NATIONAL TRANSPORTATION SAFETY BOARD
Office of Railroad, Pipeline, and Hazardous Materials Investigations
Washington, D.C. 20594

Survival Factors

Group Chairman's Factual Report of the Investigation

– Emergency Preparedness / Emergency Response [1]

Report Date: October 31, 2018

A. ACCIDENT

Accident Number:	DCA17FP006
Location [2]:	Millersville, Pennsylvania
Date:	July 02, 2017 [3]
Time (approximate):	12:32 p.m. EDT [4]
Event description:	apparent unintended release of commercially supplied natural gas, and subsequent explosion within a residential dwelling
Property site [5]:	206 Springdale Lane, Manor Township, PA.

B. SYNOPSIS OF THE ACCIDENT

See documentation as compiled by the Investigator-in-Charge.

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[1] The Survival Factors investigation exclusively addresses the emergency preparedness and emergency response, and injury causation elements of the accident.

[2] i.e., the accident site jurisdictional municipality reference as designated by the agency

[3] NTSB initiated an investigation on the evening of July 2, 2017.

[4] Eastern Daylight Time

[5] i.e., the actual physical location of the accident site

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Note – photographs compiled during the investigation by the Survival Factors Technical Working Group will be forthcoming as separate Survival Factors factual report documentation.

Select abbreviations and acronym nomenclature used in this report

~	approximate, or approximately
BREMA	Blue Rock Emergency Management Agency
BRFD	Blue Rock Fire Rescue
BRRFD	Blue Rock Regional Fire District
CFR	Code of Federal Regulations
EDT	Eastern Daylight Time
F	Fahrenheit [temperature scale]
hrs	hours (ref to 4-digit, or 6-digit military time)
inHg	inches of Mercury [barometric pressure]
mph	mile per hour [speed]
MTPD	Manor Township Police Department
OPS	Office of Pipeline Safety, within the PHMSA
PHMSA	U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (see [Internet] http://www.phmsa.dot.gov/)
ref	reference, or in reference to
SF	Survival Factors [investigation]
UGI	UGI Utilities, Inc.

C. SURVIVAL FACTORS -- TECHNICAL WORKING GROUP PARTICIPANTS

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D. DETAILS OF THE INVESTIGATION [6]

1.0 Relevant Background Factors

1.1 Locality of the Accident / Civil Jurisdiction, and Property Identification

The accident (a natural gas leak, explosion and fire) occurred in a residential dwelling structure that was located at 206 Springdale Lane, in Manor Township, which is a municipality of Lancaster County, Pennsylvania (PA). The residential community of the accident site is also known locally as "Springdale Farms". [7] The accident site is within the emergency services jurisdiction (fire protection district) of the Blue Rock Fire Rescue - Station 90, which is located in Millersville, PA (see further § 3.1 in this report), and is within the law enforcement jurisdiction of the Manor Township Police Department (see § 3.4).

1.2 Site Characterization – Pre-Event

The area of the accident site is a 'moderately' dense (population density) suburban neighborhood, generally consisting of single-family, residential dwelling structures.[8]

[6] Source: on-scene observations of, and field notations recorded by, the SF Group Chair, also utilizing data of the Party to the Investigation participants (that supported the investigation), and as further described.

[7] Source: permanent signage located at the roadway entrance of the community.

[8] Manor Township, Lancaster County, PA, comprises 38.33 sq. mi. [total area], and had a population of 19,612 persons; source: "US Census Bureau - Quick Facts" [data tabulation], 2010 census (for additional data, see [Internet] https://www.census.gov/quickfacts/fact/table/manortownshiplancastercountypennsylvania/AGE275210).

1.2.1 Accident Structure - Overall Physical Configuration [9, 10]

The residential structure at 206 Springdale Lane that was directly impacted by the accident, which was demolished as a result of the explosion (see § 2.1.1), was a single-family, residential-use, stucco masonry veneer [11], wood-framed construction, dwelling. The dwelling was originally constructed in 1998, and was located on a 'cul-de-sac' [12] roadway. The structure comprised 4,356 sq. ft., as situated on three levels (i.e., a basement, a first floor, and second floor), which included an attached 3-car garage (at the north end of the building), and an attached wood deck (at the west side of the structure). The front-entrance of the subject dwelling, which faces the 'cul-de-sac', is on the east side of the structure. The main portion of the dwelling was constructed on a concrete block perimeter wall foundation (that contained the basement areas), with the garage segment of the dwelling constructed on a concrete slab. At the time of the accident, the dwelling contained the personal effects of the owner / resident (i.e., household furnishings [furniture, etc.], major appliances, floor coverings, clothing, etc.), including one automobile that was parked in the garage.

Natural gas, which was sold to the subject property owner by a retail supplier / distributor, UGI Utilities, Inc. (see further § 1.3), was delivered to the subject residential dwelling via an underground distribution pipeline system, which was also likewise sold and delivered (in a similar manner) to the other residential dwelling properties that are located in the Springdale Farms residential community.

The distribution pipeline system at the subject property was comprised of a "main" pipeline, a "service" pipeline, and related appurtenances (i.e., pipeline fittings and fixtures; see further § 1.2.2). The natural gas was utilized as fuel for domestic heating (residential spaces), hot water heating (domestic use), household cooking (e.g., a kitchen stove), a gas fireplace, and a gas [laundry] dryer.[13]

A basic schematic floor plan illustration, depicting the accident site infrastructure (pre-event), was obtained by the investigation [14], a copy of which is anticipated to be available in the NTSB docket. Photographic images of the exterior of the structure, recorded both prior to, and subsequent to the accident, were obtained by the investigation, which are anticipated to be available in the NTSB docket.

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[9] Ref, Lancaster County, PA, Property Assessment Office - tax records database documentation, and for further information, see [Internet] http://lancasterpa.devnetwedge.com/parcel/view/4109447900000/2017, and as further described.

[10] Source: on-scene observations of, and field notations recorded by, the SF Group Chair, as supported by the SF Group - participating Parties, and also utilizing informational data of other sources as further described.

[11] Stucco is an exterior cement plaster material that is applied to a wall sub-surface (panel) of a structure.

[12] A 'cul-de-sac' is an infrastructure feature that is typically located at the end of a street that does not have an exit at the opposite end [of the entrance], in which the street terminates with an enlarged, usually somewhat circular-shaped roadway surface (i.e., the 'cul-de-sac'), the area of which can be used by vehicles to facilitate a U-turn process.

[13] Source: NTSB interview conducted with the property resident / owner; see the transcript for details.

[14] Source, and for further information, see [Internet] https://www.co.lancaster.pa.us/143/GIS-Division, and http://lancasterpa.devnetwedge.com/parcel/view/4109447900000/2017.

In addition to the subject property (accident site dwelling at 206 Springdale Lane), the 'cul-de-sac' contained three other similarly constructed, two-story / single-family, residential dwellings (i.e., the properties at 197, 201, and 202 Springdale Lane). Additional residential dwellings were located on Springdale Lane that were situated to the east of the cul-de-sac. The properties located on the cul-de-sac, and properties located on Springdale Lane to the east of the cul-de-sac (in the accident site area), were bordered by a natural woodlands area that was identified as Springdale Park.

Several maps, describing the accident site dwelling, and the layout configuration of the residential dwellings that were located on the 'cul-de-sac' at the accident site, were obtained by the investigation, which are anticipated to be available in the NTSB docket.

1.2.2 Summary of Natural Gas Delivery Operations at the Accident Site [15]

The following provides a generalized description [16] of the pipeline infrastructure, and related fittings and fixtures (operational equipment) at the accident site.[17]

See the Operations Group Factual Report for additional information detail on this topic.

a. Gas Delivery Infrastructure System at 206 Springdale Lane

A buried, two-inch (diameter) plastic gas distribution "main" [pipeline], owned / operated by UGI Utilities, Inc., which also supplied the natural gas product to the residential dwellings that were situated on the 'cul-de-sac' roadway, was located in front of the subject residential dwelling, about three feet from the curb-line of the 'cul-de-sac' roadway [18]. The distribution main [pipeline] was buried (at the accident site address) to a depth of soil coverage of about three feet, in which a mechanical connection was provided (as further described), to join the distribution main to additional buried piping that extended to the subject residential dwelling.

This mechanical piping connection (at the accident site address) was comprised of a one-inch [diameter] plastic "sleeve pipe", which contained a one-half inch [diameter] plastic "service line" [pipeline], in which a device, referred to as a "saddle service-tee" (which is also referred to as a 'tapping-tee assembly'), was also incorporated in this connection equipment, to mechanically

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[15] Source: on-scene observations of, and field notations recorded by, the SF Group Chair, utilizing informational data of UGI personnel (that supported the on-scene investigation), and as further described.

[16] The intent of this report section is not to provide a detailed description of the gas delivery system at the accident site (in that, that topic will be addressed in greater detail in the Operations Group Factual Report of the Investigation), but rather, this section is supportive to a general understanding of the gas delivery system, relative to the actions immediately preceding the accident (explosion) and the emergency services response to the accident site.

[17] Additional select / supplemental technical data [supportive to this report section] was provided in email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[18] The pathway (route) of the gas main at the site was characterized as being "behind" the curb-line, i.e., it was located in an area that could be visually identified (to the casual observer standing in the 'cul-de-sac') as being on the "front lawn" of the subject property (which was the pipeline-routing convention for the properties situated on the 'cul-de-sac'), although the exact property line at the site was not specifically delineated in, nor is it of significant importance to, the investigation.

join the one-half inch "service line" to the two-inch "main". The tapping-tee assembly contained a mechanical fixture that's referred to an "excess flow valve", and a mechanical connection point for the one-half inch service line. After the tapping-tee assembly connection point, the sleeve pipe / service line extended in the direction of the subject residential dwelling, in which the service sleeve initiated at a point about one foot after the tapping-tee connection, and terminated at a point about one foot from the mechanical connection point of the service riser (as further described).

At the point that the sleeve pipe / service line was proximate to (i.e., within about one foot of) the exterior sidewall surface (of the structural foundation) of the dwelling, the piping segment, which at that point is referred to as a "service riser", then extended upward to the ground surface, which was on the south side of the subject residential dwelling. Upon exiting the ground, the service riser further extended upward to, and was mechanically connected to the inlet piping of the gas delivery equipment as installed in the piping system at that location, which is referred to as the "prefabricated meter set". The prefabricated meter set is fitted with a manually-operated shut-off [flow control] valve, a service regulator device [19], connection piping, and a customer [gas] meter [20]. Piping, connected to the outlet of the gas meter equipment (which is also referred to as the "fuel line"), further extended to, and passed through the (basement) foundation wall of the subject residential dwelling, where it was connected to the various natural gas-fueled appliances of the dwelling (e.g., a furnace, hot water heater, stove, etc.).

b. Associated Gas Flow Control Equipment Configuration [21]

A "main valve" is one means for appropriately qualified personnel to control the flow of gas into a given segment of "main" [pipeline]. [22] Such a flow control function would include the 'shut off' (complete stoppage) of gas flow beyond the main valve, which in this case included the subject residential dwelling [23], among the other residential properties located on Springdale Lane (as situated beyond the "main valve") that are serviced from that gas main. The main valve that was nearest to the subject structure, which was the only main valve that provided a flow control function in the gas main that extends to the accident site (i.e., a complete stoppage of the gas flow) [24], was located approximately 950 feet east (of the accident site) on Springdale Lane, at the intersection of Burr Oak Road.

[19] A "service regulator means the device on a service line that controls the pressure of gas delivered from a higher pressure to the pressure provided to the customer" (ref 49 CFR 192.3 Definitions).

[20] A "customer meter means the meter that measures the transfer of gas from an operator to a consumer" (ref 49 CFR 192.3 Definitions), in which also the meter records the volume of gas usage data for later [data] recovery by the natural gas vendor.

[21] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[22] Another [gas service] flow control device that is utilized in the field is referred to as a "curb valve"; see further § 4.4.3.

[23] i.e., utilizing a valve located on the "prefabricated meter set"; see further § 1.2.2.a.

[24] In some cases, a given segment of main [pipeline] may be supplied from two (opposite) directions, to which the "main valve" on both sides of that segment of main (at a given location) would need to be closed to successfully shut off the gas flow to a given location (gas customer).

Further, the accident site (subject residential dwelling) was located proximate to the far-end of that segment of the gas main [pipeline] that is located along Springdale Lane, in which the gas main terminates in (does not extend beyond) the 'cul-de-sac'. Additionally, the investigation identified that, in some cases, a given segment of gas main [pipeline] that services a given customer site [address] may be supplied by gas product that flows from two opposite directions, to which a "main valve", as (might be) located on both sides of that segment of gas main, would need to be closed to successfully stop the flow of gas to a given customer site.[25]

1.3 Natural Gas Retail Supplier / Distributor - UGI [26, 27]

UGI Utilities, Inc. (UGI) was the retail supplier / distributor of natural gas for the subject residential dwelling, as well as all the residential properties that were located in the area of the subject residential dwelling (see further § 4.0). UGI was a natural gas and electric utility that services approximately 700,000 customers in portions of 45 counties in Pennsylvania and one county in Maryland. The company, which operates about 13,000 miles of natural gas pipelines, is headquartered in Reading, PA, and is a wholly-owned subsidiary of UGI Corporation, which is based in Valley Forge, PA.[28] The natural gas product delivered by the company was purchased from several wholesale suppliers, and was delivered to its customers through a network of underground distribution pipelines of various diameters.

Supportive to its natural gas delivery operations, for service to customers in Lancaster County (i.e., the Millersville area), the company maintains [29]:

- a Gas Operations Central Gas Control facility in Temple, PA, in which Gas Controllers [personnel] continually monitor the natural gas system pressures and flow rates at key points within UGI's pipeline systems, using a Supervisory Control and Data Acquisition ("SCADA") system [30],
- a Central Dispatching Office in Reading, PA (see § 4.4.3), to address assignments of field technical personnel,
- 28 "Field Operations Centers" that are situated throughout UGI's service territory, which are staffed for conducting area field activities (which is collectively referred to as 'infrastructure maintenance'), such as routine utility work, construction and maintenance, meter reading, emergency response, and other utility field activities [31],
- (internal / company) training facilities in Reading, Middletown, and Bethlehem, PA, and

[25] Ref, and for further information, see the NTSB investigation of an apartment building explosion and fire, Accident Number DCA16FP003, that occurred in Silver Spring, MD, on August 10, 2016, as described in the public docket documentation of [Internet] https://www ntsb.gov/investigations/Pages/2016_silverspring_md.aspx.

[26] Source, and for further information, see [Internet] https://www.ugi.com/, and as further described.

[27] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16, 20/2018.

[28] Source, and for further information, see [Internet] https://www.ugi.com/about-us/

[29] Ref, UGI Gas Operations Manual, Procedure Number 60.50 Emergency Plan, and as further described.

[30] Source, and for further information, see [Internet] www.puc.pa.gov/NaturalGas/pdf/Reliability/Winter_ Reliability_ 2017-UGI.pdf.

[31] Supplemental / select technical data in this section provided in email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

- a Customer Service 'Call-Center' facility, in Reading, PA [32], that both gas and electric customers and non-customers can contact, by calling [a toll-free line] (800) 276-2722, which:
  - operates weekdays (Monday through Friday) between 8:00 AM and 5 PM, to accept / process existing customer, and new customer inquiries (principally to establish new gas or electric service, address existing customer billing queries, and existing customer - service cessation requests),
  - and also handles emergency calls from the public (i.e., both customers, and non-customers), which is continually operational (24 hours per day / 7 days per week).

Additionally, one of the (above noted) 28 Field Operations Centers [that performs 'infrastructure maintenance'] is located in the City of Lancaster, out of which its natural gas-service technical staff (field technicians) are stationed to address its natural gas customers in Lancaster County, which includes Manor Township.

1.4 Natural Gas Product Delivered [33, 34]

The principal constituent of the natural gas product that was delivered to UGI customers is methane.

An inert odorant, consisting of a sulfur-like material called mercaptan, is added, as a safety measure, to the natural gas product traveling through UGI distribution pipelines, usually before distribution [35], to render it readily detectable by individuals with a normal sense of smell if a leak occurs. UGI is capable of monitoring the 'odorization' levels of the natural gas product [in its pipelines], and also can add additional odorant, as needed.

A Safety Data Sheet (SDS) [36] for natural gas was obtained by the investigation, which provides information on the physical data, toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and [unintended / uncontrolled] release-handling procedures of the product, as might be needed by emergency responders and any individual who might be exposed.[37]

1.5 Regulation Applicable to Emergency Preparedness / Emergency Response

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[32] Ref, UGI Gas Operations Manual, Procedure Number 60.50 Emergency Plan.

[33] Source, and for further information, see [Internet] https://energy.gov/natural-gas, and as further described.

[34] Supplemental / select technical data in this section provided in email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16, 20/2018.

[35] UGI noted that, the majority of UGI's supplies are odorized upstream of the UGI system by the Transmission Supplier.

[36] This documentation was previously referred to as a Material Safety Data Sheet (MSDS); Source, and for further information (as generic information on this topic); see [Internet] https://energy.gov/ehss/material-safety-data-sheets, and http://www.api.org/oil-and-natural-gas/health-and-safety/health-and-safety-in-the-industry/sds-petroleum-industry-practices.

[37] The creation, publication, and use of SDS / MSDS documentation are governed by the Hazard Communication Standard (HCS) that is promulgated by the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor; ref, and for further information, see [Internet] https://www.osha.gov/dsg/hazcom/.

1.5.1 Federal [38]

The Federal government establishes minimum pipeline safety standards under the U.S. Code of Federal Regulations (CFR), Title 49 "Transportation", Parts 190 - 199. Regulation that addresses pipeline shipment of natural gas is addressed in 49 CFR Part 192. The Office of Pipeline Safety (OPS), within the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), has overall regulatory responsibility for hazardous liquid and gas pipelines under its jurisdiction in the United States. The OPS enforces pipeline safety regulations for interstate gas and hazardous liquid pipeline operators in Pennsylvania, based on the inspections performed by the state. [39]

Specific regulation to address prospective Survival Factors issues (i.e., relative to emergency preparedness / emergency response aspects of the investigation) is addressed under the following sections of the Code of Federal Regulation (CFR), Part 192:

49 CFR 192.605	Procedural manual for operations, maintenance, and emergencies [40]
49 CFR 192.615	Emergency plans [41]
49 CFR 192.616	Public awareness [42]
49 CFR 192 Subpart P	Gas Distribution Pipeline Integrity Management [43]

1.5.2 State - Pennsylvania [44]

The PHMSA / OPS enforces pipeline safety regulations for interstate gas and hazardous liquid pipeline operators in Pennsylvania, based on the inspections performed by the state. By signed agreement with OPS, the state inspects interstate gas and hazardous liquid pipeline operators in Pennsylvania. Through certification by OPS, the state inspects and enforces the pipeline safety regulations for intrastate gas and hazardous liquid pipeline operators in Pennsylvania. The State of Pennsylvania has developed its own pipeline standard(s), in which State pipeline standards may be more stringent, but cannot be less stringent, than Federal regulations.

The Pennsylvania Public Utility Commission (PA-PUC) is the designated agency of the State of Pennsylvania, as empowered by the Pennsylvania legislature, to perform, as an agent for the

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[38] Source, and for further information, see [Internet] http://phmsa.dot.gov/pipeline, and as further described.

[39] Source, and for further information, see [Internet] https://primis.phmsa.dot.gov/comm/FactSheets/States/PA_State_PL_Safety_Regulatory_Fact_Sheet.htm.

[40] Ref [Internet] http://www.ecfr.gov/cgi-bin/text-idx?SID=bfcd0369491cb31ec126db7971c3b0c3&node=se49.3.192_1605&rgn=div8.

[41] Ref [Internet] http://www.ecfr.gov/cgi-bin/text- idx?SID=bfcd0369491cb31ec126db7971c3b0c3&node=se49.3.192_1615&rgn=div8.

[42] Ref [Internet] http://www.ecfr.gov/cgi-bin/text- idx?SID=bfcd0369491cb31ec126db7971c3b0c3&node=se49.3.192_1616&rgn=div8.

[43] Ref [Internet] http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=bfcd0369491cb31ec126db7971c3b0c3&n=sp49.3.192.o&r=SUBPART&ty=HTML

[44] Source, and for further information, see [Internet] http://www. puc.state.pa.us/, and as further described.

OPS, inspections of natural gas pipeline operators in Pennsylvania, and to enforce the pipeline safety standards and regulations for certificated utilities engaged in the transportation of natural gas and other gas by pipeline in Pennsylvania. [45]

The PA-PUC Gas Service safety standards and regulations [46] apply to the design, installation, operation, inspection, testing, construction, extension, replacement and maintenance of pipeline facilities, which are designed to assist operators in recognizing and preventing problems before they become hazardous. The PA-PUC may prescribe additional pipeline safety standards or regulations over and above federal standards (as prescribed by the OPS), provided they are not in conflict with the OPS safety standards and regulations. Also, each operator must have a damage prevention program and an emergency response program. The damage prevention program must include provisions to ensure compliance with the state's Underground Utility Protect Act, better known as the One Call Act.

The Gas Safety Section of the Bureau of Investigation (within the PA-PUC) conducts the inspections and enforces the pipeline safety regulations of the PA-PUC. If the PA-PUC identifies pipeline safety violations (as prescribed in the safety standards and regulations), it is empowered to direct the gas utility to take necessary steps to correct the violation.

Specific regulation to address prospective Survival Factors issues (i.e., relative to emergency preparedness / emergency response aspects of the investigation) is addressed under the following sections of the Pennsylvania Code [47]:

Title 52 PA Code § 59.11 Accidents
Title 52 PA Code § 59.33 Safety
Title 52 PA Code § 59.63 Natural gas emergency plans
Title 52 PA Code § 59.71 Definitions [Gas Emergency Plans]
Title 52 PA Code § 59.72 Natural gas emergency planning
Title 52 PA Code § 59.73 Emergency action
Title 52 PA Code § 67.1 General provisions

1.6 Industry Standards

A Recommended Practice (RP) document was developed, and is promulgated by the American Petroleum Institute (API) [48], to "provide guidance to be used by natural gas pipeline operators, to

[45] Source, and for further information, see [Internet] http://www.puc.state.pa.us/consumer_info/natural_ gas/pipeline_ safety.aspx.

