research and Special Programs Administration, the former name of the Pipeline and Hazardous Materials Safety Administration ("PHMSA"), require pipeline operators to implement a program to identify and replace cast iron pipe. In late 2009, PHMSA directed operators to create and implement by August 2011 a Distribution Integrity Management Program ("DIMP"). Under the DIMP guidelines, operators must evaluate the specific characteristics of the pipe in their systems and the operating environment for those pipelines to identify threats, to evaluate risks, and to take measures to reduce risks.

[3] *See*, the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration, "Pipeline Replacement Background," available at https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/pipeline-replacement-background.

Q. What has been CGC's response to these various policies and initiatives?

A. Over the last 15 years, CGC has undertaken a significant effort to remove cast iron and bare steel pipe from its system. In CGC's 2006 rate case, CGC proposed a cast iron and bare steel replacement rider to specifically address the removal of the highest risk classes of pipe in CGC's system. While the rider was not a part of the Company's eventual rate case settlement, CGC did commit to replace approximately 21 miles of bare steel and cast iron pipe through December 31, 2010. In CGC's 2009 rate case, the Company's witnesses testified that CGC was on track to complete that program. In addition, CGC proposed the removal of more cast iron and bare steel pipe, approximately 59 additional miles to be completed in the next ten years, meaning CGC would replace a total of some 80 miles of pipe over a thirteen-year period. CGC reported in its 2018 rate case that the Company was on track to complete this multiyear project in 2019. At our annual capital expenditures budget presentation to the Commission in early 2020, I along with Jacob Ziliak reported that the cast iron and bare steel replacement program was completed. Overall, this program has been a great success for CGC and its customers by helping to improve the safety and reliability of our system.

Q. With the cast iron and bare steel program completed, why does CGC need another program at this time?

A. While CGC has removed and replaced what was considered to be some of the most at-risk pipe in its system, this does not mean that the remainder of the system is free from the effects of ageing pipe or that all of its aging infrastructure has been removed from its system. Further data and research regarding pipeline materials

has been shared within the industry and has led to new and better understandings as to how various pipeline materials perform over time. The process of evaluating the safety of CGC's distribution system through DIMP and other activities, and the integrity of the pipeline materials is an ongoing evaluation process.

One part of this process is CGC's annual construction budget for pipe replacements due to road construction project relocations, mains renewals, and pressure improvements, which has as one of its effects the removal of older or potentially higher risk pipe from the system. Also, since 2010, the annual construction budget has normally included funds specifically targeted at pipeline integrity pursuant to the Company's DIMP mandated by PHMSA's pipeline safety regulations since 2009, as is discussed above. The DIMP renewals process is a data driven prioritization and implementation of pipe replacements for pipe that typically experiences greater volumes of leaks caused by corrosion, material/weld/equipment failure, and natural forces damage. Finally, the Commission's own Natural Gas Pipeline Safety Division conducts safety inspections and reviews pursuant to Tennessee and federal law and presents reports and direction to utilities for corrective action.

V. PIPELINE SAFETY DIVISION INVESTIGATION

Q. You have testified that the catalyst for CGC's new pipe replacement program is an investigation conducted by the Commission's Pipeline Safety Division ("Division"). Can you please provide some background for this investigation?

A. Besides the information gained through the DIMP and other Company processes, the Division conducts safety inspections and reviews pursuant to Tennessee and federal law and presents reports and direction to utilities for corrective action.

On August 23, 2019, the Division began an inspection of an incident that led to a residential house fire and explosion for a CGC customer. Because this incident is currently the subject of litigation, the Commission's investigation speaks for itself. CGC has fully cooperated with the Commission's investigation as well as other investigating agencies. For purposes of this proceeding, the Division did not identify any violations by CGC. The investigation found that scientific analysis of the break determined that the damage to the pipe was a ductile fracture as opposed to a brittle fracture. A ductile fracture is also known as plastic collapse, which is a general bending or twisting of the pipe until it fails and that occurs when a material is simply loaded beyond its ultimate tensile strength. On the other hand, a brittle fracture can occur without any stress on the pipe or deforming of the pipe; rather the fractures in the material occur over time with the brittle cracking leading to complete failure of the material very rapidly when a critical load is reached.

