

**MARYLAND PUBLIC SERVICE COMMISSION
GAS PIPELINE SAFETY PROGRAM
Pipeline Incident Investigation Report**

Address of Incident: 8701 Arliss St., Silver Spring, MD 20901

Date of Incident: August 10, 2016

Operator: Washington Gas Light ("WGL")

Operator Point of Contact: Ghassan Saroor

Title: Supervisor - System Planning

Date, Time and Person reporting to PSC: 8/11/16 - 1:30 am - Ghassan Saroor

PSC personnel who received report: John Clementson

PSC Inspectors: John Clementson & RK Amroliwala

NRC Report Number: 1155909

Date, Time and Person reporting to NRC: August 11, 2016 - 1:31 am Ghassa Saroor

A FACTS RELATED TO THE FAILURE

Explosion? Yes **Evacuation?** If so, number of buildings evacuated: Two

Incident Location & Response

Detailed location of Incident: Intersection of Arliss St. & Piney Branch Rd., Silver Spring, MD

Date and Time Incident Detected: August 10, 2016 - 11:55 pm

Utility Notification Time: August 11, 2016 - 12:10 am

Utility Arrival Time: August 11, 2016 - 12:36 am

Utility Personnel first responding; actions taken: WGL crew accessed the scene and met with Fire Department personnel to see what needed to be done.

Damages

Estimated property & associated damages (include cleanup): Excess of \$1,000,000.00

Number of Customers out of service? Thirty

Fatalities or Injuries

Number of fatalities: Seven

Number of persons requiring in-patient hospitalization and the severity of the injuries:

See below

Number of persons injured, but not requiring in-patient hospitalization:

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Forty two people are injured, including three firefighters. Unsure as to the number of people admitted to the hospital.

Pipe/Component Failure Description

Description of failure (corrosion, gouge, seam split): Undetermined

Person taking custody of failed section or component: NTSB took possession of the gas meters (15), regulators (2) and associated piping from the incident site. Also, the hot water heater from 8701 Arliss St. was taken by NTSB.

Outside Force Damage Involved? Undetermined

B POST INCIDENT DATA

Pressure Test After Incident (Describe Sections Tested): A pressure test was conducted on the gas main that ran from the curb valve at 8701 Arliss St. to 8711 Arliss St.. The pressure test was started at 5:29 pm on 8/11/16. The pressure was established at 10 psig and held for approximately 43 minutes at which time the pressure was increase to 22 psig and held for one hour. No leaks were detected. This pressure test also included a portion of the service lines that feed 8701 & 8703 Arliss St. On 8/15/16 from 5:57 pm to 6:12 pm, a separate pressure test was conducted at 8701 Arliss St for the remaining portion of the service line from where it had been cut outside of the building up to and through the wall to an elbow, where it made a 90 degree bend in a downward direction. This pressure test also passed. A pressure test of WGL's inside piping including the meter rack assembly was not possible as that piping was damaged in the explosion and subsequent fire.

Failure Isolation/Control of Gas

Method and location: Closed valve on gas main at 12:52 am on 8/11/16.

Valves closed, include locations: Curb valve outside of 8701 Arliss St.

Gas Migration Survey

Type of Survey (sub-surface/surface): Sub-Surface

Person Performing Survey: Earnest Harris & Jervie Guinyard (WGL employees) early morning hours of 8/11/16 8707-8709 Arliss St.

Mike Sneed, Wayne Holmes & Ron Byrd (WGL employees) on 8/11/16 starting at 6:35 pm.

Results of Survey: Gas reading of 0.2% LEL found at 8709 Arliss St. over the main. However, the reading dropped within seconds. No indications of gas were found at the building wall (8709).

No indications of gas were found during the leak survey performed over the main at 8701 & 8703 Arliss St.

PSC not present for all leak surveys after the incident. However, records indicate that no gas was found after the incident as a result of leaks surveys on the buried gas main & service on the

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complex. One non-hazardous leak was found and repaired on a valve at 8555 Piney Branch Rd. **Buildings surveyed, include addresses:** 8707-8709 & 8701-8703 (MDPSC present)
Equipment used, serial number, calibration dates: Gas Rover PE1638 Calibration due date 9/1/16.

Odorant Survey

Readings in % Gas in Air: 0.5% LEL - Compliant with MD pipeline safety regulations.
Person conducting survey: Ted Wrightmeyer & John Morgan

C PIPELINE OPERATIONAL HISTORY

Pipe Data

Material, diameter, SMYS: Wrapped Steel, Main 6", 4", 2", Services 3/4", 1" & 2", Houseline 1"

Installation date: 1955 - original main & services, 1969 - 4" main

Pipe specifications (API 5L, ASTM D2513, etc.): Coal enamel tar

Wall thickness/SDR: 2.38" OD, 0.165" wt

Type of coating & condition: Coating on the exposed pipe was in good shape. No evidence of external or internal corrosion on the removed sections of pipe.

