# Pipeline Failure Investigation Report
## (Non-Confidential Version)

Saratoga Springs

February 6, 2007

# Pipeline Failure Investigation Report

**Pipeline System:** Distribution **Operator:** Questar Gas Company

**Location:** 682 North Badger Lane, Saratoga Springs, UT 84045 **Date of Occurrence:** February 6, 2007

**Medium Released:** Natural Gas **Quantity:** 4,571 MCF

**PHMSA Arrival Time & Date:** N/A **Total Damages $** 500,000.00 +

**Investigation Responsibility:** ☒ State ☐ PHMSA ☐ NTSB Other _____

***Company Reported Apparent Cause:***

☐ Corrosion ☐ Excavation

☐ Natural Forces ☐ Incorrect Operation ☐ Other Outside Force Damage

☐ Material and/or Welds ☐ Equipment and Operations ☒ Other Third Party Damage

| | | |
|---|---|---|
| Rupture | ☐ Yes | ☐ No |
| Leak | ☒ Yes | ☐ No |
| Fire | ☒ Yes | ☐ No |
| Explosion | ☒ Yes | ☐ No |
| Evacuation | ☒ Yes | ☐ No |

Number of Persons 2 Area Adjacent Homes(2 total)

## *Narrative Summary*

Short summary of the Incident/Accident which will give interested persons sufficient information to make them aware of the basic scenario and facts.

Mr. Manuel Robles of S&E Cable, Inc. was boring to bury a Qwest communication line to Roper's house, when he damaged a natural gas main at approximately 12:30 PM on February 6, 2007.
The Roper's house was located on Lot 806 of Sunrise Meadows Subdivision Plat "H" in Saratoga Springs, Utah. Lot 806 is a corner lot at the southeast corner of Badger Lane and Prairie Dog Way (see Appendix #1, site plans and Appendix 12, Aerial photos#53 to 62).
The 2" plastic (PE) main belonged to Questar Gas Company (QGC) and was installed along the south side of the Prairie Dog Way between the concrete walkway and the homes along the south side of this street (See Appendix #1, site plans).
QGC was notified; QGC crew arrived at the site at approximately 2:11 PM. The bar hole test of the area indicated gas in the ground and two homes in the vicinity of the damaged main were evacuated. Nobody was in the house at 953 West Prairie Dog ways (Lot 805); Mrs. April Roper and her daughter Olivia were evacuated from their home at 682 North Badger Lane (Lot 806).
QGC's crew proceeded to isolate the damaged section by squeezing off the two ends of the damaged section. They encountered frost in the ground from 6 inches down to couple of feet in the process of digging potholes. At 2:40 PM potholes were complete and the two ends of the damaged section were squeezed off. S&E Cable was asked to reverse and remove the boring machine.
QGC's crew then replaced the damaged section, and electro fusion of the two ends was completed around 3:45 PM at which time a 30 minute cooling off period started.
Between 4:10 and 4:15 PM, when Mr. Larry Radford (QGC employee) and Mrs. April Roper had entered the Roper house for re-lighting of the water heater, the house exploded and the fire started.
Fire Department and Police were at the site within 5 to 10 minutes. The incident was fatal to Mrs. April Roper and Mr.Larry Radford. Their bodies were discovered after more than 5 hours. (See Appendix 12, photos #45 to #52).
Division of Public Utilities is petitioning the Public Service Commission to take enforcement actions against:
1. S&E Cable for violation of the Utah Code Title 54-8a-5.5, location with hand tools, and operating without a proper license:
2. Questar Gas Company for violation of the Emergency Leak Repair QGC Manual of Standard Practice Volume 3, Section 5.0.8.7.

**Region/State** Western / Utah **Reviewed by:** Chris White

**Principal Investigator:** Al Zadnik **Title:** Division Director

# Pipeline Failure Investigation Report

Date: 7/18/07 Date: 7/18/07

| Failure Location & Response | |
|---|---|
| Location (City, Township, Range, County/Parish): Saratoga Springs, T.5.S.,R.1.W., Utah | (Acquire Map) |
| Address or M.P. on Pipeline: (1) 682 Badger Lane | Type of Area (Rural, City): (1) City |
| Date: February 6, 2007 | Time of Failure: 12:30 PM |
| Time Detected: 12:30 PM | Time Located: 2:15 PM |
| How Located: By Manuel Robles of S&E Cable, Inc. Mr. Manuel damaged the main during directional boring to bury a Qwest communication line to the Roper's house. | |
| NRC Report #: (Attach Report) 825728 | Time Reported to NRC: 4:58 PM / Reported by: Lou Flaim |

**Type of Pipeline:**

| Gas Distribution | Gas Transmission | Hazardous Liquid | LNG |
|---|---|---|---|
| ☐ LP | ☐ Interstate Gas | ☐ Interstate Liquid | ☐ LNG Facility |
| ☐ Municipal | ☐ Intrastate Gas | ☐ Intrastate Liquid | |
| ☒ Public Utility | ☐ Jurisdictional Gas Gathering | ☐ Offshore Liquid | |
| ☐ Master Meter | ☐ Offshore Gas | ☐ Jurisdictional Liquid Gathering | |
| | ☐ Offshore Gas - High $H_2S$ | ☐ $CO_2$ | |