While the investigation indicates that the pipe failure was a ductile break, it further notes that the type of pipe used in this service line is known as Aldyl-A pipe. As noted by the Division, PHMSA Advisory Bulletin ADB-02-07 indicates the susceptibility of Aldyl-A pipe to premature brittle-like cracking. Again, the specific gas pipe reviewed by the Division did not appear to exhibit any brittle-like cracking. However, in view of the potential issues associated with Aldyl-A pipe, the Division requested, among several recommendations, that CGC identify the

Aldyl-A plastic pipe in CGC's system and develop and implement a five to seven year plan for the removal of all Aldyl-A pipe covered by the advisories from its system.

Q. Why does CGC have Aldyl-A pipe in its system?

A. Aldyl-A pipe is a polyethylene pipeline product manufactured by DuPont using DuPont's proprietary Alathon 5040 polymer resin that was first introduced to the market in 1965. In 1970 DuPont began using an improved resin, Alathon 5043, until 1983. During the Alathon 5043 period, DuPont discovered that approximately 30%-40% of the Aldyl-A pipe made during 1970-1973 had what is now known as Low Ductile Inner Wall ("LDIW") characteristics that resulted from excessive temperature settings during the extrusion process. The effect of this is that the inner surface of the pipe is more susceptible to cracking, known as slow crack growth or "brittle-like cracking," which results in reduced pipeline integrity and longevity. As this Aldyl-A pipe ages, the cracks that develop typically will at some point eventually release gas into the environment, which could potentially result in concentrations of the gas posing health, environmental, and fire and explosion safety hazards. The Gas Piping and Technology Committee provides guidance for grading leaks as hazardous or non-hazardous, with Grade 1 leaks representing an existing or probable hazard to persons or property requiring immediate repair or continuous action until the conditions are no longer hazardous. CGC monitors and responds to leaks based upon their grading and applicable regulations.

Q. Is there any easy way to identify this Aldyl-A pipe?

A. No, nor is there a simple non-destructive test that may be employed in the field to distinguish LDIW Aldyl-A pipe from non-LDIW Aldyl-A pipe. As a consequence, Aldyl-A pipe manufactured prior to 1974 is considered to have low resistance to slow crack growth, adversely impacting its longevity. DuPont made further improvements to the resins used in the manufacturing of Aldyl-A pipe in 1983, 1988, and 1992, with the 1988-1992 vintage considered to have high relative resistance to slow crack growth, and the 1992-1999 to have very high relative resistance to slow crack growth.[4] Thus, Aldyl-A pipe manufactured after 1983 is generally not considered to be at risk or requiring replacement sooner than its projected useful life absent other adverse factors.

Q. How much Aldyl-A pipe does CGC have in its system?

A. My Exhibit PCL-2 is a map of CGC's system that shows the Aldyl-A era pipe. I know it is hard to read this on letter-sized paper, but in the electronic form it is easier to enlarge and see. As PCL-2 reflects, there is approximately 30 miles of pre-1974 Aldyl-A pipe, 88 miles of 1974-1983 Aldyl-A pipe, less than a mile of post-1983 Aldyl-A pipe, and about 14.5 miles of undated Aldyl-A pipe. Please note that our records report some pipe as "Smains," but this pipe is distribution

[4] "Hazard Analysis & Mitigation Report On Aldyl A Polyethylene Gas Pipelines in California," California Public Utilities Commission, Steve Haine, P.E., at 5-8 (June 11, 2014), available at https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Natural_Gas_Pipeline/Plans_and_Reports/AldylAReport.pdf#:~:text=Aldyl%C2%A0A%C2%A0pipeline%C2%A0products%C2%A0were%C2%A0first%C2%A0introduced%C2%A0to%C2%A0the%C2%A0market%C2%A0in%C2%A01965.%20%C2%A0%C2%A0The%C2%A0initial%C2%A0PE%C2%A0resin%C2%A0from,which%C2%A0Aldyl%C2%A0A%C2%A0was%C2%A0manufactured%C2%A0between%C2%A01965%C2%A0and%C2%A01970%C2%A0was%C2%A0Alathon%C2%A05040.%20Vintage%3A%C2%A0%C2%A01970%E2%80%901983.

mains, and I have combined mains and smains together for purposes of my testimony.

Q. Given the focus on Aldyl-A pipe, why does your proposal address Aldyl-A pipe along with other vintage plastic pipe and bare or ineffectively coated steel pipe as well?