[46] Ref Chapter 59. Gas Service of the Pennsylvania Code; ref for further information, see [Internet] https://www.pacode.com/secure/data/052/chapter59/chap59toc.html.

[47] The Pennsylvania Code is an official publication of the Commonwealth of Pennsylvania, which contains all [codified] rules, regulations, and other administrative documents of the Government of Pennsylvania, as further described in [Internet] https://www.pacode.com/about/about.html.

[48] As described in the "Mission" [statement] of the organization, the API is "to influence public policy in support of a strong, viable U.S. oil and natural gas industry" where the API "Engages in federal and state legislative and regulatory advocacy", as further described in [Internet] http://www.api.org/globalitems/globalheaderpages/about-api/industry-mission.

develop and actively manage their Public Awareness programs", as required under 49 CFR 192.616 (ref § 1.5.1, above), as follows.

API - RP 1162 Public Awareness Programs for Pipeline Operators [49]

The most recent revision of this document is the second edition, dated December 2010. However, the first edition, dated December 2003, is applicable to the circumstances of this investigation.[50]

Although the term "recommended practice" potentially suggests 'voluntary compliance', conformity to this recommended practice is effectively a regulatory requirement, pursuant to Final Rule [51] action, issued in May 2005 by the PHMSA-OPS, in which (mandatory) compliance with RP 1162 was "incorporated by reference".

1.7 Communicating Emergency Response Information – Natural Gas / Hazardous Liquids Pipelines

A document titled "Guide for Communicating Emergency Response Information for Natural Gas and Hazardous Liquids Pipelines", was observed to provide pertinent guidance information on the subject topic-point for both pipeline operators and public safety agencies. [52]

1.8 Meteorological Factors [53]

The recorded weather at the approximate time of the accident was daylight, 86 degrees F, wind at 6 mph from variable directions, barometric pressure 29.59 inHg, relative humidity 51%, under scattered cloudy skies, with 10 miles visibility.

2.0 Accident Site Damage Characterization

2.1 Damage Description [54]

2.1.1 Residential Dwelling at 206 Springdale Lane

The explosion and subsequent fire at this property resulted in catastrophic damage to the entire structure. As a result of the explosion, material of the dwelling structure and household contents

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[49] Available, as a "non-printable copy", at [Internet] http://www.techstreet.com/api/products/1757546.

[50] Review of the subject regulation identified that the second edition of this [Recommended Practice] document has not been accepted in the Federal regulation.

[51] Ref: as described in the Federal Register, Vol. 70, No. 96, May 19, 2005, page 28833; available at [Internet] http://www.gpo. gov/fdsys/pkg/FR-2005-05-19/html/05-9464.htm

[52] Ref, and for further information, see [Internet] https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/hmcrp_rpt_014.pdf.

[53] Source: Quality Controlled Local Climatological Data, [recorded] hourly, [data of] 02 July 2017, at 11:52 hours (the closest data recording time to the event), for Lancaster Airport (WBAN station 54737/LNS), which is about 9.4 miles northeast of the accident site, available from [Internet] http://www ncdc.noaa.gov/qclcd/QCLCD.

[54] Source: NTSB initial on-scene investigation / damage documentation notations, and as further described.

(e.g., pieces of Fiberglas insulation, fragments of splintered dimensional lumber, and personal effects) were found to have been expelled from the structure, in an outward direction, which resulted in a debris field proximate to the structure. These emitted materials were distributed on the ground, and in some of the adjacent trees, in all directions around the perimeter of the structure. Some of the displaced [expelled] materials from the structure were found up to several hundred feet from the structure. The explosion also resulted in a structural collapse of both the first and second floor of the dwelling, including the roof structure, in which some of the structure debris was also found to have collapsed into the basement area. Cracks were observed in the concrete block foundation (wall) of the structure. Some of the combustible materials of the dwelling, which came to rest within the perimeter walls of the structure, displayed evidence of fire damage. The automobile, which was parked in the garage at the time of the explosion, was found beneath collapse debris, in which the vehicle was also observed to have sustained damage.

2.1.2 Properties Adjacent to 206 Springdale Lane

a. Data Obtained During, and Subsequent to, the On-Scene Investigation [55]

Four similarly constructed, two-story / single-family, residential dwelling structures, located in the areas adjacent to the accident site structure (i.e., the properties at 197, 198, 201, and 202 Springdale Lane), reportedly sustained various degrees of substantial damage to the structures as a result of the explosion. The dwellings of these four properties, which (as a result of the explosion) were deemed unsafe pursuant to Manor Township policy and PA State Law, were 'tagged' with a "Notification of Unsafe Condition" placard (affixed to the front of the structure) by the jurisdictional fire department authority [BRFR], indicating that the structures should not be occupied due to a "Structural Damage" hazardous condition.[56] Additional residential dwellings of the properties on Springdale Lane, located to the east of the cul-de-sac (e.g., 193, 194 Springdale Lane), reportedly sustained various degrees of minor documented damage as a result of the explosion.

b. Data of UGI (Claims Department) [57]

"As determined by the evaluations by structural engineering resources the structure at 206 Springdale Lane was characterized as a total loss. The nearby structures including 193, 194, 197, 198, 201, and 202 Springdale Lane were deemed repairable. The property at 202 Springdale was razed although it was deemed repairable."

2.2 Quantity of Pipeline Product Released [58]

[55] Source: NTSB initial on-scene, and subsequent investigation / damage documentation notations, and as further described.

[56] Source: email correspondence to NTSB / SF Group Chair, from the BRFR Party spokesperson, dated 7/06/2017.

[57] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018 (quoted verbatim).

[58] A calculation can be performed of the approximate quantity of pipeline product that is released, which requires identification of the event sequence and sources of release, duration of release, piping geometry, escape path geometry, differential pressures, inside piping diameters, and other pertinent factors to be incorporated into the equation.

The degree of damage sustained by the gas line piping (at the accident site) precluded performing a calculation to determine the approximate quantity of pipeline product released.[59]

2.3 Accident Site Map

A site survey was conducted by resources of the natural gas retail supplier / distributor, which documented the accident site, a copy of which is anticipated to be available in the NTSB docket.

2.4 Time of the Event Occurrence [60]

The jurisdictional [local] fire department had resources at the accident site at the time of the explosion (i.e., one fire engine, with 4 personnel, which arrived at the scene about 4 minutes prior to the explosion). A radio call, which initiated at 12:32:14 hrs, as placed by the BRFR command officer at the scene (i.e., the Fire Chief), provided a notification to fire department Dispatch that an explosion had occurred, thus depicting that an explosion had occurred immediately prior to this radio call.

3.0 Jurisdictional Emergency Services Agencies – Background and Emergency Preparedness Measures

3.1 Jurisdictional Fire / Rescue Agency - BRRFD [61]

The accident occurred on private property within the jurisdiction [fire protection district] of the Blue Rock Regional Fire District (BRRFD), which is comprised of the Blue Rock Fire Rescue (BRFR), and the Blue Rock Emergency Management Agency (BREMA), both organizations of which provided resources in response to the accident event.

3.1.1 BRFR - Background [62]

The BRFR is the principal emergency services agency responsible for responding to fire suppression, emergency rescue, and an initial response to hazardous materials incidents within the fire protection district that encompassed the accident event, and was the initial fire / rescue agency that responded to the scene in this incident, as further described in this report. Briefly summarized, the BRFR:

- is an all-volunteer organization, in which (at the time of the accident) the BRFR maintained a roster of about 125 response personnel, of which the Millersville fire station maintained a

[59] In this event, because the damage sustained by the piping was so extensive, definitive piping data (e.g., pipe dimensions at release location(s), release duration, etc.), and other pertinent factors, could not be ascertained.

[60] Source: timestamp data of (automatically archived) CAD report data, and corresponding digital voice recordings, of the local emergency services dispatch service radio communications system.

[61] Source, and for further information, see [Internet] https://www.bluerockfire.com/about-us, and as further described.

[62] Source: data obtained during the on-scene, and subsequent, debriefing interviews / discussions with the Command Officers (e.g., the Fire Chief, Fire Commissioner) and Administrative personnel of the BRFR.

roster of 35 field-response personnel (firefighters), in which about 30% of the Millersville fire station response personnel maintained an emergency medical technician (EMT) credential,

- operates out of four fire stations (which are located in Millersville, West Lancaster, Highville, and Washington Boro), in which personnel / apparatus from the Millersville station provided the initial dispatch of resources to the incident [accident] site,
- in which the Millersville fire station maintains an apparatus roster [operational vehicles list] comprised of:
  - 2 Engine (Pumper) trucks,
  - 1 Tanker truck,
  - 1 Heavy Rescue truck,
  - 2 Collapse Team trucks,
  - 2 Rescue Squad trucks.
- the agency has formal "mutual aid" response agreements with fire department resources from neighboring jurisdictions (e.g., City of Lancaster, PA), and is available to respond to emergency incidents in those jurisdictions, and
- the agency does possess / utilize (hand-held) natural gas monitoring equipment, and
- training of the field personnel (firefighters) of this agency is conducted by the agency itself, as well as provided by the Lancaster County Public Safety Training Center [63].

3.1.2 BRFR - Preparedness Plans / Measures - Natural Gas Release / Fire Event

a. Standard Operating Guidelines (SOG's)

The BRFR maintains a series of formal / documented SOG's, which the agency refers to as Policy and Procedure [documentation] that govern most of the routine fire / rescue, and related emergency services operations, to be employed in response to a natural gas release / fire event, which include, but are not limited to, the following.

Title	Ref #	Effective Date
Self Contained Breathing Apparatus (SCBA)	3001	Jan. 2011
Propane Emergency Operations	4002	Jan. 2011
Natural Gas Emergency Operations	4003	Jan. 2011
Public Notifications of Unsafe Conditions	9003	Feb. 2015

b. Equipment / Procedures / Practices - Specific to Addressing a Response to a Fire Event and/or a Report of a Natural Gas Release [64]

The BRFR documented to the investigation that:

[63] Source, and for further information, see [Internet] https://www.lcpstc.org/.

[64] Source: email correspondence to NTSB / SF Group Chair, from the BRFR Party spokesperson, dated 8/27/2018.

[1] the principals and practices of the agency are, in effect, compliant and consistent with the guidance as stated in NFPA 1500 Standard on Fire Department Occupational Safety and Health Program, and NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments, and

[2] the BRFR has 'intrinsically safe' exhaust fax equipment on "various vehicles", as might be needed in the mitigation of a natural gas release / fire event, and that "… what is most important is that whenever we have a dispatch to an incident where a fan may be needed, a minimum of one vehicle with an exhaust fan is always on the first due response [apparatus]. We have 8 ventilation fans on our six primary vehicles. However, not all vehicles have fans, but for instance on Springdale Lane, two of the first three dispatched vehicles had fans on them".

c. Training Programs / Curricula - Specific to Addressing the Identification and Mitigation of a Natural Gas Release / Fire Event [65]

The BRFR stated that the agency:

- does not offer any "stand-alone natural gas emergency response training" for its field [firefighter] personnel, but that training in the identification and mitigation of natural gas emergencies is embedded into entry level Firefighter I and II, and 'Hazmat' (hazardous materials - response actions) classes conducted by the agency, and
- the skillsets [on this topic] are augmented during Probationary Training of its field personnel with (hand-held) natural gas meter [monitoring equipment] operation / utilization training, and policy / procedure review (i.e., identify the presence of natural gas at a reported gas leak scene, or a fire-scene), and that
- periodic recurrent training [on this topic] is routinely provided for its field personnel.

3.1.3 Training History - Activities Conducted with/by the Natural Gas Retail Supplier / Distributor (UGI) [66]

Specific to addressing response actions to a natural gas release / fire incident, the BRFR indicated that, within the five years prior to the incident [accident], as an agency, their field personnel had not participated in 'classroom venue' [lecture / group discussion session, etc.] training activities, or any 'live-action' training activities, as conducted with/by UGI, or a designated UGI training contractor.

3.1.4 Challenges of Attendance by Volunteer Firefighters at Initial and Recurrent Firefighting Training Activities [67]

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[65] Source: email correspondence to NTSB / SF Group Chair, from the BRFR Party spokesperson (admin-staff), dated 7/06/2017, and corresponding follow-up investigation [debriefing] discussion with the Party spokesperson.

[66] Source: email correspondence to NTSB / SF Group Chair, from the BRFR Party spokesperson, dated 5/01/2018.

[67] This report section was compiled to factually address the observation that the BRFR had not recently participated in 'classroom venue' or 'live-action' training activities, as made available by the natural gas retail supplier /

Research conducted by the SF Investigation, as supported by research conducted by the BRFR [68], identified and documented a number of observations and consideration-points, which factually characterize the challenges that are attributed to the volunteer firefighting community's inability to efficiently / effectively attend firefighting training activities, the consideration-points of which are briefly summarized as follows:

- *Career* firefighters (that receive [wage / salary] compensation to perform the duty-service) are fully paid to attend / participate in routine / scheduled firefighting training activities, whereas *volunteer* firefighters (that are not compensated to perform the duty-service) attend / participate in the firefighting training activities on their own time.[69]
- Regulation-prescribed training requirements (for firefighters, whether career or volunteer) have been enacted over the past several decades, which require a sizeable amount of time to accommodate (e.g., many fire protection districts now require completion of a training regimen pursuant to "NFPA 1001 Standard for Fire Fighter Professional Qualifications" [70]), of which the time to attend this training is fundamentally unavailable for many volunteer firefighters, due to family life commitments and their customary "compensated employment" (i.e., 'regular / full-time job') obligations, whereas career firefighters attend such prescribed training during their normal workday activities.[71]
- The number of overall fire calls (nationwide) has statistically dropped over the past several decades (e.g., due to improvements in the Fire Code, widespread use of [Fire Code mandated] smoke / fire alert features, and better fire-resistant residential dwelling construction, to cite a few), which has fundamentally resulted in fewer firefighters that are needed for a given fire protection district, which has commensurately resulted in less firefighters being recruited by those fire protection districts, which places a higher burden of time-dedication [to attend the requisite training activities] upon the existing (count of) firefighters of those fire protection districts.[72]
- The number of volunteer firefighters in active service has dropped by about 11% since the mid-1980s, while the number of career (paid) firefighters has grown by more than 50%.[73]

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distributor (UGI), in which the cited observations / considerations are presented in no particular priority sequence, and the line-items cited do not necessarily catalogue the full spectrum of considerations that exists on this topic.

[68] Source: email correspondence to SF Group Chair, from the BRFR participant of the SF Group, dated 4/28/2018.

[69] Source, and for further information, see [Internet] https://www.bls.gov/ooh/protective-service/firefighters htm, and http://www.fireengineering.com/articles/print/volume-169/issue-6/departments/volunteers-corner/the-professional-volunteer-fire-department.html.

[70] Ref, and for further information, see [Internet]: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1001.

[71] Source, and for further information, see [Internet] https://www nytimes.com/2014/08/17/sunday-review/the-disappearing-volunteer-firefighter html.

[72] Source, and for further information, see [Internet] https://www.usfa fema.gov/downloads/pdf/statistics/v17i8.pdf, and https://portal.nvfc.org/.

[73] Source, and for further information, see [Internet] https://www nytimes.com/2014/08/17/sunday-review/the-disappearing-volunteer-firefighter html.

- Approximately 97% of the firefighters in Pennsylvania are volunteers, or are affiliated with firefighting agencies that are comprised mostly of volunteers, in which the State of Pennsylvania currently has about 50,000 volunteer firefighters (which is down from about 300,000 in the 1970's).[74]
- Fundraising activities (in fire protection districts nationwide) occupy, on average, about one-half of the time that most volunteer firefighters spend "on duty", which correspondingly competes with their "on duty" time that's needed to address training activities, to which a considerable segment of the volunteer firefighter community deems such fund-raising activities as an inefficient use of their 'professional skills' [as a trained firefighter], but that this [fundraising] is often a necessary action that's required to maintain the continued operation of the fire protection service.[75]

3.1.5 The Importance / Benefits of a Natural Gas Retail Supplier / Distributor in Placing an Immediate / Parallel Notification of a Reported Natural Gas Odor to the Jurisdictional 911/PSAP Agency

Research conducted by the SF Investigation, as supported by research conducted by the BRFR[76], identified and documented, observations and consideration-points that characterize and exemplify the importance and/or benefits of a natural gas retail supplier / distributor, to promptly initiate an immediate / parallel notification of a reported natural gas odor, in the event that the report identifies that an occupied structure or other similar enclosure is involved, to the jurisdictional 911/ PSAP [77] agency, the consideration-points of which are briefly summarized as follows.[78]

[1] "A natural gas leak or suspected leak is like any other potential emergency; it is dealt with as an emergency incident until it can be resolved. This is no different than the emergency services being called to an electric line arcing on a power transmission pole; the agency responds, an assessment of the situation is performed, in which incident command is established until the utility company arrives and mitigates the problem. Universally, whether it is a police officer, firefighter or utility company worker arriving first at any potential incident, Incident Command is established, for coordination and control of all resources by this first arriving entity. This is not a rule or policy of this emergency services agency [the

[74] Source, and for further information, see [Internet] https://apps.usfa.fema.gov/registry/summary/.

[75] Source, and for further information, see [Internet] https://www nytimes.com/2014/08/17/sunday-review/the-disappearing-volunteer-firefighter html.

[76] Source: email correspondence between NTSB / SF Group Chair, and the BRFR Party spokesperson, [dated] 05/08-08/27/2018, inclusive, and as further described.

[77] Such a facility or operation is also referred to as a Public Safety Answering Point (PSAP), as further described in [Internet] http://www nena.org/.

[78] This report section was compiled by the SF Investigation to factually address consideration-points, relative to the factual observation that the retail vendor / distributor of natural gas in the accident (UGI) received an odor of natural gas report (notification) at 10:26 hrs, in which a notification of that odor report, and a request to provide a fire department response to the odor report site, was subsequently provided by UGI to the jurisdictional 911/PSAP agency at 12:16:15 hrs (1 hour, 50 minutes later).

Blue Rock Regional Fire District], it is federal law [79] under the National Incident Management System (NIMS) [80], and part of the Incident Command System (ICS) process [81] to which emergency response personnel all train on and practice at incidents. This is the method that's universally utilized by all emergency services agencies to control / mitigate a situation while preventing loss of life, injury and potential additional property damage. [Moreover,] this is the basis of the ICS and behind the need for an immediate / parallel dispatch of the jurisdictional emergency services agencies, and prompt communications among all entities when a suspected natural gas leak is reported." [82]

[2] NFPA[83] Standards / Recommended Practices

a. NFPA 329 Recommended Practice for Handling Release of Flammable and Combustible Liquids and Gases [84]

Review of this document, relative to the applicable facts / circumstances / context of the investigation, identified, among other advice, the following 'safety practices' guidance.

Chapter 3 Definitions,
section 3.3 General Definitions,
subsection 3.3.14, "Purging [of] … flammable … gases, [means] the process of displacing vapors or gases from an enclosure or confined space.",
Chapter 4 Flammable and Combustible Liquids and Gases,
section 4.1 General,
subsection 4.1.15, "Flammable and combustible liquids and gases include natural gas, propane, sewage gases, and refrigerant gases."
Chapter 5 Initial Response,
section 5.2 Initial Response to Physical Discovery,
subsection 5.2.1, "Depending on the circumstances of physical discovery, conditions might exist where a potential hazard to life or property exists, in which case immediate steps should be taken to protect the public from the danger of an explosion or fire.",

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[79] Ref, and for further information, see Robert T Stafford Disaster Relief and Emergency Assistance Act, 42 USC 5121, et seq: 44CFR Part 206, the implementing regulations for the Stafford Act, the Homeland Security Act, Pub L 107-296, as amended; Homeland Security Presidential Directive 5, effective March 22, 2008; and Presidential Policy Directive 8, effective March 30, 2011, as collectively described in [Internet] https://www.fema.gov/media-library/assets/documents/15271, and associated legal resources.

[80] Source, and for further information, see [Internet] https://www.fema.gov/national-incident-management-system.

[81] The NIMS protocols encompass the procedural elements and processes of the Incident Command System (ICS).

[82] Source: statement (a collaborative edit [by NTSB] / excerpt from a more extensive narrative) to address the specific topical elements of this discussion-point, from the Fire Commissioner (BRFR participant of the SF Group), Blue Rock Regional Fire District, Millersville, PA (email correspondence - SF Group Chair, dated 7/17/2018).

[83] National Fire Protection Association (NFPA) is an international nonprofit organization, which produces and advocates scientifically-based consensus codes, standards, and recommended practices, many of which have been adopted by industry, and municipal / jurisdictional authorities, as a required safety standard or practice (see further [Internet]: http://www.nfpa.org).

[84] Ref, and for further information, see [Internet]: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=329.

subsection 5.2.3, "Police should be asked to keep to public clear of any danger areas.",
subsection 5.2.4, "If necessary, the fire department should assist in fire control and purging.",
subsection 5.2.7, "No one should enter areas where flammable or combustible liquids, gasses, or vapors have been discovered, except as described in Section 5.4.",
subsection 5.2.7.1, "If liquids, gases, or vapors within or above the flammable range are found in the building, the building should not be entered.".
section 5.4 Entering the Area,
subsection 5.4,5, "The gas or vapor concentrations in the affected area should be checked continuously or at intervals determined by a qualified person.",
subsection 5.4.5.4, "Personnel should wear self-contained breathing apparatus when entering the affected area.".
subsection 5.4.7, "Where natural ventilation is not capable of removing vapors from all areas, particularly from low, confined spaces, grounded and bonded mechanical exhaust ventilation equipment should be used.".[85]

b. NFPA 1500 Standard on Fire Department Occupational Safety and Health Program [86]

Review of this document, relative to the applicable facts / circumstances / context of the investigation, identified the following 'safety practices' guidance.

Annex A – section A.8.5.1.1 cites, "It is recommended that a minimum acceptable fire company staffing level should be four members responding on or arriving with each engine and each ladder company responding to any type of fire."

c. NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments [87]

Review of this document, relative to the applicable facts / circumstances / context of the investigation, identified the following 'safety practices' guidance.

