COMMONWEALTH OF PENNSYLVANIA
(Public Utility Commission)

BUREAU OF INVESTIGATIONS AND ENFORCEMENT, Petitioner,	:	Docket No.: C-2022-3033834
vs.	:	
PHILADELPHIA GAS WORKS, Respondent.	:	

Pages 8 - 25

TELEPHONIC HEARING
State Office Building
801 Market Street
Philadelphia, PA 19107

Friday, May 17, 2024
Met, pursuant to notice, at 1:35 p.m.

BEFORE: THE HONORABLE DENNIS J. BUCKLEY
(Administrative Law Judge

INDEX TO EXHIBITS
Docket No.: C-2022-3033834
Hearing Date: May 17, 2024

EXHIBITS INDEX

NUMBER	FOR IDENTIFICATION	IN EVIDENCE
I&E		
1 (Distribution Dept. 9/1/13)		15
2 (Distribution Dept. 8/2/16)		15
3 (Distribution Dept. 4/5/11)		15
4 (PA Underground Utility Line Request)		15
5 (Photo)		15
6 (Photo)		15
7 (Photo)		15
8 (Photo)		15
9 (Photo)		15
10 (Photo)		15
11 (Photo)		15
12 (Photo)		15
13 (Photo)		15
14 (Photo)		15
15 (Photo)		15
16 (Photo)		15
17 (Photo)		15
18 (Photo)		15

EXHIBIT INDEX

NUMBER	FOR IDENTIFICATION	IN EVIDENCE
I&E		
19 (Photo)		15
20 (Photo)		15
21 (Photo)		15
22 (Photo)		15
23 (Photo)		15
24 (Photo)		15
25 (AEL, Inc. Chain of Custody)		15
25(a) (AEL, Inc. Letter Dated 9/30/20)		15
26 (Field Operator Training Program Manuel)		15
27 (I&E's Proposed Methane Detector Program)		15

EXHIBIT INDEX

NUMBER	FOR IDENTIFICATION	IN EVIDENCE
I&E (Statements)		
1 (Elena Bozhko)		16
2 (Christopher Whiteash, P.E.)		16
3 (Robert Horensky)		16
PGW		
1 (Rebuttal Testimony of Joseph Hawkinson)		15
2 (Answers to Interrogatories I & 2 Set I)		15
3 (Answers to Interrogatories I & 2 Set II)		15
4 (Answers to Interrogatories I & 2 Set III-IV)		15

I&E
EXHIBIT 10



I&E
EXHIBIT 11



I&E
EXHIBIT 12


CA
EX1

I&E
EXHIBIT 13



I&E
EXHIBIT 14


580N
CASE

I&E
EXHIBIT 15



I&E
EXHIBIT 16



I&E
EXHIBIT 17



I&E
EXHIBIT 18



I&E
EXHIBIT 19



I&E
EXHIBIT 20



I&E
EXHIBIT 21



I&E
EXHIBIT 22



I&E
EXHIBIT 23



I&E
EXHIBIT 24



I&E
EXHIBIT 25a

AFFILIATED ENGINEERING LABORATORIES, INC.

Engineering Consultants

Physical Location:
777 New Durham Road
Edison, NJ 08817

P.O. Box 3300
Edison, NJ 08818-3300

Phone (732) 429-1200
Fax (732) 429-1201
www.affiliatedinc.net

September 30, 2020

Philadelphia Gas Works
800 West Montgomery Street
Philadelphia, Pennsylvania 19122-2806

Attention: Mr. Raymond Welte

Pennsylvania Public Utility Commission
400 North Street
Harrisburg, Pennsylvania 17120

Attention: Mr. Robert Horensky, Manager
Safety Division – Bureau of Investigation & Enforcement

Re: Philadelphia Gas Works
Our File No. W-2400

Dear Mr. Welte & Mr. Horensky:

Pursuant to your request, the writer conducted a metallurgical evaluation on the submitted section of cast iron gas piping and corresponding service lines pertaining to the above referenced matter. On December 19, 2019, a gas explosion reportedly occurred at 1435 South 8th Street, Philadelphia, Pennsylvania, followed by a fire. Subsequently, Philadelphia Gas Works (PGW) launched an investigation for the source of a potential gas leak. As a result of the investigation, PGW'S response team located a breach in a 6-inch diameter cast iron pipe located at/near the 1435 South 8th Street row home (intersection of 8th Street and Wilder Street) and attributed it to the gas leak (**Figure No. 1**). The breached section was excavated along with corresponding service lines to the subject residence as well as adjoining residences (1433 and 1437 South 8th Street) and stored at the facilities of PGW. It was understood that the Pennsylvania Public Utility Commission (PA PUC) is investigating the incident and, per Federal Pipeline Safety Regulations 49 CFR 192.617, requires that the incident pipe section be evaluated for the cause of failure. Upon which, the undersigned was retained to perform a metallurgical evaluation per the request of the PA PUC and PGW.