A. The Division was focused on Aldyl-A pipe since that is the type of pipe that was specifically investigated. However, the Division's concern, just like our DIMP process, is to remove suspected pipe that is at the highest risk for leaking. Given the ambiguity in some of our records that do not specify the manufacturer or type for some of our pipe, we felt it appropriate to remove all pre-1974 Aldyl-A pipe, plus mid-vintage (1974-1983) plastic pipe as determined by leak surveys, as well as some additional steel pipe, classified and reported as bare steel but which could be uncoated or using early coating processes that are now considered to be less effective. Based upon this assessment, and consistent with the Division's intent, CGC identified the specific plastic and bare or ineffectively coated steel pipe considered to be most at risk and requiring replacement sooner than its normal life expectancy.

Q. Does replacement of this pipe provide any other benefits?

A. Yes. In addition to the system integrity gained by this process, a big benefit is to reduce system leaks and the associated spot repair costs. Also, by replacing sections of older pipe we can right-size otherwise currently undersized pipe so as to improve system pressure and flow characteristics, which helps existing customers and future customers that may want to connect to CGC's system. By

replacing the Aldyl-A and other vintage plastic pipe along with the additional bare and ineffectively coated steel pipe on a timetable consistent with the request from the Pipeline Safety Staff, CGC can best balance costs with results. Through adoption of this program, CGC will be in the best position to ensure that it can continue to provide safe, reliable, and affordable natural gas to its customers.

Q. The Division also identified other actions that CGC should undertake besides the pipe replacement. What action on those items will you be taking?

A. First, CGC will be increasing its leak inspection program for all 133 total miles of plastic pipe. In addition, CGC will be engaging in additional public awareness efforts through bill inserts, social media, and other channels to remind customers to "call 811 before you dig," the risks associated with building on top of natural gas lines, and to provide other information regarding the benefits of CGC replacement programs on safety, reliability, and reducing gas emissions. These activities are not included as a part of CGC's PRP, and any additional costs for these actions will be recovered through the ARM process as a part of CGC's normal operational costs.

VI. CGC'S PIPE REPLACEMENT PROGRAM.

Q. How did CGC determine which pipe should be replaced?

A. Based upon the Division's findings that Aldyl-A pipe should be removed, CGC updated its risk-based evaluation of all of the pipe in its system, approximately 1,675 miles of system main pipe. Utilizing the Division's criteria, CGC identified approximately 73 miles of pipe that should be replaced in five to seven years by the

PRP. Specifically, this breaks down as approximately 30 miles of pre-1974 vintage plastic main, 15 miles of mid-vintage (1974-1983) risk-based plastic main, 3 miles of mid-vintage (1974-1983) neighborhood convenience plastic main[5], and 25 miles of ineffectively coated or bare steel main. The vintage plastic pipe identified for replacement includes Aldyl-A pipe as well as other plastic pipe of unknown specific type. The presently estimated cost to replace all 73 miles of of pipe under the PRP is approximately $118 million. I also note that in replacing the mains, we will also replace any service lines that run between the main and the customer meter if that service line is also made from one of the materials that we are removing. All of these costs are identified in my Exhibit PCL-3.

Q. The Division requested that the pipe to be removed should be done on a five to seven-year schedule. What options did you consider?

A. CGC is providing information for both 5-year and 7-year options in its case. Additionally, CGC is providing information for 10-year and 15-year replacement schedules so the Commission can fully understand and assess the benefits of the different options and their potential impacts on customers and system integrity.

Q. What schedule is CGC proposing?

A. CGC believes that a 7-year schedule is the most appropriate means of balancing customer cost impacts with safely operating the system while removing the vintage plastic and bare steel pipe in a timely manner. The LDIW issues for Aldyl-A were

[5] What CGC is referring to as "neighborhood convenience" plastic pipe is pipe in an area where CGC is otherwise engaged in doing a renewal project and it is more cost effective to replace the additional vintage plastic pipe in the same area even though at that time the particular vintage plastic pipe may not be experiencing a high level of leaks.

first identified by DuPont some 40 years ago, and PHMSA and state authorities have issued various advisories and directives over the years regarding Aldyl-A pipe as well as other plastic and bare steel pipe. Again, through ongoing leak surveying and monitoring, the pipe identified in CGC's PRP does not need to be immediately removed. But the propensity for the pipe CGC has identified for its PRP to leak increases over time the longer this pipe remains in the system. The prudent course is for CGC to remove this vintage pipe, and that the best timeline to accomplish such removals is on a 7-year schedule.

