Office of the People's Counsel
District of Columbia
1133 15th Street, NW • Suite 500 • Washington, DC 20005-2710
202.727.3071 • FAX 202.727.1014 • TTY/TDD 202.727.2876

Elizabeth A. Noël
People's Counsel

October 16, 2008

VIA ELECTRONIC FILING
Dorothy Wideman
Commission Secretary
Public Service Commission
of the District of Columbia
1333 H Street, N.W.
Second Floor West
Washington, D.C. 20005

Re: Formal Case No. 1027, In the Matter of the Emergency Petition of the Office of the People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company

Dear Ms. Wideman:

Please find enclosed an original and three (3) copies of the "Comments of the Office of the People's Counsel" in the above-referenced proceeding.

Please contact me if you have questions regarding this matter at (202) 727-3071.

Sincerely,

Jennifer L. Weberski
Assistant People's Counsel

Enclosure

cc: All parties of record

BEFORE
THE DISTRICT OF COLUMBIA
PUBLIC SERVICE COMMISSION

In the Matter of	§	
	§	
The Emergency Petition of	§	**Formal Case No. 1027**
The Office of the People's Counsel	§	
For An Expedited Investigation of the	§	
Distribution System of Washington Gas	§	
Light Company	§	

COMMENTS OF THE OFFICE OF THE PEOPLE'S COUNSEL

Pursuant to Order No. 14842 issued by the Public Service Commission of the District of Columbia ("Commission" or "PSC"),[1] the Office of the People's Counsel for the District of Columbia ("OPC" or "Office"), the statutory representative of District of Columbia ratepayers and consumers,[2] hereby submits its Comments and Report. OPC contracted Hudson River Energy Group ("HREG") to conduct a complete review and analysis of WGL's use of mechanical couplings, the leaks associated with the hot tarred mechanical couplings and WGL's use of hexane to remedy the leaks (Attachment A is the Report of HREG).

This case is of paramount importance to DC consumers because it raises public safety issues and has related cost implications. OPC commends the Commission for undertaking this comprehensive investigation and requiring Washington Gas to file its report and updates. Throughout the course of this proceeding, OPC has stressed the need for detailed and comprehensive analysis of how the District's natural gas distribution system is currently being

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[1] *Formal Case No. 1027, In The Matter of The Emergency Petition of the Office of the People's Counsel for An Expedited Investigation of the Distribution System of Washington Gas Light Company*, Order No. 14842, rel. June 27, 2008.

[2] D.C. Code Ann. §34-804 (2004).

operated. In its earlier comments, the Office stressed that it would be premature to fully comment on whether Washington Gas should change its operating, leak survey, inspection, pipe replacement, and repair procedures until the record in this proceeding is more fully developed. The Office emphasized that a more fully developed record will allow the Commission, OPC, and the public to make a reasonable assessment of the extent to which Washington Gas's operations should be modified. Hence, the Office concurred with the PSC's decision to defer its decision pending the outcome of determinations by other agencies with jurisdiction over related issues, such as the Federal Energy Regulatory Commission, ("FERC").

FERC conducted a parallel proceeding regarding the expansion of Cove Point. The FERC proceeding established some basic facts that underlie this proceeding. For example, FERC found the results of couplings testing as far back as 1965, demonstrated that the couplings in the ground are prone to leaks. The WGL couplings continue to be susceptible to leaks and two explosions have resulted from gas leaking from the couplings. Laboratory tests conducted by WGL have not demonstrated that hexane enriched gas can stop leaky couplings from continuing to leak. Similar issues were addressed by the Maryland Public Service Commission. Based upon its review of all of the relevant data and documents OPC submits the following Report and Recommendations for the Commission's review and consideration.

SUMMARY OF REPORT

After thorough analysis of WGL's presented data, the MD proceeding and the FERC proceeding, HREG has concluded:

- WGL has not complied with the applicable safety code requirements.
- WGL has not addressed the recommendations of the PHMSA (US Department of Transportation Pipeline and Hazardous Materials Safety Administration) advisories.

- WGL has ignored the events and activities leading up to the proposed rules on integrity management, which bear directly on the types of issues it is confronting.

- Revaporized LNG from Cove Point is not the primary source of WGL's leaking coupling problems, although it may be a contributing factor.

- There is no evidence to support WGL's claim that application of hot tar to compression couplings was standard industry practice.

- WGL's purported understanding of the problems has been understated, inconsistent over time and inconsistent across jurisdictions.

- Hexane injection is not a long term solution and is questionable as a short term solution.

- WGL has not developed a plan to proactively address coupling leaks in the District.

Therefore, OPC recommends:

- The PSC should direct WGL to address the following issues associated with its compression couplings:

    1. Identify as precisely as possible the locations of the hot tarred couplings.

    2. Determine in what priority order the couplings should be replaced/repaired. [In Prince George's County, Maryland, WGL practice was to replace service lines and replace or repair mains, depending on other parameters. Use of the phrase "replaced/repaired" here contemplates continuation of that approach.]

    3. Determine over what period of time the replacement/repairs should take place, and identifying the actions that should be taken with respect to hot tarred couplings remaining on the system pending replacement/repair, such as frequency of additional leak surveys and expedited repairs to new leaking couplings.

- A minimally acceptable plan for addressing the leaking couplings would include:

    1. Increasing the frequency of leak surveys over mains and service lines containing leak prone hot-tarred couplings and ensure their effectiveness. WGL must accomplish such leak surveys every three months over its system containing leak prone couplings.

    2. Identifying and replacing all its service lines (8,091) containing leak prone hot-tarred couplings in the district within 3 years, and

3. Identifying priorities and replacing or repairing all 2" and smaller diameter couplings on its mains (56 miles) within 5 years.

- An aggressive plan for addressing the leaking couplings would include:

1. Identifying the location of its leak prone hot-tarred couplings within the District of Columbia by December 1, 2008 and establishing priorities for their replacement/repair.

2. Replacing 4,000 service lines containing hot-tarred couplings each year for the next two years (2009-2010).

3. Replacing 15 miles of 2" and smaller diameter mains containing leak prone hot-tarred couplings each year for the next three years (2009-2011) and completing all replacements/repairs in the fourth year (2012).

- A comparison of the revenue requirements associated with complete replacement/repair as compared to hexane injection strongly favors replacement/repair. HREG's calculation of annual revenue requirement associated with complete replacement/repair of mains and services with mechanical couplings to be $2.65 million per year, as compare to $6.4 million for hexane injection.
- The Commission should require WGL to show cause why ratepayers should be responsible for the cost of the replacement/repair program, additional surveys, and related program costs.

CONCLUSION

Wherefore, OPC respectfully requests the Commission adopt the recommendations contained in the attached Report.

Respectfully submitted,

Elizabeth A. Noël
People's Counsel
D.C. Bar No. 288965

Sandra Mattavous-Frye
Deputy People's Counsel
D.C. Bar No. 375833

Barbara L. Burton
Assistant People's Counsel
D.C. Bar No.430524

Brian O. Edmonds
Assistant People's Counsel
D.C. Bar No. 475869

Jennifer L. Weberski
Assistant People's Counsel
D.C. Bar No. 481853

OFFICE OF THE PEOPLE'S COUNSEL
OF THE DISTRICT OF COLUMBIA
1133 15th Street, N.W., Suite 500
Washington, D.C. 20005
(202) 727-3071

DATED: October 16, 2008

Formal Case No. 1027

OPC Attachment A

Formal Case #1027 – In the Matter of the Emergency Petition of the Office of People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company

Report of the Hudson River Energy Group

October 16, 2008

Hudson River Energy Group
Frank Radigan
John Gawronski
Phillip Teumim

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Executive Summary

In August 2005, the Office of People's Counsel ("OPC") retained the Hudson River Energy Group ("HREG") to provide technical support and services to OPC in the Public Service Commission's Formal Case No. 1027, *In the Matter of the Emergency Petition of the Office of People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company* (FC 1027). On behalf of OPC, HREG has prepared a report which provides a critical analysis of the factors surrounding gas leaks on Washington Gas Light Company ("WGL") distribution system.

A summary of Hudson River Energy's Group and the qualifications of its consultants is included as Appendix 1 to this report.

HREG's conclusions and recommendations are summarized below.

Conclusions

- *WGL has not complied with the applicable safety code requirements.*
- *WGL has not addressed the recommendations of the PHMSA (US Department of Transportation Pipeline and Hazardous Materials Safety Administration) advisories.*
- *WGL has ignored the events and activities leading up to the proposed rules on integrity management, which bear directly on the types of issues it is confronting.*
- *Revaporized LNG from Cove Point is not the primary source of WGL's leaking coupling problems, although it may be a contributing factor.*
- *There is no evidence to support WGL's claim that application of hot tar to compression couplings was standard industry practice.*
- *WGL's purported understanding of the problems has been understated, inconsistent over time and inconsistent across jurisdictions.*
- *WGL has not developed a plan to proactively address coupling leaks in the District.*

Recommendations

- The PSC should direct WGL to address the following issues associated with its compression couplings:
  1. Identify as precisely as possible the locations of the hot tarred couplings.

2. Determine the basis for and in what priority order the couplings should be replaced/repaired. [In Prince George's County, Maryland, WGL practice was to replace service lines and replace or repair mains, depending on other parameters. Use of the phrase "replaced/repaired" here contemplates continuation of that approach.]
3. Determine over what period of time the replacement/repairs should take place, and identifying the actions that should be taken with respect to hot tarred couplings remaining on the system pending replacement/repair, such as frequency of additional leak surveys and expedited repairs to new leaking couplings.

- A minimally acceptable plan for addressing the leaking couplings would include:
  1. Increasing the frequency of leak surveys over mains and service lines containing leak prone hot-tarred couplings and ensure their effectiveness. WGL must accomplish such leak surveys every three months over its system containing leak prone couplings.
  2. Identifying and replacing all its service lines (8,091) containing leak prone hot-tarred couplings in the district within 3 years, and
  3. Identifying priorities and replacing or repairing all 2" and smaller diameter couplings on its mains (56 miles) within 5 years.

- An aggressive plan for addressing the leaking couplings would include:
  1. Identifying the location of its leak prone hot-tarred couplings within the District of Columbia by December 1, 2008 and establishing priorities for their replacement/repair.
  2. Replacing 4,000 service lines containing hot-tarred couplings each year for the next two years (2009-2010).
  3. Replacing 15 miles of 2" and smaller diameter mains containing leak prone hot-tarred couplings each year for the next three years (2009-2011) and completing all replacements/repairs in the fourth year (2012).

- A comparison of the revenue requirements associated with complete replacement/repair as compared to hexane injection strongly favors replacement/repair. HREG's calculation of annual revenue requirement associated with complete replacement/repair of mains and services with mechanical couplings to be $2.65 million per year, as compare to $6.4 million for hexane injection.

- The Commission should require WGL to show cause why ratepayers should be responsible for the cost of the replacement/repair program, additional surveys, and related program costs.

I. Historical Background

The Cove Point LNG Facility

In the 1970s, the Consolidated Natural Gas Company and the Columbia Gas System jointly developed the Cove Point LNG import facility ("Cove Point") on the Chesapeake Bay in Cove Point, Maryland, some 65 miles from Washington DC. The facility changed hands several times over the years, and is currently operated as Dominion Cove Point LNG, LP, a subsidiary of Dominion Resources, an integrated energy company headquartered in Richmond, Virginia, which owns electric generation and transmission, oil and gas production, gas transmission and storage, and electric and gas utilities.