Pipeline Configuration (Regulator Station, Pump Station, Pipeline, etc.):
Plastic distribution main and service

| Operator/Owner Information | |
|---|---|
| Owner: Questar Gas Company<br>Address:<br>P.O.Box 45360<br>Salt Lake City, Utah 84145 | Operator: Same<br>Address:<br>Same |
| Company Official: Ron Jibson<br>Phone No.: 801-324-5424 Fax No.: 801-324-5535 | Company Official: Same<br>Phone No. Same Fax No. Same |

Drug and Alcohol Testing Program Contacts ☐ N/A

Drug Program Contact & Phone: Brenda Bain 801-324-3742
Alcohol Program Contact & Phone: Same as above

| Damages | |
|---|---|
| Product/Gas Loss or Spill(2) 4,571 MCF | Estimated Property Damage $ 250,000.00 |

1 Photo documentation
2 Initial volume lost or spilled

# Pipeline Failure Investigation Report

| Damages | | | |
|---|---|---|---|
| Amount Recovered | N/A | Associated Damages[3] $ | 5,990.00 |
| Estimated Amount $ | 250,000.00 | | |

Description of Property Damage:
The Roper's house was destroyed in the explosion/fire.

Customers out of Service: ☐ Yes ☒ No Number: N/A
Suppliers out of Service: ☐ Yes ☒ No Number: N/A

## Fatalities and Injuries

| | | | | | |
|---|---|---|---|---|---|
| Fatalities: | ☒ Yes | ☐ No | Company: 1 | Contractor: ____ | Public: 1 |
| Injuries - Hospitalization: | ☐ Yes | ☐ No | Company: ____ | Contractor: ____ | Public: ____ |
| Injuries - Non-Hospitalization: | ☒ Yes | ☐ No | Company: ____ | Contractor: ____ | Public: 1 |
| Total Injuries (including Non-Hospitalization): | | | Company: 1 | Contractor: ____ | Public: 2 |

| Name | Job Function | Yrs w/ Comp. | Yrs. Exp. | Type of Injury |
|---|---|---|---|---|
| Larry Radford | Operations Rep. | 24 | 21 | Fatality |
| April Roper | N/A | NA | NA | Fatality |
| Olivia Roper | N/A | NA | NA | Cut to mouth |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Drug/Alcohol Testing ☐ N/A

Were all employees that could have contributed to the incident, post-accident tested within the 2 hour time frame for alcohol or the 32 hour time frame for all other drugs?
☒ Yes ☐ No

| Job Function | Test Date & Time | Location | Results | | Type of Drug |
|---|---|---|---|---|---|
| | | | Pos | Neg | |
| Crew Foreman | 2/6/2007 9:15 PM | Top Stop (Convenience Store) Redwood Rd. & Hwy. 73 | ☐ | ☒ | See Appendix # 2 |
| Operations Rep. | 2/6/2007 9:15 PM | Top Stop (Convenience Store) Redwood Rd. & Hwy. 73 | ☐ | ☒ | |
| Operations Rep. | 2/6/2007 9:15 PM | Top Stop (Convenience Store) Redwood Rd. & Hwy. 73 | ☐ | ☒ | |
| | | | ☐ | ☐ | |

3 Including cleanup cost

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| Drug/Alcohol Testing | | | | | ☐ N/A |
|---|---|---|---|---|---|
| | | | ☐ | ☐ | |

| System Description |
|---|
| Describe the Operator's System:<br>Distribution with plastic main and service lines |

| Pipe Failure Description | | ☒ N/A |
|---|---|---|
| Length of Failure (inches, feet, miles): (1) | | |
| Position (Top, Bottom, include position on pipe, 6 O'clock): (1) | Description of Failure (Corrosion Gouge, Seam Split): (1) | |
| Laboratory Analysis: ☐ Yes ☐ No<br>Performed by: | | |
| Preservation of Failed Section or Component: ☐ Yes ☐ No<br>If Yes - Method: | | |
| In Custody of: | | |
| Develop a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, etc. Bar Hole Test Survey Plot should be outlined with concentrations at test points. Direction of Flow. | | |

| Component Failure Description | | ☒ N/A |
|---|---|---|
| Component Failed: (1) | | |
| Manufacturer: | Model: | |
| Pressure Rating: | Size: | |
| Other (Breakout Tank, Underground Storage): | | |

| Pipe Data | | ☐ N/A |
|---|---|---|
| Material: Polyethylene Plastic | Wall Thickness/SDR: 11 | |
| Diameter (O.D.): 2 inches | Installation Date: 11/04/2005 | |
| SMYS: N/A | Manufacturer: Polypipe | |
| Longitudinal Seam: N/A | Type of Coating: N/A | |
| Pipe Specifications (API 5L, ASTM A53, etc.): ASTM D2513 | | |

| Joining | | ☒ N/A |
|---|---|---|
| Type: | Procedure: | |
| NDT Method: | Inspected: ☐ Yes ☐ No | |