Chapter 4 Organization, Operation, and Deployment,
section 4.3 Staffing and Deployment,

[85] Such "… grounded and bonded mechanical exhaust ventilation equipment …", as utilized in the context of this investigation, is also referred to as "intrinsically safe" exhaust equipment; ref, and for further information, see [Internet] https://www.osha.gov/ pls/oshaweb/owadisp.show_document?p_id=9884&p_table=standards.

[86] Ref, and for further information, see NFPA 1500 - Annex A – section A.8.5.1.1; available at [Internet] https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1500.

[87] Ref, and for further information, see [Internet]: https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1720, and as further described

subsection 4.3.1, **"**The fire department shall identify minimum staffing requirements to ensure that a sufficient number of members are available to operate safely and effectively."

Table 4.3.2 [titled] "Staffing and Response Time" cites, for a given Demand Zone (i.e., urban, suburban, rural, special risks), the Minimum Staffing [personnel to respond], and Response Time.

[3] "In most emergency situations, and notably in the incident of the investigation, time works against emergency responders, whether paid or voluntary. As there are many less volunteer emergency responders (throughout the nation) today as compared to decades past [88], time is everything in preventing a disaster, particularly to a volunteer-based emergency services agency. Even a four-, or five-minute notification delay … works against the agency's ability to properly respond with the adequate personnel numbers to handle a response call, as stipulated in applicable NFPA Standards / Recommended Practices [89]. Response requirements are further outlined in the NIMS, which defines the proper command structure for accountability and safety.[90] Whereas volunteers and career staff had been previously reasonably abundant, today, many fire-response vehicles are being dispatched with a minimum staffing count, in which sometimes it's as low as two persons, or even just a driver.[91] Thus, fundamental logic prescribes that having sufficient numbers of firefighting personnel, to properly and safely address an emergency incident, is critically dependent upon receipt of a timely notification (of an incident) to the jurisdictional emergency services dispatch agency." [92]

[4] The investigation observed that a hesitancy of a natural gas retail supplier / distributor to place an immediate / parallel notification of a reported natural gas odor to the jurisdictional 911/PSAP agency may be due to a suspected substantial call volume increase that the natural gas retail supplier / distributor might have to deal with by making the immediate / parallel notifications to the jurisdictional 911/PSAP agencies, to which a review of the call-volume data for UGI for the Lancaster natural gas service area was conducted by the investigation, as further addressed in this report (see § 4.9).

3.2 Emergency Services – 9-1-1 Call Processing / Fire Department, EMS, and Law Enforcement Dispatching [93]

[88] Source, and for further information, see [Internet] https://www nytimes.com/2014/08/17/sunday-review/the-disappearing-volunteer-firefighter html.

[89] See further § 3.1.5 [2].

[90] Source, and for further information, see [Internet] https://www.fema.gov/national-incident-management-system.

[91] Source: excerpt from a national study of the volunteer fire service, compiled by Dr. Duane Hagelgans of the Millersville University's Center for Disaster Research and Education (email correspondence of Fire Commissioner, Blue Rock Regional Fire District (BRFR participant of the SF Group), to SF Group Chair, dated 7/17/2018).

[92] Source: statement (a collaborative edit [by NTSB] / excerpt from a more extensive narrative) to address the specific topical elements of this discussion-point, from the Fire Commissioner (BRFR participant of the SF Group), Blue Rock Regional Fire District, Millersville, PA (email correspondence - SF Group Chair, dated 8/14-27/2018).

[93] Source, and for further information, see [Internet] https://www.lcwc911.us/lcwc/.

Telephone requests for fire / rescue, EMS, or police department emergency services in Lancaster County are placed via the Lancaster County-Wide Communications 9-1-1 PSAP [agency], which provided resources in response to the accident event. This agency, which is also known as "Lancaster County 9-1-1", maintains a facility in Manheim, PA, which processes the incoming 9-1-1 call request(s) for services, and commensurately dispatches the appropriate resources for the subject jurisdiction (municipality).

3.3 Emergency Medical Services (EMS) / Ambulance [94] – L-EMS

Lancaster EMS (L-EMS) is the principal emergency services agency that provides emergency medical [ambulance] transport in Manor Township. The organization, which is a private operated "nonprofit 501(c)(3) emergency medical services association" enterprise, operates out of 10 operational facility locations in the County (which are referred to as EMS Stations), which is staffed by both paid professional employees and [clinically qualified] volunteer personnel. The operation can provide both Basic Life Support (BLS), or Advanced Life Support (ALS) ambulance transportation services, as well as non-emergency transport (e.g., Wheelchair Van transport), among other EMS support services (e.g., a Mass Causality Incident Trailer). The agency maintains an EMS Station in Millersville (identified as the West Station [95]), the location of which also provided resources in response to the accident event. Primary dispatching [96] of the L-EMS [emergency operations services] is provided by the Lancaster County-Wide Communications 9-1-1 PSAP [agency].

3.4 Jurisdictional Law Enforcement (Police) – MTPD [97]

The Manor Township Police Department (MTPD) is the primary local law enforcement agency responsible for responding to criminal activity complaints, civil disorder, or other law enforcement-relevant emergency events in Manor Township, which also provided resources in response to the accident event. Dispatching of the MTPD [emergency operations services] is provided by the Lancaster County-Wide Communications 9-1-1 PSAP [agency].

3.5 Jurisdictional Emergency Management Agency (Blue Rock EMA) [98]

The Blue Rock Emergency Management Agency provides emergency management support in Lancaster County, which is a multi-jurisdictional emergency management agency comprised of personnel from various municipalities, emergency services agencies (fire /rescue, EMS, law enforcement), educational facilities within Lancaster County, and community members. The

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[94] Source, and for further information, see [Internet] http://www.lemsa.com/, and as further described.

[95] The business office of this organization is also situated at this location.

[96] Primary dispatching refers to the initial notification [provided to a given EMS operation] that an EMS response is needed at a specified location, in which this organization also utilizes an internal dispatching operation, to identify and dispatch the most appropriate / available L-EMS asset (i.e., an EMS vehicle, as staffed by EMT/Paramedic, or other personnel) for the described response request call.

[97] Source, and for further information, see [Internet] http://manortownship.net/police/.

[98] Source, and for further information, see [Internet] https://www.bluerockfire.com/brema.

agency has an Emergency Operations Center at the district headquarters (in Millersville) that can coordinate operations during times of disaster, in which the agency members also have special emergency management training in dealing with disasters.

4.0 Natural Gas Retail Supplier / Distributor (UGI) – Background and Emergency Preparedness Measures [99, 100]

UGI Utilities, Inc. (UGI) supplied natural gas to all of the structures that used natural gas in the subject community (Springdale Farms), including the residential dwelling structure involved in the explosion / fire.

4.1 Emergency Preparedness and Response - Plans / Measures [101]

Supportive to addressing a gas-related emergency event, UGI had developed and maintained a comprehensive document, which was comprised of a combined 'preparedness plan' and 'technical guidance specification', among other data, the document of which is referred to as the UGI "Gas Operations Manual" (GOM), a copy of which was made available (by UGI) to the investigation [102].

Review of the GOM document identified that it contained detailed Operations and Maintenance Procedures, as well as UGI's Emergency Response Procedures, which are as follows.

Plan / Specification - Identification Title	Spec. Ref.	Rev. Date
Gas Operations Manual	60.60.10	Jan. 2016
Emergency Plan	60.50	Sept. 2009

4.2 System Integrity Plan [103]

Pursuant to the requirements of 49 CFR 192 Subpart P [titled] Gas Distribution Pipeline Integrity Management, UGI had compiled a documented System Integrity Plan (SIP), which consisted of

[99] Source, and for further information, see [Internet] https://www.ugi.com/, and as further described.

[100] The characterizations of this report section describe resources / procedures that were in-place prior to the incident [accident], unless specifically indicated otherwise.

[101] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018.

[102] A copy of the subject UGI GOM document was received from this organization (data contributor), the content of which was marked, with the exception of the Table of Contents [segment of the document], as "confidential" [on each page] by the data contributor, wherein, due to this imposed confidentiality constraint, [1] the summary of data cited [in this report section] was based on, and made possible by, a review of the entire subject document content, in which a review of same [exclusively by the NTSB] for this purpose, was not prohibited by the imposed confidentiality constraint, providing no further disclosure [by the Investigation] of designated confidential content of the subject document, and [2] pursuant to the criteria under 49 CFR 831.6, the information provided in the "confidential" [marked] segments of the subject document was declared to be prohibited from public disclosure, which thus precludes such specific data from public release (i.e., said confidential data [content] shall not be cited in the SF Factual Report, or be placed in the NTSB public docket [of this, or any investigation]).

[103] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018, and 5/02/2018.

documentation that addressed integrity management of the company's transmission pipeline system, and documentation that addressed integrity management of the company's distribution pipeline system, titled, "UGI Distribution Integrity Management Program" (DIMP), revision [dated] June 2017, a copy of which was made available to the investigation [104].

Relevant to the emergency preparedness / emergency response aspects of the SF investigation, among other managerial aspects of the utility's safety management system, the investigation identified data in the DIMP documentation that addresses the component elements of the following:

[1] "Emergency Plan" (as described in the Gas Operations Manual § 60.50), and

[2] "Public Awareness Program" (as described in the Gas Operations Manual § 60.60.10).

On this topic-point, as additionally described by UGI [105]:

> "Coupled with its Distribution Integrity Management Program, UGI has also established and maintains a detailed Long-Term Infrastructure Improvement Plan (LTIIP) [106], which was filed with the PA PUC on Dec 12, 2013."

4.3 Public Awareness Program [107]

Pursuant to the requirements of 49 CFR 192.616 [titled] Public awareness, and as addressed in the UGI DIMP [document] (see § 4.2), UGI had compiled a documented Public Awareness Program (PAP), revision [dated] December 2015, which is described in UGI's Gas Operations Manual § 60.60.10, as further described in this report (see § 4.1).

Pursuant to the criteria of 49 CFR 192.616(a), "… each pipeline operator must develop and implement a written continuing public education program that follows the guidance provided in the American Petroleum Institute's (API) Recommended Practice (RP) 1162", which is "incorporated by reference" in 49 CFR 192.616.

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[104] A copy of the subject UGI DIMP document was received from this organization (data contributor), the content of which was marked, with the exception of the Table of Contents [segment of the document], as "confidential" [on each page] by the data contributor, wherein, due to this imposed confidentiality constraint, [1] the summary of data cited [in this report section] was based on, and made possible by, a review of the entire subject document content, in which a review of same [exclusively by the NTSB] for this purpose, was not prohibited by the imposed confidentiality constraint, providing no further disclosure [by the Investigation] of designated confidential content of the subject document, and [2] pursuant to the criteria under 49 CFR 831.6, the information provided in the "confidential" [marked] segments of the subject document was declared to be prohibited from public disclosure, which thus precludes such specific data from public release (i.e., said confidential data [content] shall not be cited in the SF Factual Report, or be placed in the NTSB public docket [of this, or any investigation]).

[105] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[106] Ref, and for further information, see [Internet] http://www.puc.state.pa.us/filing_resources/issues_laws_regulations/system_improvement_charges_act_11_.aspx.

[107] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018.

As cited in the UGI PAP documentation, a copy of which was made available (by UGI) to the investigation [108], responsive to the criteria in 49 CFR 192.616(a) regulation, UGI documented to the investigation that they had implemented (i.e., had in-place prior to the accident) a number of public education / communication programs that include, among other safety initiative measures:

[1] the periodic dispersal of printed information (e.g., a pamphlet included in its mailed monthly billing statements), to help educate its customers on measures that should be employed to help ensure the safe use of its natural gas product (see also § 4.4.1), and

[2] a professional instructional guidance training program that is made available to the emergency services agencies that are located within the UGI gas service territory (see also § 4.5), and

[3] the distribution of emergency response procedures documentation to the emergency services agencies that are located within the UGI gas service territory (see also § 4.6).

4.4 Resources / Operational Procedures of UGI to Address a Gas Leak and Other Gas Safety Issues

Means and methods that are utilized by the company to address a natural gas leak, or to address other safety issues involving its product delivery and usage, include the following resources and functional departments of the company.

4.4.1 Emergency Telephone Contact

The company maintained and publicized, in its [Internet] web-site, a toll-free telephone number[109] as a means for individuals to contact the company in the event of a gas leak, or other safety issues involving its product delivery and usage. The company also indicated, in its [Internet] website [110], and in information that's periodically mailed to its customers (e.g., a pamphlet included in its monthly billing statements), for individuals to call UGI or 9-1-1 in the event of a gas leak.

4.4.2 Customer Communication Center [111]

[108] A copy of the subject UGI PAP document was received from this organization (data contributor), in which several [select] pages were marked "confidential" by the data contributor, wherein, due to this imposed confidentiality constraint, [1] the summary of data cited [in this report section] was based on, and made possible by, a review of the entire subject document content, in which a review of same [exclusively by the NTSB] for this purpose, was not prohibited by the imposed confidentiality constraint, providing no further disclosure [by the Investigation] of designated confidential content of the subject document, and [2] pursuant to the criteria under 49 CFR 831.6, the information provided in the "confidential" [marked] segments of the subject document was declared to be prohibited from public disclosure, which thus precludes such specific data from public release (i.e., said confidential data [content] shall not be cited in the SF Factual Report, or be placed in the NTSB public docket [of this, or any investigation]).

[109] The cited telephone number was 800-276-2722, which connects directly to the UGI Emergency Call Center, which operates on a 24-hour basis.

[110] Ref, [Internet] https://www.ugi.com/safety/natural-gas-safety/if-you-smell-natural-gas/.

[111] Ref, [Internet] https://www.ugi.com/customer-services/.

The company maintained a "Customer Communication Center" (CCC), which was staffed by trained personnel (referred to as Customer Care Representatives), for natural gas and electric service customers, or other individuals who are within the UGI service territory, to communicate [place a telephone call, in reference to] various inquiries and requests (principally customer billing or service changes) as placed with the company. The Call Center was also available to receive notifications of a natural gas odor from the public, the information of which is then immediately conveyed to the Central Dispatching Office (see § 4.4.3).

4.4.3 Central Dispatching Office [112]

The company maintained a "Central Dispatching Office" (CDO), which is the communications center for all messaging concerning gas service requests and potential emergencies. The CDO was staffed by trained personnel (referred to as Gas Operations Dispatchers), 24 hours per day, 365 days per year. Based upon the time of day, UGI had between two to five dispatchers on-duty at this location.

Generally described, the Gas Operations Dispatchers receive information from the Customer Communication Center regarding a routine gas service request, or information regarding a gas-related emergency event (i.e., a reported gas odor). Based upon what a caller indicates to the CDO staff, the Dispatchers will dispatch Gas Operations - service technician(s) (see § 4.4.4) to perform:

[1] various routine gas operations service-call duties throughout the UGI system (e.g., service connections, disconnections, meter servicing, etc.), or

[2] emergency gas operations duties, such as if a gas odor is reported, consisting of, for example, activities to repair / address damaged or struck gas lines, blowing gas, emergency 'facility locate' requests, requests for immediate support from external emergency response agencies (e.g., the local fire department, EMS, police, etc.), or suspected carbon monoxide complaints, to perform emergency support as needed, in which:

- the Dispatchers (at the CDO) also coordinate with the local emergency services personnel (fire department, EMS, police, etc.) to perform other emergency support as needed, and also internally provide notification to key UGI operations personnel and Central Gas Control (CGC) during an emergency utilizing an Emergency Contact Matrix, and
- the Dispatched personnel (in the field) may be required to perform an immediate shut-off of the gas flow valve(s) at a gas leak site (e.g., closure of a "main valve", or a "curb valve"), or implement other emergency-initiated [natural gas] product flow-control operations (e.g., employ a "squeeze-off" [of plastic pipe] procedure [113]), and/or

[112] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16, 20/2018.

[113] Briefly described, pursuant to UGI Gas Operations Manual, Procedure Number 60.50.30.5.2.5, the "squeeze-off"" [activity] is a flow-control process, which is usually employed only in exigent circumstances (e.g., an emergency that requires an immediate gas flow stoppage, in which closure of a "main valve" or similar flow control device in the subject gas line [e.g., a "curb valve"] is not, or cannot, be utilized), whereby the [field-service] mechanic accesses the plastic pipe (which is usually buried underground), and then places a mechanical device that essentially clamps around the exterior of the pipe, that when 'activated', the device applies pressure against the exterior pipe surface, which compresses and deforms the pipe, to the point where the interior of the subject pipe is

coordinate with the local emergency services personnel (fire department, EMS, police, etc.).

In the event that a gas odor is reported to UGI's CDO, as a generalized procedural description, pursuant to the CDO's documented operational procedures [i.e., the "UGI Gas Operations Manual, Procedure Number 60.50 "Emergency Plan"], the received gas odor data (referred to as a 'service ticket') is processed in a prescribed response, which is briefly summarized as follows.

[1] The gas odor data is logged by Customer Call Center personnel (or other qualified personnel) into the Gas Operations Computer Aided Dispatch (CAD) System by the CDO Dispatcher.

[2] A Gas Operations Service Technician, who is closest to the reported odor site, is identified, as a general rule, by utilizing the GPS function of the 'mobile dispatch application' (see also § 4.4.5).

[3] The received gas odor data ['service ticket'] is transmitted to that closest identified Service Technician (i.e., relayed as a digital message, via the CAD System, to a computer display in the Service Technician's vehicle), as preparation for dispatch of the Service Technician to the report site.

[4] The Service Technician is to acknowledge receipt of the call within the CAD system and indicate electronically that he/she is responding and is enroute to the emergency, to which a telephone call is also placed by the Dispatcher to the Service Technician, to affirm that the 'service ticket' has been received and that the Service Technician is responding.

[5] Upon arrival at the report site, the first responder [UGI field-personnel] is to affirm electronically, via UGI's 'mobile dispatch application' (see also § 4.4.5), that he/she has arrived, and then the UGI field-personnel are to begin to investigate the [elements of the] emergency call.

[6] In the event that the reported gas odor is potentially of a significant consequence, as based on the Service Technician's findings (Step 5, above), a field supervisor and/or other resources may be notified, and may subsequently be dispatched to the reported gas odor site.

[7] At the conclusion of the service call, the [field-service] mechanics report the outcome / closure of their service call (e.g., a gas leak report) to the CDO via the UGI CAD system.

Additionally, arrangements have been implemented by UGI, whereby the local emergency services communications centers (e.g., Lancaster County-Wide Communications 9-1-1 PSAP) can connect immediately with / directly to the Central Dispatching Office to report an emergency event (in a process analogous to a 'speed-dial system'), rather than having to relay reported gas odor data to the Dispatch Center via contacting the Customer Communication Center. Further, the above [seven] procedural response steps would also apply, in the event that a reported gas odor is received directly from a local emergency services communications agency (e.g., Lancaster County-Wide Communications 9-1-1 PSAP).

completely compressed, thus fully stopping the flow of gas through the pipe, as described in (as an illustrative example only) [Internet] https://www reedmfgco.com/en/products/plastic-pipe-tools/pe-squeeze-off-tools/.

4.4.4 Gas Operations – [Field Service] Mechanics [114, 115]

Supportive to the Central Dispatching Office (CDO) operations, the company maintained a number of trained personnel, which have the job title of "mechanic" (which are sometimes informally referred to as 'service technicians'), who were strategically situated at a number of assigned duty-station locations throughout the UGI operational system. The mechanics are assigned to respond to various service-calls throughout the UGI system, to:

[1] perform routine gas operations duties in the field (e.g., gas service connections and disconnections, meter servicing, infrastructure [piping] installation and inspections, etc.), or

[2] perform emergency operations duties, consisting of, for example, gas leak location identification, perform an expedited closure of gas flow valve(s) at a gas leak site, and/or coordinating with the local emergency personnel (fire department, police, etc.) to perform other emergency support as needed.

4.4.5 Gas Operations – Vehicle(s) Utilized by [Field Service] Mechanics [116]

Mechanics are issued a vehicle (a specially equipped utility truck) to perform their service-calls (whether routine, or as an emergency dispatch). Communication of the [field-service] mechanics with the CDO personnel are by:

- company-issued cellular telephone (the principal voice-communication method), or
- two-way service radio (as fitted to UGI field-service vehicles, as used by the mechanics), or
- the Gas Operations - Computer Aided Dispatch (CAD) [digital data transmittal] System [117], which is also referred to [by the company] as a 'mobile dispatch application', which is fitted to the service technician's vehicle, in which this digital data transmittal system also has a 'GPS fleet tracking' capability (which is also referred to as a 'vehicle tracking' system).

4.5 Gas Operations – Emergency Response Procedures - Available Instructional Guidance Training [118]

UGI offers professional instructional guidance training in the principles and practices of emergency response procedures to address natural gas emergencies, which are available to personnel of the local emergency services agencies within the UGI gas-service operational

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[114] Source: on-scene discussion with the SF group / UGI Party representative, and corresponding follow-up [telecon] discussion (dated 03/29/2018), and supportive Party-supplied documentation (as indicated).

[115] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018.

[116] Source: on-scene discussion with the SF Group / UGI Party representative, and corresponding follow-up [telecon] discussion (dated 03/29/2018), supportive Party-supplied documentation (as indicated), and email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[117] The CAD digital data transmittal System was produced (originally manufactured) by company by the name of "FleetMatics", which is currently owned by a company by the name of "Verizon Connect" (as described in [Internet] https://www.verizonconnect.com/company/); Source, and for further information [on the FleetMatics digital data transmittal System], see [Internet] https://www.verizonconnect.com/solutions/gps-fleet-tracking-software/.

[118] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018.

territories (principally fire departments). The training information is provided either (a) online [Internet access], or (b) available through UGI-facilitated in-person training with emergency response personnel (typically held at the local emergency services facility), or (c) available through training activities referred to as "Liaison Meetings" (see § 4.5.1). The UGI training activities are offered at no cost to the recipient attendees, during which emergency response procedures documentation is also distributed (see § 4.6), which are summarized as follows.