Description of pipeline distribution system in the vicinity of the incident (sizes, types, year of construction): The apartment buildings on Arlis St. (8701 to 8711) are feed natural gas through a medium pressure gas line that operates at approximately 20 psig. In 1969, the two inch line that feeds those apartments was connected to a four inch gas line that runs down Arliss St. The two inch line was previously connected to six inch gas line on the far side of the street. The two inch gas main runs in front of 8701 through 8711 Arliss St. on the apartment complex's property. 8701 Arliss St. was served by a two inch gas line that was tapped off of the two inch gas main in front of the complex. The six inch main along with the piping in front of the apartments was installed in 1955. The inside piping for 8701 Arliss St. consisted of a combination of 3/4 inch and 1" piping, two Reynolds Model 30 #1 mercury sealed regulators connected in parallel. The regulators served fifteen gas meters in 8701 Arliss St.

Operating Pressure

MAOP: 25 psig

Actual Operating Pressure at time of Incident: 20 psig

Meter Data & Readings: The meters (15) were damaged as a result of the explosion and subsequent fire and were unable to be read.

Regulator Testing Results: The regulators (2) were damaged as a result of the explosion and subsequent fire and were unable to be tested.

Pipeline Operation History

Description (repair or leak reports, exposed pipe reports): A review of records, for the area in question, does not reveal any issues in the area of where the explosion and subsequent fire

took place. WGL performed a gas leakage survey of its facilities, inside (8/26/15) and outside (1/19/16), at 8701 Arliss St. and did not find any indications of natural gas. A review of WGL's Call Center emergency logs, for the day of the event, did not reveal any calls from the vicinity of 8701 Arliss St. reporting an odor of natural gas. In following up with an odor call, received by the Montgomery County Fire Department on July 25, 2016, WGL indicated that it had no record of any call from either an individual nor the Montgomery County Fire Department reporting a gas leak. The Montgomery County Fire Department did not detect any presence of natural gas when they responded to the odor complaint.

Cathodic Protection History

Type of cathodic protection system: Anode

Has cathodic protection been adequate? (specify records reviewed) A review of the cathodic protection records, for the last three years for Test Station #102-03 and #102-04, in Map NW-Q-A-7-NE where 8701 Arliss St. is located, indicated that the readings have met the Federal Pipeline Safety Regulations requirement.

Employee Training/Qualification

What covered task qualified the individual to perform the duties witnessed by the PSC?

OOST 1201-6.1 Gas Leakage Surveys - Mobile & Walking

OOST-1503 Odorization Olfactory Monitor

When did he/she receive the qualification for the covered task?

Earnest Harris, Jervie Guinyard and Ron Byrd were all qualified to perform leakage surveys.

Ted Rightmeyer was qualified to perform the odorization testing.

D SUMMARY

Event Log

Sequence of events prior, during and after the incident by time. (Consider the events of all parties involved in the incident, Fire Department and Police reports, operator logs and other government agencies):

The following groups were present during the investigation;

Montgomery County Fire Department ("MCFD")

U.S. Dept. of Justice - Bureau of Alcohol, Tobacco, Firearms and Explosives ("ATF")

National Transportation Safety Board ("NTSB") - Lead Investigator

Washington Gas Light ("WGL")

Public Service Commission of MD ("MDPSC")

August 10, 2016

Prior to the explosion, a tenenat of 8701 Arliss St. was going outside to take trash to the dumpster when he smelled gas in the hallway/stairwell of the building. The individual went downstairs to investigate the smell. He indicated to the MCFD that he heard a "hissing" sound. He then proceeded to take out the trash. As he returned to the building the explosion occurred.

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11:55 p.m. - An explosion and subsequent fire occur at the Flower Branch Apartment Complex located at 8701 & 8703 Arliss St. Silver Spring, MD.

August 11, 2016

12:10 a.m. - WGL receives call from the Montgomery County Fire Department notifying them of the explosion and fire.

12:36 a.m. - WGL personnel arrive on the scene and meet with the fire department.

12:52 a.m. - WGL personnel shut off the flow of gas by closing the curb valve in front of 8701 Arliss St.

1:21 a.m. - Public Service Commission of MD Engineering Division (John Clementson) receives notification of an explosion and fire at 8701 Arliss St. from Ghasson Saroor (Washington Gas Supervisor DOT Pipeline Compliance).

2:41 a.m. - MDPSC arrives on site and meet with WGL personnel to get an update of the situation.

3:45 a.m. - WGL personnel, under the observation of the MDPSC, conduct an odorant check at 8609 Piney Branch Rd. The odorant check revealed that the odorant level was at 0.5% LEL of natural gas, and was compliant with COMAR regulations.

Prior to Daylight - The MDPSC joined WGL personnel for a leak survey of the gas main in front of 8707 & 8709 Arliss St. The only indication found was in front of the building entrance at 8709 Arliss St., 0.2% LEL. The indications dropped very quickly after being detected. No indications were found at the building wall.

Morning Hours - NTSB's arrives on the scene to begin their investigation.

5:25 p.m. - WGL begins the process of testing the 2" gas main in front of the apartments on Arliss St.

5:29 p.m. - WGL raise the pressure in the main to 10 psig and holds it there to verify that the gas valve in front of 8701 Arliss St. is not allowing gas to pass through it. Valve is functioning properly.