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| *Pressure @ Time of Failure @ Failure Site* | | | | ☐ *N/A* |
|---|---|---|---|---|
| Pressure @ Failure Site: 45 psig | | Elevation @ Failure Site: 4,510 feet | | |
| Pressure Readings @ Various Locations: | | | Direction from Failure Site | |
| Location/M.P./Station # | Pressure (psig) | Elevation (ft msl) | Upstream | Downstream |
| TG0001(regulator station) | 45 | 4,603 | 1.5 miles | |
| | | | | |
| | | | | |
| | | | | |

| *Upstream Pump Station Data* | ☒ *N/A* |
|---|---|
| Type of Product: | API Gravity: |
| Specific Gravity: | Flow Rate: |
| Pressure @ Time of Failure [4] | Distance to Failure Site: |
| High Pressure Set Point: | Low Pressure Set Point: |

| *Upstream Compressor Station Data* | ☒ *N/A* |
|---|---|
| Specific Gravity: | Flow Rate: |
| Pressure @ Time of Failure [4] | Distance to Failure Site: |
| High Pressure Set Point: | Low Pressure Set Point: |

| *Operating Pressure* | ☐ *N/A* |
|---|---|
| Max. Allowable Operating Pressure: 60 psig | Determination of MAOP: pressure test (100 psig) |
| Actual Operating Pressure: 45 psig, See Appendix # 3 | |
| Method of Over Pressure Protection: Worker/Monitor Regulator Station | |
| Relief Valve Set Point: 52 psig(token): 55psig(monitor) | Capacity Adequate? ☒ Yes ☐ No |

| *Integrity Test After Failure* | ☒ *N/A* |
|---|---|
| Pressure Test Conducted in place? (Conducted on Failed Components or Associated Piping): ☐ Yes ☐ No | |
| If NO, Tested after removal? ☐ Yes ☐ No | |
| Method: | |

4 Obtain event logs and pressure recording charts

# Pipeline Failure Investigation Report

| *Integrity Test After Failure* | ☒ *N/A* |
|---|---|
| Describe any failures during the test. | |

| *Soil/water Conditions @ Failure Site* | ☐ *N/A* |
|---|---|
| Condition of and Type of Soil around Failure Site (Color, Wet, Dry, Frost Depth): **Sandy clay with gravel, frost at varying depths down to the pipe** | |
| Type of Backfill (Size and Description): **sand** | |
| Type of Water (Salt, Brackish): **N/A** | Water Analysis [5] ☐ Yes ☒ No |

| *External Pipe or Component Examination* | ☒ *N/A* |
|---|---|
| External Corrosion? ☐ Yes ☐ No [1] | Coating Condition (Disbonded, Non-existent): [1] |
| Description of Corrosion: | |
| Description of Failure Surface (Gouges, Arc Burns, Wrinkle Bends, Cracks, Stress Cracks, Chevrons, Fracture Mode, Point of Origin): | |
| Above Ground: ☐ Yes ☐ No [1] | Buried: ☐ Yes ☐ No [1] |
| Stress Inducing Factors: [1] | Depth of Cover: [1] |

| *Cathodic Protection* | ☒ *N/A* |
|---|---|
| P/S (Surface): | P/S (Interface): |
| Soil Resistivity: pH: | Date of Installation: |
| Method of Protection: | |
| Did the Operator have knowledge of Corrosion before the Incident? ☐ Yes ☐ No | |
| How Discovered? (Close Interval Survey, Instrumented Pig, Annual Survey, Rectifier Readings, ECDA, etc): | |

| *Internal Pipe or Component Examination* | ☒ *N/A* |
|---|---|
| Internal Corrosion: ☐ Yes ☐ No [1] | Injected Inhibitors: ☐ Yes ☐ No |
| Type of Inhibitors: | Testing: ☐ Yes ☐ No |

5 Attach copy of water analysis report

# Pipeline Failure Investigation Report

| *Internal Pipe or Component Examination* ☒ N/A | |
|---|---|
| Results (Coupon Test, Corrosion Resistance Probe): | |
| Description of Failure Surface (MIC, Pitting, Wall Thinning, Chevrons, Fracture Mode, Point of Origin): | |
| Cleaning Pig Program: ☐ Yes ☐ No | Gas and/or Liquid Analysis: ☐ Yes ☐ No |
| Results of Gas and/or Liquid Analysis [6] | |
| Internal Inspection Survey: ☐ Yes ☐ No | Results [7] |
| Did the Operator have knowledge of Corrosion before the Incident? ☐ Yes ☐ No | |
| How Discovered? (Instrumented Pig, Coupon Testing, ICDA, etc.): | |

| *Outside Force Damage* ☐ N/A | |
|---|---|
| Responsible Party: S&E Cable, Inc. | Telephone No.: 801-688-6145 |
| Address: 5153 W. 5400 S., Kearns, UT 84118 | |
| Work Being Performed:<br>**Directional boring** | |
| Equipment Involved: Vermeer Hammer Head Mobile (boring missile) [1] | Called One Call System? ☒ Yes ☐ No |
| One Call Name: Blue Stakes of Utah | One Call Report # [8] A70260070 |
| Notice Date: 1/26/2007 | Time: 9:03 AM |
| Response Date: 1/29/2007 | Time: 2:15 PM |
| Details of Response:<br>See Appendix #4, Blue Stake ticket and locate records | |
| Was Location Marked According to Procedures? ☒ Yes ☐ No | |
| Pipeline Marking Type: [1] | Location: [1] |