4.5.1 Instructional Technical Lectures – In-person Participation ("Liaison Meetings") [119]

This aspect of the UGI training program involves the UGI sponsorship of instructional technical lectures, which are referred to as "Liaison Meetings", which was conducted by a training support contractor by the name of Paradigm Liaison Services (Paradigm) [120].

As additionally described by UGI [121]:

> "Paradigm provides support to the utility industry to provide public awareness and damage prevention training in accordance with the regulatory requirements under 49 CFR 192, 195, as well as API RP 1162. Paradigm provides annual liaison meetings for Emergency Services, Excavators and Public Officials for a consortium of pipeline and distribution companies on a state by state basis. [This contractor] also completed a bi-annual collaborative mailer, and have supported UGI with the US Department of Transportation-required 4-year effectiveness survey."

These Liaison Meetings involve periodically scheduled 'classroom venue' training activities, in which the lecture involves a PowerPoint® (PPT) presentation (comprised of 39 slides), as narrated by the 'meeting facilitator', where the PPT presentation provides detailed technical aspects of emergency procedures to be implemented in the event of a gas leak or a fire. The meetings are typically held at a local commercial meeting facility (e.g., a hotel meeting room, or similar venue), in which a catered meal is usually provided for the attendees [122].

4.5.2 Supplemental In-Person Training Sessions [123]

Supplemental to the Liaison Meetings (see § 4.5.1), by request, UGI's Damage Prevention & Public Awareness group will conduct In-Person ('face-to-face') training sessions with the local emergency service agencies within the UGI service territories. No specific [training session] data on this form of training activity was made available by UGI.

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[119] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018, and as further described.

[120] Source, and for further information, see [Internet] http://www.pdigm.com/home.

[121] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018.

[122] Meetings are usually conducted during meal times (a complementary dinner or lunch is offered), which are conducted at a time-period that's found to be convenient for most attendees in the emergency services profession.

[123] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018, and as further described.

As additionally described by UGI [124]:

> "Training on responding to natural gas emergencies is provided via a module titled, "A Shared View". When requests for training are received, UGI typically schedules and conducts this training at local Fire Stations across its territory. UGI recommends that the Fire Company take the on line Responding to Utility Emergencies (RTUE) portion in advance of the face-to-face session as it has proven to greatly enhance the discussion. Training is attended by local Fire Services, Police, EMT and Municipal personnel. Instruction is provided on the basics of Natural Gas, responding to Gas emergencies, and collaborating with Emergency response personnel. UGI maintains in-person training documentation such as sign-in sheets for in-person training with local emergency response personnel."

4.5.3 Instructional Technical Lectures – Online Presentation [125]

This UGI training program involves the UGI sponsorship of an online tutorial demonstration titled "ICS for Energy Infrastructure Emergencies Level I – First Responder", which was administered by a training support contractor. [126]

As additionally described by UGI [127]:

> "The tool is designed and tailored to conveniently reach, educate and train emergency responders for responding to natural gas and electrical emergencies. It is a video-based training including an extensive and interactive curriculum. There are multiple training tracks specific for Fire Service / Emergency Management Services, Law Enforcement and Community officials. UGI promotes this training annually through public awareness mailings to stakeholders and in person via displays at select emergency responder conferences and expos.
>
> The Pa State Fire Academy invited all certified Pa State Fire Instructors to the Academy in October of 2015 and March of 2016 to a review of the natural gas and electric emergency modules, provided by UGI and available on the RTUE website. This resulted in the Academy adopting the natural gas and electric modules as the accredited training for Fire Service in Pennsylvania on June 1, 2016. This adoption and accreditation provides for any of the certified Fire Service Instructors to teach the modules through the Local Level Course program or at any of the (20) ETA's (Educational Training Agency) across Pennsylvania."

[124] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[125] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018, and as further described.

[126] UGI identified a firm by the name of RTUE Online, LLC; ref, and for further information, see [Internet] https://www.rtueonline.com/, with the gas-operations tutorial presentation available at https://rtue-gas.rtueonline.com/.

[127] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

4.6 Gas Operations – Distributed Emergency Response Procedures - Instructional Guidance Documentation [128]

UGI distributed (through its training contractor) instructional guidance documentation during the Liaison Meetings, titled "Pipeline Emergency Response Planning Information – 2016 Emergency Responder Manual" that addresses gas emergency procedures, in which this document is also mailed to the constituent fire department agencies that are located within the UGI service territory that don't attend the Liaison Meetings.

As additionally described by UGI [129]:

> "This information is in addition to documentation that is made available through the other training programs discussed above, including UGI's in-person on-site training, the RTUE, and the Liaison Meetings."

4.7 Live-Action - Professional Training Facility or Mobile Training Equipment [130]

At the time of the incident [accident] the company did not operate or maintain a [so-called] 'live-action training facility, or utilize mobile training equipment.

Subsequent to the incident [accident], the company procured an Incident Command Trailer that 'doubles' as a mobile training-support trailer, to facilitate field-training activities, which can be transported, for example, to a local fire station, such to conduct 'live-action' demonstration activities (see also § 7.2), in which, as additionally described by UGI [131]:

> "The [training] trailer is also used as [a] public awareness tool, and promotes the ICS protocols including enhancing UGI's capabilities to respond to an emergency."

4.8 Training History - Activities Conducted by UGI with the Jurisdictional Fire / Rescue Agency [132]

UGI research of the UGI (facilitated / sponsored) training history data for the 5 years prior to the incident [accident], indicated that personnel of the BRFR are not cited among the list of attendees, in which UGI also indicated that personnel of the BRFR had attended the UGI (facilitated / sponsored) training activity that was conducted in August 2017.

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[128] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018, and as further described.

[129] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[130] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018, and as further described.

[131] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[132] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/27/2018.

4.9 History of Emergency Call Activities - UGI Retail Natural Gas Supplier / Distribution System Operations [133]

Data on UGI emergency call activities, for UGI's retail natural gas supplier / distribution system operations, for the five-year interval prior to, and including the year of the accident (i.e., 2013-2017, inclusive) was made available to the investigation, which is included in Exhibit 1.

5.0 The Emergency Response

5.1 Event Chronology ("Timeline")

An event chronology ("Timeline") was constructed to identify the sequencing facts of the emergency response to the event, and to examine the execution of the emergency response effort (e.g., fire suppression / search and rescue). In support of this, the principal responding emergency services agencies, and the natural gas retail supplier / distributor (UGI Utilities. Inc.), were afforded the opportunity to provide incident response data and communications information as relevant to this event. NTSB staff also conducted individual interviews of gas utility company personnel, and personnel of the emergency services agencies, to identify the facts as cited in the Timeline narrative.

Commensurate to the above, data obtained from the organizations that were contacted in this data collection effort is as follows.

5.1.1 Emergency Services Agencies [134]

Data supportive to this topic was provided by the BRFR, which is included in Exhibit 2.

5.1.2 UGI [135]

Data supportive to this topic was provided by UGI, which is included in Exhibit 3.

5.2 Summary Timeline of Activities Immediately Prior to the Explosion [136]

Based upon Timeline data of the SF Investigation and supplementary data obtained [137], a tabulation was compiled, to a provide a brief summarization of key / significant activities that occurred immediately prior to, and including, the explosion at the subject residential dwelling [206 Springdale Lane], which is included in Exhibit 4.

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[133] Source: email correspondence between SF Group Chair and the UGI participant of the SF Group, dated 5/03-17/2018, inclusive.

[134] Source: printed copy of the subject documentation, supplied during the on-scene phase of the investigation by the BRFR participant of the SF Group to SF Group Chair.

[135] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/16/2018.

[136] Source: on-scene observations of, and field notations recorded by the SF Group Chair, and as further described.

[137] Data source of the subject tabulation was the individual Timeline data of UGI and BRFR (Exhibits 2 and 3), and data made available by the Lancaster County 9-1-1 / Dispatch agency, and as further described.

An employee of one other utility service (the Lancaster Area Sewer Authority; see § 5.2.3), who was supportive of the gas leak response effort, was also present at the site (at the time of the explosion), in which the approximate physical locations of all the individuals at the site, at the approximate time of the explosion, and other significant observations relative to the corresponding activities of those personnel (at that time), are summarized as follows.[138]

5.2.1 UGI Technical Personnel [139]

Three employees of the company arrived at the site, in which:

- two of the employees were located in front of the subject dwelling, where they were positioned on the west side of the UGI service truck (that was located approximately at the curb line in front of the dwelling), where the individuals were also proximate to a hole that was being dug in the front yard of the structure (to access the gas main to 'squeeze it off' and stop the flow of gas [140]), and
- a third employee was (based upon the post-event location of this individual) apparently located at, or near, the south end of the subject structure (which is proximate to the location of the residential gas meter that services the subject dwelling), in which no evidence was attained that identified the specific activity that this individual was performing at the time of the explosion.

5.2.2 BRFR Personnel [141]

Four firefighters of the agency (a Fire Chief, and three firefighters), who were performing stand-by support at the scene (on the prospect that fire-suppression would be needed), arrived at the site, via their vehicle (a fire engine), about four minutes prior to the explosion, in which:

- the Fire Chief, who was on foot, and was wearing firefighter turnout gear, was located proximate to the left / front corner of the fire truck (which was located near the entrance of the 'cul-de-sac' (which is at the east end of the 'cul-de-sac'), and
- one firefighter, who was on foot, and was wearing firefighter turnout gear, was located proximate to the right side / mid-section area of the fire truck (adjacent to the 'pump-panel' [operating station] of the vehicle), and
- one firefighter, who was on foot, and was wearing firefighter turnout gear, was located proximate to a curbside fire hydrant that was situated adjacent to the mailbox of the residential dwelling at 177 Springdale Lane (which was about 320 feet to the east of the cul-de-sac), and

[138] Potentially supportive data to injury causation evaluation, or as otherwise supportive to the investigative process.

[139] Source: NTSB interviews conducted with the two surviving subject personnel; see the respective transcripts for details, and email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[140] A flow control device that compresses / deforms the exterior pipe surface was utilized by the mechanic, as described in § 4.4.3.

[141] Source: NTSB interviews conducted with the subject personnel; see the respective transcripts for details.

- one firefighter, who was on foot, and was wearing firefighter turnout gear and had donned SCBA (but was not utilizing the air supply), having just completed the placement of a non-charged fire hose (which was laid on the pavement, staged for potential immediate use [142]), was located proximate to the center of the cul-de-sac, approximately in front of the subject dwelling, in which this firefighter was facing away from the dwelling at the moment of the explosion.

5.2.3 Lancaster Area Sewer Authority Personnel [143]

A field-services employee of the Lancaster Area Sewer Authority (LASA) was at the site (on assignment, in response to the report of a suspected gas leak) to mark the location [on the pavement / grass surfaces, using a hand-held can of spray paint] of the sewer lines in that area. He stated that, at the moment of detonation, he was standing next to his work-vehicle, which was parked in the roadway across the 'cul-de-sac' from the subject residential structure. The employee stated that, from where he was located (next to his service truck), he heard the sound of the UGI service truck [diesel] engine running (idling) immediately preceding the explosion [144], and that he could also smell natural gas at that location.

5.3 Execution of the Emergency Response

See the Timeline(s) of the Event (Exhibit 2, Exhibit 3, and Exhibit 4) for additional detail.

Generally described, the response activities of the emergency services agencies, and the natural gas retail supplier / distributor, in the incident [accident] are briefly summarized as follows.

5.3.1 BRFR

Personnel of this agency, which arrived at the scene immediately prior to the explosion, provided:

[1] stand-by support at the scene (on the prospect that fire-suppression would be needed), in which,

[2] upon the explosion occurring, this agency provided fire suppression of the subject residential dwelling that sustained explosion / fire damage, in which,

[3] upon arrival of additional firefighting response personnel / equipment, provided search and rescue activities at the scene.

5.3.2 Lancaster EMS (Ambulance)

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[142] A non-charged fire hose is a hose that does not contain water.

[143] Source: NTSB interview conducted with the subject individual; see the transcript for details.

[144] The on-scene investigation team determined that, upon conducting a canvas of the 'cul-de-sac' area, the UGI service truck appears to have been the only vehicle that was situated proximate to the reported natural gas release location, in which (based upon the testimony of this witness, it appears that) the engine was operating [idling] at the time of detonation.

Personnel of this agency, upon arrival at the scene, provided injury triage, and then provided transport of the injured individuals from the scene to the local medical facility.

5.3.3 MTPD

Personnel of this agency, upon arrival at the scene, provided an exigent door-to-door canvas of the other [non-explosion involved] residential dwellings on the 'cul-de-sac', in an effort to determine if the occupants had been evacuated or needed assistance, and then provided the initial site-security at the scene (which was later replaced by a professional security services contractor as engaged by UGI).

5.3.4 Jurisdictional Emergency Management Agency (Blue Rock EMA) [145]

This agency made available 'commissary support services' (food / catering resources) to the responding on-scene emergency services agencies, provided coordination support to Incident Command [with other responding emergency services agencies], and afforded administrative and technical support to the official investigation of the event (as conducted by a Federal agency [146]).

5.3.5 UGI [147]

Three UGI technical personnel had arrived at the scene prior to the explosion, in which the personnel were engaged in activities to address the report of a gas odor, which was in process up to the time of the explosion. Upon the explosion occurring, additional technical personnel of the company (in response to a request for support from the three, already on-scene, UGI technical personnel), upon arrival at the scene, provided technical support to the on-scene fire department agency, consisting of performing odorant checks, the gas flow shut-off (valve closure in the gas line to the east of the 'cul-de-sac'), monitored the site for possible additional gas leaks, summoned additional UGI technical personnel and heavy equipment to the scene, and supported the medical-response processing of their personnel who were injured in the accident.

5.4 Medical Facilities Utilized in the Response to the Accident

Medical facilities that received patients transported from the accident site are listed as follows.[148]

Facility	Location
Lancaster General Hospital [149]	Lancaster, PA

5.5 Post-Event Critique / Debriefing - After-Action Review Activities / Reports

[145] Source: email correspondence to NTSB / SF Group Chair, from the BRFR Party spokesperson, dated 4/21/2017.

[146] The Commissioner of this agency was also the Party Spokesperson that represented the BRFR in the NTSB investigation.

[147] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018.

[148] Ref: data as sourced from the emergency services agencies that responded to the accident.

[149] Ref, and for further information, see [Internet] http://www.lancastergeneralhealth.org/LGH/Locations/ Inpatient/ Lancaster-General-Hospital.aspx.

The responding jurisdictional fire service agency (BRFR), and the natural gas retail supplier / distributor (UGI), were afforded an opportunity to document to the investigation any post-event critique / debriefing - review meeting activities, or After-Action report documentation as might have been conducted / compiled in the event, the responses of which are as follows.

5.5.1 BRFR [150]

A document titled "Gas Leak on Springdale Lane After Action", undated, as compiled by the agency, was made available to the investigation by the agency, which is included in Exhibit 5 (see also § 7.1).

5.5.2 UGI [151]

A document titled "After Action Reports – Lessons Learned Reports", dated April 17, 2018, as compiled by the company, was made available to the investigation by the company, which is included in Exhibit 6 (see also § 7.2).

6.0 Medical and/or Pathology Data [152]

6.1 Civilian – Injuries [153]

Two individuals reportedly sustained what were described as minor injuries:

- One resident (of the area) accidently fell (post-event), which was commensurately treated.
- One resident (of the area) sustained what appeared to have been heat exhaustion, which was commensurately treated.

6.2 Emergency Responders

Three BRFR firefighters reportedly sustained what were described as minor injuries:

- One firefighter, who was situated in front of the subject residential dwelling [206 Springdale lane] at the time of the explosion, was struck by propelled debris as a result of the explosion, which was not immediately addressed by that individual (the individual described that the injury didn't immediately appear to be of consequence at that time), which was commensurately addressed in follow-up examination / treatment at a local medical facility.[154]

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[150] Source: email correspondence to NTSB / SF Group Chair, from the BRFR Party spokesperson (admin-staff), dated 3/22/2018, and corresponding follow-up investigation interview discussion.

[151] Source: email correspondence to SF Group Chair, from UGI Party Spokesperson, dated 4/17/2018.

[152] The investigation utilizes injury data sourced from the SF Group interviews conducted with the identified individuals (during the on-scene phase of the investigation), the responding local emergency services agencies, the transportation carrier (i.e., UGI, the natural gas retail supplier), and data identified in death certificate / pathology report documentation (obtained from the jurisdictional death investigation authority), and as further described.

[153] Source: notations of NTSB / SF Group interview conducted with the BRFR Command Officer (Fire Chief).

[154] Source: notations of NTSB / SF Group interviews conducted with the identified BRFR personnel.

- Two BRFR firefighters accidently stepped on exposed nails during the (post-explosion) response effort, which were commensurately treated.[155]

6.3 Employees of the Natural Gas Retail Supplier / Distributor (UGI)

6.3.1 Injuries Sustained [156]

Two UGI employees, who were located immediately in front of the subject residential structure [206 Springdale Lane] at the time of the explosion, who were struck by propelled debris as a result of the explosion, sustained what were described as serious injuries, in which the individuals were transported by the responding EMS [agency] to the local medical facility for examination / treatment.

6.3.2 Fatalities [157]

One UGI employee, who apparently was located at, or near, the south end of the subject residential structure [206 Springdale Lane] at the time of the explosion [158], sustained injuries that were consistent with having been struck by debris during the explosion [159], which resulted in non-survivable injury, as described in the Coroner's report documentation[160], which indicated (briefly summarized):

- [the forensic pathologic examination supported 'diagnostic observations' of] extensive blunt-impact head trauma, among other sustained injuries, in which,
- the Cause of Death was "Multiple Traumatic Injuries", in which,
- the Manner of Death was "Accidental".

6.4 Other Reported Injuries [161]

A field-services employee of the Lancaster Area Sewer Authority was struck by propelled debris as a result of the explosion, in which this individual sustained what was described as non-life-

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[155] Source: notations of NTSB / SF Group interviews conducted (during the on-scene phase of the investigation) with the BRFR Command Officer (Fire Chief).

[156] Source: NTSB interviews conducted with the subject UGI employees; see the respective interview transcripts for details.

[157] Source: notations of NTSB / SF Group interviews conducted (during the on-scene phase of the investigation) with the BRFR Command Officer (Fire Chief) and other emergency response officials, and as further described.

[158] The location was based upon where the decedent remains were found by emergency responders (i.e., the BRFR, Lancaster EMS), as supported by notations of NTSB / SF Group interviews conducted with officials of the emergency services agencies.

[159] As supported by the physical description of how and where the decedent was found (at the scene), as documented in the Coroner's report.

[160] Source: official correspondence [data request response], dated 03/23/2018, containing the forensic pathology, and associated report documentation, received from [generated by] the Lancaster County, PA - Office of the Coroner (a copy of which is available directly from the agency; see [Internet] https://co.lancaster.pa.us/133/Coroner).

[161] Source: notations of NTSB / SF Group interview conducted (during the on-scene phase of the investigation) with the subject individual.

threatening injuries, in which this individual was subsequently transported by the L-EMS [agency] to the local medical facility for examination / treatment.

7.0 Proactively Employed Initiative Measures / Actions - Implemented Subsequent to the Accident

SF Group participants of the investigation were afforded an opportunity for data feedback to the investigation [162], to describe specific / documented initiative measures that have been initiated or employed by these organizations subsequent to the event, such to take advantage of 'lessons-learned' in the accident, the response(s) of which are described below.

7.1 BRFR

A documented response, as received from this agency [163], is provided in Exhibit 7.

7.2 UGI

A documented response, as received from the company [164], is provided in Exhibit 8.

E. **AUTHORSHIP**

Compiled by: // s // Date Oct. 31, 2018
Richard M. Downs, Jr., P.E.
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Supervisory review: // s // Date Oct. 31, 2018
Robert J. Beaton, Ph.D., CPE
Chief, Human Performance and Survival Factors Division (RPH-40)

-- End of this report section --

[162] Ref email inquiry from SF Group Chair, to the individual SF Group Party participants, dated 3/12/2018.

[163] Source: email to the SF Group Chair, from the subject SF Group Party participant, dated 04/06/2018.

[164] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, with an updated / 'final revision' transmittal, dated 10/31/2018; see additional [footnoted] notations in the Exhibit.

List of Exhibits

1. History of Emergency Call Activities - UGI Retail Natural Gas Supplier / Distribution System

2. BRFR - Event Chronology (“Timeline”)

3. UGI - Event Chronology (“Timeline”)

4. Summary Timeline – On-Scene Activities Immediately Prior to the Explosion

5. BRFR “Gas Leak on Springdale Lane After Action”

6. UGI “After Action Reports – Lessons Learned Reports”

7. BRFR - Proactively Employed Initiative Measures / Actions - Implemented Subsequent to the Accident

8. UGI - Proactively Employed Initiative Measures / Actions - Implemented Subsequent to the Accident

Exhibit 1. History of Emergency Call Activities - UGI Retail Natural Gas Supplier / Distribution System Operations [1]

1. Data on UGI emergency call activities, for UGI's retail natural gas supplier / distribution system operations, for the five-year interval prior to, and including the year of the accident (i.e., 2013-2017, inclusive) was made available to the investigation, the data of which is as follows.

UGI Gas – <u>Entire System</u> Operating Areas					
Calendar Year	2017	2016	2015	2014	2013
Average Daily Call Count	39	40	41	43	38
Total Emergency Calls	14,171	14,632	14,988	15,533	13,956
Annual Counts of Component Call Types (of Total Emergency Calls):					
Odor Call Negative	6,191	6,334	6,109	6,731	5,958
Odor Call Confirmed*	7,219	7,520	8,134	8,065	7,311
Damaged Facility Leaking	195	207	180	201	165
Damaged Facility Not Leaking	74	79	46	72	54
Damage Call No Damage Found	350	352	393	348	336
Fire Call	142	140	126	116	132

*Odor Call Confirmed may result from UGI facility or a customer-owned facility

[1] Source: email correspondence between SF Group Chair and the UGI participant of the SF Group, dated 5/03-17/2018, inclusive.