The Cove Point terminal is interconnected to the wholesale natural gas transmission system through the 88-mile Cove Point pipeline. The Cove Point pipeline is currently interconnected near its western end with Columbia Gas Transmission and Dominion Transmission in Loudon County, Virginia, and Transco at the Pleasant Valley Gate station in Fairfax County, Virginia. WGL receives gas supplies into its distribution system from those interstate pipelines near their interconnections with the Cove Point pipeline.[1] The six WGL gate stations near the those interconnections provide the sole source of supply for WGL customers in Calvert and St. Mary's Counties, Maryland as well as portions of Prince George's County, Maryland and the District of Columbia.[2] Since the reactivation of the LNG terminal in 2003, WGL received revaporized LNG, unblended with traditional pipeline gas supplies, at each of these gate stations, which currently serves about 30 percent of WGL's load.[3]

Cove Point was operated as an import facility from 1978 to 1980, when it became uneconomic to operate. In 1995, it was reopened as an LNG storage and peak-shaving plant, using domestic natural gas.

On January 12, 2001, FERC approved a certificate filed by Cove Point in Docket No. CP01-76 to construct new facilities and reactivate existing facilities at the LNG terminal located in Calvert County, Maryland.[4] The certified storage capacity was 7.8 Bcf and the daily send-out capacity of the Cove Point facilities was 1 Bcf of gas/day. In August 2003, Dominion once again began receiving shipments of imported LNG.[5] LNG arrives via LNG tankers, which are off-laded at an offshore dock and stored in liquid form in insulated tanks until needed, at which time it is revaporized and delivered to the pipeline.

On April 5, 2005, Cove Point filed an application to expand the storage and sendout capacity of its facilities. Cove Point proposed to expand its existing LNG terminal by adding two new LNG storage tanks and additional vaporization capacity. The proposed

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[1] FERC Docket No. CP05-130-00, WGL Supplemental comments filed November 11, 2005
[2] MD PSC Case 9035, Direct Testimony of Douglas Staebler
[3] Ibid.
[4] Cove Point LNG Limited Partnership, 97 FERC @ 61,044 (2001).
[5] MD PSC Case 9035, Direct Testimony of Douglas Staebler

expansion would approximately double the LNG storage and send out capacity.[6] Cove Point also proposed to construct and operate additional pipeline and storage facilities to allow additional deliveries to other interstate pipelines.[7] In August 2006, Cove Point received FERC approval to expand the storage capacity to approximately 14.5 Bcf and the daily send-out capacity to 1.8 Bcf, as well as to construct additional pipeline and storage expansions in Maryland and Pennsylvania. Construction began in 2006, and the expansion is expected to be in service prior in November 2008 if all legal and regulatory issues are resolved.[8]

The reactivation of Cove Point as an LNG import facility, its pending expansion, and the possible effects of revaporized LNG on WGL's system are at the heart of FC 1027 and the related Maryland and FERC proceedings.

Natural Gas Composition

Natural gas is a combustible mixture of hydrocarbon gases. In its unrefined state, the "typical" composition of natural gas is shown in the following table:[9]

Component	Percentage
Methane	70 – 90
Various other hydrocarbons e.g., Ethane, propane, butane	0 – 20
Carbon Dioxide	0 – 8
Oxygen	0 – 0.2
Nitrogen	0- 5
Hydrogen Sulphide	0 – 5
Rare Gases	Traces

During processing, most of the non-methane hydrocarbons and other components are removed, so that the remaining gas, often referred to as pipeline quality gas, is almost entirely methane. Further, most company tariffs specify pipeline quality gas as a gas with water content less than seven pounds per million cubic feet, and in fact, much gas is transported with water vapor content less than four pounds per cubic feet. The non-methane hydrocarbons, which are considered "heavy" hydrocarbons, tend to exist in a liquid rather than a gaseous state, and are therefore also referred to as "natural gas liquids" (NGLs). Removal of those heavier hydrocarbons is often referred to as "stripping" the gas. The extent to which gas is stripped in the refining process often depends on the prices those liquids will fetch in the marketplace.

[6] Ibid
[7] Ibid.
[8] As discussed later in this report, the US Court of Appeals has remanded the case to FERC with respect to the issue of leakage on the WGL system.
[9] Natural Gas Supply Association http://www.naturalgas.org/overview/background.asp

Processed natural gas with a higher level of NGLs is considered wetter gas and with a lower level of NGLs is considered drier gas. Pipeline tariffs typically contain provisions as to the permissible levels of NGLs allowed in the gas they transport.

During the process of liquefying natural gas, the first hydrocarbons that liquefy and "drop out" of the gas stream are the heavy hydrocarbons, and the last to liquefy is methane, so it is a very simple process to remove the heavier hydrocarbons. Thus, all else being equal, revaporized LNG is likely to be drier than conventional natural gas.

Use of Mechanical Couplings in the Gas Industry

One of the first materials to replace cast iron pipe on gas utilities' piping network, was high carbon steels such as wrought and ductile iron. As steel pipe replaced cast iron on their low and medium pressure gas distribution systems, gas utilities used several methods of joining steel pipe, including compression couplings. Most couplings rely on elastomers and compression as sealing mechanisms. Couplings installed on gas systems include:

- Mechanical (compression) couplings – which consist of many differing designs. The most common coupling design to join two pipes consists of a cylindrical barrel with end caps "follower rings" attached at the ends of the barrel. For small diameters, the follower ends are attached to the barrel by a threaded connection. To form the gas seal between the pipe and the coupling, a rubber wedge shaped ring or gasket, rests on the pipe between the barrel and the pipe. The follower ring is tightened against the barrel and forces the rubber gasket material against the barrel and pipe to make a gas tight seal.
- Threaded or screw couplings – which consists of a piece of pipe threaded on the inside (screw coupling) that connects the threaded ends of two pipe ends.

Two widely used compression couplings during the decades of the 1940s through the 1960s were manufactured by Dresser Industries [10] and Norton McMurray (Normac), similar to those illustrated below.[11].

[10] In 1885, Solomon Dresser manufactured a coupling to join pipes together in such a way that they would not leak natural gas. This coupling used rubber for a tight fit, and it was so successful that it permitted for the first time the long-range transmission of natural gas from the oil fields where it naturally occurred to faraway cities. In 1988, Dresser Industries was acquired by M.W. Kellogg, merged with Halliburton in 1998 and is now owned by First Reserve Corporation, an investment company.

[11] Norton McMurray Manufacturing Company, Geneva Illinois has manufactured gas couplings since 1938.

Compression Couplings of the Type Used on WGL's System[12]

Example of a Style 90 Type Dresser Compression Coupling, Open Ended Barrel for View of Components[13]

Compression coupling technology was generally overtaken by welding technology, and steel pipe has been largely replaced by plastic pipe, which is joined primarily by fusion, (essentially plastic welding). A variety of couplings of various designs, including compression couplings, are still used today in the gas industry to join pipe and fittings.

Many compression couplings are still in service, generally without systemic problems and issues. However, in addition to the gas leak issues which are the subject of this proceeding, there have been several other problems which attracted industry and regulatory attention in the United States.

[12] Photos from Norton MacMurray Manufacturing Company website
[13] Railroad Commission of Texas, Pipeline Safety Section Study Report on *Compression Type Couplings*

Use of Mechanical Couplings by WGL

During the years 1948 to 1974, WGL used Normac and Dresser compression couplings (WGL suspended its use of Normac couplings in 1966), almost exclusively as the means of joining pipes on its lower pressure, small diameter (less than 2inch diameter) steel pipes. The Company has estimated that it installed approximately 8,100 services and between 56-60 miles of two inch and smaller diameter main within Washington DC during that time frame. Using 56 miles with a coupling installed every thirty feet and 8100 service lines, with each service line containing two compression couplings (one at the main and one at the house), equates to 26,000 at risk compression couplings.

During this period of time, WGL's practice was to coat compression couplings with hot coal tar enamel, ("hot tar") as a means of providing additional corrosion protection to the joints. The hot tar was applied to the couplings at a temperature of 400 degrees F. This practice is documented in WGL's contemporaneous corrosion control procedures dated 1955 and 1969, which state that:

> Street Department Operating Instruction No. 21
> Priming and Coating Joints and Repairing "Holidays"
>
> *Step 3. After primer has cured, hot enamel shall be applied. It is important that the enamel is from the same manufacturer as the primer. The correct temperature for pouring (400 degrees Fahrenheit) is indicated by the emission of a light blue vapor from the enamel; yellowish-brown fumes indicate that the enamel has been over-heated and must be discarded. Where cardboard or asbestos felt molds are available, they shall always be used and enamel poured over the entire primed surface, filling the mold.*[14]

Coupling manufacturers may have permitted heated coated materials, however Normac states to FERC that the high temperatures combined with the molds used to maintain hot tar contact with the coupling, resulted in gasket and seal degradation.[15] The hot tar combined with the questionable performance of gasket materials (Buna S versus Nitrile or Buna N material) of that era resulted in poor coupling performance. Even after WGL switched to Dresser couplings in 1966 with better gasket materials, WGL still identified leaky couplings of vintages until 1974. This apparently is when WGL finally stopped hot tarring couplings, or by then switched to the use of plastic pipe, which it would not have exposed to hot temperatures other than pipe ends for fusing lengths of pipe.

During the 1960s, after experiencing a series of leaks following installation of Normac couplings on sizes ¾ inch through 2 inch diameter mains and services WGL tested its hot coal tar enamel coated couplings (hot tarred couplings). Field crews had reported that when they excavated leaking couplings, they found the rubber seals so deformed that the mechanical nuts, which were originally wrench tightened to form the seal against the internal couplings' rubber, were so loose, "they could be removed by hand."

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[14] FERC Docket # CP05-130, WGL response to FERC data request 9 dated April 18, 2006
[15] FERC Docket # CP05-130, Normac's March 10, 2006 Comments

WGL confirmed this by a series of tests of its Normac hot-tarred couplings during 1966[16], suspended use of Normac couplings and switched instead to use Dresser manufactured couplings. However, WGL's standard for hot tar coating its couplings dated 1969 remained in effect and apparently Dresser couplings were hot tarred just as the earlier Normac couplings were hot tar coated. It is not clear exactly when WGL suspended its practice of hot tarring its couplings.

WGL continued to experience coupling leaks following changing to the use of Dresser couplings, but was able to keep up with the rate of leakage, that is to respond to the leak location, investigate the extent of hazardous gas migration, and repair the hazardous leaks. WGL did not identify any programs to address their leaking coupling problem.

[16] FC 1027, WGL internal communication memos dated March 8, 1966 and March 15, 1966 in response to OPC data request 5-15. These memos identify and list memos of coupling tests conducted during 1965 as well as discuss additional tests on couplings conducted during 1966.

II. Applicable Safety Codes, Advisories, and Proposed Rules

Applicable Safety Code

The USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA)[17] has issued 49 CFR Part 192 Pipeline Safety Code Requirements. In particular, 49CFR192.613 Continuing Surveillance states that:

> *(a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions.*
> *(b) If a segment of pipeline is determined to be in unsatisfactory condition but no immediate hazard exists, the operator shall initiate a program to recondition or phase out the segment involved, or, if the segment cannot be reconditioned or phased out, reduce the maximum allowable operating pressure in accordance with §192.619 (a) and (b).*

Safety Advisories concerning Mechanical Couplings

The USDOT has issued several advisories regarding incidents and problems with mechanical couplings over the years.