6 Attach copy of gas and/or liquid analysis report
7 Attach copy of internal inspection survey report
8 Attach copy of one-call report

# Pipeline Failure Investigation Report

| *Outside Force Damage* | ☐ *N/A* |
|---|---|
| Paint and Flags | South side of Prairie Dog Way |
| State Law Damage Prevention Program Followed? ☐ Yes ☒ No ☐ No State Law | |
| Notice Required: ☒ Yes ☐ No | Response Required: ☒ Yes ☐ No |
| Was Operator Member of State One Call? ☒ Yes ☐ No | Was Operator on Site? ☐ Yes ☒ No |
| Did a deficiency in the Public Awareness Program contribute to the accident? ☐ Yes ☒ No | |
| Is OSHA Notification Required? ☒ Yes ☐ No | |

| *Natural Forces* | ☒ *N/A* |
|---|---|
| Description (Earthquake, Tornado, Flooding, Erosion): | |

| *Failure Isolation* | ☐ *N/A* (1) |
|---|---|
| Squeeze Off/Stopple Location and Method:<br>**See Appendix #1 Site Plan** | |
| Valve Closed - Upstream: N/A<br>Time: N/A | I.D.: N/A<br>M.P.: N/A |
| Valve Closed - Downstream: N/A<br>Time: N/A | I.D.: N/A<br>M.P.: N/A |
| Pipeline Shutdown Method: ☒ Manual ☐ Automatic ☐ SCADA ☐ Controller ☐ ESD | |
| Failed Section Bypassed or Isolated: Isolated | |
| Performed By: QGC Crew, Brian Southwick, Crew Foreman | Valve Spacing: N/A |

| *Odorization* | ☐ *N/A* |
|---|---|
| Gas Odorized: ☒ Yes ☐ No | Concentration of Odorant (Post Incident at Failure Site): |
| Method of Determination: ☒ Yes ☐ No<br>Odorometer Test | % LEL: ☐ Yes ☒ No % Gas In Air: ☒ Yes ☐ No<br>Time Taken: ☒ Yes ☐ No |
| Was Odorizer Working Prior to the Incident?<br>☒ Yes ☐ No | Type of Odorizer (Wick, By-Pass): Pump<br>11:44 AM.,2/07/2007 |

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| *Odorization* | ☐ N/A |
|---|---|
| Odorant Manufacturer: Natural Gas Odorization<br><br>Model: YZ Industries, NJEX 7202 | Type of Odorant: 50% Tetrahydrothiophene(THT), 50% Tert-butylmercaptan(TBM) |
| Amount Injected: 0.75 lbs/mcfh | Monitoring Interval (Weekly): Monthly |
| Odorization History (Leaks Complaints, Low Odorant Levels, Monitoring Locations, Distances from Failure Site):<br>No complaints;<br>Odorant level normal;<br>Monthly baseline test locations located 4.8 miles to the east and 9.4 miles to the west of failure site;<br>See Appendix #5 Odorant Records | |

| *Weather Conditions* | ☐ N/A |
|---|---|
| Temperature: mid to high 30s | Wind (Direction & Speed): minimal |
| Climate (Snow, Rain): No. | Humidity: minimal |
| Was Incident preceded by a rapid weather change? ☐ Yes ☒ No | |
| Weather Conditions Prior to Incident (Cloud Cover, Ceiling Heights, Snow, Rain, Fog):<br>**Cold, frost on the ground** | |

| *Gas Migration Survey* | ☐ N/A |
|---|---|
| Bar Hole Test of Area: ☒ Yes ☐ No | Equipment Used: Bascom-Turner Gas Ranger |
| Method of Survey (Foundations, Curbs, Manholes, Driveways, Mains, Services) [9] [1]<br>Foundation and adjacent grounds within 20 feet of the building, (See Appendix #7, QGC Standard Practice),<br>For the CGI (See Appendix #8, calibration records, and Appendix #12, photos #35 to 40) | |

| *Environment Sensitivity Impact* | ☒ N/A |
|---|---|
| Location (Nearest Rivers, Body of Water, Marshlands, Wildlife Refuge, City Water Supplies that could be or were affected by the medium loss): [1] | |
| OPA Contingency Plan Available? ☐ Yes ☐ No | Followed? ☐ Yes ☐ No |

| *Class Location/High Consequence Area* | ☒ N/A |
|---|---|
| Class Location: 1 ☐ 2 ☐ 3 ☐ 4 ☐<br>Determination: _____ | HCA Area? ☐ Yes ☐ No ☐ N/A<br>Determination: _____ |