UGI Gas – Lancaster Operating Area Only					
Calendar Year	2017	2016	2015	2014	2013
Average Daily Call Count	7	6	7	6	6
Total Emergency Calls	2,530	2,284	2,389	2,360	2,038
Annual Counts of Component Call Types (of Total Emergency Calls):					
Odor Call Negative	1,088	983	974	1,059	903
Odor Call Confirmed*	1,338	1,204	1,310	1,196	1,037
Damaged Facility Leaking	29	20	20	27	36
Damaged Facility Not Leaking	12	12	14	10	7
Damage Call No Damage Found	56	62	69	66	52
Fire Call	7	3	2	2	3

*Odor Call Confirmed may result from UGI facility or a customer-owned facility

2. Map (next page) of Pennsylvania, illustrating the UGI Retail Natural Gas Supplier / Distribution System and the UGI Lancaster Gas Operations Area.

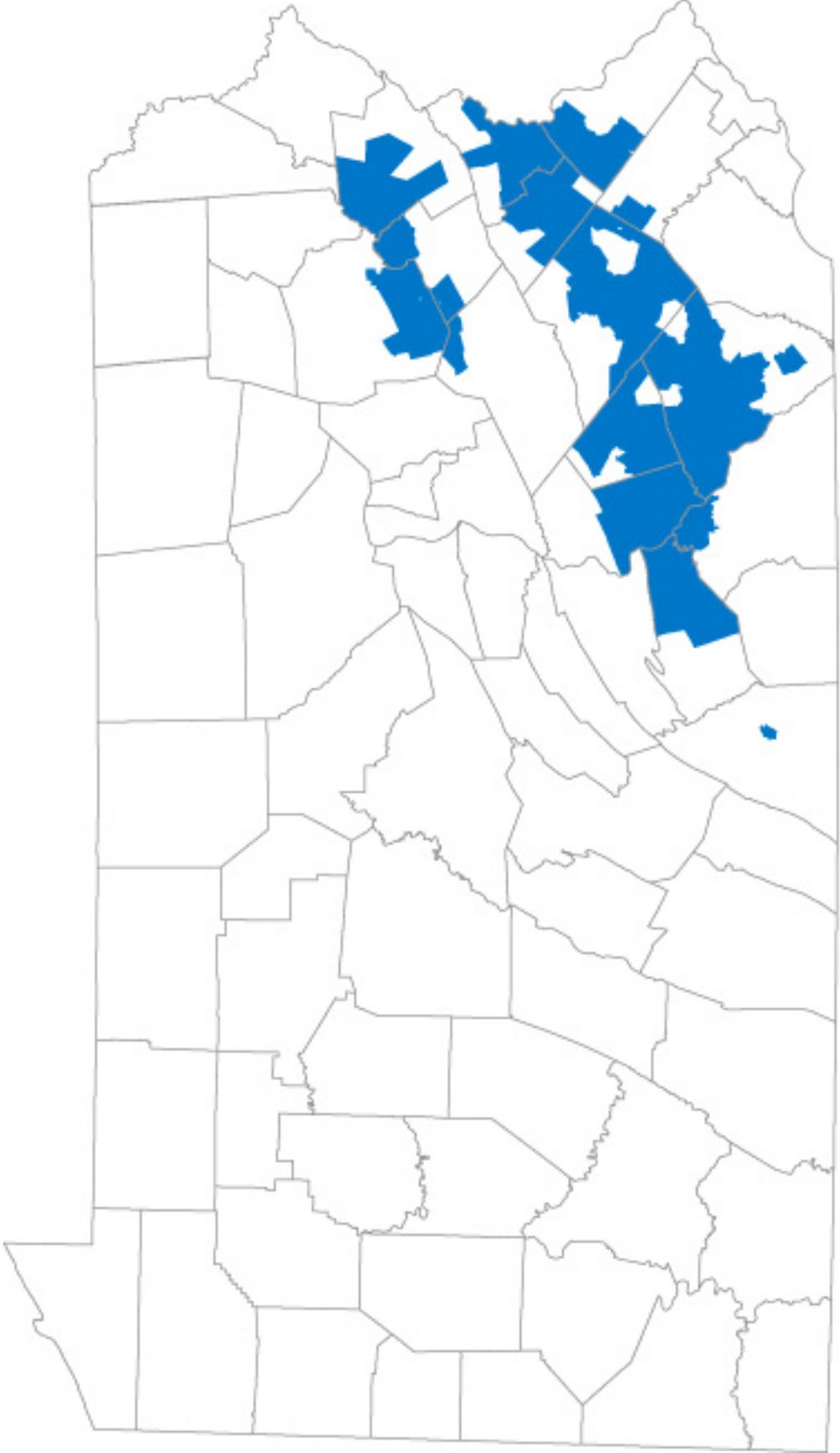

Exhibit 2. BRFR - Event Chronology (“Timeline”)

BLUE ROCK FIRE RESCUE – SPRINGDALE LANE - JULY 2, 2017

Incident # 1707001638

Gas Leak w/explosion and fire

July 2, 2017

Weather Time of Dispatch: (Millersville University Weather Oberservations)

Sunny
Temp – 85 degrees
Dew Point - 67 degrees
Rel. Humidity - 56%
Wind – WNW 2mph
Rain - 0

Times:

Dispatched: 12:16:56
Chief En-Route: 12:18
E905 En-Route: 12:23:28
On–Scene: 12:28:11
Explosion: 12:32:14
Cleared: 17:57:00

Fire department was dispatched to a gas leak with UGI on scene

206 Springdale Lane – Destroyed
201 Springdale Lane- Damaged - tagged
202 Springdale Lane- Damaged - tagged
197 Springdale Lane- Damaged – tagged

7

BLUE ROCK FIRE RESCUE – SPRINGDALE LANE - JULY 2, 2017

These times are not official times.
They are those captured by the scribe at the Command Post

Times:

12:16 Dispatched
12:18 Chief 905 En-route
12:23 Engine 905 & 901 En-route
12:28 Engine 905 OS
12:30 Reported Active Leak
12:31 Conversation with UGI Rep
12:32 Explosion
12:32 Report Missing workers
12:32 Additional EMS Units
12:33 Contact with LASA Employee (Walking Wounded)
12:35 PPL Request
12:35 Report Persons Trapped
12:41 Notify UGI of Conditions
12:43 UGI Notification completed
12:48 More EMS Units Required
12:57 4 more Engines Required
13:00 PEMA/LEMA Notified
13:00 Gas Shut off in street by UGI
13:13 4 Additional Engines
13:19 Coroner requested
13:19 FM Requested Trooper Cornetta
13:22 Gas shut off verified and bled off
13:22 Chaplin Requested
13:25 Support Group Requested
13:34 Pa Labor and Industry
13:39 HazMat requested
13:41 Chief 2 enroute
13:41 Red Cross Requested
13:48 Special Request for Canopies
14:19 Additional Fire Police
14:30 15 minutes crew rotates established
14:24 Foam 63 requested for additional foam
14:24 Water Company
14:39 UGI and Haz Mat working together
15:09 201 & 202 Cleared
15:20 198 Cleared
15:33 LASA Notified
17:58 FD Cleared

Exhibit 3. UGI - Event Chronology ("Timeline")

A summary of substantive activities conducted by the distribution pipeline owner / operator during this event is as follows.

Notes –

- Data of this document was sourced from UGI, in which,
  - the individuals that are identified in this document refer to UGI personnel, unless described otherwise, and
  - no effort was expended by the NTSB to independently validate the accuracy / authenticity of the UIG supplied data tabulation.
- Certain job titles and descriptions cited in this document refer to UGI job titles and descriptions, unless described otherwise.
- The revision date of this document is May 14, 2018, in which this document incorporates the UGI-supplied activity data as cited in the three prior [revision] versions of this tabulation (as received from UGI).
- Redaction of certain personally identifiable information (PII), consisting of the family (sur) names of individuals, the last 4-digits of telephone numbers, or other distribution-restricted information as cited in this report, has been employed by the NTSB [1].

Acronym nomenclature and abbreviations used in this Tabulation

00:00	hours:minutes (time references are denoted in 4-digit military time, EDT [2])
911	Lancaster County-Wide Communications 9-1-1 PSAP
Duration	refers to the length of time of the cited activity (which usually refers to a telephone call, unless described otherwise), is denoted in minutes:seconds
LASA	Lancaster Area Sewer Authority
NTSB	National Transportation Safety Board
PHMSA	Pipeline Hazardous Materials Safety Administration

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[1] engaged pursuant to NTSB report documentation practice

[2] Eastern Daylight Time

NTSB Request No. 51: UGI Timeline of Events
Draft -- Revision 7/7/2017, Revision 7/10/2017, Revision 12/21/17, Revision 5/14/18
All events listed below occurred 7/2/2017 unless otherwise noted

Time	Duration	Activity	Source
10:26	Approx. 3 min	Joanne [redacted] called into the UGI Call Center (answered by Sharleen [redacted] (Call Center Rep 3) located at [redacted] Road, Reading, PA 19611 reporting gas smell in front of [redacted] Springdale Lane, Millersville	Call Center Call (Recorded); Sharleen [redacted] page 10, lines 2-21 and page 17, lines 13-18 (July 27, 2017)[1]
10:29		Emergency order generated by Sharleen [redacted] (UGI Call Center Rep) for outside odor at [redacted] Springdale Lane. (WR-499958)	Work Order Management System Creation Time; Christine [redacted] page 18, line 13 (Sept. 15, 2017)[1]; Sharleen [redacted] page 19, lines 4-5 (July 27, 2017)[1]
10:31		Order is dispatched to Rick [redacted] (Mechanic III) by Christine [redacted] (Dispatcher)	Mobile Dispatch Application Dispatch Time; Christine [redacted] page 18, lines 14-15 (Sept. 15, 2017)[1]
10:31	1:00	UGI Dispatch calls from [redacted] Rd., Reading, Pa to Rick [redacted] (Mechanic III) to dispatch Rick [redacted] to [redacted] Springdale Lane, Millersville to respond to reported gas odor.	Call from 484-256-[redacted] to 610-972-[redacted] Christine [redacted] page 18, lines 14-15 (Sept. 15, 2017)[1]
11:00		Rick [redacted] (Mechanic III) arrives on scene at [redacted] Springdale Lane, Millersville.	Mobile Dispatch Application Arrival Time
11:18	2:00	Rick [redacted] (Mechanic III) calls from unspecified location to Jason [redacted] (Senior Supervisor Operations-C&M) to request crew to respond to confirmed leak.	Call from 610-972-[redacted] to 610-842-[redacted] Jason [redacted] page 18, line 22 to page 19, line 2 (July 25, 2017)[1]
11:20	3:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to UGI Dispatch to request that UGI Dispatch put a One-Call ticket in to enable UGI to perform dig in response to gas leak.	Mobile Cell Phone Records (Call from 610-842-[redacted] to 610-736-[redacted] Jason [redacted] page 19, lines 3-5 (July 25, 2017)[1]
11:23	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Robert [redacted] (Mechanic II, Duty Foreman) to inform Robert [redacted] that there was a gas leak and that he was assembling a response crew to repair leak. Jason [redacted] informed Robert [redacted] that Robert [redacted] should be prepared to respond to / assist with response to a leaking mechanical tee.	Call from 610-842-[redacted] to 717-666-[redacted] Jason [redacted] page 19, lines 10-11 (July 25, 2017)[1]; Robert [redacted] page 16, line 6 (Sept. 15, 2017)[1]
11:25	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to the work phone of Norm [redacted] (Mechanic II, Duty Operator) - (no answer). Jason [redacted] left message asking Norm [redacted] to call Jason [redacted] immediately because he was in need of Norm [redacted] services to assist with the gas leak at [redacted] Springdale Lane, Millersville.	Call from 610-842-[redacted] to 610-842-[redacted] Cell Phone Image; Jason [redacted] page 19, lines 14-17 (July 25, 2017)[1]
11:26	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Kenneth [redacted] (Utility A - 3 Year, Duty Laborer) to assemble response crew to be prepared to assist with cut out of a mechanical tee and replacement of a section of main.	Call from 610-842-[redacted] to 610-842-[redacted] Jason [redacted] page 20, lines 7-10 (July 25, 2017)[1]
11:27		UGI Dispatch places call to PA One Call (811) to notify of dig at or in proximity to [redacted] Springdale Lane, Millersville.	UGI Dispatch Log
11:27	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Norm [redacted] (Mechanic II) home number (no answer, left message asking for him to return phone call).	Call from 610-842-[redacted] to 717-291-[redacted] Jason [redacted] page 19, lines 17-20 (July 25, 2017)[1]

Time	Duration	Activity	Source
11:30	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Sandy [redacted] (Engineer II) office to discuss plan to shutdown gas line due to gas leak.	Call from 610-842-[redacted] to 717-255-[redacted] Jason [redacted] page 21, lines 11-20 (July 25, 2017)[1]
11:31	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to UGI Dispatch.	Call from 610-972-[redacted] to 484-256-[redacted]
11:32	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to Robert [redacted] (Mechanic II) (no answer).	Call from 610-972-[redacted] to 717-666-[redacted] Robert [redacted] page 16, lines 14-15 (Sept. 15, 2017)[1]
11:32	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Robert [redacted] (Mechanic II) but Robert [redacted] does not answer.	Call from 610-842-[redacted] to 717-666-[redacted]
11:33	2:00	Robert [redacted] (Mechanic II) calls from unspecified location to Rick [redacted] (Mechanic III) to discuss response crew arrangements and confirm address of gas leak. Rick [redacted] confirms that Robert [redacted] is the duty foreman and asks what other crew will be responding to the gas leak. Rick [redacted] also indicates that they will need to shut down the line and cut in a section of the main.	Call from 717-666-[redacted] to 610-972-[redacted] Robert [redacted] page 16, lines 16-19 (Sept. 15, 2017)[1]
11:35	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to Kim [redacted] (Rick's Wife)	Call from 610-972-[redacted] to 717-606-[redacted]
11:38	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to UGI Dispatch regarding the need to contact PA One Call (811) to enable UGI to perform dig.	Call from 610-972-[redacted] to 484-256-[redacted] UGI Dispatch Log; Kenneth [redacted] page 37, lines 22-23 (July 25, 2017)[1]
11:42	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Robert [redacted] (Mechanic II) to discuss repair crew composition, specifically whether Norm [redacted] (an operator) had contacted Robert [redacted] Robert [redacted] confirms that Norm [redacted] had not responded to phone call requests to serve as operator at the repair site.	Call from 610-842-[redacted] to 717-666-[redacted] Robert [redacted] page 16, line 21 (Sept. 15, 2017)[1]
11:43	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to Kenneth Sean [redacted] (Mechanic II), but there was no answer.	Call from 610-972-[redacted] to 484-256-[redacted] Kenneth [redacted] page 53, lines 9-11 (July 25, 2017)[1]
11:44	2:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Rick [redacted] (Mechanic III) and Rick [redacted] explained that he heard "Ken" was coming out to the job, but Kenneth [redacted] stated that it was not him.	Call from 484-256-[redacted] to 610-972-[redacted] Kenneth [redacted] page 9, lines 1-5 and page 52, lines 13-17 (July 25, 2017)[1]
11:44	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Norm [redacted] (Mechanic II) cell phone - (no contact, but leaves message informing him that he was calling the next operator on the list because he had not heard back from Norm [redacted]	Call from 610-842-[redacted] to 610-842-[redacted] Cell Phone Image; Jason [redacted] page 19, lines 17-20 page 20, line 14 (July 25, 2017)[1]
11:46	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to UGI Dispatch to confirm whether UGI Dispatch was attempting to contact him because Kenneth Sean [redacted] had heard from Rick [redacted] that dispatch was attempting to contact "Ken." The Ken that UGI Dispatch is attempting to contact is confirmed to be Ken [redacted]	Call from 484-256-[redacted] to 484-256-[redacted] Kenneth [redacted] page 9, line 6 (July 25, 2017)[1]
11:47	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Jesse [redacted] (Utility A-III) cell phone.	Call from 610-842-[redacted] to 717-205-[redacted] Jason [redacted] page 20, lines 124-25 (July 25, 2017)[1]

Time	Duration	Activity	Source
11:47	2:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Jason [redacted] (Senior Supervisor Operations-C&M) to offer to respond, and Jason [redacted] agrees to have Sean [redacted] assist on-scene.	Call from 484-256-[redacted] to 610-842-[redacted] Jason [redacted], page 23, lines 16-23 (July 25, 2017)[1]; Kenneth [redacted], page 9, line 10 and page 53, lines 15-16 (July 25, 2017)[1]
11:50	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Jesse [redacted]'s (Utility A-III) home phone and Jason [redacted] requests that Jesse [redacted] respond to gas leak as an operator replacement/substitute for Norm [redacted] because Norm [redacted] could not be reached by telephone. Jesse [redacted] agrees to respond (but Jesse [redacted] does not arrive to 206 Springdale Lane, Millersville until after the accident).	Call from 610-842-[redacted] to 717-682-[redacted] Jason [redacted], page 21, lines 2-6 and page 43, line 21 (July 25, 2017)[1]
11:52	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Robert [redacted] (Mechanic II) to discuss repair crew and to inform Robert [redacted] that an operator was located to replace Norm [redacted] if necessary -- that replacement operator was Jesse [redacted] Jason [redacted] indicated to Robert [redacted] that Jason [redacted] would dig at the site of the gas leak as the operator until Jesse [redacted] arrives, given that Jesse [redacted] lived some distance from the accident site.	Call from 610-842-[redacted] to 717-666-[redacted] Jason [redacted], page 21, lines 9-10 (July 25, 2017)[1]; Robert [redacted], page 17, lines 2-5 (Sept. 15, 2017)[1]
Approx. 11:52		Jason [redacted] (Senior Supervisor Operations-C&M) places call to Sandy [redacted] (Engineer II) to discuss plan to shut down the main and to make sure that it would be okay to do what was necessary to make the situation safe (no answer, but Sandy [redacted] later returns this call)	Jason [redacted], page 21, lines 11-18 (July 25, 2017)[1]
11:53	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to Kenneth Sean [redacted] (Mechanic II).	Call from 610-972-[redacted] to 484-256-[redacted]
11:53	1:00	Rick [redacted] (Mechanic III) calls from unspecified location to Jason [redacted] (Senior Supervisor Operations-C&M)	Call from 610-972-[redacted] to 610-842-[redacted]
11:53	3:00	Rick [redacted] (Mechanic III) calls from unspecified location to Jason [redacted] (Senior Supervisor Operations-C&M) to discuss status of response efforts and readings. Jason [redacted] informed Rick [redacted] that Rick [redacted] should do everything possible to clear the house at 206 Springdale Lane, Millersville.	Call from 610-972-[redacted] to 610-842-[redacted] Jason [redacted], page 21, line 20 to page 22, line 6 (July 25, 2017)[1]
12:03	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to Sandy [redacted] (Engineer II) cell phone	Call from 610-842-[redacted] to 610-842-[redacted]
12:04	5:00	Jason [redacted] (Senior Supervisor Operations-C&M) receives a call from Sandy [redacted] (Engineer II) to discuss plan to shut down the main. Sandy [redacted] informed Jason [redacted] that it was OK to stop the flow of gas on the main line.	Call from 610-842-[redacted] to 610-842-[redacted]; Jason [redacted], page 22, lines 7-15 (July 25, 2017)[1]
Approx. 12:05		Jason [redacted] (Senior Supervisor Operations-C&M) arrives on scene at house at 206 Springdale Lane, Millersville. Jason [redacted] begins to dig-up the main to squeeze-off the line. Jason [redacted] reports that, at that time, someone came to the door at 206 Springdale Lane, Millersville. Also, Jason [redacted] reports that Robert [redacted] (Mechanic II) arrived with a street truck and helped dig up the main.	Jason [redacted], page 22, line 14 to page 23, line 7 (July 25, 2017)[1]

Time	Duration	Activity	Source
12:09	3:00	Robert [redacted] (Mechanic II) receives call from Jesse [redacted] (Utility A-III) cell phone to discuss response crew arrangements, informing [redacted] to bring a dump truck. Jesse [redacted] indicated that he was not on call that weekend and that he needed to go to his home to get his work equipment before responding. Jesse [redacted] indicated that he would go to the UGI shop after he obtained his work equipment from home. Robert [redacted] also informed Jesse [redacted] that the laborer was Kenny [redacted] and that Jesse [redacted] needed to drive the empty dump truck to the gas leak site, and that Kenny was instructed by Robert [redacted] to bring the backhoe to the gas leak site.	Call from 717-666-[redacted] to 717-205-[redacted] Robert [redacted] page 17, lines 9-19 (Sept. 15, 2017)[1]
12:14	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from the scene to UGI Dispatch to request that, as a precaution, UGI Dispatch should call 911 to request emergency response support, stating that they needed the fire department on-scene.	Call from 610-842-[redacted] to 610-736-[redacted] Jason [redacted] page 23, lines 9-13, page 68, lines 13-14, page 68, line 23 to page 69, line 7, and page 77, lines 14-15 (July 25, 2017)[1]; Christine [redacted] page 16, lines 21-23 and page 21, lines 16-18 (Sept. 15, 2017)[1]
12:15		UGI Dispatch calls Lancaster County 911 to request emergency response assistance at 206 Springdale Lane, Millersville.	UGI Dispatch Log
Approx. 12:19		Robert [redacted] (Mechanic II) arrives on scene to assist with the repair.	Jason [redacted] page 70, lines 14-17 (July 25, 2017)[1]
12:25	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Jason [redacted] (Senior Supervisor Operations-C&M) to confirm address to where he should respond and informing Jason [redacted] that he was responding to assist with repair/response.	Call from 484-256-[redacted] to 610-842-[redacted] Jason [redacted] page 23, line 16 (July 25, 2017)[1]; Kenneth [redacted] page 53, line 16-20 (July 25, 2017)[1]
12:26	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) calls from unspecified location to UGI Dispatch.	Call from 610-842-[redacted] to 610-736-[redacted] Christine [redacted] page 18, lines 17-18(Sept. 15, 2017)[1]
Approx. 12:30		Jason [redacted] (Senior Supervisor Operations-C&M) observes that fire department arrives, that the main has been dug up, and asks the fireman about venting the house faster because the situation was "not good", that at any point something bad could happen. Jason [redacted] made sure that the fire chief understood him. Jason [redacted] observed Denny [redacted] from LASA marking sewer lines and (just prior to the accident) pointed out that the sewer line ran into the house.	Jason [redacted] page 24, lines 2-20 and page 56, line 3 to page 58, line 15 (July 25, 2017)[1]
Approx. 12:31 and later		Kenneth Sean [redacted] (Mechanic II) arrives on scene, observes two fire trucks, witnesses accident, leaves vehicle to search for victims, observes Robert [redacted] (Mechanic II) under material, and later helps Jason [redacted] (Senior Supervisor Operations-C&M).	Kenneth [redacted] page 9, line 20 to page 10, line 3 and page 16, lines 13-15 (July 25, 2017)[1]
12:36	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Jose [redacted] (Manager Operations) after the accident occurs but Jose [redacted] misses the phone call and then later returns the call to Kenneth Sean [redacted]	Call from 484-256-[redacted] to 484-256-[redacted] Jose [redacted] page 15, line 21 to page 16, line 1 (July 25, 2017)[1]; Kenneth [redacted] page 17, lines 23-25 and page 54, lines 15-16 (July 25, 2017)[1]
12:39	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to UGI Dispatch to inform them that an accident has occurred and to confirm that the appropriate personnel were responding.	Call from 484-256-[redacted] to 484-256-[redacted] Dispatcher notes from day of event; Christine [redacted] page 18, lines 19-20 (Sept. 15, 2017)[1]; Kenneth [redacted] page 54, lines 17-20 (July 25, 2017)[1]