6:12 p.m. - WGL increases the pressure on the main from 10 psig to 22 psig to establish a pressure test of the main at the pressure the system was operating at the time of the explosion.

6:35 p.m. - WGL personnel perform a sub-surface leakage survey of the gas main in front of 8701 and 8703 Arliss St. No leaks found during survey.

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7:12 p.m. – WGL completes the pressure test of the 2” gas main. No leaks were found during the pressure test.

August 12, 2016

WGL personnel backfill the holes in front of 8701 & 8703 Arliss St. in order to make the site safer. The excavations were made in order to perform the previous day’s pipeline test. The pipe was wrapped, where the service lines were cut, and an anode was attached to the remaining active portion of the service stub to 8703 Arliss St.

August 15, 2016

5:57 p.m. - WGL personnel perform a pressure test on the remaining section of service line (building side of the cut) for 8701 Arliss St. The service line was tested to 22 psig for 15 minutes. The service line passed the pressure test.

August 16, 2016

10:12 a.m. – WGL personnel perform a test of the regulator vent line to ensure that it was free of any obstructions in the piping. The vent line did not show any indications of any obstructions.

ATF conducts a test with the individual who heard the "hissing" noise prior to the explosion. The purpose of the test is to reproduce various sounds that escaping gas would make and see which sound(s) the individual could hear outside of the maintenance door. The test was conducted at 8709 Arliss St. a building with a similar set up to 8701 Arliss St. with regards to the meter bank location. The two leaks that were simulated were a low pressure leak (pin-hole leak) and a high pressure leak. The individual indicated that he was unable to hear the low pressure leak but could hear the high pressure leak. However, he inddicated that the "hissing" sound he heard, prior to the explosion, was coming from the area where the rental office was located. Which is on the opposite side of the hall from the meter room.

During the excavation of the scene, ATF investigators halted the work to follow up on a noise that sounded like escaping natural gas. It was discovered that the noise was that of water running through a pipe in 8701-11. Additionally, after the testing with the individual, that heard the "hissing" sound, investigators heard a similar sound in 8709 Arliss St. coming from either 8709-11 or 8709-12.

Findings

Emergency Procedures followed? A review of WGL's actions during and after the explosion and fire indicates that the Company followed its Emergency Response procedures.

Operation and Maintenance plan followed? A review of WGL's records revealed that the Company followed its Operations and Maintenance plan according to Federal and Pipeline Safety regulations.

Conclusion

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Meter Room Investigation

The piping, meter rack and mercury regulators were destroyed as a result of the explosion and subsequent fire. The regulators received heat damage as a result of the fire and were found melted. The meter rack was found in numerous sections with meters attached to various components. The meters were found in various states of distress from being melted by the heat of the fire to just being damaged by falling debris. It was discovered that the the union for the lower regulator's vent piping, that connected the vent to the main vent line, was found to be disconnected. No evidence has been found that would indicate if the union was disconnected by hand, intentionally or unintentionally, or as a result of the explosion.

Discovered in the meter room was a small can of gasoline and a gasoline powered piece of equipment. Both the can and the piece of equipment had their respective caps in place. Data from the investigation ruled out the hupothesis that gasoline was the first fuel. Hypothesis involving explosives and or a clandestine drug laboratory were falsified by available data. Investigators concluded the first fuel was fugitive natural gas.

Building and Debris Field Investigation

All indication from the debris field, found inside of 8701 Arliss St. after the explosion and fire, indicates that the explosion started in the vicinity of the gas meters and the subsequent blast wave travelled in an outward direction away from the meters. The stairwell doors to Apartment #11, the Rental Office and the Maintenaqnce Office were blown from their locked position into their respective rooms. The Meter Room door was blown outward into the lower level stairwell. The ceiling of the Meter Room was blown up into the apartment above (#101). The rest of the building experienced damage that was consistent with the blast wave travelling away from the gas meters and up the stairwell of the apartment building.

The debris field found outside of 8701 Arliss St. also indicates that an explosion occurred inside of 8701 Arliss St.. The debris field is scatted in an outward pattern away from 8701 Arliss St., in a pattern that is consistent with an explosion emanating from that address. Several cars, that were parked on Arliss St. were hit by flying debris on the side of the car that was facing the apartment building. The front door to 8701 Apartment #101 was found three hundred feet away from the apartment complex. The door travelled across the road and parking lot and came to rest on a small hill.

Onsite Testing Investigation

The leakage survey, conducted after the explosion and fire by WGL personnel, did not find any indications of natural gas that could have lead to the explosion.

The pressure testing of the two inch natural gas main, in front of 8701 to 8711 Arliss St., did not reveal any indications of a gas leak.

Conclusion

As a result of the investigation the explosion and subsequent fire appears to be the result of a natural gas leak, as no other source was determined and from the witness' statement indicating

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that he smelled gas in the stairwell just prior to the explosion. However, as a result of the damage to the structure and interior gas piping, WGL's and the apartment complex's, the source of the natural gas and the ignition source was unable to be identified. Therefore, as a result of the source of the natural gas and the ignition source not being identified the explosion is classified as undetermined.