9 Plot on site description page

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| *Class Location/High Consequence Area* | ☒ N/A |
|---|---|
| Odorization Required? ☐ Yes ☐ No ☐ N/A | |

| *Pressure Test History* (Expand List as Necessary) | | | | | | ☒ N/A |
|---|---|---|---|---|---|---|
| | Req'd [10] Assessment Deadline Date | Test Date | Test Medium | Pressure (psig) | Duration (hrs) | % SMYS |
| Installation | N/A | | | | | |
| Next | | | | | | |
| Next | | | | | | |
| Most Recent | | | | | | |
| Describe any problems experienced during the pressure tests. | | | | | | |

| *Internal Line Inspection/Other Assessment History* (Expand List as Necessary) | | | | | ☒ N/A |
|---|---|---|---|---|---|
| | Req'd [10] Assessment Deadline Date | Assessment Date | Type of ILI Tool [11] | Other Assessment Method [12] | Indicated Anomaly If yes, describe below |
| Initial | | | | | ☐ Yes ☐ No |
| Next | | | | | ☐ Yes ☐ No |
| Next | | | | | ☐ Yes ☐ No |
| Most Recent | | | | | ☐ Yes ☐ No |
| Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions. | | | | | |

| *Pre-Failure Conditions and Actions* | ☒ N/A |
|---|---|
| Was there a known pre-failure condition requiring [10] the operator to schedule evaluation and remediation? ☐ Yes (describe below or on attachment) ☐ No | |
| If there was such a known pre-failure condition, had the operator established and adhered to a required [10] evaluation and remediation schedule? Describe below or on attachment. ☐ Yes ☐ No ☐ N/A | |
| Prior to the failure, had the operator performed the required [10] actions to address the threats that are now known to be related to the cause of this failure? ☐ Yes ☐ No ☐ N/A<br>List below or on an attachment such operator-identified threats, and operator actions taken prior to the accident. | |

10 As required of Pipeline Integrity Management regulations in 49CFR Parts 192 and 195
11 MFL, geometry, crack, etc.
12 ECDA, ICDA, SCCDA, "other technology," etc.

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| *Pre-Failure Conditions and Actions* | ☒ N/A |
|---|---|
| Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions. | |

| *Maps & Records* | ☐ N/A |
|---|---|
| Are Maps and Records Current? [13] ☒ Yes ☐ No<br>Comments:<br>See Appendix #1 | |

| *Leak Survey History* | ☐ N/A |
|---|---|
| Leak Survey History (Trend Analysis, Leak Plots):<br>**No prior leaks, except for a few 3rd party leaks in the general area (new subdivision).** | |

| *Pipeline Operation History* | ☐ N/A |
|---|---|
| Description (Repair or Leak Reports, Exposed Pipe Reports):<br>**LRO# 69311 (3rd party leak on Badger Lane, in 2006)** | |
| Did a Safety Related Condition Exist Prior to Failure? ☐ Yes ☒ No Reported? ☐ Yes ☐ No | |
| Unaccounted For Gas: **N/A** | |
| Over & Short/Line Balance (24 hr., Weekly, Monthly/Trend): **N/A** | |

| *Operator/Contractor Error* | ☐ N/A |
|---|---|
| Name:<br>1. S&E Cable, Inc. (contractor)<br>[Note: S&E Cable was in violation of Utah Code Title 54.8a.5.5 Location with hand tools, and was operating without a proper license. Utah Pipeline Safety Section does not have jurisdiction over contractors]<br>2. Questar Gas Company (operator) | Job Function: Repair of 3rd party damage |
| Title: Response Crew to 3rd party damage<br>(Crew Foreman: Brian Southwick) | Years of Experience: 6 to 27 yrs |
| Training (Type of Training, Background): See Appendix #6 (Operator Qualification records) | |
| Was the person "Operator Qualified" as applicable to a precursor abnormal operating condition? ☒ Yes ☐ No ☐ N/A | |
| Was qualified individual suspended from performing covered task ☐ Yes ☒ No ☐ N/A | |
| Type of Error (Inadvertent Operation of a Valve): Failure to clear the house properly for Natural Gas in violation of QGC Manual of Standard Practice Volume 3, Section 5.0.8.7 (See Appendix #7 QGC Procedure/Checklist). | |

13 Obtain copies of maps and records

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| *Operator/Contractor Error* | ☐ *N/A* |
|---|---|

Procedures that are required:
Emergency Leak Repair QGC Manual of Standard Practice Volume 3, Section 5.0.8.7. (See Appendix #7 QGC Procedure/Checklist)

Actions that were taken:
According to Brian Southwick when he had asked Larry Radford about the gas levels in the ground along the north side of the house, Larry responded; "it was clear" (below 2% gas in the air). Larry was using CGI (ID#73, with serial number 0512-055540) for testing gas levels in the ground outside the house (See Appendix #8, Calibration Records and Appendix #12, Photos #35 to 40) . This CGI unit was in Larry's truck after the incident, indicating that Larry did not use this unit for testing gas level inside the house. Larry's TIF (a different kind of instrument which makes a clicking sound when encounters methane gas at 500PPM level and higher) was discovered in the basement of the house after the explosion (Appendix 12, Photo #31). The on-off button of the instrument was at on position. It is not clear at this time, why it did not alert Larry from entering the house. This instrument has been tested non-destructively (See Appendix #8, statement from QGC and maintenance records). There will be additional destructive testing by the manufacturer at some point in the future. The Division will obtain copies of any reports of such testing.

Pre-Job Meeting (Construction, Maintenance, Blow Down, Purging, Isolation): N/A

Prevention of Accidental Ignition (Tag & Lock Out, Hot Weld Permit): N/A

Procedures conducted for Accidental Ignition:
N/A

Was a Company Inspector on the Job? ☐ Yes ☒ No

Was an Inspection conducted on this portion of the job? ☐ Yes ☒ No

Additional Actions (Contributing factors may include number of hours at work prior to failure or time of day work being conducted):
The crew had started work at 7:00 AM in the morning of the incident. At the time of the accident it would have been only less than half an hour over 8 hour workday.