February 26, 1986 USDOT Advisory Bulletin ADB-86-02 issued in response to the National Transportation Safety Board's Recommendation P-85-31:
ADB-86-02 states that the Office of Pipeline Safety (USDOT) is aware of a number of incidents where plastic piping has pulled out of mechanical couplings including:

- Natural Gas Explosion and Fire, Sharpsville, Pennsylvania. NTSB's investigation pointed out the cyclic effects of temperature related contraction/expansion on plastic pipe in couplings with inadequate pullout restraint. OPS recommended:
  - "Each operator on natural gas pipelines review their present procedures for using mechanical couplings on plastic pipe to insure that the design of the coupling used, and the qualifications of the person(s) doing the joining meet Federal pipeline safety regulations contained in CFR Part 192, and
  - Each operator evaluate the procedures used for each type of coupling connection previously installed considering the present known factors affecting the coupling safety and take action as appropriate.

March 4, 2008 USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) Notice of Issuance of Advisory Bulletin concerning failures of mechanical couplings updating information in Advisory Bulleting ADB-86-02:

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[17] PHMSA's regulations in 49 CFR Part 192 establish a minimum set of safety requirements that all States must implement, although States may impose more stringent requirements on intrastate systems.

This notice advises owners and operators of gas pipelines to consider the potential failure modes for mechanical couplings used for joining and pressure sealing two pipes together. Failures can occur when there is inadequate restraint for the potential stresses on the two pipes, when the couplings are incorrectly installed or supported, or when the coupling components such as elastomers degrade over time. In addition, inadequate leak surveys which fail to identify leaks requiring immediate repair can lead to more serious incidents. PHMSA urges operators to review their procedures for using mechanical couplings and ensure coupling design, installation procedures, leak survey procedures, and personnel qualifications meet Federal requirements. Operators should work with Federal and State pipeline safety representatives, manufacturers, and industry partners to determine how best to resolve potential issues in their state or region. The March 4, 2008 advisory bulletin identifies 3,417 gas distribution incident reports submitted to PHMSA since 1984 and identified 148 incidents that appear to be coupling or fitting failures on steel and plastic pipe. The significant incidents within that data as well as the potential for additional significant incidents should not be ignored. The following specific coupling incidents and issues were cited:

- Long Island Lighting Company, a combination utility formerly serving Counties on Long Island in New York State experienced leaks attributed to gaskets and gas quality on coupled steel lines.[18] In that case, a number of leaks in compression couplings on service lines resulted in the wholesale replacement of Normac compression coupling vintages installed between 1955 and 1974 (some 30,000) on the distribution system. Initial analysis determined couplings of those vintages were susceptible to leaks, and that their gasket materials swelled or reduced in size when immersed in heavy hydrocarbons. Dresser couplings tested were not found susceptible to leakage. LILCO employees anecdotally indicated that the couplings affected may not have been suitable for gas service due to their gasket materials.
- Failure in Buffalo, Minnesota on February 19, 2004 that resulted in significant property damage,
- Failure in Ramsey, Minnesota on December 28, 2004 that resulted in three fatalities and one serious injury, after these incidents two additional incidents in the State,
- Failure in Wylie, Texas on October 16, 2006 that resulted in two fatalities. Between 1980 and 2007, seven incidents occurred in Texas outlined in a Texas Railroad Commission report titled "Study Report on Compression Type Couplings".
- Texas - As a result of two explosions in Texas[19] involving compression couplings at service riser installations, the Texas Railroad Commission adopted directives requiring replacement of compression couplings which did not have restraints to resist pull out of the pipes.
- In 2005, Washington Gas Light issued a report on the increased incidence of natural gas leaks attributed to gaskets and gas quality on mechanically coupled

[18] The gas properties of LILCO were later acquired by the Brooklyn Union Gas Company, and the succeeding company became KeySpan, which was later acquired by National Grid.
[19] October 2006 and March 2007

steel pipe. As discussed previously, at least one explosion in Prince Georges County, Maryland was the result of coupling leaks.

- In 2005 the Public Utilities Commission of Ohio (PUCO) opened a statewide investigation due to a series of natural gas incidents reported to PUCO involving risers, the vertical portion of service lines connecting company and customer meters near or within customer's premises,

PHMSA identified one of the failure modes as involving leakage through the sealing surface between the coupling and the pipe. This occurred when the integrity of long term viscous and elastic effects of the seals degraded which eventually caused a leak path to develop. Further, PHMSA stated that in some cases, a change in the gas quality in the distribution system may have contributed to the failure.
PHMSA advised operators of gas distribution pipelines using mechanical couplings to do the following to ensure compliance with 49CFR part 192:

- Review procedures for using mechanical couplings, including the coupling design and installation and ensure that they meet manufacturer's recommendations,
- Improve recordkeeping on specific couplings that exist, i.e., their type, installation date, maintenance schedule, and any failures encountered, to help identify a trend of problems that may occur with a specific coupling or type of installation.
- Consider whether to adopt a full replacement program if there are too many unknowns related to couplings in service, and to
- Work with Federal and State pipeline safety representatives, manufacturers, and industry partners to determine how best to resolve potential issues in their respective state or region.

Proposed Rules on Integrity Management

In a report published June 14, 2004,[20] the USDOT's Inspector General (IG) found that recent accident trends for gas distribution pipelines are not favorable. The IG noted that nearly all of the natural gas distribution pipelines are located in highly populated areas, such as business districts and residential communities, where a rupture could have the most significant consequences. As a result, the audit pointed out for the 10-year period from 1994 through 2003, accidents on natural gas distribution pipelines have resulted in more fatalities and injuries than accidents on hazardous liquid and natural gas transmission lines combined.

The IG also recognized that applying risk management principles to distribution pipelines could help reverse these trends. In testimony before Congress in July 2004,[21] the IG recommended that PHMSA should define an approach for requiring operators of distribution pipeline systems to implement some form of integrity management or

[20] Audit report SC-2004-064, issued June 14, 2004
[21] *Progress and Challenges in Improving Pipeline Safety*, Statement of the Honorable Kenneth M. Mead, Inspector General, Department of Transportation, before the Committee on Energy and Commerce, Subcommittee on energy and Air Quality, U.S. House of Representatives, July 20, 2004.

enhanced safety program with elements similar to those required in hazardous liquid and gas transmission pipeline integrity management programs.

The IG stated that operators should:

- Understand their infrastructure (know their system),
- Identify and characterize the threats to their system, and
- Determine how best to manage the known risks to its system (prevention, detection and mitigation).

As a result, PHMSA proposed, on June 25, 2008, its Integrity Management Program (IMP) for Gas Distribution Pipelines.[22]

The proposed regulation would require operators to develop and implement written IM programs addressing the following elements:

- Knowledge of infrastructure;
- Identification of threats;
- Evaluation and prioritization of risks;
- Mitigation of risks;
- Measurement and monitoring of performance;
- Periodic evaluation and improvement; and
- Reporting of results.

Excerpts from the proposed rules are included as Appendix 1 to this report.

[22] Federal Register: June 25, 2008 (Volume 73, Number 123) [Proposed Rules]

III. Relevant Proceedings

This case is distinguished by the existence of several interrelated proceedings running parallel or concurrently. Formal Case No. 1027, GT 06-1, Maryland 9035 and FERC CP05-130, 131. A brief description of F.C. 1027 is included here, and a detailed and expanded procedural history of each docket is attached as Appendix 2.

On January 13, 2004 OPC filed an emergency petition requesting that the Commission open a formal case, including formal evidentiary hearings, to investigate a spate of natural gas service interruptions at or about the 100 block of 11th Street, SE that caused gas furnaces to cut off, meters to freeze, and homes to be without heat and hot water.[23]

On March 28, 2005 a natural gas-related incident occurred in District Heights, Maryland, which resulted in an explosion and fire to a private residence.

On April 7, 2005 in response to the explosion in Maryland, OPC filed a motion that noted that the incident raised some serious concerns about the safety and reliability of WGL's distribution system and asked that the Commission conduct a thorough investigation to ensure the public that every possible action is being taken to ensure the integrity of the District's natural gas distribution system. OPC further stated that taking proactive measures in the wake of known occurrences and conditions is a more efficient use of resources, rather than investigating occurrences that could potentially cause the loss of not only property, but human life.[24]

On April 13, 2005 after reviewing all of the filings in the case, the Commission found that the matter of leaks on WGL's system warranted further inquiry. The Commission asked that the parties address certain questions that the Commission raised and directed WGL to file all reports that it prepared in connection with the recent explosion in Maryland.[25]

On March 25, 2008, the Commission issued Order No. 14767, directing WGL and OPC to prepare a procedural schedule and list of issues on the prudence of WGL's hexane strategy in light of Maryland's conclusions and holding in 9035.

On June 27, 2008, the Commission issued Order No. 14842 adopting WGL and OPC's proposed issues and procedural schedule.

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[23] Formal Case No. 1027, In the Matter of the Emergency Petition of the Office of the People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company ("F. C. 1027'), Emergency Petition of the Office of the People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company ("Petition"), filed January 13, 2004.

[24] See F.C. No. 1027, Motion of the Office of the People's Counsel for an Expansive Investigation of the Safety and Reliability of Washington Gas Light Company's Distribution System, filed April 7, 2005.

[25] See. F.C. No. 1027, Order No. 13557.

IV. Analysis

WGL has not complied with the applicable safety code requirements.

As described previously, circa 1965, WGL was aware that it was having problems with leaks from hot tarred couplings. WGL claims this leaking coupling problem was not chronic. WGL's internal memos from its personnel stated that its coupling leak rates of coupling vintages after 1965 falls off,[26] however, other WGL email associated with this issue indicates that leak rates for specific vintage of pipe may be higher than others due to more pipe (and couplings) being installed during those vintage years[27]. Notably, WGL personnel make further statements in a document WGL filed with FERC (attributed to Mike Hagan with no date) that leaks were a continuing problem.

> *Normac coupling leaks are not a new occurrence. As far back as 1967 we were having problems with Normacs. On June 18, 1975 a memo was written by Keith Fellows to finally disapprove use of the couplings. Apparently there was much pressure to use Normacs because they were less expensive. Most crews in the field know that we need to make repairs as above or as indicated on page 1 for any existing Normac that is exposed for any reason. As far as I can remember crews know that this needs to be done and there has always been a general feeling that Normacs are probably unreliable or are going to eventually be leaking.*
>
> *.... There are probably still many defective Dressers still installed from a period of approximately 1957 through 1963 when they apparently corrected their problem.*[28]

The FERC proceeding established some basic facts:

- WGL has marginally sealed hot tarred couplings,
- The results of couplings tested as far back as 1965, demonstrated that the couplings in the ground are prone to leaks and many have been found over the years to be hand tight,
- WGL's couplings continue to be susceptible to leaks, and
- At least one explosion resulted from gas leaking from its couplings.
- WGL's PSI[29] study on couplings reflects that hexane has little effect or showed little changes in volume swell on non-leaking Normac couplings."[30] PSI also

[26] FERC Docket CP05-130, Alan Mayberry email 4-21-2005
[27] Ibid., Julie Galante email 5-08-2005
[28] Ibid., Undated memo from WGL employee Mike Hagan filed on 4-20-2006 in response to FERC data request of 3-24-2006 to provide all work papers, internal and third party test results, internal memorandum, email correspondence and all correspondence between Washington Gas and other parties.
[29] WGL's PSI study dated September 27, 2005 and filed with FERC on November 30, 2006 reflects that gas composition *had virtually no effect on non-leaking seals*. PSI conducted laboratory tests on seal samples from both leaking and non-leaking WGL couplings. As a result of these laboratory experiments, PSI concluded that while leaking seals were affected by the two different gases, "the non-leaking Normac seals showed very little changes in volume swell when subjected to the two different gas supplies."

noted that the non-leaking seals "showed little effect in the hexane immersion study" previously conducted by PSI.[31]

The safety code requirements contained in 49CFR192.619 require operators such as WGL to have a program that continually surveys its facilities to determine and take appropriate action concerning changes, failures, leakage history, and other unusual operating and maintenance conditions. Whether this subset of couplings are of poor design, have gasket materials unsuitable for gas service, are damaged due to hot tar at the time of their installation, or react poorly to colder ground temperatures, increased operating pressures, or changes in gas composition, the fact remains they are prone to leakage, experiencing over 300 leaks per year prior to the introduction of Cove Point LNG. In 1999, with no LNG gas from Cove Point pipeline flowing, WGL leaks actually spiked to 531.[32]

In response to OPC data requests to identify this set of main and service line segments with higher risk couplings, WGL has stated it does not risk rank its pipe segments experiencing coupling leaks any higher than a segment experiencing a leak from other causes.[33] In response to OPC data requests of when is a coupling leak rate on a segment safe, or how many coupling leaks would it take to identify a main segment for replacement, WGL simply responds there are a number of other factors in determining when to replace a pipe segment, it has been able to respond and repair coupling leaks so far, and it is relying on hexane injections to control leaks.[34] WGL has not provided a plan to replace its leak prone couplings.[35]

In HREG's judgment, a prudent operator would have acknowledged that it had couplings prone to leak and would have implemented a program to eliminate those components. Applying the words used by the USDOT Inspector General, WGL has not taken steps to understand its infrastructure, identify and characterize the threats to their system, and determine how best to manage the known risks to its system.