Q. How many miles of pipe would be replaced each year under each of the options?

A. As a starting point, CGC would divide the 73 miles of pipe to be replaced fairly evenly over 5, 7, 10, and 15 years, resulting in yearly averages of pipe to be replaced of approximately 14.6, 10.4, 7.3, and 4.9 miles, respectively. However, these numbers are not necessarily what will be done each year. Regardless of the schedule chosen, as circumstances may require, CGC may adjust the miles of pipe to be replaced up or down annually, based upon both leak detection information and other information. For example, CGC already has a higher than historic average construction budget for the next several years due to various already scheduled operational needs, such as expiring gas supply contracts requiring gas supply enhancements and various pressure improvement projects. Given other construction priorities in the next few years, assuming the increased leak tests do not indicate any critical needs, under the seven-year schedule it may be appropriate for CGC to replace fewer miles in the first year or two of the PRP than the schedule

would otherwise indicate, and then the miles being replaced may be accelerated in later years. All of the different factors would be evaluated each year during CGC's budgeting process in scheduling specific PRP pipe to be replaced. The opposite is also true. In any given year or years CGC may need to accelerate or otherwise modify its pipe replacement schedule and remove more pipe than projected in order to ensure system integrity and public safety.

Q. Are there other considerations in picking a replacement schedule?

A. Yes. In choosing a specific schedule it is also necessary to consider the relationship of the PRP plan to CGC's annual construction budget. Through the normal DIMP process, some of the 73 miles likely will be replaced in the coming years outside of the PRP. The current CGC capital plan for the next 5 years anticipates approximately $3.9 million per year in pipe replacements that may address some of the same pipe that is covered by the PRP. Whether the pipe to be replaced under the PRP is removed under the PRP plan or the annual capital plan/DIMP process, the cost to remove the 73 miles of the identified pipe is estimated to be $118 million. To the extent pipe identified by the PRP plan is removed pursuant to the annual capital plan/DIMP process, such removals merely shift the costs for accounting purposes. My Exhibit PCL-4 is an example of how these costs may be split for accounting purposes, which means the amount to be recovered through the PRP may be less than the estimated $118 million. Thus, the longer the pipe replacement schedule chosen for the PRP, the fewer miles of pipe that would need to be replaced under the PRP because some vintage plastic and bare steel pipe would have already been replaced as a part of the DIMP process through the

regularly authorized annual construction expenditures. However, it remains necessary to undertake the PRP because even at 15 years, not all of the vintage plastic and bare steel pipe that needs to be replaced will be replaced under the DIMP program alone.

Q. What about cost recovery and rate impacts?

A. Those issues are addressed in Mr. Hickerson's testimony.

VII. CONCLUSION.

Q. Do you have any concluding remarks?

A. The PRP is about being proactive versus reactive based upon well-documented industry information and guidance. Some of the pipe scheduled to be replaced will be more than 50 years old when removed, and for accounting purposes it will be beyond its useful life. CGC believes that it is very necessary for the long-term safety and reliability of CGC's natural gas system to remove the Aldyl-A and other pre-1974 vintage plastic pipe from its system along with the mid-vintage (1974-1983) plastic as determined by leak surveys and the remaining bare and ineffectively coated steel pipe. CGC believes that the best balance between safety/reliability and cost is to remove this pipe on a 7-year schedule. We are asking the Commission to agree with the prudency of removing this pipe and to do so on a 7-year schedule. In approving the PRP and a specific removal schedule, such approval needs to come with the understanding that the specific amount of pipe to be replaced each year may be subject to modification as circumstances dictate.

However, the objective shall be to remove all of the identified pipe through the PRP or DIMP process in 7 years, or in the number of years approved by the Commission.

Q. Does this conclude your direct testimony?

A. Yes.

Bare Steel Protected (Ineffectively Coated) and Vintage Plastic Replacement Program Overview

- Risk-based program to replace ineffectively coated steel and certain vintage plastics.
- Program would focus on replacing pre-1974 vintage plastic and leakiest sections of mid-vintage (1974-83) plastic as determined by leak surveys.
- As with CGC's bare steel/cast iron replacement program (2007-2020), CGC would report the renewal program spend for the year in the annual report to TPUC.
- $118 million total cost; cost recovery would be through CGC's ARM Docket each year.
- Cumulative rate increase for the average R-1 customer under the 7-year schedule is estimated to be $7.26 per month.