Training Procedures:
See Appendix #6

Operation Procedures:
See Appendix #7

Controller Activities:
N/A

| Name | Title | Years Experience | Hours on Duty Prior to Failure | Shift |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Alarm Parameters: N/A

High/Low Pressure Shutdown: N/A

Flow Rate: N/A

Procedures for Clearing Alarms: N/A

Type of Alarm: N/A

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| *Operator/Contractor Error* | ☐ *N/A* |
|---|---|
| Company Response Procedures for Abnormal Operations: **N/A** | |
| Over/Short Line Balance Procedures: **N/A** | |
| Frequency of Over/Short Line Balance: N/A | |
| Additional Actions: **The next day a vacuum truck was used to pull the natural gas that was released from the damaged main out of the ground near adjacent property.** | |

| *Additional Actions Taken by the Operator* | ☒ *N/A* |
|---|---|
| Make notes regarding the emergency and Failure Investigation Procedures (Pressure reduction, Reinforced Squeeze Off, Clean Up, Use of Evacuators, Line Purging, closing Additional Valves, Double Block and Bleed, Continue Operating downstream Pumps): | |

# Pipeline Failure Investigation Report

## *Photo Documentation* [1]

Overall Area from best possible view. Pictures from the four points of the compass. Failed Component, Operator Action, Damages in Area, Address Markings, etc.

| Photo No. | Description | Roll No. | Photo No. | Description | Roll No. |
|---|---|---|---|---|---|
| 1 | Standing W. of the site looking E. | | 31 | Mr. Radford's TIF | |
| 2 | Standing W. of the site looking E. | | 32 | LMr. Radford's Tool Box | |
| 3 | Standing N.E. of the site looking S. | | 33 | Mr. Radford's Truck | |
| 4 | Standing N. looking E.(couch on the neighbor's roof) | | 34 | Mr. Radford's Truck | |
| 5 | Standing N. looking S. | | 35 | LMr. Radford's CGI | |
| 6 | Standing S. looking N. | | 36 | Mr. Radford's CGI | |
| 7 | Standing S.W. looking N.E. | | 37 | Mr. Radford's CGI | |
| 8 | Standing N.W. looking S.E. | | 38 | Mr. Radford's CGI | |
| 9 | Standing N. E. looking W. 2/06/2007 | | 39 | Mr. Radford's CGI | |
| 10 | Standing N.E. looking S.W. 2/07/07 | | 40 | Mr. Radford's CGI | |
| 11 | Standing N.E. looking W. | | 41 | Gas Meter | |
| 12 | Standing N.E. looking W. Squeeze off pot-holes are visible, blue tarp covers where main was damaged | | 42 | Inlet and Outlet to gas meter | |
| 13 | East squeeze off pothole | | 43 | Safety valve to the furnace | |
| 14 | West squeeze off pothole | | 44 | Safety valve to the water heater | |
| 15 | Repaired section of main | | 45 | Mr. Radford's body | |
| 16 | Service Riser N.W. corner | | 46 | Mr. Radford's body | |
| 17 | Standing W. looking E. | | 47 | Mr. Radford's body | |
| 18 | Damage to west side of the adjacent home (Lot 805) at 953 West Prairie Dog Way | | 48 | Mr. Radford's body | |
| 19 | Standing N.E. looking S.W. | | 49 | Mrs. Roper's body | |
| 20 | CGI inside Mr. Radford's truck | | 50 | Mrs. Roper's body | |
| 21 | Standing N.W. looking S.E. | | 51 | Mrs. Roper's body | |
| 22 | Standing W. looking E. and down | | 52 | Mrs. Roper's body | |
| 23 | Standing E. looking W. and down | | 53 | 53 to 62 Aerial photos taken by Utah County Sheriff's Office. | |
| 24 | Standing S. looking N. | | 54 | | |
| 25 | Standing S. looking N. | | 55 | | |
| 26 | Standing N.W. looking E. | | 56 | | |
| 27 | Standing N.W. looking S.E. | | 57 | | |
| 28 | Bottom left pothole is where boring started , blue tarp covers where main was damaged, Top center is west squeeze off pothole. | | 58 | | |
| 29 | Damaged section of main | | 59 | | |

# Pipeline Failure Investigation Report

| *Photo Documentation* [1] | | | | | |
|---|---|---|---|---|---|
| 30 | Damaged section of main | | 60 | | |
| Type of Camera: Olympus Digital Camera D-450 Zoom, 1.3 Mega pixel was used by Utah Pipeline Safety Staff for Photos #1 to #30, Photos #31 to #52 were submitted by State Fire Marshall's Office, and Photos #53 to #62 were submitted by Utah County Sheriff's Office. | | | | | |
| Film ASA:N/A | | | | | |
| Video Counter Log (Attach Copy): N/A | | | | | |

| *Additional Information Sources* | | | |
|---|---|---|---|
| Agency | Name | Title | Phone Number |
| Police: | **Scott Jody** | **Detective, Utah County Sheriff's Office** | **801-343-4000** |
| Fire Dept.: | **Dennis Barker** | **Utah County Fire Marshall** | **801-404-0659** |
| State Fire Marshall: | **Troy Mills** | **Deputy** | **801-556-4154** |
| State Agency: | | | |
| NTSB: | | | |
| EPA: | | | |
| FBI: | | | |
| ATF: | | | |
| OSHA: | **Jim Johnston** | **Compliance Officer** | **801-530-6604** |
| Insurance Co.: | | | |
| FRA: | | | |
| MMS: | | | |
| Television: | **Local Channels 2, 4, 5, 13** | | |
| Newspaper: | **Local newspapers** | | |
| Other: | **Mike Penovich** | **Saratoga Springs Fire Marshall** | **801-830-2462** |