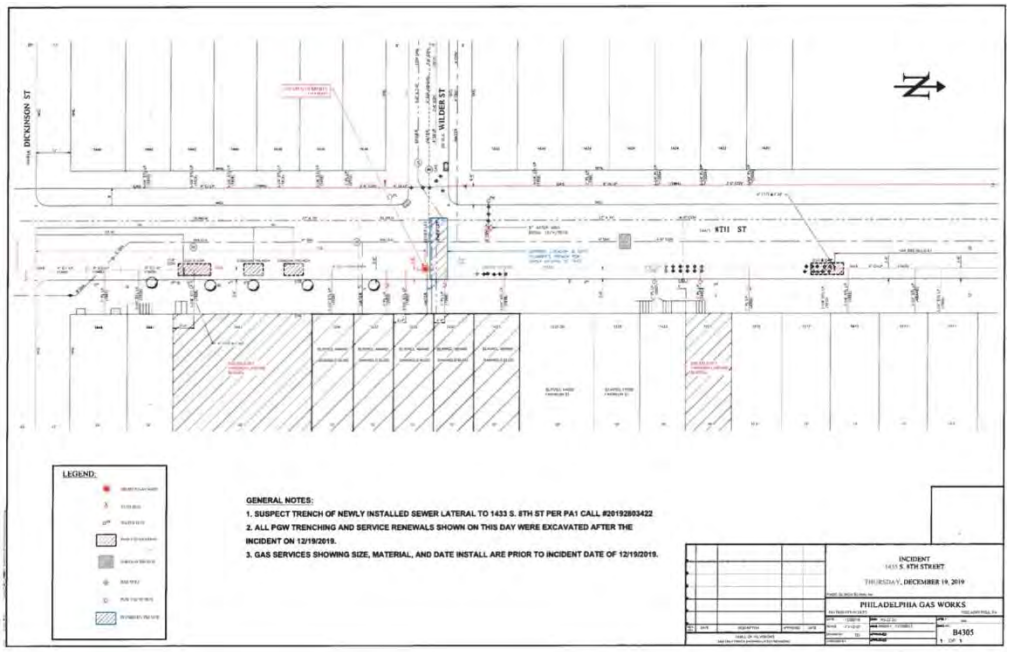


Figure No. 1

The writer was informed by PGW representatives that the pipe was installed circa 1928-era, indicating that it was approximately 91 years old at the time of the reported explosion. Upon excavation, PGW representatives observed soil erosion underneath the roadway surface. It was reported that a March 2015 repair record identified a repair to a broken main in front of 1419 South 8th Street, which was 98 feet, 4 inches north of the north curb of Wilder Street, thereby not in close proximity to the loss. In fact, it was understood that there were no repair records for any PGW work performed on the subject cast iron main related to the subject residence or adjoining residences preceding the incident. However, it was reported that another entity/entities performed excavations for water infrastructure work in the vicinity of the loss in the months leading up to the incident.

In order to prepare a recommended test protocol for the evaluation of the subject gas main, the writer traveled to the facilities of PGW on February 25, 2020, and performed a preliminary visual inspection of the physical evidence that has been retained by PGW as part of its investigation. **ATTACHMENT A** contains all of the photographic documentation generated during said initial inspection on February 25, 2020. Accordingly, a comprehensive protocol dated March 3, 2020 was submitted to the PA PUC and PGW (**ATTACHMENT B** – Test Protocol) with item-specific objectives, including but not limited to, X-ray radiography, chemical analysis, mechanical testing, metallography and fractography per the requirements of the PA PUC.

On May 28, 2020, an Affiliated Engineering Laboratories, Inc. (AEL) representative took possession of the incident items from PGW custody (**ATTACHMENT C** contains the Chain of Custody Transfer Form) and brought it to the facilities of AEL for a metallurgical evaluation. It may be noted that this writer's investigation was based solely on the evaluation of the items' conditions per

the March 3, 2020 protocol and did not address the events leading up to the reported explosion itself. The following shall serve as confirmation of the findings.