Time	Duration	Activity	Source
12:40	1:00	Jose [redacted] (Manager Operations) receives call from Christine [redacted] (UGI Dispatcher), who informs Jose [redacted] of the accident and instructs him to go to the scene of the accident.	Call from 484-256-[redacted] to 484-256-[redacted] Dispatcher notes from day of event; Christine [redacted] page 18, lines 21-22 (Sept. 15, 2017)[1]; Jose [redacted] page 15, lines 2-6 (July 25, 2017)[1]
12:42		UGI calls Christa [redacted] (CGC) and provides notice of the accident event.	Call from T. [redacted] (UGC); Copy of Dispatch Traffic, NTSB-UGI-01641-01647
12:42		UGI Dispatcher Christine [redacted] contacts her direct supervisor, Alana [redacted] to notify of accident event.	Christine [redacted] page 18, line 23 (Sept. 15, 2017)[1]
12:43		UGI Dispatcher Christine [redacted] contacts the acting supervisor in her department for the weekend, Tom [redacted] to notify of the accident event.	Christine [redacted] page 18, lines 24-25 (Sept. 15, 2017)[1]
12:43		UGI Dispatch contacts Steve [redacted] (Sr. Manager Business Development) to notify of the accident event.	Christine [redacted] page 19, line 1 (Sept. 15, 2017)[1]
12:44		UGI Dispatch contacts Gas System Operations to notify of the accident event.	Christine [redacted] page 19, line 2 (Sept. 15, 2017)[1]
12:44	1:13	Ken [redacted] (Utility A-III) calls from unspecified location to UGI Dispatch.	Ken [redacted] Mobile Phone Image
12:44	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to UGI Dispatch	Call from 484-256-[redacted] to 484-256-[redacted]
12:43		UGI Dispatch calls Christa [redacted] (Gas Controller II, Central Gas Control)	Call from 610-736-[redacted] to 610-736-[redacted]
12:46	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to UGI Dispatch to ensure appropriate personnel were responding to accident.	Call from 484-256-[redacted] to 484-256-[redacted] Kenneth [redacted] page 54, line 18 and page 55, line 14 (July 25, 2017)[1]
12:46	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to UGI Dispatch (2nd time within the minute) to ensure appropriate personnel were responding to accident	Call from 484-256-[redacted] to 484-256-[redacted] Kenneth [redacted] page 54, line 18 and page 55, line 14 (July 25, 2017)[1]
12:46		UGI Dispatch calls Dan [redacted] (Senior Manager Operations) and provides notice of the accident event.	Call from 610-736-[redacted] to 484-769-[redacted] Copy of Dispatch Traffic, NTSB-UGI-01641-01647; Christine [redacted] page 19, line3 (Sept. 15, 2017)[1]
12:46		UGI Dispatch calls Eric [redacted] (Sr Manager Damage Prevention/Claims/Public Awareness) to notify of the accident event.	Call from 610-736-[redacted] to 610-842-[redacted] Christine [redacted] page 19, line 4 (Sept. 15, 2017)[1]
12:47		Central Gas Control calls Robert [redacted] (V.P. Operations)	Call from 610-736-[redacted] to 484-256-[redacted]
12:47	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Brian [redacted] (Manager Operations) to confirm that Brian [redacted] was on his way to 206 Springdale Lane, Millersville.	Call from 484-256-[redacted] to 610-842-[redacted] Kenneth [redacted] page 55, line 9 (July 25, 2017)[1]
12:48		UGI Dispatch calls Brian [redacted] (Manager Operations) and provides notice of the accident event.	Call from 610-736-[redacted] to 610-842-[redacted] Copy of Dispatch Traffic, NTSB-UGI-01641-01647; Christine [redacted] page 19, line 5 (Sept. 15, 2017)[1]

Time	Duration	Activity	Source
12:48		UGI Dispatch calls Chester [redacted] (Sr Manager Engineering) and provides notice of the accident event.	Call from 484-256-[redacted] to 484-554-[redacted] Christine [redacted] page 19, line 6 (Sept. 15, 2017)[1]
12:48	2:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Jose [redacted] (Manager Operations) to discuss shutting off the valve for the gas line; specifically, Kenneth Sean [redacted] indicated to Jose [redacted] that he wanted to shut the valve to cul-de-sac, and [redacted] instructed him to do so and told him that he was on his way to the accident site.	Call from 484-256-[redacted] to 484-256-[redacted] Kenneth [redacted] page 55, line 9 and page 55, line 21 to page 56, line 16 (July 25, 2017)[1]; Jose [redacted] page 16, lines 9-15 (July 25, 2017)[1]
12:50		Chris [redacted] (Director Operations South Region) notified of accident event by UGI Dispatch.	Call from 610-736-[redacted] to 484-256-[redacted] Christine [redacted] page 19, line 7 (Sept. 15, 2017)[1]
12:51		Central Gas Control calls Robert [redacted] (V.P. Customer Relations) and provides notice of the accident event.	Call from 610-736-[redacted] to 570-696-[redacted]
12:51		Don [redacted] (Sr Manager Operations Measurement & Regulation) notified of the accident event by UGI Dispatch	Call from 610-736-[redacted] to 717-360-[redacted] Christine [redacted] page 19, line 8 (Sept. 15, 2017)[1]
12:53	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to UGI Dispatch.	Call from 484-256-[redacted] to 484-256-[redacted]
12:55	1:00	Kenneth Sean [redacted] contacts UGI Dispatch (Mechanic II) and reported that he had shut off at the main in proximity to 206 Springdale Lane, Millersville.	Call from 484-256-[redacted] to 484-256-[redacted] Christine [redacted] page 19, lines 9-10 (Sept. 15, 2017)[1]
12:56		Central Gas Control calls Hans [redacted] (Chief Operating Officer)	Call from 610-736-[redacted] to 484-525-[redacted]
12:56	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Rick [redacted] (Mechanic III)	Call from 484-256-[redacted] to 610-972-[redacted]
12:59		PP&L contacted by UGI Dispatch to report that the power was shut off to repair area.	Landline phone log Leanne [redacted] (Dispatcher II); Dispatcher notes from day of event; Christine [redacted] page 19, lines 12-13 (Sept. 15, 2017)[1]
12:59		Central Gas Control calls Frank [redacted] (Director Engineering & Technical Services) cell phone.	Call from 610-736-[redacted] to 484-769-[redacted]
Between 12:40 to 13:00		Jose [redacted] (Manager Operations) called by Dan [redacted] (Senior Manager Operations) to report status of UGI response to accident.	Jose [redacted] page 16, lines 16 (July 25, 2017)[1]
Between 12:40 to 13:00		Jose [redacted] (Manager Operations) called by Chris [redacted] (Director Operations South Region) to report status of UGI response to accident.	Jose [redacted] page 16, lines 17 (July 25, 2017)[1]
13:00	1:33	Dan [redacted] (Senior Manager Operations) calls from unspecified location to Sunil [redacted] (PUC).	Dan [redacted] Cell Phone Records (Call from 484-769-[redacted] to 717-940-[redacted]

Time	Duration	Activity	Source
Between 13:00 to 13:40		Jose [redacted] (Manager Operations) encountered Jason [redacted] (Senior Supervisor Operations-C&M) and Robert [redacted] (Mechanic II, Duty Foreman) on-scene at accident site. Jose [redacted] sees Jason [redacted] on stretcher, asks him how he is doing and reassures him that everything is going to be okay. Jose [redacted] also encounters Robert [redacted] how asks Jose [redacted] to contact his wife and father-in-law in order to let them know that he was going to the hospital. Jose [redacted] then approaches the cul-de-sac area.	Jose [redacted] page 16, line 20 to page 17, line 8 (July 25, 2017)[1]
Between 13:00 to 13:40		Jose [redacted] (Manager Operations) encountered Ken [redacted] (Utility A-III) on the scene, who informed him that Rick [redacted] could not be located.	Jose [redacted] page 17, lines 12 (July 25, 2017)[1]
Between 13:00 to 13:40		Jose [redacted] (Manager Operations) instructs UGI personnel on-site to shutdown all valves.	Jose [redacted] page 17, lines 17-20 (July 25, 2017)[1]
Between 13:00 to 13:40		Jose [redacted] (Manager Operations) spoke with firefighter and police officers on the scene, and he learned of an employee fatality.	Jose [redacted] page 17, lines 20-25 (July 25, 2017)[1]
13:01		Central Gas Control calls Frank [redacted] (Director Engineering & Technical Services) home phone	Call from 610-736-[redacted] to 610-269-[redacted]
13:01	3:00	Chet [redacted] (Sr Manager Engineering) calls from unspecified location to Kenneth Sean [redacted] (Mechanic II)	Call from 610-554-[redacted] to 484-256-[redacted]
13:04		Central Gas Control calls Edward [redacted] (Director Operations Support)	Call from 610-736-[redacted] to 610-372-[redacted]
13:08		PP&L calls back to let UGI Dispatcher know power is shut off and PP&L personnel are on site	Landline phone log Christine [redacted] (Dispatcher I); Dispatcher notes from day of event; Christine [redacted] page 19, lines 12-13 (Sept. 15, 2017)[1]
13:08	1:00	Chet [redacted] (Sr Manager Engineering) calls from unspecified location to Kenneth Sean [redacted] (Mechanic II)	Call from 610-554-[redacted] to 484-256-[redacted]
13:08		Central Gas Control calls Kelly [redacted] (V.P. Engineering & Operations Support)	Call from 610-736-[redacted] to 610-223-[redacted]
13:09		Central Gas Control calls Alisa [redacted] (V.P. Legislative Affairs)	Call from 610-736-[redacted] to 610-401-[redacted]
13:10		Central Gas Control calls Alisa [redacted] (V.P. Legislative Affairs) office phone	Call from 610-736-[redacted] to 717-255-[redacted]
13:10	2:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Chet [redacted] (Sr Manager Engineering)	Call from 484-256-[redacted] to 610-554-[redacted]
13:12		Central Gas Control calls Mike [redacted] (Director Regulatory Affairs) cell phone	Call from 610-736-[redacted] to 484-824-[redacted]
13:14		Central Gas Control calls Mike [redacted] (Director Regulatory Affairs) office phone	Call from 610-736-[redacted] to 717-255-[redacted]
13:16		Central Gas Control calls Robert [redacted] (President & CEO UGI Utilities, Inc.) cell phone	Call from 610-736-[redacted] to 717-471-[redacted]
13:17		Central Gas Control calls Robert [redacted] (President & CEO UGI Utilities, Inc.) home phone	Call from 610-736-[redacted] to 717-786-[redacted]

Time	Duration	Activity	Source
13:19		Christa [redacted] (Gas System Operations Supervisor) calls UGI Dispatch and informs them that everyone on their list had been contacted	Call from 610-736-[redacted] to 610-736-[redacted] Christine [redacted] page 19, lines 14-15 (Sept. 15, 2017)[1]
13:29	2:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
13:31	1:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
13:40	2:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
After 13:40		Jose [redacted] (Manager Operations) spoke with UGI personnel on-site who informed him that they, together with the fire department, had began to check other houses and Kenneth Sean [redacted] (Mechanic II) confirmed on-site that gas was shut off to the area.	Jose [redacted] page 18, lines 1-25; page 29, lines 23-25; page 31, lines 14-18 (July 25, 2017)[1]
13:44	2:00	Kenneth Sean [redacted] (Mechanic II) receives a call from Keith [redacted] (Utility A - 2 Year)	Call from 484-955-[redacted] to 484-256-[redacted]
13:47	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) receives a call from an unknown person	Call from 717-342-[redacted] to 610-842-[redacted]
13:50	1:00	Kenneth Sean [redacted] (Mechanic II) calls from unspecified location to Jesse [redacted] (Utility A-III) cell phone	Call from 484-256-[redacted] to 717-205-[redacted]
13:50	8:00	Chester [redacted] (Sr Manager Engineering) calls from unspecified location to PHMSA Incident reporting line, Kevin [redacted] incident # 118291 (correct incident # 1182921)	Employee notes from day of event
13:53	3:00	Jason [redacted] (Senior Supervisor Operations-C&M) receives a call from an unknown person	Call from 484-256-[redacted] to 610-842-[redacted]
13:54	3:00	Kenneth Sean [redacted] (Mechanic II) receives a call from Norm [redacted] (Mechanic II)	Call from 610-842-[redacted] to 484-256-[redacted]
14:03	1:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
14:07	1:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
14:08	2:00	Kenneth Sean [redacted] (Mechanic II) calls his wife	Call from 484-256-[redacted] to 717-371-[redacted]
14:14		Chester [redacted] (Sr Manager Engineering) receives a call from Paul [redacted] PHMSA inspector on call	Employee notes from day of event
14:16	2:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
14:24	2:00	Kenneth Sean [redacted] (Mechanic II) receives a call from Darren [redacted] (Mechanic II)	Call from 717-317-[redacted] to 484-256-[redacted]
Approx. 14:30		Timothy [redacted] (Senior Supervisor of Construction and Maintenance) arrives on the scene and began assisting Jose [redacted] and Chris [redacted] in mitigating the emergency.	Timothy [redacted] page 8, lines 16-17 (July 25, 2017)[1]
14:40		Ben [redacted] from County Hazmat and a firefighter assigned by Chief [redacted] of Blue Rock Fire Co. along with Ken [redacted] (Combustible Gas Indicator) and Louie [redacted] (Flashlight) checked for gas readings at [redacted] and [redacted] Springdale Ln; all readings negative	Eric [redacted] records; Employee notes from day of event
14:57	1:00	Kenneth Sean [redacted] (Mechanic II) receives a call from Adam [redacted] (Utility A - 3 Year)	Call from 717-514-[redacted] to 484-256-[redacted]
15:00 - 23:00		Heath Consultants performs a walking leak survey on gas mains and services in designated area (map shows surrounding development)	Heath paperwork records
15:05		Chester [redacted] (Sr Manager Engineering) receives a call from Kalukelly [redacted] from NTSB	Employee notes from day of event

Time	Duration	Activity	Source
15:10	1:00	Jason [redacted] (Senior Supervisor Operations-C&M) receives a call from an unknown person	Call from 610-823-[redacted] to 610-842-[redacted]
15:17	1:00	Kenneth Sean [redacted] (Mechanic II) receives a call from his wife	Call from 717-371-[redacted] to 484-256-[redacted]
15:19	2:00	Jason [redacted] (Senior Supervisor Operations-C&M) receives a call from an unknown person	Call from 610-823-[redacted] to 610-842-[redacted]
15:30		Coroner on site, removes [redacted] (Mechanic III) from the area	Employee notes from day of event
15:38	1:00	Kenneth Sean [redacted] (Mechanic II) receives a call from Darren [redacted] (Mechanic II)	Call from 717-317-[redacted] to 484-256-[redacted]
~16:15		Kenneth Sean [redacted] (Mechanic II), Kelly [redacted] (Utility A-III), & Brandon [redacted] (Mechanic II) were asked by non-UGI officials on site to check on a suspected propane odor behind 206. Kenneth Sean [redacted] used Combustible Gas Indicator along the back of the property and did not get any readings.	Employee notes from day of event; Employee notes/witness from day of event
16:33	1:00	Kenneth Sean [redacted] (Mechanic II) calls Adam [redacted] (Utility A - 3 Year)	Call from 484-256-[redacted] to 717-514-[redacted]
17:30 - 18:45		Lou [redacted] (Utility A - 2 Year) (+ Mike [redacted] Safety and Compliance Inspector), Norm [redacted] (+ Tim [redacted] Operations Supervisor) leak checked w/ Combustible Gas Indicator inside of the homes along Springdale, except for [redacted] 206, [redacted] and [redacted] in the condemned area. Also gathered contact information. Did not have access to [redacted] or [redacted] Also disconnected the risers and plugged [redacted] and [redacted] to prepare for future air test.	Employee notes from day of event; Employee notes/witness from day of event
18:39	1:00	UGI Dispatch calls Kenneth Sean [redacted] (Mechanic II)	Call from 484-256-[redacted] to 484-256-[redacted]
21:44	13:00	Kenneth Sean [redacted] (Mechanic II) calls Johnathan [redacted] (Sales Representative II)	Call from 484-256-[redacted] to 484-663-[redacted]
22:30		Properties at [redacted] and [redacted] were checked again for inside leaks by Lou [redacted] (Utility A - 2 Year) with a Combustible Gas Indicator prior to electric turn on, zero readings.	Employee witness from day of event
23:00		Power is restored to all properties on Springdale Ln except for [redacted] 206, [redacted] by 23:00	Employee witness from day of event
23:08		David [redacted] (Director of Investigations from INA Inc.) arrives on site, receives direction from Dan [redacted] (Senior Manager Operations) on securing the site for the night.	Employee notes from day of event
23:10		Lou [redacted] (Mechanic III) arrives on site with Flame Ionization unit, meets with supervisor Tim [redacted] to review leak survey location. Lou leak surveys the shut down main on Springdale Ln from Burr Oak Drive to the condemned section near [redacted] and [redacted] Springdale. Survey times were 23:15, 00:15, 01:20, 02:25, 03:30, 04:30, 05:10, and 06:10. No gas readings were found.	Leak Migration Report; Employee witness from day of event
23:38	7:00	Kenneth Sean [redacted] (Mechanic II) calls Johnathan [redacted] (Sales Representative II)	Call from 484-256-[redacted] to 484-663-[redacted]

[1] **Source: NTSB Interview Transcripts**

Exhibit 4. Summary Timeline – On-Scene Activities Immediately Prior to the Explosion [1]

Based upon Timeline data of the SF Investigation and supplementary data obtained [2], a tabulation was compiled, as presented below, to a provide a brief summarization of key / significant activities that occurred immediately prior to, and including, the explosion at the subject residential dwelling [206 Springdale Lane].

Activity Summary	Timestamp	Source
UGI CCC received a telephone call from a civilian, who (shortly prior to making this call) had been located near the accident site [i.e., near 202 Springdale Lane, as indicated by the caller], to report a gas odor, in which the call data was correspondingly relayed to the UGI CDO.	10:26 am	UGI Timeline [3], and Interview Transcript[4]
UGI CDO - Service Dispatcher contacted a UGI Mechanic (field technician), and placed a request to respond to the site of the gas odor report.	10:31 am	UGI Timeline
The UGI Mechanic (field technician), who was notified by the CDO to respond to the site, arrived at the site of the gas odor report [202 Springdale Lane], the location of which was adjusted shortly thereafter to 206 Springdale Lane [which was the immediately adjacent property], in which the Mechanic began to address the reported gas leak.	11:00 am	UGI Timeline
Additional technical personnel from UGI, who were also supportive of the gas odor response effort, subsequently arrived at the site and began activities to further assess the situation, stop the flow of gas and coordinate activities with responders of other organizations as they arrived.		UGI [5], and Interview Transcript[6]

[1] Source: on-scene observations of, and field notations recorded by the SF Group Chair, and as further described.

[2] Data source of the subject tabulation was the individual Timeline data of UGI and BRFR (Exhibits 1 and 2), and data made available by the Lancaster County 9-1-1 / Dispatch agency, and as further described.

[3] UGI Timeline, in this Tabulation, [globally] refers to the UGI Timeline document, compiled by that organization, as provided in Exhibit 2 of this report.

[4] Source: NTSB interview conducted with the subject [9-1-1 caller] individual; see the transcript for details.

[5] Source: email correspondence to SF Group Chair, from the UGI participant of the SF Group, dated 4/20/2018, which provided supplemental information detail for the Tabulation.

[6] Source: NTSB interview conducted with a UGI employee [Mechanic] who had responded to the site to address the gas odor; see the transcript for details.

The resident / owner of the subject residential dwelling [206 Springdale Lane], who was in the dwelling at the time that the UGI personnel arrived at the site, was requested by one of the UGI personnel to immediately evacuate the subject property, in which that individual subsequently departed shortly before the explosion occurred.		Interview Transcript[7]
A request to respond Fire Department resources to 206 Springdale Lane, Millersville, as placed by UGI, was received by Lancaster County 9-1-1 / Dispatch [agency].	12:16:15 pm	Lancaster County 9-1-1 [8]
BRFR (Millersville Fire Station) was notified [9] by Lancaster County 9-1-1, with a request to respond resources [apparatus and firefighter personnel] to the scene.	12:16:56 pm	Lancaster County 9-1-1
The Command Officer [the Fire Chief] of the first BRFR apparatus responded [in a radio call] that he was enroute to the Millersville Fire Station.	12:18:41 pm	Lancaster County 9-1-1
The Fire Chief of the first responding BRFR apparatus [a Fire Engine, Unit 905, comprised of the Fire Chief and crew of 2 firefighters (at that time)], reported [in a radio call] to Dispatch[10] that they were "understaffed" [11] (and, thus, were unable to depart the Fire Station).	12:23:28 pm	Lancaster County 9-1-1
The Fire Chief of the first responding BRFR apparatus [Unit 905], comprised of the Fire Chief and crew of 3 firefighters [12], reported they [had departed Millersville Fire Station, and] were responding to the scene.	12:24:09 pm	Lancaster County 9-1-1

[7] Source: NTSB interview conducted with the subject individual; see the transcript for details.