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[30] *Characterization of Seal Swell in Two Gaseous Environments*, Polymer Solutions Incorporated, September 27, 2005, at 4. The graphs and charts contained in the PSI Report show that the changes in volume swell for the non-leaking seals were very close to or within the standard deviation. *Id.* at 5-8.

[31] Ibid. at 5. This "hexane immersion study" also has not been provided by WGL, but apparently was briefly described at pages 19-21 of the ENVIRON Report. ENVIRON stated that after immersion of seal samples in hexane for 70 hours, "[t]he non-leaking NBR seals have a significantly lower hexane swell and a different specific gravity than their leaking counterparts." ENVIRON Report at 19.

[32] FERC Docket CP05-130, WGL response of April 18, 2006 to FERC staff data request contains the following: On page 2 of Exhibit LNG-106 from Docket No. RP04-249, et al., the total number of leaks experienced in 2003 was 562, or an increase of about 55 percent from the 363 leaks experienced in 2002. However, Exhibit LNG-106 also shows that the total compression related leaks experienced by Washington Gas spiked to 531 in 1999 from 359 the previous year, or an increase of 48 percent, when LNG was not flowing through the Cove Point pipeline.

[33] FC 1027, WGL response to OPC data requests 5-8(d) dated August 13, 2008

[34] FC 1027, WGL response to OPC data requests 5-8(e,f), 5-10 dated August 13, 2008

[35] FC 1027, WGL response to OPC data requests 5-16 dated August 13, 2008

WGL has not addressed the recommendations of the PHMSA advisories.

WGL's coupling installation violated manufacturer's recommendations with respect to application of hot tar.[36] Specifically, it has not identified its vulnerable couplings, and it has not disclosed any consideration of a replacement program.

WGL has ignored the events and activities leading up to the proposed rules on integrity management, which bear directly on the types of issues it is confronting.

The need for distribution integrity management programs has been identified by regulatory authorities for a number of years, as explained in Section II of this report. WGL has known of the vulnerability of its hot tarred couplings, yet it has not identified nor has it implemented a comprehensive, systematic coupling replacement program within the District.
WGL continues to fall short of compliance with applicable safety codes and pipeline safety advisories.

Revaporized LNG from Cove Point is not the primary source of WGL's leaking coupling problems, although it may be a contributing factor.

WGL has alleged that the revaporized LNG from Cove Point is drier than conventional natural gas and has been damaging the rubber seals in the compression couplings, tending to cause them to leak. WGL petitioned FERC:

- WGL contends that FERC should not approve Cove Point LNG's proposal until Cove Point LNG takes appropriate steps to ensure that the increased deliveries of regasified LNG from Cove Point LNG's facilities will not damage WGL's infrastructure.[37]
- WGL contends the expansion is likely to subject WGL service territory to 3,500 new leaks annually and may take 14 years, at an exorbitant cost, for WGL to encapsulate or replace its mechanical couplings.[38]

The FERC proceeding has an extensive record. (See, Appendix 2) The FERC decision, with respect to the alleged relationship between the revaporized LNG and the leaking compression couplings, provides a useful perspective.

In its June 16, 2006 decision, FERC concluded that impacts on coupling leak rates was greater due to changes in ground temperature than compared with changes in gas composition, and that it is clear that any shrinkage due to the desorption of C5+ was small, particularly when compared to other contributing factors. FERC further concluded that the evidence in the record did not support a conclusion that the gas composition is a key contributor in causing the increase in coupling leaks. The loss of heavy hydrocarbon compounds would not have caused any increase in leak rates on WGL's system in the

[36] FERC Docket CP05-130, Normac Comments 3-10-2006
[37] FERC Dockets CP05-130, 131, 132, order issuing certificates and granting Section 3 authority, Paragraph 40 (Issued June 16, 2006)
[38] WGL reply comments following FERC technical conference of August 14, 2008

absence of those other more significant contributing factors, namely, the application of hot tar, increase in operating pressure and a decrease in temperatures.[39]

By petition dated July 17, 2006, WGL requested rehearing on the grounds that its system is leaking, leaks appear to be higher in recent years in the area where it receives the highest concentration of regasified LNG and, ergo, the LNG must be the cause of the leaks, and that Cove Point and its shippers must pay for replacement and repair of WGL leaking infrastructure.[40]

Subsequently, in its Order on Rehearing issued January 4, 2007 FERC stated:

> *Based on these results, [results of tests and other evidence presented in the rehearing process] the Commission stands by its determination that hot tar, and other contributing factors (such as age, temperature, and pressure), had compromised a subset of couplings on WGL's system to the point of only sealing "marginally." If the sealing ability of the couplings had not been compromised, WGL's system would not have had an increase in leak rates after the introduction of re-vaporized LNG.*[41]

There is no evidence to support WGL's claim that application of hot tar to compression couplings was standard industry practice.

The evidence is inconclusive but strongly suggests that coating compression couplings with hot tar was the exception rather than the rule. The response rate to WGL's survey was 16% or less (4 out of more than 24). Two of the four respondents did not coat compression couplings with hot tar, one coated couplings form another manufacturer or manufacturers, and one apparently coated large diameter mains but rarely small diameter mains.

More important, the practice was direct contradiction to the manufacturer's specifications, which would negate any claims against the manufacturer for inadequate performance. In HREG's experience, utilities rarely engage in that type of behavior.

WGL has defended its application of hot tar to compression couplings by asserting that it was an accepted industry practice. WGL based its assertions on an informal survey, which it described as follows:

> *Washington Gas sent an informal survey to more than two dozen gas distribution companies to obtain information regarding the application of coal tar enamel to couplings. Four of the recipients responded to the survey and two of such companies indicated they had applied coal tar enamel to their couplings as a coating. .... Washington Gas has no information form other companies regarding*

[39] Refer to paragraphs 70,72 and 73 of FERC decision dated June 16, 2006 in Docket# CP05-130
[40] Request For Rehearing Of Washington Gas Light Company filed in Docket# CP05-130 on July 17, 2005.
[41] FERC Docket No CP05-130-003, et. al. Item 96, pp 43-44.

damage to elastomer seals or other components resulting from the application of hot tar. Washing ton Gas does not have any information on their leak experience solely related to mechanical couplings. [42]

One of the respondents indicated that it did not use Normac or Dresser couplings, but used melted Dearborn [a form of asphaltic tar) and poured in to fill a mold encapsulating mechanical couplings from another manufacturer(s). The second company indicated that it used both Normac and Dresser couplings, but the former only inside buildings, which means they would not have been coated and buried. That company coated couplings on transmission or large distribution mains with hot tar, and with respect to small diameter mains, "... *rarely, but sometimes coated them with hot tar.*[43]"

The use of hot tar with molds on couplings of one company out of twenty four companies surveyed does not in fact establish an industry practice. It verifies an industry exception to the norm.

WGL's stated understanding of the problems has been understated, inconsistent over time and inconsistent across jurisdictions.

As discussed earlier in this report, WGL has variously characterized its problems as follows: (Note: all statements below pertain to the District except as specifically noted.)

- (August 2003) Cove Point began receiving LNG.
- (1/15/04) Opposed formal hearings on service interruptions, asserting it had identified the problem and was working to correct it. Argued that hearings would be unnecessary and counterproductive.
- (Winter 2003 – 04) Noted a substantial increase in the number of leaks in Prince George's County.
- (3/8/04) Stated that there were no safety issues related to the above outages, the repairs were limited and were the result of breakages not know to the company prior to the outages, required follow-up remedies are in place or will be put in place, and hearings would not be in the public interest.
- (9/21/04) Filed a report summarizing the proactive steps it had taken over the spring and summer to upgrade the system.
- (Winter 2004 - 05) Leaks again occurred in Prince George's County dramatically above historical rates.
- (January 2005) Began a more formal process to address leak pattern in Prince George's County. Found that the leaks tended to be origination in Normac Compression couplings installed between the mid-to-late 1950s until the mid 1970s.
- (March 2005) Retained ENVIRON to investigate causes of leaks rates in seals.

[42] FC 1027, Response to OPC Data Request 5-17, August 13, 2008
[43] Ibid., Attachment pp 1, 3

- (April 2005) Initiated program to remediate or replace coupled services and remediate or replace coupled mains in the affected areas of Prince George's County.
- (4/22/05) Subsequent to the fire and explosion in District Heights, Maryland on 3/28/05, WGL stated that the matters addressed by OPC [concerns about safety and reliability] either are being or have been addressed by the company it its normal operations, and that there was absolutely no need for a further investigation, and that there is no evidence that there is an overriding concern. Also indicated that the fire and explosion may have resulted from a gas leak resulting from leaking seals.
- (4/25/05) There was no spike in coupling related leaks in the District.
- (5/9/05) Asked PSC to dismiss OPC's petition to expand investigation, as the Company had already remedied all the leaks noted in the petition.
- (5/31/05) Filed a motion for reconsideration of the Commission's order to submit a plan for repairing leaks and to conduct a special survey, arguing that there was no record evidence supporting, it, and it would force the company to divert resources from Maryland where demonstrated problems existed to the District, where problems were speculative.
- (7/1/05) ENVIORN report issued.
- (9/21/05) Filed a report to update the steps it had taken to upgrade the system associated with the water infiltration, and concluded that it should prevent further outages in the affected areas.
- (9/11/05) stated that gas leakage in the District in the area east of the Anacostia River was of normal proportion, but will perform the special leak surveys as agreed [and subsequently approved by the Commission].
- (February 2006) Began injecting hexane at the Gardner Road gate station.
- (2/8/06) Stated that the results of the special leak survey indicated there was no systematic problem of gas leaks in the survey area similar to that found in the affected area of Prince George's County.
- (5/1/06) Filed to recover the costs of injecting hexane into the system, stating that it will reduce the shrinkage of rubber seal in its mechanical couplings and the resulting gas leaks.
- (8/24/06) Filed reply comments in FC 1027, asserting that OPC has not presented any evidence that there are systemic leaks in the District, and that industry data and its own testing show that inserting hexane is necessary to prevent leakage from mechanical couplings.
- (1/5/07) Reported that all leaks found in the special survey in the District were repaired, that the company had met its commitment, and ***expected to file no more reports in the matter.*** [Emphasis added]
- (6/13/07) WGL stated, in response to OPC follow-up data requests, that laboratory tests and early field results indicated that *further impact to the coupled piping systems can be avoided or minimized by supplementing supplies of LNG with hexane.*[44]
- (8/14/08) WGL reported, at FERC technical conference, that hexane injection reduced but did not eliminate incremental leaks resulting from unblended LNG,

[44] FC 1027, Follow-up Response to Data Request 3, Question No. 3-2(h), June 13, 2007.

and that it still experienced a 247% increase in leaks, that ***the expansion of Cove Point will result in unsafe leaks on the WGL system, and that it is not possible for the Company acting alone to provide a permanent solution to unsafe leakage in time for the Cove Point expansion in the Fall of 2008.*** [Emphasis added.]