As part of the evaluation, a joint-party inspection of the physical evidence was held at the facilities of AEL to allow for all interested parties to examine the items while the testing commenced. Due to the ongoing national COVID-19 health crisis, the inspection was a two-day live-stream event broadcasted to all interested parties on June 24-25, 2020. **ATTACHMENT D** titled *"Sign-In Sheet for Attendees"* has been included with this report detailing the virtual attendees for the inspection.

All of the photographic and videographic documentation, sketches, and laboratory data generated associated with the evaluation is included in the enclosed USB drive. Further, select photographs are included herewith for general information and future reference (Photograph Nos. 1 – 102), while the complete set of photographic documentation generated as part of the metallurgical evaluation is contained in **ATTACHMENT E** for general information.

SUMMARY OF FINDINGS

The conditions of **ITEMS A**, **B**, and **C** were visually examined and their conditions were documented, as requested. No destructive testing was performed to date.

ITEM D – External stresses applied to a graphitized gas main induced a circumferential crack whereby gas was allowed to escape. There was no evidence of a pre-existing breach or leak location observed on the fracture surface.

SUBMITTED ITEMS

Four items were submitted for evaluation and are listed below along with the objectives for testing.

ITEM A – Service line to 1433 South 8th Street (plastic) with Tap.
ITEM B – Service line to 1435 South 8th Street (steel) with Tap.
ITEM C – Service line to 1437 South 8th Street (plastic) with Tap.
ITEM D – 6" cast iron main.

OBJECTIVES: Visually examine and document condition (**ITEMS A, B,** and **C**).
Characterize material and determine cause for fracture (**ITEM D**).

Each item was supplied inside padlocked wooden crates whereby a key was provided to gain access (**Photo Nos. 1 – 2**). In order to reduce the potential of mixing items, only one item was removed from its respective crate at a time. In addition, all of the items were returned to their respective crates and locked at the end of each work day, except for the samples that were shipped to an independent testing laboratory while maintaining chain of custody, which were eventually returned to the respective crate upon completion of mechanical testing and chemical analysis as per the March 3, 2020 protocol.

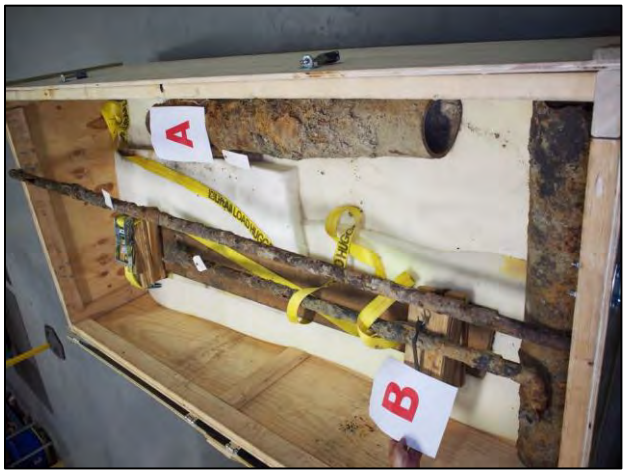


Photo No. 1 (B-057)



Photo No. 2 (B-045)

ITEM A – Service line to 1433 South 8th Street (plastic) with Tap.

Objectives: Visually examine and document condition.

Refer to **Photo Nos. 3 – 10.**

A paper tag was observed affixed to both the main segment and service tap associated with the adjoining residence (1433 South 8th Street) containing the following tag information:

MAIN
DATE: 1-2-2020
LOCATION: 1435 S. 8th
DESCRIPTION: Main to 1433 S. 8th St.

SERVICE TAP
DATE: 1-2-2020
LOCATION: 1435 S. 8th
DESCRIPTION: Service main connection to 1433

VISUAL EXAMINATION

ITEM A consisted of a 55-inch long section of 6-inch diameter cast iron pipe with a service tap (**Photo No. 3**). Proper wall thickness measurements required either cutting and/or extensive cleaning of the inside and outside diameter walls to remove deposits and debris. However, nominal wall thickness was approximately 0.4 inch. The marking on the OD of the pipe denoted the North direction as the line was installed (**Photo No. 4**). The South end was a field-cut surface while the North end exhibited a jagged circumferential fracture (**Photo Nos. 5 – 6**, respectively). Examination of the North end fracture surface confirmed the presence of black colored patches suspected to be graphitization. The majority of the fracture surface topography was bright gray colored with little or no surface deposits or oxidation, indicating that once the pipe section broke it was not exposed to a corrosive environment. It was evident that this fracture was induced as part of retrieval and was stored in a relatively short period of time.