[8] Source: Computer Aided Dispatch (CAD) documentation (and support documents), and related audio recordings [of telephone / service radio communications], of the incident, as made available by the Lancaster County 9-1-1 / Dispatch agency (to which, in this Tabulation, this source is [globally] referred to as Lancaster County 9-1-1).

[9] This notification process is referred to, in the Firefighter Services profession, as being "toned-out" to a response call.

[10] Dispatch (in this Tabulation) is a [global] reference to the Lancaster County 9-1-1 [agency], which also performs the dispatch services for the Lancaster County fire departments.

[11] Per the NTSB interview conducted with the subject individual [Fire Chief], the apparatus / crew was unable to immediately depart the Fire Station due to an "understaffed" condition of the apparatus (i.e., an insufficient number of firefighter crew had arrived at the Fire Station, such to provide the 'minimum manpower count' for the emergency call response).

[12] One additional firefighter arrived at the Fire Station shortly thereafter [making the "understaffed" notification radio call], in which the 'minimum manpower count' was then achieved, which allowed a departure from the Fire Station.

The Fire Chief of first BRFR apparatus [Unit 905] reported [in a radio call] to Dispatch that the Unit had arrived at the scene.	12:28:11 pm	Lancaster County 9-1-1
The Fire Chief [of Unit 905] reported to Dispatch [in a radio call] that there was an "active leak" [at the scene].	12:30:43 pm	Lancaster County 9-1-1
Upon arrival at the scene, the BRFR Fire Chief initiated on-scene response activities; the Chief [in the role as Incident Commander] performed a 'size-up' of the situation [13], in which the Chief conferred with a UGI employee (where the Chief was informed about what was occurring at the site), in which the BRFR firefighter personnel were also instructed accordingly [by the Chief]; the BRFR personnel laid-out a hose line, made a hydrant connection, prepared the pump panel [of the Fire Engine] for waterflow activation.		Interview Notes (of the SF Group Chair), and subsequent [recorded] Interview transcript[14]
A radio call by the BRFR Chief [Unit 905], to Dispatch, reported that an explosion had occurred [at the scene], and placed a request to dispatch additional BRFR and associated response resources to the scene.	12:32:14 pm	Lancaster County 9-1-1

-- End of Tabulation --

[13] Generally described, this 'size-up' process, in the Firefighter Services profession, refers to conducting a 'threat / risk assessment' (of the situation, based upon information [of the incident] available at that time), and, in concert with knowledge of appropriate firefighting response actions, then correspondingly identifying specific steps that were to be taken to address the 'threat / risk assessment' elements during the on-scene response actions.

[14] Source: NTSB interview conducted with the subject individual; see the transcript for details.

Exhibit 5. BRFR “Gas Leak on Springdale Lane After Action”

Gas Leak on Springdale Lane:

Notes/Questions:

- Question about the information provided the 911 center from the utility calling
- Question about the information provided to the responding apparatus from the call center
- Did the utility call anyone other than a required Call 1 call after confirming an active leak
- Why was the fire department not sent as part of the normal procedure response
- How do utilities do on-scene accountability

Lessons Learned:

- Apparatus parking is important
- Verify and check information even if from a utility on scene
- Terminology is different across the trades
- Fire Department focus/mission/goals is different than others working the scene
- Accountability of utility workers on scene difficult in a catastrophic event
- When an entire utility crew is disabled someone else must notify their home base
- Buildings affected by the blast have different mission requirements
- The blast zone effected buildings outside the original hot zone
- This scene changed within minutes very quickly from FD arrival
- Sole accountability for a very large zone is difficult, especially on nice days, with a public park walk way inside the original hot zone.

- Accountability of other utility worker(s) on-scene, if he didn't walk up, would have been his vehicle; with only a door sticker as an indicator, vehicles are the same color.
- Ramping up the command post is important
- Having met folks and worked with folks from the different agencies pre-incident is very helpful
- Having early on security of the scene helps with accountability
- Rotation of crews during long/hot events
- Plan for a media event
- Release of coordinated information between agencies
- It helped to have a one way in street
- Quickly turns into a medical needs event
- De-powering a large area for long periods of time creates a possible "special needs" list
- Enlist a building engineer earlier than later
- Events can go on for days/weeks
- Asking utilities to do something is difficult from the fire department

Exhibit 6. UGI “After Action Reports – Lessons Learned Reports”

UGI UTILITIES RESPONSE TO NTSB INFORMATION REQUEST
APRIL 17, 2018

NTSB Request No. 50: After Action Reports – Lessons Learned Reports

UGI Response:

The following actions were undertaken by UGI after the incident:

1. Immediately following the incident on July 2, 2017, daily leak surveys were completed on the mains and services in the development surrounding 206 Springdale Lane.
2. UGI also enhanced the response protocol to immediately address any leaks that were found, regardless of classification. There were (2) A leaks, (2) B leaks, and (1) C leak found during July 2017 which were fixed immediately.
3. UGI has replaced or abandoned all of the mains and services on Springdale Lane west of Burr Oak.
4. After close monitoring of the development, the leak surveys were reduced to a weekly frequency in mid-August, which has continued to present day.
5. System wide, UGI has also enhanced its leak survey processes in two ways. First, the criteria used to identify suspected mechanical tee locations has been reviewed and updated. Second, UGI has accelerated existing annual leak surveys of suspected mechanical tee locations to twice-annual leak surveys beginning in 2018.
6. On August 15, 2017, in accordance with established procedures, UGI held a "lessons learned" meeting following the July 2 incident on Springdale Lane. Attendees included representatives from the following organizations, Operations, Engineering, Damage Prevention, Safety, Training, Security & Facilities, Distribution Integrity, Standards, Dispatch, Legal, and Customer Service. The purpose of the meeting was to review the response of UGI to the incident and identify potential improvements to areas including dispatch, operational, or training practices. A general overview of the timeline of the events was reviewed based on the NTSB Preliminary Report on the incident.
7. Based on the lessons learned review of the emergency dispatch function, the following actions have been undertaken by the Company:
    a. Dispatch personnel were instructed on July 21, 2017 to affirmatively ask questions regarding terminating electricity when a first responder contacts them about an emergency situation.
    b. Mandatory Emergency Response Training was held with all Dispatch personnel in the Fall of 2017 and will be completed annually in the future.
    c. A project is in progress to ensure all incoming calls to Dispatch are recorded.
    d. Draft scripts were to be developed for dispatch/first responder communication mandating what information the first responder must convey to Dispatch.
    e. Guidelines will be developed on what actions Dispatch should take if a certain amount of time has passed since making contact with the first responder.
    f. UGI will investigate mobile technology that allows Dispatch, Engineering, and Operations access to the same information about a situation, with the ability to modify that information granted to approved personnel.

g. UGI will provide Dispatch with a means to electronically log notes about a call.
h. A comprehensive Dispatch policy will be added to the Gas Operations Manual/Emergency Plan.

8. Based on the lessons learned discussion, the following actions have been undertaken or will be undertaken relative to the Company's Emergency Response Training Program:
   a. UGI created an Emergency Plan Manual that will be maintained and accessed separate from the Gas Operations Manual. The Emergency Manual reemphasizes the first priority of protecting life and property, including specific criteria for evacuation including the definition of a 330' safety perimeter. Revisions have added further specificity to the actions to be taken in hazardous conditions and provide additional clarity to the discretion field personnel have in making decisions for making the situation safe. All revisions were included in the 2017 Emergency Response Training held with field employees and were completed by December 31, 2017.
   b. Electric shutdown procedures were included and reinforced as part of UGI's annual emergency response training.
   c. Existing classroom based training was supplemented with table-top simulated field situations. In addition, situational training exercises are being developed incorporating both gas detection equipment simulations and live gas in a controlled field environment. Training emphasis, as it is currently, will include identification of uncontrolled hazardous situations and appropriate actions to be taken to protect life and property. In addition to the enhanced field training, additional experience based criteria are being considered for first responders on call and duty supervisors. Considering the logistics which must be addressed, such as development of the enhanced training curriculum and simulation environments, the program framework will be developed in the Fall of 2017, incrementally deployed as content is developed, with full deployment by the end of 2018.
   d. UGI has conducted Incident Command System("ICS") facilitated video training, "ICS Awareness for Natural Gas Emergencies" across the service territory for Operations and Engineering Personnel. This module was developed and delivered by an external consultant with incident command expertise at Responding to Utility Emergencies ("RTUE") and a number of employees from UGI.
   e. UGI has established a team to plan and manage the development of a Central Training Facility. In addition to classroom and computer learning, the facility will include an Emergency Response Safety Town where employees can receive hands-on, scenario-based training. The facility will simulate real-world conditions with functioning underground natural gas lines, house meters, and a variety of gas appliances inside the homes.

9. Lastly, the following enhancements are in progress or planned to improve the Operations Response to emergencies:
   a. UGI will investigate additional mobile technology options to facilitate the improved sharing of information in the field, such as customer lists and system maps.
   b. UGI has ordered vests to identify command roles during emergencies.
   c. UGI has acquired an Incident Command/Training Trailer.

d. UGI developed decals listing specific evacuation criteria to place on gas detecting equipment.
e. As part of the ICS training and Emergency Plan, UGI has developed a first hour checklist to assist with responding to emergencies.
f. UGI has also distributed AEGIS Insurance Services Inc. emergency response tip cards which were placed in company vehicles and circulated a technical advisory reminding employees of the key make-safe actions to be taken during an emergency.
g. UGI included in its Emergency Plan the mandate for all personnel to check in and out of an incident site. A designated area for sign in and media activities will also be identified during an emergency as ICS dictates.
h. ICS training will reinforce the roles and responsibilities with Emergency Response personnel. During an emergency, the tasks completed will be documented and transferred to replacement employees as they arrive on site. There will also be procedures to hold daily meetings with all parties to discuss and understand goals for the day.
i. UGI will create a manpower area near the incident site from which fresh crews are dispatched and a rehabilitation area for previously dispatched crews.
j. During incidents similar to Springdale Lane, UGI will make efforts to dispatch two UGI employees to participate in customer/premise canvassing activities to ensure that there is a resource to document relevant activities.

Please note that UGI is driven to continuous improvement and will continue to incorporate changes into its procedures and training, as it has in the past, in the ordinary course of business.

Exhibit 7. BRFR - Proactively Employed Initiative Measures / Actions - Implemented Subsequent to the Accident [1]

[1] Note – the described documentation is provided as received, in its entirety, from the Party participant, to which no effort was undertaken by the NTSB to validate or affirm that the identified Initiatives, as described by the Party participant, were fully implemented.

Blue Rock Fire Rescue Initiatives as follow-up to the

Springdale Lane Natural Gas explosion on July 2, 2017

First and foremost, we, Blue Rock Fire Rescue, believe there should be a technical working group established including representatives from the following groups: Lancaster County Fire Chiefs Association, Lancaster County Police of Chiefs, Lancaster County Emergency Medical Board, Lancaster County Emergency Management, Lancaster County-Wide Communications and UGI Corporation to address many health and safety issues that arose due to this tragic incident.

Blue Rock has an existing SOG: Natural Gas Emergency Operations, SOG 4003.

In reviewing this SOG, we have determined that we need to add a section on "Undetermined Gas leaks."

We will create a technical working group to create this new section but have the below as a starting point for the discussion

In this section we will bullet the following:

- Establishment of Incident Command per other SOGs and the National Incident Management System, to include utility company personnel working at the scene
- Proper accountability of all personnel working at the scene to include but not limited to emergency responders, private contractors, utility company employees
- Proper staging of ALL vehicles away from the area of any suspected natural gas leak
- Proper evacuation of any area, residents, bystanders in an area of an unknown natural gas leak
- Timely and proper dispatch immediately upon notification of any unknown potential Natural gas leak
- Metering of all areas of a suspected natural gas leak, both within and outside structures
- Requesting of the utility company to immediate close any remote valves when there is an unknown leak from an unknown source or area
- If necessary evacuate all personnel, including utility company employees out of the immediate danger zone

In addition to the proposed revisions to the above SOG, we have also completed an After Action Review process, in which we have come up with the following proposed initiatives, some of which, as documented, have already been imitated or begun:

- Meet with Utility companies and Lancaster County-wide Communication, LCWC, (9-1-1) to ensure that the fire department is always notified immediately (in parallel) of any known or suspected natural gas leak (which did not occur in this incident)
    - In this incident it was well over an hour, which could have been even more catastrophic then this tragic event already was, producing potentially more loss of life
    - Make sure that all information given to the 9-1-1 center is conveyed to the fire department
    - Make sure that a system exist in which all information given to the utility company is conveyed to the fire department

    - There NEEDS to be communications from the utility worker on the scene to the incident commander/emergency services
- Ensure that LCWC has a SOG that addresses the above issues of communication and dispatch protocol
    - The NTSB specifically addressed the issue of the written detail from the LCWC documents about the incident. There appeared to be gaps in what was logged.
    - Is there a protocol for extra telecommunicators to assist at major events
    - Is there a protocol for what is written in the LCWC Log during an active incident/major incident?
- Ensure that the utility companies have a SOG that addresses the above issues of communication and dispatch protocol
- Ensure that a system is in place in which all personnel working on the scene are operating within the Incident Command System (NIMs)
    - All personnel, including emergency responders and utility company employees must properly communicate with the Incident Commander
    - Ensure that all personnel, including emergency responders and utility company employees, log in and have a system of accountability (Identification tags)
    - Blue Rock Fire Rescue will provide accountability tags for ALL Manor Township and Millersville Borough law enforcement, so that they can give their accountability tags to the accountability officer working within the ICS.
- Ensure that there is training with the emergency response community and the utility in which a formal understanding of the ICS system is explained and common terminology can be identified.
    - In this incident, the utility workers and responders were using terminology such as percentages and number, which were in conflict, as the sides had different understanding of what some of these “numbers” meant.
- We plan to work with the NTSB Training Branch to host a course on Media Communications at large scale incidents, inviting all local public sector and select private sector organizations to the training. (Contact has already been initiated with Training Branch)
    - While the emergency services were coordinated with their media message, the utility company did news releases and news conferences sometimes outside the formal ICS structure
- We believe there is a need locally to be educated on “how to interact with federal investigators.” While the overall results have been very good, there was a steep learning curve, having never been involved with a high level federal investigation previously.
    - This training will be beneficial for local government, local level emergency management, law enforcement, fire service and emergency medical service agencies.
- There needs to be yearly training between the emergency services and the utility workers who “actually respond” to these events as their day to day job, not just with utility company management
- Utility companies NEED to be responsive to the request and needs of the emergency services.
    - Tunnel vision as to their core mission is many times a detriment to the overall mission by the incident commander
    - Utility workers (those first on scene and working) MUST understand the bigger picture and work with the Incident Commander

Exhibit 8. UGI - Proactively Employed Initiative Measures / Actions - Implemented Subsequent to the Accident [1, 2]

[1] Source: to supplement the prior UGI Initiatives List transmittal dated 5/25/2018 (as cited in the SF Factual Report § 7.2), an updated Initiatives List, and supplemental data supportive to resultant NTSB questions, was provided in a series of email correspondence from the UGI participant to the SF Group Chair, dated 10/18-29/2018, inclusive, to which a final transmittal submission was received from this Party participant on 10/31/2018, wherein acceptance of the subject UGI documentation is stipulated as a 'late-received replacement submission' to the [total of] four prior Initiatives List transmittals (all containing "draft" and 'confidentiality constraint' notations) as issued by UGI.

[2] Note – the described documentation is provided as received, in its entirety, from the Party participant, to which no effort was undertaken by the NTSB to validate or affirm that the identified Initiatives, as described by the Party participant, were fully implemented by the Party participant.

UGI UTILITIES RESPONSE TO NTSB INFORMATION REQUEST

NTSB REQUEST NO. 152:
UGI after accident initiatives

UGI RESPONSE AS OF OCTOBER 31, 2018: The UGI procedures and programs that were in place at the time of the accident met or exceeded applicable regulatory requirements, as well as industry standards. While no deficiency existed with respect to UGI's procedures and programs, following the events of July 2, 2017, and as part of UGI's ongoing efforts to proactively continue to improve and enhance its commitment to safety, UGI implemented the following improvements.

UGI took the tragic events of July 2, 2017 as an opportunity to reinforce and enhance the procedures and programs specifically revolving around emergency response to ensure employee preparedness, competence, and confidence when responding to emergency situations. Enumerated below is a summary of emergency response enhancements UGI implemented across departments and job functions.

All initiatives listed are as of the date of this document. Some initiatives are ongoing.

1. **Immediately following the accident, UGI instituted the following limited duration initiatives to manage the integrity of the system on Springdale Lane from the intersection of Burr Oak Drive west to the end of the cul-de-sac**:

   - A daily walking leak survey with a Flame Ionization (FI) unit on the main will be performed until all known mechanical tees are remediated or replaced.

   - Work commenced to remediate or replace all known mechanical tees on Monday, July 10, 2017. This work has been completed.

   - The existing gas main will be replaced in its entirety as soon as necessary permits and permissions have been received. This work has been completed.

     UGI has also taken the limited duration actions below to manage the integrity of the surrounding neighborhood defined by the boundaries of North Duke Street, Blue Rock Road, Letort Road, and Little Conestoga Creek.

   - Perform a daily driving leak survey of the main in the neighborhood as defined above.

   - Perform a daily 8-hour walking leak survey with a Flame Ionization (FI) unit of the main in the neighborhood as defined above.

     Any leak that is found through the surveys listed above, regardless of classification, will be immediately repaired and reported to the Pennsylvania Public Utility Commission.

2. **<u>Pipeline & Public Safety (P&PS) Enhancements</u>:** Since the events of July 2, 2017, the PP&S group has undertaken several training initiatives to emphasize the incident command system. Outreach efforts with external Emergency Response departments has also increased to strengthen the awareness of natural gas pipeline safety. Below is a summary of these enhancements.

- UGI has enhanced and expanded their gas safety training for external emergency responders by developing the "A Shared View" presentation. The presentation provides training and discussion on the following:

    - Properties of Natural Gas
    - Odorant and Rotten Egg comparison
    - Components of Natural Gas Systems and their purpose
    - Controlling Ignition Sources
    - ROW's and Pipeline Markers
    - Gas valve operation do's and don'ts
    - Responding to CO emergencies
    - Responding to Natural Gas emergencies and odors
    - Audio of 3rd Alarm Philadelphia gas explosion from 2011
    - Lafayette Indiana Incident Case Study
    - UGI's annual Paradigm Public Awareness meetings
    - UGI's Responding to Utility Emergencies (RTUE) online training programs for gas and electric
    - 811 and Pennsylvania 811 Firehouse Sign contest

- Paradigm Liaisons meetings with pipeline stakeholders were enhanced post-accident to include CORE – Coordinated Response Exercise, where the Operators in attendance mixed in with the stakeholders (Emergency Responders & Public Officials) and worked through a series of Emergency Response/Incident Command decisions much like a table top exercise. This enhanced approach was interactive and required cross functional participation and engagement for responding to simulated emergency situations.

- On August 21st, 2017, UGI held their Natural Gas Safety program, "A Shared View" at Millersville University. The event was coordinated through Blue Rock Regional Fire District and was offered to other mutual aid companies in the region as well as the Lancaster County 911 Center. The Pennsylvania PUC Inspectors attended along with (67) other Emergency Services personnel.

- UGI has increased advertising frequency to monthly in the PA Fireman's Magazine promoting the Responding to Utility Emergencies "RTUE" (now called Energy Emergencies) product and related information on the site. Energy Emergencies (previously RTUE) is an external facing curriculum that provides Emergency Management personnel the ability to train, test and certify in responding to Natural Gas & Electrical Utility emergencies at no cost to emergency responders. The PA Fireman's Magazine is distributed monthly to all Fire Houses in PA and adjoining states and is a product of the Lancaster County Fireman's Association.

- UGI has held executive and management level meetings since July 2017 with PPL Electric, the electric Utility serving the Millersville area, to refine and enhance electric shutdown protocols with an emphasis on public and employee safety.

- On November 30, 2017, three Incident Command System "ICS" breakout sessions were conducted at the semi-annual UGI Operations Supervisor Meeting. These were conducted by the P&PS group in coordination with external facilitators from Energy Emergencies (previously RTUE) which included two current active Fire Chiefs and Fire Academy Training Staff.

- UGI has designed, purchased, and received a Pipeline & Public Safety – Incident Command Trailer that is capable of being used at various sites to enhance outreach and training opportunities with emergency responders, public officials and excavators. This trailer will also be utilized internally in the event of a warranted emergency. This trailer will promote the ICS protocols and enhance UGI's efforts in responding to an emergency.

- UGI is continuing the process of implementing the Everbridge mass notification system that can be used in the event of various emergency situations. UGI integrated a single sign-on feature which will allow company personnel to log into the system and update personal contact information using their company credentials. Although the system has not been fully deployed yet, message testing with an internal test group (UGI Ambassadors) and scenario templates is planned to be completed by end of the calendar year.

- As a central point for external Emergency Responders, Excavators and Plumbers to schedule Gas Safety Training, a scheduling tool has been added to the UGI Web site, effective July 2018. This tool will provide external Emergency Responders, Excavators and Plumbers the ability to register for a training session covering any of our (3) primary safety messages:

    - Natural Gas or Electric Emergencies
    - 811 Call Before You Dig and reducing damages
    - Cross Bore Awareness for drain cleaning

- UGI Presented their Gas Safety module at the November 2017 PFESI – Pennsylvania Fire & Emergency Services Institute Annual Conference. UGI is a prime sponsor for the 2018 Conference and anticipates doing a presentation at that conference.

- In December 2018 UGI held a Gas Safety presentation, "A Shared View" at the Lancaster County Fire Chief's Association meeting.

3. **Training and Field Compliance Enhancements:** UGI undertook several enhancements in an effort to increase the skill set of our employees when responding to an emergency. Below is a summary of these enhancements.