The above time line of WGL statements clearly demonstrates that WGL has consistently understated the extent of its leakage problems, has been slow to acknowledge issues and problems, and has presented different explanations and strategies technical solutions in the three different jurisdictions (DC PSC, Maryland PSC, and FERC).

Hexane injection is not a long term solution and is questionable as a short term solution.

There is ample evidence that hexane injection is not a panacea. WGL has acknowledged this in the FERC proceeding, as described above, and indicated that even with hexane injection, leaks increased by 247%.

WGL has not developed a plan to proactively address coupling leaks in the District.

As recently as July 25, 2008, in a Discovery teleconference, WGL indicated to OPC that very few couplings are failing in the district, that it does not have prioritized plan for replacing vulnerable couplings in the District, and that it intends to address leaks if and when they occur. This occurred approximately 3 weeks prior to WGL's presentation at the FERC technical conference cited above, in which it stated it expected an unsafe level of leaks on its system.

While FERC may yet delay the on-line date of the Cove Point expansion, WGL's strategy is unacceptable, high risk approach, for the following reasons:

- It fails to treat the leakage problems associated with existing levels of LNG.
- It assumes FERC will not allow the Cove Point expansion at any time. WGL has not presented a plan and asked for more time to implement it. It has not presented any plan whatsoever.

V. Recommendations

Safety-Related Recommendations

HREG has identified a range of possible scenarios for addressing public safety issues, which are bounded by an aggressive scenario and a minimally acceptable scenario. A rough cost and rate plan for the two boundary scenarios is also included.

HREG believes that any acceptable scenario involves replacement or repair of all hot-tarred compression couplings in the District. As described previously, the seals in all those couplings have been exposed to high temperatures and may have been compromised, and there is no way to determine whether or not that has taken place. Further, according to WGL, all couplings are likely to be exposed to revaporized LNG after the Cove Point expansion project is completed.[45] The way of ensuring the safety hazards of its leak prone couplings installed during 1948 and 1974 is to replace that subset of couplings located within its service lines (replace or insert the service lines) and replace or permanently repair the leak prone hot-tarred couplings on its mains two inches and smaller in diameter.

The issues associated with the leaking couplings are:

1. Identifying as precisely as possible the locations of the hot tarred couplings.
2. Determining the basis for and in what priority order the couplings should be replaced or repaired.
3. Determining over what period of time the replacement and repairs should take place, and identifying the actions that should be taken with respect to hot tarred couplings remaining on the system pending replacement or repair, such as frequency of additional leak surveys and expedited repairs to new leaking couplings.

Two other non-safety related issues remain, which are addressed in the following section, and should be considered independently from the physical actins taken.

- How should the costs of the replace/repair program be recovered?
- Who should bear those costs?

1. Identifying as precisely as possible the locations of the hot-tarred couplings.

Any scenarios must start with an identification of the hot tarred couplings on the system. WGL has stated that it has 8,091 services with hot tarred couplings, and between 56-60 miles of two inch and smaller diameter main within Washington DC. Using 56 miles with a coupling installed every thirty feet and 8100 service lines, with each service line

[45] *Washington Gas' Response to Cove Point Gas*, p. 27, PowerPoint presentation at FERC Technical Conference August 14, 2008

containing two compression couplings (one at the main and one at the house), equates to 26,000 at risk compression.[46]

2. Determining in what priority order the couplings should be replaced or repaired.

While WGL has publicly stated that it does not have a prioritized ranking of the relative risks associated with the couplings,[47] it has identified a number of parameters for establishing the priorities for areas to be targeted, as follows;

- ***Number of leaks, pending or repaired, per unit of measure since August 2003*** - WGL would associate all leaks within two feet of the closest main or service line.

- ***Exposure to Cove Point LNG since August 2003*** - WGL would determine the percent of the year that experiences temperatures in 10 degree increments starting with 15-25 degrees, determine the minimum and maximum supply off the Cove Point line for this interval. System Planning would set up models for these conditions and prioritize areas for most to least exposure.

- ***Soil Condition*** – Core samples to be taken from different locations in different neighborhoods, to identify clay versus sand, loam, etc. Areas identified as clay will be delineated. (limited information available).

- ***Year installed*** – Data from other memos identified 1965 and older vintages had higher leak rates, (apparently especially 1960-65). This is when WGL switched from Normac to Dresser couplings. Apparently this factor is related to the composition of the rubber in the gasket material. Other WGL memos from Charles Jackson-WGL in this data response to FERC indicates that the earlier gasket material in couplings may have been "Buna-S (a/k/a SBR) swells dramatically in all hydrocarbons and not recommended for use with Hydrocarbons. This has universally replaced with either EPDM or Nitrile (Buna-N) rubber. In LNG, CNGT, LPG, etc., Nitrile rubber (Buna-N) is the standard material of choice.

- ***Pipe size*** – 2" W/S pipe was installed from 1954-1974. Services installed during this time period were ¾" W/S. W/S = wrapped steel. Sizes apparently leak prone were used in multi-family complexes, master meter systems, trunk lines and commercial/industrial services.

While this list is not necessarily complete and does not assign weighting factors to the parameters, it does represent the types of parameters that should be used to develop a priority replace/repair schedule.

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[46] FC 1027, WGL response to OPC Data Request 5-20 – August 13, 2008

[47] WGL internal memos filed with FERC in response to FERC's March 24 2006 Data Request, specifically WGL internal memo/email from Julie Galante dated April 6, 2005

3. Determining over what period of time the replacement and repairs should take place and identifying the actions that should be taken with respect to hot tarred couplings remaining on the system pending replacement or repair.

We present two scenarios below, a minimally acceptable scenario and an aggressive scenario, recognizing that an acceptable scenario may also fall anywhere in between.

Minimally Acceptable Plan:

- Increase the frequency of leak surveys over mains and service lines containing leak prone hot-tarred couplings and ensure their effectiveness. WGL must accomplish such leak surveys every three months over WGL system containing leak prone couplings.
- Identify and replace all its service lines (8,091) containing leak prone hot-tarred couplings in the district within 3 years, and
- Identify priorities and replace all 2" and smaller diameter couplings on its mains (56 miles) within 5 years.

Aggressive Scenario:

- Identify the location of its leak prone hot-tarred couplings within the District of Columbia by December 1, 2008 and establish priorities for their replacement.
- Replace 4,000 service lines containing hot-tarred couplings each year for the next two years (2009-2010).
- Replace 15 miles of 2" and smaller diameter main containing leak prone hot-tarred couplings each year for the next three years (2009-2011) and complete its replacement in the fourth year (2012).

Cost and Rate Recommendations

A comparison of the revenue requirements associated with complete replacement as compared to hexane injection strongly favors replacement.

Replacement: WGL reports that the cost approximately $221,000 per mile to replace mains and services, based on its costs in Prince Georges County.[48] WGL reports that there are 60 miles of mains[49] with mechanical couplings in DC.[50] Thus, the cost to replace all mains and services in DC would be $221,000 per mile multiplied by 60 miles, or $13.3 million.

Applying a 20% Carrying Charge Factor for taxes, return and depreciation to this investment would result in a revenue requirement of **$2.65 million per year**. For comparison purposes, we assume the entire cost would be passed on to ratepayers.

[48] WGL presentation at FERC technical conference on 8/14/2008
[49] Using the high end of WGL's range of 56 – 60 miles.
[50] Ibid.

Hexane Injection: WGL reports that the cost of the three hexane injection facilities will be $12.5 million,[51] and that the District is allocated 16% of these costs.[52] Again using a 20% carrying charge, this results in an annual cost of $0.4 million per year.

WGL reports that the cost of injecting hexane into the system for the Rockville and Dranesville Hexane Injection facilities could cost as high as $24.7 million per year, assuming Cove Point doubles.[53] WGL also reports that the Rockville and Dranesville facilities are approximately 2/3 of total hexane injection capacity.[54] Thus, total hexane injection cost could be as high as $36 million per year.[55] WGL reports that the District is allocated 16% of these costs.[56] Thus, the District's cost responsibility for hexane injection could be as high as $5.8 million per year.

There fore, the total revenue requirement associated with hexane injection, assuming the entire allocation to the District were passed on to ratepayers, is $5.8 million of hexane and $0.4 million associated with capital additions, or **$6.4 million per year**.

Additionally, we note that the hexane option does not include certain other costs, such as the need for additional leak surveys, inefficiencies associated with unplanned, random replacement as opposed to planned and scheduled activities, and related costs.

The Commission should require WGL to show cause why ratepayers should be responsible for the cost of the replacement program, additional surveys, and related program costs.

The root cause of the leaks is WGL's use of hot tar when installing the compression couplings, following a written procedure which the company knew or should have known was compromising the integrity of the seals in the couplings. The earliest hot tar procedure WGL provided was dated 1955.

That procedure significantly shortened the life of the couplings, which now require premature replacement. While ratepayers received a benefit from the use of the couplings during the years they have been in service, they should not be saddled with the loss in value associated with premature retirements, the cost of coupling replacement, and additional remediation measures such as surveys.

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[51] Ibid
[52] GT06-1, response to OPC question 1-9
[53] GT06-1, response to OPC question 1-14.
[54] WGL presentation at FERC technical conference on 8/14/2008
[55] Actual costs for the Gardiner Road station are not used because they are based on current output of Cove Point.
[56] GT06-1, response to OPC question 1-9

Appendix 1

Hudson River Energy Group

The Hudson River Energy Group (HREG) is an engineering consulting firm specializing in the fields of rates, planning, economics and utility operations for the electric, natural gas, steam and water utility industries. HREG was founded in 1998 and has served a wide variety of clients including municipal utilities, government agencies, State Commissions, consumer advocates, law firms, industrial companies, power companies and environmental organizations. HREG conducts rate design and cost of service studies, designs performance based rate plans. HREG also assists clients in dealing with the complexities of deregulation and restructuring, including OATT pricing, unbundling of rates, resource adequacy, and transmission planning policies and power supply. Our experience in these areas has brought us to testify before the Federal Energy Regulatory Commission and a large number of utility Commissions across the country.

Frank Radigan

Mr. Radigan has 27 years of experience as a regulator and consultant in the utility industry. Mr.Radigan is the principal and owner of the Hudson River Energy Group, a consulting firm providing services to the utility industry and specializing in the fields of rates, planning, and utility economics.

Mr. Radigan received a Bachelor of Science degree in Chemical Engineering from Clarkson College of Technology in Potsdam, New York (now Clarkson University) in 1981 and a Certificate in Regulatory Economics from the State University of New York at Albany in 1990. From 1981 through February 1997, he served on the Staff of the New York State Department of Public Service in the Rates and System Planning sections of the Power Division and on the Rates Section of the Gas and Water Division.

While at the Commission, Mr. Radigan's responsibilities included resource planning, modeling and forecasting forward price curves for the wholesale market, and the analysis of rates and tariffs, rate design and performing embedded and marginal cost of service studies as well as depreciation studies. Before leaving the Commission, Mr. Radigan was responsible for directing all engineering staff during major rate proceedings including those relating to integrated resource planning and environmental impact studies.