Material to be Replaced	Mileage
Bare Steel (ineffectively coated) Distribution Main	25
Early Vintage Plastic Main (pre-1974)	30
Mid-Vintage Plastic Main, Risk Based (1974-1983)	15
Mid-Vintage Plastic Main, Neighborhood Convenience (1974-1983)	3
TOTAL	73

Chattanooga Gas
Service Center Territory
Munis and districts

Aldyl-A Era Plastic
- Pre-1974 Plastic
- 1974 through 1983 Plastic
- Post-1983 Aldyl-A
- Undated Plastic

Other main and smain
- Plastic
- Steel
- Smain

N

0 1 2 4 Miles

CGC Aldyl-A Era Pipe

Sum of Mileage	Vintage									
	Distribution				Distribution Total	Smain				Smain Total	Grand Total
Muni or District	Pre-74	1974-83	>83 Aldyl-A	Undated		Pre-74	1974-83	>83 Aldyl-A	Undated		
Hamilton County, TN	29.23	82.90	0.18	2.35	114.66	0.48	0.86		8.83	10.18	124.84
Chattanooga	13.07	23.97	0.18	1.28	38.50	0.48	0.78		8.60	9.87	48.38
East Ridge	0.67	2.32		0.09	3.08		0.08			0.08	3.16
Lookout Mountain		0.64			0.64						0.64
Red Bank	1.55	0.52		0.00	2.07						2.07
Signal Mountain	0.23	10.78		0.61	11.62						11.62
Soddy-Daisy		0.66			0.66						0.66
Uninc. District 1	0.00	0.23			0.23						0.23
Uninc. District 3	4.80	14.66		0.00	19.46						19.46
Uninc. District 7	6.35	18.24		0.04	24.63						24.63
Uninc. District 9	1.74	10.61		0.23	12.58						12.58
Walden	0.30	0.23		0.00	0.53						0.53
Collegedale	0.52	0.03		0.10	0.66				0.23	0.23	0.89
Bradley County, TN		4.86		2.98	7.84			0.09	0.38	0.47	8.31
Uninc. District 1				0.71	0.71						0.71
Cleveland		4.86		2.27	7.13			0.09	0.16	0.25	7.38
Uninc. District 5									0.22	0.22	0.22
Grand Total	29.23	87.77	0.18	5.33	122.50	0.48	0.86	0.09	9.21	10.65	133.15

	A	B	C	D
1	**Vintage Plastic**			
2	**Mains**			
3	**Size**	**Length (miles)**	**Cost/Foot**	**Total Cost**
4	2"	48	90	$22,809,600
5				
6	**Services**			
7	**Size**	**Quantity**	**Cost/Service**	**Total Cost**
8	Various	3,000	$3,750	$11,250,000
9	Assume 75 foot service at $50 per foot			
10				
11	**Category**	**Cost**		
12	Mains	$22,809,600		
13	Services	$11,250,000		
14	Misc @ 10%	$3,405,960		
15	**Total**	**$37,465,560**		
16				
17	**Program Estimate**	**$38,000,000**		

	A	B	C	D
1	**Bare or Ineffectively Coated Steel**			
2	**Mains**			
3	**Size**	**Length (miles)**	**Cost/Foot**	**Total Cost**
4	2"	3.38	275	$4,907,760
5	4"	6.64	325	$11,394,240
6	6"	0.74	425	$1,660,560
7	8"	2.05	475	$5,141,400
8	12"	5.93	625	$19,569,000
9	16"	4.32	850	$19,388,160
10	Total	23.06		$62,061,120
11				
12	**Services**			
13	**Size**	**Quantity**	**Cost/Service**	**Total Cost**
14	Various	412	$3,750	$1,545,000
15	Assume 75 foot service at $50 per foot			
16				
17	**Category**	**Cost**		
18	Mains	$62,061,120		
19	Services	$1,545,000		
20	Misc @ 25%	$15,901,530		
21	**Total**	**$79,507,650**		
22				
23	**Program Estimate**	**$80,000,000**		

PRP-DIMP Cost Split (Estimated)

- Total program spend is projected to be $118M (Additional Capital + Current DIMP in Capital Plan)
  - 7yr Program >> $94.2M + 23.8M = $118M
  - 10yr Program >> $78.6M + $39.4M = $118M
  - 15yr Program >> $58.6M + $59.4M = $118M

Additional Capital Needed