- Skilled UGI Staff (encompassing Operations, Engineering, Training, & Pipeline Safety members) in collaboration with Energy Emergencies, developed an interactive video module covering incident command. This lesson was facilitated by UGI P&PS Staff while the core Incident Command Structure "ICS" content is delivered via video by external facilitators. The video lesson is titled "ICS Awareness for Natural Gas Emergencies" and covers key aspects of UGI First Responder actions and decisions, the ICS structure and role assignments and the three Priorities of Emergency Response; Life Safety, Incident Stabilization, Property Conservation. To date, 716 UGI employees have taken this instructor facilitated video lesson.

- UGI developed and delivered an enhanced scenario-based Annual UGI First Responder Refresher Training and Requalification Program (Operator Qualification for Covered Task #27, Investigating Leak/Odor Complaints). During classroom training, breakout groups participated in tabletop emergency response scenarios. Situational training exercises are also being developed in order to reinforce UGI first responder skills in emergency situations.

- UGI developed and distributed Emergency Response stickers to be placed on each Gas Measurement Indicator "GMI" used by UGI first responders. These stickers provide responders visual reminders and guidance for actions to be taken when encountering atmospheric readings of 20% LEL or greater. They focus on reinforcing life safety, eliminating ignition source/electric shutdown, and use of UGI's First Hour Check List, First Responder Actions checklist. The stickers are placed on GMI's utilized by UGI emergency responders to further reinforce their role and expectations in an emergency situation. Please refer to Standards & Procedures enhancements below for a detailed summary of the First Hour Check List, First Responder Actions checklist.

- As an enhancement to prior emergency response initiatives, UGI ensured all UGI Emergency Response vehicles contained the AEGIS Insurance Services Tip Card Visor handouts covering Emergency Response. The Natural Gas Emergency Tip Cards are a set of 5 cards to assist UGI first responders in determining the proper actions to take when responding to an emergency. These tip cards cover the topics of:

    - Gas Explosions
    - Inside Gas Leak Investigations
    - Outside Gas Leak Investigations
    - Inside Carbon Monoxide Leak Investigations
    - Facility Damages

  UGI utilizes these tip cards to reinforce general emergency response guidelines for its emergency responders.

- UGI Issued Technical Advisories: T2017-16 Blowing Gas Procedures, T2018-03 Gas Emergency Shutdown, and T2018-05 Electrical Shutdown for Gas Emergency Response to further emphasize emergency response. Please refer to Appendix A for a copy of these three technical advisories. UGI will include Technical Advisories in the Gas Operations Manual and Emergency Plan as links in an appendix in each manual.

- All UGI Compliance Inspectors attended the National Safety Council Incident Investigation – Root Cause Analysis (RCA) course in February 2018 to increase their knowledge of performing and documenting incident investigations. The course included Incident Investigation Kits, Incident Investigation Report, Causal Factors and Corrective Action Forms, and Five Questions to Ask. The form to document RCA's has been digitized and is centrally stored.

- UGI developed and implemented a Mechanical Tee Remediation Inspection SharePoint application for the field compliance inspectors to audit and record ongoing remediation procedure compliance.

- UGI's (3) Gas Leak Simulation Fields have been upgraded at the Lewistown, Reading and Wilkes-Barre locations. The upgrades include the placement of mock-up buildings, the installation of new simulated piping and associated safety equipment and the installation of curbing, signage, and sub-structure items (surface-placed manholes, curb boxes and mock-up gas services). The Lewistown installation includes the placement of gas appliances to support live gas turn-on and light-up training and simulations.

- UGI has expanded and further enhanced its Gas Leak Investigation Training Module. This new multi-day program has been developed for UGI first responders and will utilize the Gas Leak Simulation Fields for both initial first responder training and for remedial training on gas leak investigations. In association with this training session is the use of new technology, featuring a Combustible Gas Indicator (CGI) capable of displaying variable gas readings and controlled by the Training Instructors tablet PC. Our Technical Instructors can use this training aid to simulate inside leak scenarios without the use of actual natural gas sources.

4. **Pipeline Facility Enhancements:** UGI undertook several enhancements to ensure the safe and reliable delivery of natural gas to our customers.

- UGI is proactively remediating the mechanical tee installations of all single family homes in the Springdale Lane Development. To date, 99 total mechanical tees have been remediated or replaced in the development. In addition to the remediation process, UGI has replaced the main on Springdale Lane from Burr Oak Circle to the cul-de-sac at the end of Springdale Lane which encompasses approximately 994 feet of distribution pipeline. UGI also replaced a portion of main in the townhome section of the development.

- UGI has increased remediation activity of mechanical tees throughout our distribution system, remediating or replacing approximately 2,577 total mechanical tees since the accident and through Oct 4, 2018.

- UGI continues to research main and service facilities suspected of utilizing mechanical tee installations. As UGI refines the data, a list of potential locations is generated and prioritized to facilitate the removal of mechanical tees from its distribution system.

- UGI is piloting a camera project to inspect gas mains utilizing an inline camera system capable of identifying and viewing service taps and collar depths in the main.

5. **Dispatch Enhancements:** Since the events of July 2, 2017, UGI enhanced its dispatch procedures and protocols. These enhancements streamlined dispatch processes in order to proactively identify the need for electrical shutdown and additional help. Listed below are the Dispatch Enhancements made or in the process of being implemented since the events of July 2, 2017.

- UGI Dispatchers receive Annual Emergency Response and ICS Training to familiarize them with emergency response through the viewpoint of an emergency responder.

- To serve as a reminder to UGI first responders, UGI Dispatchers are instructed to ask UGI first responders if they require the interruption of electric facilities when responding to an emergency.

- As an enhancement to their existing dispatch GPS technology utilized in MobileUP, UGI recently deployed Verizon Connect software for GPS fleet tracking. UGI Dispatchers utilize this GPS location tool to help locate and identify the closest qualified UGI first responder for emergencies in the event additional manpower is necessary.

- As an enhancement to existing phone recording technology, all UGI Dispatcher landline phone lines are recorded utilizing the NICE phone recording server.

- UGI enhanced their landline phone call logs by utilizing a third-party software application, ShoreTel Brightmetrics.

- In addition to company issued cell phones, to enhance communication between the field, Central Dispatch, and local operating offices, UGI is conducting a study to determine if two-way radio communication is feasible as the primary mode of communication throughout UGI's operating areas.

6. **Standard & Procedure Enhancements:** UGI has created an Emergency Plan document separate from the Gas Operations Manual ("GOM"). UGI's Emergency Plan contains similar content as previously included in GOM 60.50 – Emergency Plan. The procedures have been revised to add further clarity to emergency response situations and actions

undertaken. Please refer to Appendix B for a detailed summary of the changes made to UGI's Emergency Plan. A summary of changes made include:

- UGI developed a "First Hour Check List, First Responder Actions" checklist as an appendix to its enhanced Emergency Plan. This checklist serves as a handy safety reminder for UGI emergency responders arriving at the scene of an emergency and reinforces the principals of protecting the public and all personnel responding to an emergency. In this checklist, UGI emergency responders are reminded of the important steps to take within the first hour of arrival, such as evacuating the public, identifying the need for additional resources, communicating with Emergency Departments/Incident Commander, and the internal transfer of incident command. Please refer to Appendix C for a copy of this checklist.

- Updating procedures to include safety perimeter criteria. This perimeter is situation dependent, but provides additional guidance for removing the general public away from a natural gas emergency.

- UGI reinforced the discretion UGI first responders have to shut down a pipeline. Existing procedures prior to the events of July 2, 2017 empowered UGI first responders to act appropriately should they feel that life and property were in imminent danger. To reinforce this responsibility, UGI issued Technical Advisory T2018-03 "Gas Emergency Shutdown". This advisory identified prudent actions for UGI first responders during gas leak investigations for the emergency operation of system valves.

- UGI enhanced its emergency response investigation procedure to further define the distinctions between a controllable and non-controllable incident. This revised definition is coupled with actions to be taken by UGI first responders in each circumstance.

- The UGI dispatch procedures were revised to provide additional guidance and expectations to UGI first responders which further enhance their preparedness.

- UGI clarified and specified in its operating procedures scenarios where electrical power (which can be considered a source of ignition) shall be shut down, including a form to collect the information to be provided to Central Dispatch to facilitate the request.

- UGI created two checklists for leak investigations: EP Appendix G2 Inside Leak Checklist and EP Appendix G3 Outside Leak Checklist.

7. **911-Related UGI Initiatives:** To enhance safety and ensure 911 emergency responders are timely notified, UGI will implement the following initiatives:

- UGI will expressly identify in its emergency response procedures specific emergency situations where immediate 911 notification is required by UGI personnel.

- UGI will review and update its dispatch procedures to include a decision matrix which will identify situations and keywords where immediate 911 notification is required.

- UGI will survey peers within the industry, Emergency Response subject matter experts, and other stakeholders to insure the Company's practices are in line with industry best practices.

8. **Safety Culture Assessment Project:** In June 2018 UGI began an engagement with DuPont Sustainable Solutions ("DSS") to assess our safety culture, efficacy of safety related initiatives and incident investigation process, and to create a unified safety brand. The assessment included a comprehensive evaluation that provided a baseline to understand the current state and the development of an improvement strategy to advance the culture, systems and processes as part of a world class safety program.

- The safety perception survey resulted in 1,366 respondents, or 81% response rate across UGI.

- DSS visited ten different UGI locations and conducted interviews and field visits with nearly 200 employees at all levels of the organization.

- Safety branding and communication sessions were held with Executive leaders, safety leaders, Union leaders, operations management and front-line supervision to develop UGI's internal safety brand.

- UGI is currently working with DSS to develop a long-term improvement strategy that focuses on safety governance and safety leadership skills and for employees throughout the organization.

TECHNICAL ADVISORY

Blowing Gas Procedures
Released: October 5, 2017

When operating motorized vehicles, tools or equipment in the vicinity of escaping natural gas, good judgement and prudent precaution should be taken to prevent accidental ignitions or similar incidents. Like other sources of ignition, internal combustion engines should be kept a safe distance and a safe perimeter should be established at each work site. Continuous monitoring of atmospheric readings should be taken with a combustible gas indicator. Consider the following factors at any given work site to determine and establish a safe work zone and always consider changing conditions when placing vehicles and equipment in the work zone:

- **Controlled or uncontrolled escaping gas (venting or leaking)**
- **Nature of the gas leak, including the pattern of dispersion and exposure of the facility**
- **Location of the leaking facility (subsurface, surface or above the surface)**
- **Volume of gas leaking and pressure system involved (low, medium or high pressure)**
- **Prevailing wind direction and weather conditions**
- **Access to utilize intrinsically safe and/or pneumatic tooling on the leaking facility**
- **Proximity to roadways, highways, buildings and pedestrians**

Always utilize the proper PPE and ensure that fire extinguishers are in proper working order and placed at the ready when working in the proximity of escaping gas. In addition, ensure that operators of non-UGI vehicles and equipment near the work zone are aware of the potential hazards and directed accordingly."

Consider cordoning off the area of potential hazard to prevent entry of ignition sources.

"Keep vehicles and equipment clear of possible gas leak sources."

Critical Reminder: Gas Emergency Shutdown

Effective Date: 3/1/18
T2018-03

PURPOSE: This advisory identifies prudent actions for first responders during gas leak investigations for the emergency operation of system valves and other considerations to affect a shutdown. It is provided as a reminder to steps outlined in detail in the UGI Emergency Plan procedures.

SCOPE: The scope covers response to both natural gas and propane leaks and focuses on shutting off the gas supply when Life Safety could be compromised. "Make safe" means taking actions that eliminate the hazards for employees and the public. The first priority of emergency response is Life Safety and may require evacuating people from the area depending on the nature of the leak.

SYSTEM SHUTDOWN METHODS:

- Closing valves is the generally preferred method of shut down, especially when rapid isolation is needed to protect people and property.
- On-site employees and supervisors who are familiar with the system are authorized to close valves to make the situation safe, **without waiting for engineering approval.**
- **If it is not clear which valves are needed to isolate the pipeline**, contact Dispatch or Area Engineering to evaluate which valves need to be closed or what other steps might be required to affect a shutdown.
- The Sr. Area Engineering Manager or designee shall determine the appropriate in-line valves to close and isolate the system. These valve numbers and their location shall be promptly communicated to field personnel and to Central Dispatch.
- As required, request Dispatching to send additional employees if needed to isolate the system.

Considerations for gas system shutdown include:

- Imminent Danger from a Hazardous Condition
- A Rapidly Migrating or Widespread Leak
- A Mechanical Tee Failure
- Blowing Gas Threatening Life Safety
- Mitigation of Potential Property Damage

For full details on Emergency Response and Gas Leak investigation refer to the Emergency Plan on the Operations page @ InsideUGI
https://ugi.sharepoint.com/department/operations/emergencyplan/SitePages/Home.aspx

DCA17FP006 – Millersville – NTSB
NTSB-UGI-04693

Electrical Shutdown for Gas Emergency Response

Effective Date: 3/26/18
T2018-05

PURPOSE

Electrical power shall be shut off to the emergency site (including back-up electrical sources such as whole house generators or solar panels) when there is an uncontrolled gas migration or accumulation which results in any of the following conditions:

- Any gas reading in the atmosphere of multiple buildings in the leak area.
- Gas readings at or above 20% LEL in the atmosphere of a building.
- Situations in which a repeatable 80% LEL gas reading is found in manholes or ducts.
- Any time evacuations have been initiated by on site UGI personnel, except when the evacuation is only in response to Carbon Monoxide readings.
- Blowing gas situations where overhead electrical lines could cause ignition.
- When access cannot be gained to a building where an odor complaint was reported and inside gas readings cannot be verified.
- **Imminent danger exists in the judgment of UGI field personnel.**

SCOPE

The prevention of accidental ignition from electrical sources.

PROCEDURES

Requests to have the electric shut off should be made through the UGI Central Dispatch Office. Information to provide Central Dispatch includes the following:

- The location of the incident as precisely as can be determined. This may include street addresses, and municipality, nearest cross streets.
- Electric utility pole numbers or underground pad-mounted transformer identification numbers. **(See page 2 for examples and suggestions).**
- The nature of the emergency.
- If applicable, the number and type (fire, police) of emergency personnel at the event location and a contact number of the incident commander.
    - If power has already been shut off, or has previously been requested to be shut off by emergency responders, communicate to Central Dispatch the name, telephone number of the person who made that request and the time of the request.
    - Central Dispatch will record this information and contact the electric provider to ensure the request to have the electric cut off has been communicated.

Electric Utility Facility Number

Wooden distribution pole with standard PPL grid location of 58542s47030.
Most pole tags are in yellow or gray/silver and will be shown in two rows like the image to the left. The designation standards are 5 digits, then a letter (either N or S), followed by another 5 digits. Depending on where in PPL the device is located the letter on the second row should be either N (north) or S (south).
UG padmounted transformer with standard PPL grid location of 58605s46980.
Most residential subdivisions have underground construction and are serviced by what are referred to as padmounted transformers. Below is an example of what a padmount tag would look like. The naming convention is the same as a pole.

The ID number can usually be found at a height of 6 feet from the ground.
There are many types of utility pole identifiers as shown, and sometimes you will find more than one row of numbers on a utility pole. If you should happen to find more than one row of numbers on a utility pole always document all numbers or letters from the top most or left most number or letter. This information with the nearest location; street, city, E, W, N, S, in front of building number, etc.

The correct pole # is as indicated, 36520.
When in doubt document:
Top Row: 36520
Second Row: 13
Third Row: 0249
Fourth Row: 013

First Energy-Pole # 34197-36580
Pennsylvania First Energy Companies

- Met Ed
- Penelec
- Penn Power
- West Penn Power

Emergency Plan EP 3.1
Please review the Emergency Plan referenced above on the Operations page on *Inside UGI* for details, or contact a supervisor.

Appendix B: Detailed Summary of Emergency Plan enhancements.

1 Introduction and Levels of Emergencies
- 1.1 Emergency Plan Introduction
- 1.2 Levels of Emergencies ****New Document****

2 Receiving and Classifying Emergencies
- 2.1 Call Center Procedures ****New Document****
- 2.2 Gas Central Dispatch Procedures ****New Document****
- 2.3 Gas Control Procedures ****New Document****

3 Gas Emergencies
- 3.1 Gas Leak Investigation
  - Define make safe and associated actions, including actions required to shut down gas quickly
  - Identify criteria for electrical (ignition source) shutdown
  - Identify information to be provided to Central Dispatch for electrical shutdown
  - Identify actions to be taken when arriving on scene, including locating the vehicle in a safe area
  - Evacuating structures – Identify criteria and distance (330 feet) to keep displaced occupants a safe distance away from the area involved
  - Identified actions to keep personnel safe during leak investigation
  - Now includes new checklists (see Appendices G.1, G.2, G.3 & G.4)
- 3.2 Gas Explosion and/or Fire
  - Identify actions to take when arriving on-scene of a fire or explosion
    Identify with whom to make contact upon arrival (emergency responders, local officials, etc.)
  - Responsibilities when arriving on the scene of a fire or explosion
  - Actions to take to preserve life and property
- 3.3 System Overpressure
  - Identify actions to be taken for various levels of system overpressure situations
- 3.4 Emergency Shutdown and Loss of System Pressure
  - Identify response criteria for the different conditions, including how to identify those conditions
  - Actions to be taken in the event a loss of system pressure or emergency shutdown occurs
  - Identify actions to be taken in order to restore service
- 3.5 Natural Disaster
  - Converted to new format and enhanced
- 3.6 Carbon Monoxide
  - Converted to new format and enhanced
  - Lowered the minimum CO concentration in air to trigger evacuation from 200 PPM to 100 PPM
  - Now includes a new checklist (see Appendix G.5)
- 3.7 LNG Emergencies ****New Document****
- 3.8 Propane Emergencies ****New Document****

3.9 Gas Supply Emergencies **New Document**
3.10 Gas Emergency Training
- Converted to new format and enhanced
- Now includes requirements for ICS training (ICS 100 and ICS 200 modules) and Awareness for Natural Gas Emergencies training module (developed by UGI in cooperation with Mike Callan)
- Identified effectiveness measures

4 Environmental Emergency
4.1 Environmental Emergency
- Updated to include reference to the Emergency Plan and environmental requirements

5 Suspicious or Threating Activities
5.1 UGI Owned Building Evacuation Procedure
- Converted from the UGI safety manual and updated to now include evacuation minimum distances of 330 Feet, where applicable.

5.2 Bomb or Other Threats' Response Procedure **New Document**
5.3 Active Shooter Response Procedure **New Document**
5.4 Workplace Violence Response Procedure **New Document**
5.5 Physical Security Breach Response Procedure **New Document**
5.6 Cyber Security Breach Response Procedure **New Document**
5.7 National Emergencies' Response Procedure **New Document**

6 PHMSA Reporting
6.1 Incident Reporting
- Converted to new format and enhanced
- See Appendices F.1, F.2, F.3 and F.4

6.2 Safety Related Condition Reporting
- Converted to new format and enhanced
- Now includes Appendix F.5

8 Liaison with Outside Agencies
8.1 Liaison with Emergency Response Agencies
- Converted to new format and enhanced

8.2 Mutual Assistance
- Converted to new format and enhanced

Appendices
A. Emergency Contact Matrix
B. Emergency Contact Information
C.1 Emergency Material
D. Mutual Assistance
F.1 DOT Reportable Incident Flow Chart
F.2 Guidelines for Notifications
F.3 PA UCTA-8 Accident Report Form
F.4 MD EN-6 Utility Accident Investigation Report
F.5 Safety Related Condition Table
G.1 1stResponder – First Hour Checklist **New Document**

G.2 Indoor Leak Investigation Checklist ****New Document****
G.3 Outdoor Leak Investigation Checklist ****New Document****
G.4 Electric Shutoff Information ****New Document****
G.5 Carbon Monoxide Checklist ****New Document****

Energy to do more®	**FIRST HOUR CHECKLIST FIRST RESPONDER ACTIONS**	**APPENDIX G.1**

- ❑ **Approach the scene with caution wearing appropriate PPE**
- ❑ **Consider vehicle placement in relation to the report or observations**
- ❑ **Is there a Hazardous Condition Present?**
  - ❑ **If Yes** – is Evacuation of the occupants necessary? Direct persons to evacuate approximately 330 feet from the affected structure, or to an area as determined by the Incident Commander.

    When in Doubt, Get them Out! (Life Safety)

- ❑ **Single resource on site - Notify Dispatch of conditions and request they**:
  - ❑ Notify 911 if there are injuries, fire, or other help is needed.
  - ❑ Dispatch additional UGI resources (tell them what is needed and where to report).
  - ❑ Notify electric power company if power needs to be cut.
  - ❑ Notify 811, if pinpointing or excavation activities are needed.
  - ❑ Establish status update interval with Dispatch and continue investigation.

- ❑ **Is 911 (Emergency Services) on the scene – If Yes**:
  - ❑ Identify yourself to the Incident Commander (IC)
  - ❑ Discuss what actions have been taken and what you will be doing.
  - ❑ Confirm if any evacuations have taken place. Request assistance to evacuate additional occupants if necessary.
  - ❑ Discuss establishment of an appropriate Safety Perimeter and deny reentry. *Emergency Services will generally start at 330' for the Public.*
  - ❑ Let the Incident Commander know what additional resources were requested, and the estimated time of arrival.

- ❑ **Are additional non - UGI resources needed?**
  Type: Locksmith, Other Utilities, Leak Survey, Environmental, etc.

Transfer of Command Checklist: *Communicate the following where applicable*

- ❑ Incident history (what has happened) (Where is the gas?).
- ❑ Review of the scene.
- ❑ Any severe safety considerations or limitations.
- ❑ Incident potential for escalating or getting worse.
- ❑ Priorities and objectives (what you and the Incident Commander want to accomplish).
- ❑ Current plan (what you are doing to meet the objectives).
- ❑ UGI Resource(s) on scene, requested and arrival time.
- ❑ Any important communications and documentation.
- ❑ Any specialty tools or equipment required.
- ❑ If 911 is on the scene – Name, and to the extent possible their activities to this point.
- ❑ Explain any safety perimeters that have been established and who is allowed in each.
- ❑ Establish location for Command Post (In the Cold Zone).

MAP