# *Pipeline Failure Investigation Report*

| *Persons Interviewed* | | |
|---|---|---|
| Name | Title | Phone Number |
| **Brian Southwick** | **Crew Foreman, QGC** | **801-853-6506** |
| **Ryan Whittekiend** | **Operations Rep., QGC** | **801-853-6542** |
| **Jack Bryant** | **Operations Rep., QGC** | **801-853-6542** |
| **Manuel Robles** | **Equipment Operator, S&E Cable, Inc.** | **801-688-6145** |
| **Sandy Parra** | **Owner S&E Cable, Inc.** | **801-688-6145** |
| **Captain Alisa Harper** | **Saratoga Springs Fire Dept.** | **801-766-6506** |
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| *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.) | |
| Time | Event |
| 12:30 PM | **Mr. Manuel Robles of S&E Cable damaged a 2" gas main by directional boring, Mr. Robles called Mrs. Sandy Parra, (See Appendix #14, Utah County Sheriff's Report Page 20)** |
| 12:59:23 PM | **Mrs. Sandy Parra owner of S&E Cable placed a call to QGC, (See Appendix #9, emergency call timeline)** |
| 1:32 PM | **Brian Southwick of QGC and his crew while on a job at 1100 N. 100 W., Pleasant Grove received the call to respond to this 3rd party damage.** |
| 1:35 PM | **Mr. Southwick and crew left Pleasant Grove heading to Saratoga Springs** |
| 2:11 PM | **Mr. Southwick and crew arrived at 682 North Badger Lane, Saratoga Springs, Manuel pointed to the area of the damaged main, gas was bubbling out of ground along the cracks and edges of the concrete walk way.** |
| 2:15 PM | **Bar hole test revealed gas in the ground, Crew proceeded to evacuate two homes within the damaged area of the main. Nobody was in the house at 953 West Prairie Dog Way: Mrs. April Roper and her daughter Olivia were evacuated from Roper's house at 682 North Badger Lane.** |
| 2:40 PM | **The damaged section was secured by squeezing off the two ends.** |
| 2:45 PM | **Mr. Robles was asked to reverse and remove the boring machine, he did so, and QGC's crew proceeded to repair the damaged main.** |
| 3:45 PM | **The second electro fusion completed, and the 30 minute cooling off period started.** |
| 4:12 PM | **Mr. Southwick was at his truck getting a tool to raise the squeeze from the two ends of the repaired section of the main. His truck was parked on the south side of the Prairie Dog Way close to where the repair section of main was located (See Appendix #12, Photos #53 to 62). Mrs. April Roper with her daughter in a stroller walking up toward the west on Prairie Dog Way approached Mr. Southwick and asked when she could enter her house (See Appendix #13, statement from Mrs. Kristine Ewert, and Appendix #14, page 15, second paragraph from the bottom of the page). Mr. Southwick responded "it was safe for her to go back to her house". He then walked them over to Mr. Radford and his truck, where it was parked on the east side of Badger Lane close to the corner of Badger Lane with Prairie Dog Way and asked Mr. Radford to clear her house. Mr. Southwick turned around and headed toward his truck. Last time he saw Mr. Radford and Mrs. Roper, they were walking toward the front of the house.** |
| 4:12 to 4:15 PM | **Mr. Southwick was at the right side of his truck, the truck was facing east, he was getting the tool to raise the squeeze offs, when he heard the explosion.** |
| 4:15 to 4:25 PM | **Fire and police arrived at the site. Fire department started to put out the fire.** |
| 4:58 PM | **Reported to NRC (National Response Center) by Mr. Lou Flaim of QGC (See Appendix #10, PHMSA 30 day report).** |
| 9:51 PM | **Mr. Radford's body was recovered. (See Appendix #12, Photo #45 and Appendix #11, Medical Examiner Report: Case #R200700215).** |
| 9:59 PM | **Mrs. Roper's body was recovered (Appendix #12, Photo #49, and Appendix 311, Medical Examiner Report: Case #R200700214).** |
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# Pipeline Failure Investigation Report