As a consultant, Mr. Radigan has provided research, technical evaluation, due diligence, reporting and expert witness testimony on electric, water, gas and steam utilities. He has performed analysis of rate adequacy, decoupling, rate unbundling, and cost of service studies, rate design, rate structure and multi-year rate agreements. He has provided expertise in electric supply planning, economics, depreciation, regulation, wholesale supply and industry restructuring issues. He has expertise is resource planning, utility

rates, depreciation, and performs rate design and cost of service studies for gas, electric water and steam utilities.

Mr. Radigan has provided expert witness testimony in utility rate proceedings on more than 70 occasions before various utility regulatory bodies including the Arizona, Connecticut, Maryland, Michigan, New York, Nevada, Massachusetts, Ohio, Rhode Island, Vermont Public Service Board, and the Federal Energy Regulatory Commission.

John Gawronski

Mr. Gawronski has over 35 years of natural gas pipeline industry expertise in the areas of Transmission and Distribution pipeline integrity management, pipeline codes and standards, as well as monitoring and regulatory compliance reviews. As a Professional Engineer and consultant, he provides assistance to the U.S. Department of Transportation, Pipeline Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety. From 1978 to 2003, he was the Chief of Gas and Petroleum Safety for the New York Public Service Commission. In that capacity he was responsible for a staff on engineers and field investigators responsible for evaluating the operating, maintenance and construction practices of public utilities throughout New York State and reporting on their performance to the Public Service Commission. Mr. Gawronski has initiated and developed processes for evaluating and enhancing pipeline integrity.

Mr. Gawronski was Chair of the USDOT's Technical Pipeline Safety Standards Committee for 6 years, and made recommendations to the Office of Pipeline Safety concerning existing and proposed safety code requirements. Mr. Gawronski was Co-Chair of USDOT's Risk Assessment Quality Action Teams and Committees evaluating the application of risk management approaches to the operation of US pipelines. Mr. Gawronski's gas industry experience also includes the responsibility for pipeline construction, maintenance and operations in one of the nation's largest public utilities. More recently, Mr. Gawronski's work experience involved the evaluation of the Chicago public gas utility's operation and maintenance practices in complying with the Illinois Commerce Commission's gas safety codes.

Mr. Gawronski is a licensed Professional Engineer and has earned a Bachelor of Engineering degree in Mechanical Engineering and a Master of Science in Mechanical Engineering from The City College of New York.

Phillip S. Teumim

Mr. Teumim has 40 years of experience as a regulator and consultant in the utility industry. He has experience in all facets of the natural gas business, from senior level policy issues to technical matters, including regulatory and competitive policy development and implementation, rate proceedings and ratemaking, LDC gas costs, LDC

supply and capacity portfolios, and development and enforcement of gas safety requirements for pipelines and LDCs.

From 1992 to 2002, Mr. Teumim was Director of the Office of Gas & Water and its predecessor office for the New York State Public Service Commission. As such he was a senior policy and technical advisor to the Commission on all natural gas and water matters, and technical and administrative director of an office of some 70 engineers and analysts, with an annual budget of approximately $5 million. His responsibilities included regulatory and competitive policy development and implementation, rate proceedings and ratemaking, review of LDC strategic and corporate planning, annual reviews of LDC gas costs, annual reviews of LDC supply and capacity portfolios, review of affiliate relationships and transactions, intervention in FERC natural gas proceedings, and enforcement of gas safety requirements for LDCs and, as agents for federal DOT, for interstate pipelines and facilities.

Earlier, he worked as a management consultant in the areas of corporate governance, planning, organization, rates and regulatory affairs, and as a regulatory engineer and analyst in the areas of rates and valuation, management auditing, nuclear prudence auditing, and customer service.

Mr. Teumim is a frequent speaker on natural gas, energy, water and regulatory matters before utility groups, industry organizations, trade associations, NARUC conferences and committees. He has testified on numerous occasions before state regulatory commissions, state legislative committees and the FERC, and has also been a guest instructor for NARUC and various trade and industry conferences. Mr. Teumim holds a Bachelor's Degree in Electrical Engineering and a Master's Degree in Business Administration from Rensselaer Polytechnic Institute in Troy NY.

Appendix 2

Summary of Relevant State and Federal Proceedings

District of Columbia PSC – Formal Case 1027

On January 13, 2004, OPC filed an emergency petition requesting that the Commission open a formal case, including formal evidentiary hearings, to investigate a spate of natural gas service interruptions at or about the 100 block of 11th Street, SE that caused gas furnaces to cut off, meters to freeze, and homes to be without heat and hot water.[57]

On January 15, 2004, WGL filed its opposition to the OPC petition and asserting that it had determined that the problems were due to low-pressure or no pressure caused by water entering the system and blocking the flow of gas. WGL further asserted that it was taking steps to correct the problem. WGL argued that a formal hearing would be both unnecessary and counter-productive.[58]

On January 29, 2004, OPC filed a supplemental emergency petition requesting that the Commission expand its investigation to include newly affected areas.[59]

In February 6, 2004, by Order No. 13064, the Commission directed WGL to file a full report covering the Company's assessment of the cause(s) of the outages, as well as the Company's activities to remedy the outages, and future plans to avoid the natural gas service interruptions and problems identified in OPC's Petition and Supplemental Petition.[60]

On March 8, 2004, WGL filed its report and stated that cause of the outages was water from the municipal water authority's mains intruding into WGL's system. The Company stated there were no safety issues related to these outages and service was restored and repairs made expeditiously. The repairs needed in Washington Gas system were limited and were the result of breakages not known to the Company prior to these outages occurring. The Company also stated that any required follow-up remedies either are in place or will be put in place without the necessity of such hearings. Therefore WGL urged that hearings regarding this matter at this point would not serve the public interest.[61]

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[57] Formal Case No. 1027, In the Matter of the Emergency Petition of the Office of the People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company ("F. C. 1027'), Emergency Petition of the Office of the People's Counsel for an Expedited Investigation of the Distribution System of Washington Gas Light Company ("Petition"), filed January 13, 2004.

[58] *See F.C. 1027,* Answer of Washington Gas Light Company ("WGL Answer"), filed January 15, 2004.

[59] *F.C. 1027,* Supplemental Emergency Petition of the Office of the People Counsel for an Expanded Investigation of the Distribution System of Washington Gas Light Company ("Supplemental Petition"), filed January 29, 2004.

[60] *F. C. 1027,* Order No. 13064, re. February 6, 2004.

[61] See F.C. No. 1027, WGL Report per Commission Order No. 13064, filed March 8, 2004.

On May 3, 2004, OPC filed a response to the WGL report. OPC found the report deficient and that it did not provide an adequate evidentiary basis to facilitate reasoned decision making by the PSC. Specifically, OPC stated that the report failed to provide the concrete and substantive information addressing the foundational causes of the service disruptions and the proactive measures that WGL will engage in to avoid future outages.[62]

On September 21, 2004, WGL filed another report whose purpose was to summarize the proactive steps it had taken during the spring and summer of 2004 to upgrade the system. WGL did many projects that were unplanned and represent over 5000 feet of replaced and upgraded (to high pressure) main and replacement of approximately 185 services with an estimated cost of approximately $600,000. The Company estimated that approximately 450 customers experienced outages during the 2003-2004 heating season. The replaced services represent over 40% of the customers that experienced outages. An additional 3850 feet of main and 113 services were scheduled for replacement and upgrade to high pressure in the above referenced areas between October 2004 and March 2005.[63]

On March 28, 2005, a natural gas-related incident occurred in District Heights, Maryland, which resulted in an explosion and fire to a private residence.

On April 7, 2005, in response to the explosion in Maryland, OPC filed a motion that noted that the incident raised some serious concerns about the safety and reliability of WGL's distribution system and asked that the Commission conduct a thorough investigation to ensure the public that every possible action is being taken to ensure the integrity of the District's natural gas distribution system. OPC further stated that taking proactive measures in the wake of known occurrences and conditions is a more efficient use of resources, rather than investigating occurrences that could potentially cause the loss of not only property, but human life.[64]

On April 13, 2005, after reviewing all of the filings in the case, the Commission found that the matter of leaks on WGL's system warranted further inquiry. The Commission asked that the parties address questions that the Commission raised and directed WGL to file all reports that it prepared in connection with the recent explosion in Maryland.[65]

On April 22, 2005, WGL filed its opposition to OPC's motion. WGL stated that there was absolutely no need for a further investigation nor is there any evidence provided by OPC in its support for this investigation.[66]

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[62] See F.C No. 1027, Response of OPC to WGL Report filed on March 8, 2004 filed on May 2, 2004.
[63] See F.C. No. 1027, WGL September 21, 2004 Report, p 2
[64] See F.C. No. 1027, Motion of the Office of the People's Counsel for an Expansive Investigation of the Safety and Reliability of Washington Gas Light Company's Distribution System, filed April 7, 2005.
[65] See. F.C. No. 1027, Order No. 13557
[66] See F.C. No. 1027, Response of WGL to OPC's Motion for an Expansive Investigation filed April 22, 2005.

On April 25, 2005, WGL filed some data on the number of couplings in the District and leak history information for the 2003/2004 and 2004/2005 heating seasons. WGL reported that there was no spike in the number of coupling related leaks in the District.[67]

On April 25, 2005, OPC again urged the Commission to expand its investigation in this proceeding to address additional natural gas service outages that were reported by consumers. OPC again asserted that the outages were the result of a systemic problem in WGL's gas distribution system.[68]

On May 9, 2005, WGL responded to OPC stated the OPC petition should be dismissed as the Company had already remedied all the leaks that OPC noted in its petition.[69]

On May 20, 2005, the Commission found that it was in the public interest for WGL to file a plan within ten days for repairing all leaks in the District within a 3 month time frame. The Commission further directed the Company to file monthly reports on its leak repair efforts and to conduct a special leak survey in areas where mechanical couplings were located.[70]

On May 31, 2005, WGL filed a motion for reconsideration of the PSC's Order. WGL asserted that the Commission erred by: acting without any record evidence supporting the assumptions of the Commission's engineering staff regarding the safety of the distribution system; and forcing the company to divert resources from places in Maryland where demonstrated problems exist to places in the District where the problems are only speculative.[71]

On June 7, 2005, OPC filed a response to WGL's Motion for Reconsideration, OPC urged the Commission to reject WGL's proposed alternative plan and to deny WGL's request for reconsideration. According to OPC, inasmuch as Order No. 13590 was not a final order, WGL's motion for reconsideration is premature and WGL's proposed alternative plan "undermine[d] the Commission's findings and determinations."[72]

On August 22, 2005, the Commission granted the Company's request for reconsideration. The Commission then directed the WGL to meet with Commission staff, within 14 days of the date of the Order, to determine whether an additional leak survey was warranted and, if so, the scope of the area to be surveyed; and to file all relevant findings regarding this matter, whether by WGL or its consultants, as soon as they become available.[73]

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[67] See F. C. No. 1027 Order No. 13590

[68] See F.C. No. 1027, Supplemental Motion of OPC for an Expansive Investigation of the Safety and Reliability of WGL's Distribution System filed on April 25, 2005.

[69] See F.C. No. 1027 WGL Response to OPC Supplemental Motion for an Expansive Investigation filed May 9, 2005

[70] See F.C. No. 1029 – Order No. 13590 dated May 20, 2005.

[71] See F.C. No. 1027 – WGL Motion for Reconsideration of Certain Aspects of Order No. 13590 filed May 31, 2005.

[72] See F.C. No. 1027, OPC Response to WGL Motion for Reconsideration filed on June 7, 2005.