| *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.) | |
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| *Investigation Contact Log* | | | |
|---|---|---|---|
| Time | Date | Name | Description |
| AM | 2/07/07 | Judy Scott | Utah County Sheriff's Office |
| AM | 2/07/07 | Ken Leetham | City Manager, Saratoga Springs |
| AM | 2/07/07 | Timothy Parker | Mayor, Saratoga Springs |
| AM | 2/07/07 | Jimmy Franc | nextdoor neighbor's father |
| AM | 2/07/07 | Estuardo Peres | neighbor |
| AM | 2/08/07 | Mike Swenson | married to Greg Roper's sister |
| AM | 2/08/07 | Gail Roper | Greg Roper's sister |
| AM | 2/07/07 | Abbie Magrane | Questar attorney |
| AM | 2/07/07 | Ron Jorgensen | General Manager, QGC |
| AM | 2/07/07 | Jeff Hansen | QGC |
| AM | 2/07/07 | Troy Sorensen | QGC |
| AM | 2/07/07 | Ron Jibson | QGC |
| AM | 2/07/07 | James E.Johnston | OSHA |
| AM | 2/08/07 | Gary Hansen | Blue Stakes of Utah |
| AM | 2/07/07 | Sterling Jacobson | Rapid Wave, LLC. |
| AM | 2/08/07 | Richard D. Bradford | Attorney for Mr. Roper |
| AM | 2/08/07 | Mike Shinkle | Attorney for Mr. Roper |
| AM | 2/09/07 | Robert Jacobsen, CFI | Burn Pattern Analysis, INC. |
| AM | 2/26/07 | John Sumner | ELM Locating & Utility Services |
| AM | 2/14/07 | Ray Fugal | Fugal and Sons |
| AM | 2/26/07 | Kay Hansen | Paralegal, Questar |
| AM | 2/26/07 | Tim D.Dunn | Dunn & Dunn Attorney for Questar |
| AM | 2/26/07 | Ryan Whittekiend | QGC |
| AM | 2/26/07 | Jack Bryant | QGC |
| AM | 2/26/07 | Brian Southwick | QGC |

# Pipeline Failure Investigation Report

| *Investigation Contact Log* | | | |
|---|---|---|---|
| Time | Date | Name | Description |
| AM | 2/27/07 | Dave Bridge | S&E Cable, Inc. Attorney |
| AM | 2/27/07 | Sandy Parra | S&E Cable, Inc. |
| AM | 2/27/07 | Manuel Robles | S&E Cable, Inc. |
| AM | 3/12/07 | Ryan Gallagher | Qwest, Inc. |
| AM | 4/12/07 | Mike Penovich | Saratoga Springs Fire Chief. |
| AM | 4/12/07 | Troy Mills | Utah State Fire Marshal Office, investigator |
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| *Failure Investigation Documentation Log* | | | | |
|---|---|---|---|---|
| Operator: Questar Gas Company | | Unit #: Central | CPF #: N/A | Date: 4/11/07 |
| Appendix Number | Documentation Description | Date Received | FOIA | |
| | | | Yes | No |
| 1 | Site Drawings and maps | 3/20/07 | | X |
| 2 | Post accident drug test results. | 4/09/07 | | X |
| 3 | Pressure chart, Reg. Station TG0001 | 3/0/07 | | X |
| 4 | Blue Stakes of Utah Ticket and ELM Locating Records | Feb.2007 | X | |
| 5 | Odorization and Chromatograph records of odorants | 3/02/02 | | X |
| 6 | Operator Qualification Records | 3/02/07 | | X |
| 7 | QGC Manual of Standard Practice Volume 3, Section 5-00-8.7 & Checklist | 3/23/07 | | X |
| 8 | Calibration records CGI (QGC ID#73), and TIF (QGC Statement and Maintenance record) | 3/02/07 | | X |
| 9 | Processing timeline of emergency call by Questar Gas Company | 4/09/07 | | X |
| 10 | PHMSA 30 day report. | 3/23/07 | X | |
| 11 | Medical examiner reports: Case #R200700214, and Case #R200700215 | 3/14/07 3/21/07 | X | |
| 12 | Pictures | 2/06/07 2/07/07 | X | |
| 13 | Statement from Kristine Ewert Roper's neighbor Statement from Captain Alisa Harper (2/16/07) | 2/06/07 | | X |
| 14 | Utah County Sheriff's Report | 5/16/07 | X | |
| 15 | State Fire Marshal Report Case # 132007000013 | 4/26/07 | X | |
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# Pipeline Failure Investigation Report

| *Failure Investigation Documentation Log* | | | |
|---|---|---|---|
| Operator: Questar Gas Company | Unit #: Central | CPF #: N/A | Date: 4/11/07 |

| Appendix Number | Documentation Description | Date Received | FOIA | |
|---|---|---|---|---|
| | | | Yes | No |
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| *Site Description* |
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| Provide a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, etc. Bar Hole Test Survey Plot should be outlined with concentrations at test points. Photos should be taken from all angles with each photo documented. Additional areas may be needed in any area of this guideline. |

| APPENDIXES | |
|---|---|
| 1 | Site Plans |
| 2 | Post Accident Drug Test |
| 3 | Pressure Chart Station: TG 0001 |
| 4 | Blue Stakes' Ticket, and ELM Locating Records |
| 5 | Odorization Records |
| 6 | OQ Records |
| 7 | QGC Standard Practice |
| 8 | CGI Calibration Records, and<br>TIF Maintenance/QGC Statement |
| 9 | Emergency Call Processing Timeline |
| 10 | PHMSA 30 Day Report |
| 11 | Medical Examiner's Report |
| 12 | Photo Documentation |
| 13 | Statements From: Kristine Ewert, and<br>Captain Alisa Harper |
| 14 | Utah County Sheriff's Office<br>Incident Report 07UC01273 |
| 15 | State Fire Marshal Report<br>Case File No:132007000013 |