[73] See F.C. No. 1027 Order No. 13735

On September 21, 2005 WGL filed an update to its March 4, 2004 report. In that filing the Company reported that the purpose of the update was to summarize the proactive steps it had taken during the spring and summer of 2004 to upgrade the low-pressure system and improve work management practices associated with water infiltration, specifically to address outages that occurred in the District during the 2003/2004 heating season. The Company replaced and upgraded (to high pressure) over 5000 feet of main and replaced approximately 185 services with an estimated cost of approximately $600,000. The Company estimated approximately 450 customers experienced outages during the past hearing season. The 185 replaced services represent over 40% of the customers that experienced outages. An additional 3850 feet of main and 113 services are scheduled for replacement and upgrade to high pressure in the above referenced areas between October 2004 and March 2005. The Company concluded that the upgraded distribution systems should prevent future outages in these areas.[74]

On October 11, 2005, WGL filed its response to its internal review of data on any unusual gas leaks in the Company's distribution system in the District of Columbia east of the Anacostia River. This is the area where the Commission Staff expressed concern about any unusual leak patterns and the potential for coupling related gas leaks. Based on its review the Company reported that it continued to believe that the gas leakage in this area is of normal proportion. Although no unusual pattern of gas leaks was found involving coupling related leaks, the Company indicated it would perform special leak surveys for the District of Columbia east of the Anacostia River. In this filing WGL, OPC, and Commission Staff proposed a special leak survey for the District of Columbia east of the Anacostia River. According to the Joint Report and Proposal, WGL determined that of the 119 quadrant maps in the area east of the Anacostia River, there are 16 that contain pipe installed between 1953 and 1974 which is the time that WL believes mechanically coupled pipe was installed. The 16 quadrant mapped areas contain approximately 6,500 services and will be the area of focus for conducting the special leak survey.[75]

On October 20, 2005, the Commission approved the special leak survey program contained in the October 11, 2005 filing.[76]

On February 8, 2006, WGL filed a report on the results of its special gas leak survey for the Company's distribution system in the District of Columbia east of the Anacostia River. The results of this special leak survey identified above indicate that there are no systematic problems of gas leaks in the surveyed area similar to that found in the affected area of Prince George's County.[77]

WGL continues to file monthly reports to the DC PSC in GT 97-3. GT 06-1 and FC 1027. The monthly reports address numbers and location by District

[74] See F.C. No. 1027 WGL September 21, 2004 Report.

[75] See F.C. No. 1027, Joint Report of WGL and Commission Engineering Staff on a Special Leak Survey Filed on October 11, 2005.

[76] See. F.C. No. 1027, Order No. 13793

[77] See F.C. No. 1027, WGL Special Leaks Survey Results filed on February 8, 2006.

quadrant of coupling leaks discovered, repaired or scheduled for repair. From the monthly reports, it appears that the southeast quadrant of the District experiences two-thirds higher the number of leaks as compared with the northeast and northwest quadrants. The southwest quadrant of the District has experienced the fewest number of coupling leaks.

On January 5, 2007, WGL filed its final report in F.C. No. 1027. The Company reported that all leaks found in the Special Leak Survey had been repaired and that the Company had met its commitment to leaks in the District and expected to make no more reports on the matter.[78]

On March 25, 2008, the Commission issued Order No. 14767, directing WGL and OPC to prepare a procedural schedule and list of issues on the prudence of WGL's hexane strategy in light of Maryland's conclusions and holding in 9035.[79]

On June 27, 2008, the Commission issued Order No. 14842 adopting WGL and OPC's proposed issues and procedural schedule.[80]

[78] See F.C. No. 1027, WGL report filed on January 5, 2007.
[79] See F.C. No. 1027, Order No. 14767, rel. March 25, 2008.
[80] See F.C. No. 1027, Order No. 14842, rel. June 27, 2008.

District of Columbia PSC Case GT06-1

On May 1, 2006 WGL filed Tariff Page No. 57 for General Service Provision No. 23 ("GT06-1 Application").[81]

In its Application, WGL asked to recover the costs of injecting hexane into the distribution system. WGL represented that it needed to inject hexane into its distribution system to prevent the shrinkage of rubber seals in the mechanical couplings used in the distribution and service lines. WGL claimed that its tests of rubber seals indicate that they react positively to the injection of additional hexane, so adding hexane into the distribution system will reduce the shrinkage and the resulting gas leaks.[82]

In its filing, WGL stated that it was already recovering the costs of hexane from Sales Service Customers through the Purchased Gas Charge due to the benefits of injecting hexane into the distribution system. Because Delivery Service customers also receive benefits from the hexane injections, WGL stated that these customers should also pay for the injections and this was the reason for the tariff revisions.[83]

On August 9, 2006, OPC filed comments opposing the proposed revisions. OPC noted that the PSC has not yet determined whether the gas leaks in Maryland were caused by the absence of hexane in the re-gasified natural gas. Until the Commission makes a determination that injecting hexane will solve the gas leak problem, OPC argued that the Commission should not allow WGL to recover hexane costs from customers. OPC further contended that information introduced at ongoing FERC and MD PSC proceedings raised questions regarding whether WGL was correct in its claim that the lack of hexane causes the leaks. OPC also stated that information at the proceedings indicates that hot tar applications at the time of pipeline installation or exceeding safe operating pressures may actually be the cause of the failure of the couplings. OPC suggested that other remedial actions might be more cost-effective than injecting hexane.[84]

On August 24, 2006, WGL filed reply comments and asserted that available industry data and its own testing show that injection of hexane into the distribution system is necessary to prevent leakage from the mechanical couplings.

In its ruling on the Application, the Commission stated that it first must know that hexane injections were reasonable under the circumstances. However, it noted that neither it, nor FERC, nor the MD PSC has determined that the injection of hexane into the re-gasified LNG in the distribution system would reduce the leaks caused by the shrinkage of the mechanical couplings. The Commission stated it would be premature to permit cost recovery for a proposed solution that has not yet been determined to be reasonable. Thus, the Commission rejected the Application at that time.[85]

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[81] GT97-3, Application at page 1.
[82] GT97-3 Application at Page 2.
[83] GT97-3 Application at Page 3.
[84] GT97-3 OPC Comments filed August 9, 2006.
[85] GT93-3, GT06-1 and F.C. No. 1027, Order No. 14077

In rejecting the Application, the Commission also determined that it had insufficient information at that time to make a decision. It also determined that it is more cost-effective to wait until the MD PSC has completed its investigation, and then determine whether further investigation into District of Columbia-specific issues is necessary.[86]

On December 17, 2007, pursuant to the Commission's directive in Order No. 14077, WGL filed Maryland PSC Order No. 81714. In that order, the Maryland PSC adopted the propose order of a hearing-examiner's ruling in favor of WGL's recovery of hexane commodity costs in Maryland.[87]

On March 25, 2008, by Order No. 14767 the Commission noted the WGL filing and stated that inasmuch as the Maryland PSC has reached a decision, it would move forward with considering WGL's hexane strategy and directed the parties to submit filings reflecting a proposed procedure, including schedules and issues lists.[88]

On June 27, 2008, in Order No. 14842 the Commission designated the issues list for the proceeding (discussed supra) and established a preliminary procedural schedule.

[86] Ibid
[87] GT93-3, GT06-1, and F.C. No. 1027, WGL Filing of Maryland PSC Order, December 17, 2007.
[88] GT93-3, GT06-1 and F.C. No. 1027, Order No. 14767

Maryland PSC Case No. 9035

A substantial increase in leaks in the Prince George's area was first noted in the winter of 2003-4. The number of new leaks decreased as the temperatures warmed in the spring of 2004.[89]

In response to the significant increase in the level of leaks, WGL engaged in a detailed internal review to study any and all possibilities related to the leak problem and to make recommendations on how to solve the problem.[90]

Leaks again occurred dramatically above historical rates during the winter of 2004-5.[91]

In January 2005, Washington Gas began a more formal review process to address the leak pattern in the affected area. Washington Gas engaged in a multi-departmental, detailed review of the cause and development of solutions to the phenomenon. Representatives from Corporate Engineering, Construction, Field Operations and Energy Acquisition brought their collective expertise and institutional knowledge together to address this problem. Data from a myriad of sources pertaining to leaks, pipe attributes, gas composition, hydraulic flow models, installation methods, purchasing records, crew composition, temperature and gate station sendout was researched, collected and analyzed.[92]

One of the observations produced from the collective wisdom of these brainstorming sessions was the coincidence of the increase in leaks with the introduction of unblended Cove Point LNG. To further explore this phenomenon, hydraulic analyses were performed to determine the areas that would receive unblended LNG to see if there was a correlation between the area that received Cove Point LNG and the area where the accelerated leak rates had occurred.[93]

The leaks tend to be originating at a compression (Normac brand) coupling used to connect these steel piping systems together. These fittings were installed between the mid to late 1950s until the mid 1970's.[94]

In February 2005, Washington Gas issued a Request for Proposal to determine the failure mechanism and to identify possible solutions. [95]

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[89] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2.

[90] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, Post Conference Comments of Washington Gas Light dated March 10, 2006, page 8.

[91] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2.

[92] Ibid.

[93] Ibid

[94] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2. Attachment A, page 7 of 114.

WGL, as a second approach to implementing a solution to the affected area and to minimize the effects of unblended LNG on other areas that, under normal operating conditions for the distribution system, would be exposed to unblended Cove Point LNG, Washington Gas valved-off the delivery of gas from the Gardiner Road gate station into Virginia.[96]

The Company also temporarily reduced pressures in the Prince George's County system(s) to retard the rate of escaping gas from leaking couplings.[97]

According to WGL, as early as February 2005, it was looking into the leak rates and mechanical couplings in the District. As noted on February 15, 2006, WGL reported that they were analyzing operating pressures in these two areas. WGL stated that an analysis would be done on these two systems to determine if they can be operated at lower pressures. WGL noted that Capital Heights and Anacostia make up part of the 'Large Maryland' system and will need to be isolated before the pressure can be reduced. System Planning will also determine if any telemeters in those systems will be located at the low points once these systems are isolated.[98]

WGL claims to maintaining low operating pressures in the Capital Heights and Anacostia operating areas (both just outside the District) as an action step to reduce leaks in mechanical couplings.[99]

On March 28, 2005, a natural gas-related incident occurred in District Heights, Maryland, which resulted in an explosion and fire to a private residence. Based on preliminary information, it was possible that dry gas may have been a potential cause for gasket seals on the natural gas pipes to dry out, leading to a gas leak and ultimately to a fire and explosion. The preliminary focus on dry gas as a potential cause of the incident was based on its comparison of couplings near the site of the incident (Southeast Prince George's County) to couplings of similar age from other parts of the system. Information obtained from WGL showed that there are several of the same type of mechanical couplings used in Prince George's County throughout WGL's system, including the Southeast ("SE") and Northeast "NE") quadrants of the District of Columbia.[100]

In early March of 2005, WGL retained the services of ENVIRON International Corp. ("Environ"), working with Polymer Solutions, Inc (PSI) and Akron Rubber Development

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[95] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2.
[96] Ibid.
[97] Ibid.
[98] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2. Attachment A, page 26 of 114.
[99] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2. Attachment A, pages 71 to 105.
[100] F.C. No. 1027, In the Matter of the Emergency Petition of the OPC for an Expedited Investigation of the Distribution System of WGL, Maryland Prepared Documents Per DCPSC Order1 3559, filed April 22, 2005.

Laboratory ("ARDL") to conduct an investigation into the most likely causes of the increased leak rates. At the outset of the study, potential contributors to this increased leak rate included the effects of changes in gas composition (due to introduction of re-vaporized LNG), historical installation practices, the age of the installed couplings and ground movement due to earthquakes or other causes.[101]

In April 2005, WGL initiated an extensive program to replace coupled services and to remediate or replace coupled gas mains in the area in which the leaks were concentrated in Prince George's County (the affected area).[102]

The program was implemented to address the immediate safety concerns associated with the high number of leaks. The company estimated the costs to replace the services and to rehabilitate the mains to be $137 million.[103]

On July 1, 2005, Environ submitted its findings and reported that based on the work it conducted to date, it believed that a combination of factors contributed to the observed spikes in leaks. Three factors have been identified as contributors:

> 1) Aging Seals. Seals of various rubber formulations have been in service in the WGL network for 30 to 50 years. A small fraction of these seals will have undergone compression stress relaxation to the point of sealing only marginally.
>
> 2) A Change in Gas Composition. The change to a gas that has a lower concentration of pentane and higher molecular-weight (C5+) compounds, caused a slight shrinkage in some seals due to de-sorption of previously adsorbed C5+ compounds (especially those seals with an elastomer formulation with a high solvent swell index, a measure of their propensity to adsorb- hydrocarbons and increase in volume).
>
> 3) A Temperature Decrease The onset of winter caused a further slight seal shrinkage as the ground cooled, due to differential thermal expansion effects in the coupling.
>
> In addition, the use of hot coal tar as an encapsulant during installation is regarded as a potential contributing factor, in that it may have overheated some seals causing changes in physical properties of the rubbers.[104]

In the winter of 2005-06, the Company designed, constructed and placed into operation the first-of-its kind hexane injection facility.[105]

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[101] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2.
[102] MD PSC Case 9035, Direct Testimony of Douglas Staebler
[103] WGL Supplement Comments to FERC in Docket No. CP05-130-00 filed on November 11, 2005.
[104] See F.C. No. 1027, Motion to Lodge ENVIRON International Corporation for Washington Gas Light Company Entitled investigation of Leaks in Natural Gas Piping Compression Couplings, dated July l, 2005.
[105] FERC Docket No. CP05-130-00, Dominion Cove Point LNG, LP, WGL's April 18, 2006 Response to First FERC Data Request, response to question 2.

In February 2006, WGL began injecting hexane into the natural gas stream at the Company's Gardiner Road gate station in Charles County, Maryland, a point of receipt of unblended, re-gasified liquefied natural gas (LNG) from Cove Point LNG, LP which is one of the feeds to the District system.[106]

Based on a reduction in the incidence in new leaks, combined with the research compiled as of August 8, 2006, as well as the accumulated experience with the injection of hexane into the stream of unblended LNG, WGL claimed that the combined effect of remediation efforts (operational activities, replacements, and hexane injections) had sufficiently reduced the risk of unsafe conditions due to coupling leaks.[107]

On November 16, 2007, the MD PSC issued Order No. 14007, affirming the Hearing Officer's April 2, 2007 Proposed Order regarding the reporting requirements and efficiency of hexane injections.

On August 19, 2008, the MD OPC filed a Motion to Reopen the Proceeding based upon information conveyed by WGL to FERC and the most recent report on the efficiency of hexane injections. On September 16, 2008, the MD Commission issued Order No. 82234, requiring WGL file a response to the MD OPC Motion.

[106] GT97-3, GT06-1 Application page 2.
[107] MD PSC Case 9035, Direct Testimony of Douglas Staebler

FERC Dockets Nos. CP05 – 130, CP05 - 131

On January 12, 2001, FERC approved a January, 2001 certificate filed by Cove Point in Docket No. CP01-76 to construct facilities and reactivate existing facilities at the LNG terminal located in Calvert County, Maryland. The certified capacity of the Cove Point facilities is 1 Bcf of gas/day.[108]

The Cove Point terminal is interconnected to the wholesale natural gas transmission system through the 88-mile Cove Point pipeline. The Cove Point pipeline is currently interconnected near its western end with Columbia and DTI in Loudon County, Virginia, and Transco at the Pleasant Valley Gate station in Fairfax County, Virginia. Near each of the Cove Point interconnection with the interstate pipelines, WGL receives gas supplies into its distribution system.[109]

In August 2003, the Cove Point terminal in Maryland began receiving cargoes of imported LNG after a hiatus of over 20 years. In those intervening years, transportation services were offered on the 88-milee Cove Point pipeline.[110]

The six WGL gate stations along the Cove Point pipeline provide the sole source of supply for WGL customers in Calvert and St. Mary's Counties, Maryland as well as portions of Prince George's County, Maryland.[111]

Since the reactivation of the LNG terminal in 2003, WGL received regasified LNG, unblended with historic, traditional gas supplies, at each of these gate stations, which currently serves about 30 percent of WGL's load.[112]

On April 5, 2005, Cove Point filed an application to expand the storage and sendout capacity of its facilities. Cove Point proposed to expand its existing LNG terminal by adding two new 160,000 cubic meter LNG storage tanks and additional vaporization capacity at its site. The proposed expansion would approximately double the LNG storage and send out capacity.[113]

Cove Point also proposed to construct and operate pipeline to allow additional deliveries of connections with other interstate pipelines.[114]

WGL filed comments on the Cove Point expansion in March 25, 2005. While WGL did not oppose the expansion it did note that the expansion would significantly increase its exposure to LNG.[115]

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[108] Cove Point LNG Limited Partnership, 97 FERC @ 61,044 (2001).
[109] FERC Docket No. CP05-130-00, WGL Supplemental comments filed November 11, 2005
[110] Ibid
[111] Ibid.
[112] Ibid.
[113] Ibid
[114] Ibid.
[115] FERC Docket No. CP05-130-00, WGL Comments filed March 25, 2007.

In Supplemental Comments before FERC, on November 2, 2005, WGL asked that FERC condition any expansion certificates granted. WGL asked that a change to Cove Point's tariff, to call for a minimum heavy hydrocarbon level, be imposed on all Cove Point LNG gas. Alternatively, WGL asked that heavy hydrocarbons be injected at each of its gate stations that received Cove Point gas.

On June 16, 2006 FERC issued an order in the case granting the expansion. FERC stated that it was convinced that WGL's use of hot tar as a method of corrosion protection was a significant contributing factor that resulted in an increase in leak rates throughout Prince George's County. While all of the compression couplings may not have been adversely affected by the hot tar, the studies in the record of this proceeding, including the ENVIRON Report, show that there exists a subset of compression couplings on WGL's system that were damaged by the application of hot tar at the time of installation, and that it is these couplings that are contributing to the increase in leak rates experienced by WGL in Prince George's County.[116]

WGL filed an appeal of FERC's ruling before the District of Columbia Circuit[117]

On July 18, 2008, the U.S. Court of Appeals for the District of Columbia Circuit issued a decision in which it vacated the order of FERC approving the proposed expansion of the Cove Point LNG terminal and remanded it to FERC to determine whether the expansion can proceed without causing unsafe gas leakage on WGL's distribution system.

At a technical conference following the remand, WGL presented further information on the status of its distribution system. WGL reported that results of hexane injection reduced but did not eliminate incremental leaks that resulted from unblended LNG. WGL reported that it still experienced a 247% increase in leaks.

Extrapolating this 247% increase in leaks across the balance of the coupled pipe in the system results in a leak rate of 1.48 leaks per mile. As such, WGL stated that it expects an additional 3,500 peaks per year on its system. At the technical conference WGL told parties that it concluded that hexane injection cannot be the sole response.

There are 56 to 60 miles of coupled main prone to leaks in the District. Using the 1.48 leaks per mile the District can now expect leak rate on the order of 90 leaks per year after the Cove Point expansion. Previous to the Cove Point expansion the District averaged 19 leaks per year. For the 2003/2004 and 2005/2006 heating seasons, the District averaged 59 leaks per year.

On October 7, 2008, FERC reissued its authorization for the Cover Point expansion. However, FERC approved plans to cap the flow of LNG into WGL's system.

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[116] FERC Docket No. CP05-130-000, Order filed on June 16, 2006.
[117] No. 07-1015, Washington Gas Light Company vs. Federal Energy Regulatory Commission, decided July 18, 2008.

Appendix 3

Integrity Management (IM) Program for Gas Distribution Pipelines. Excerpts from Proposed Rules

SUMMARY: PHMSA proposes to amend the Federal Pipeline Safety Regulations to require operators of gas distribution pipelines to develop and implement integrity management (IM) programs. The purpose of these programs is to enhance safety by identifying and reducing pipeline integrity risks. This proposal also addresses statutory mandates and recommendations from the USDOT's Office of the Inspector General (OIG).

a. Knowledge of the system's infrastructure.
To develop an IM program, an operator must identify threats applicable to its pipeline system and analyze the risks its pipeline system poses. Operators cannot do this without understanding their pipeline systems. Generally, the operator should know information such as location, material composition, piping sizes, construction methods, date of installation, soil conditions, pressure (operating and design), operating experience, performance data, condition of the system, and any other characteristics that help identify the applicable threats and risks.

b. Identify threats (existing and potential).
Operators need to evaluate their pipeline systems and the environments in which the pipelines operate to identify specific threats the pipelines face and to determine appropriate actions to manage the threats and minimize the risk.

c. Evaluate and prioritize risk. Simply knowing what threats exist is not sufficient to understand and manage risk posed to distribution pipeline systems. Operators must determine the likelihood that a system failure would be caused by any given threat. Therefore, the proposed rule would require operators to evaluate each applicable threat and estimate the risk to the pipeline.

d. Identify and implement measures to address risks.
Once the relative risks are known, operators can take action to mitigate those risks and thus improve safety. The specific actions appropriate for an operator to take will vary depending on the applicable threats, their prevalence, and the risks posed by a leak or failure on the operator's pipeline.

e. Measure performance, monitor results, and evaluate effectiveness.
The proposed rule would require each operator to measure its performance and report certain measures periodically to PHMSA and State regulatory authorities.

f. Periodic Evaluation and Improvement.
Operators would use measured performance to determine whether further improvements are needed and to make necessary changes in their IM programs.

g. Report results.

The proposed rule would require each operator to measure its performance and report certain measures periodically to PHMSA and State regulatory authorities.

CERTIFICATE OF SERVICE

Formal Case No. 1027, In The Matter of The Emergency Petition of the Office of the People's Counsel for An Expedited Investigation of the Distribution System of Washington Gas Light Company

I hereby certify that on this 16th day of October, 2008, a copy of the "Comments of the Office of the People's Counsel" was served electronically, via first-class mail or hand delivery on:

Cathy Thurston Seignious, Esq.
Senior Attorney
Washington Gas Light Company
101 Constitution Avenue, N.W.
Washington, D.C. 20080

Richard Beverly
General Counsel
Public Service Commission of the
District of Columbia
1333 H Street, N.W., 7th Floor East
Washington, D.C. 20005

Honorable Agnes A. Yates
Chairperson
Public Service Commission of the
District of Columbia
1333 H Street, N.W., 7th Floor East
Washington, D.C. 20005

Honorable Richard E. Morgan
Commissioner
Public Service Commission of the
District of Columbia
1333 H Street, N.W., 7th Floor East
Washington, D.C. 20005

Honorable Betty Anne Kane
Commissioner
Public Service Commission of the
District of Columbia
1333 H Street, N.W., 7th Floor East
Washington, D.C. 20005

Phylicia Fauntleroy Bowman
Executive Director
Public Service Commission of the
District of Columbia
1333 H Street, N.W., 6th Floor East
Washington, D.C. 20005

Honorable Mary M. Cheh, Chairperson
Committee on Public Services
and Consumer Affairs
Council of the District of Columbia
1350 Pennsylvania Avenue, N.W., Suite 108
Washington, D.C. 20004

Jennifer L. Weberski
Assistant People's Counsel