Photo No. 3 (022)



Photo No. 4 (C-204)



Photo No. 5 (029)



Photo No. 6 (027)

A 1-inch diameter service tap hole was located approximately 19 inches from the North end. Examination of the service tap hole revealed the presence of metal threads engaged with the tapped hole that failed flush with the OD surface of the cast iron pipe (**Photo No. 7**). The fracture surface was oxidized. The mating fracture surface was located on the threaded nipple used to install the service line onto the cast iron pipe (**Photo Nos. 8 – 9**). The threaded connection between the service tap and cast iron pipe fractured, thereby separating the service line from the cast iron pipe. A 21-inch long, 1-inch diameter black plastic pipe (0.1 inch wall thickness) was attached to the service tap (**Photo No. 10**).



Photo No. 7 (C-186)



Photo No. 8 (C-181)



Photo No. 9 (C-183)



Photo No. 10 (C-196)

ITEM B – Service line to 1435 South 8th Street (steel) with Tap.

Objectives: Visually examine and document condition.

Refer to **Photo Nos. 11 – 27.**

A paper tag was observed affixed to the service tap associated with the subject residence (1435 South 8th Street) containing the following tag information:

DATE: 1-2-2020
LOCATION: 1435 S. 8th
DESCRIPTION: Service to 1435

VISUAL EXAMINATION

ITEM B consisted of a 45-inch long section of 6-inch diameter cast iron pipe with a service tap (**Photo Nos. 11 – 12**). A 61-inch long service line was attached to the service tap on the cast iron pipe approximately 12 inches from one end. The end of the service line consisted of a gas valve (**Photo Nos. 13 – 14**). Male threads were found engaged inside the open end of the valve and were corroded (**Photo No. 15**). The corresponding 94-inch long steel pipe was found separated from the service line due to corrosion and fracturing with the threaded end of the pipe (**Photo Nos. 16 – 17**). A portion of the fracture surface was bright in color, indicating that once the pipe section broke it was not exposed to a corrosive environment. It was evident that this fracture was induced as part of retrieval and the pipe section was stored in a relatively short period of time. In addition, the opposite end of the separated service line exhibited a freshly induced fracture surface along with plastic deformation, suggesting that the wall thickness was not as corroded as the other end and required more bending force to separate it from its point of attachment (**Photo No. 18**).



Photo No. 11 (060)



Photo No. 12 (C-231)



Photo No. 13 (C-234)



Photo No. 14 (C-237)



Photo No. 15 (073)



Photo No. 16 (C-227)



Photo No. 17 (058)



Photo No. 18 (053)

Proper wall thickness measurements required either cutting and/or extensive cleaning of the inside and outside diameter walls to remove deposits and debris. However, nominal wall thickness for the 6-inch diameter pipe was approximately 0.4 inch. Both ends of the cast iron pipe exhibited a jagged circumferential fracture (**Photo Nos. 19 – 20**). Examination of the ends confirmed the presence of black colored patches suspected to be graphitization. The majority of the fracture surface topography was bright gray colored with little or no surface deposits or oxidation, indicating that once the pipe section broke it was not exposed to a corrosive environment. It was evident that this fracture was induced as part of retrieval and the pipe section was stored in a relatively short period of time.

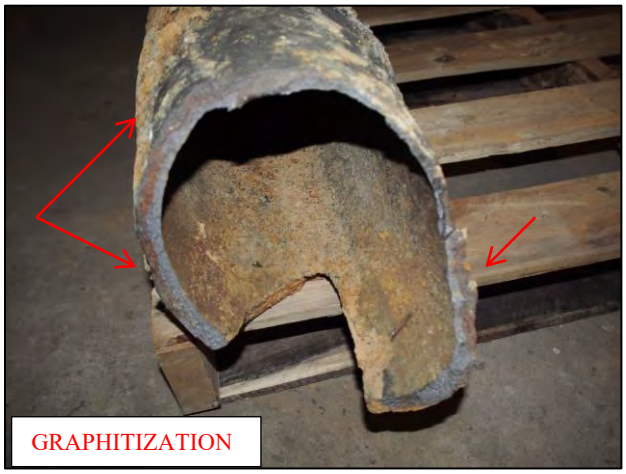


Photo No. 19 (080)



Photo No. 20 (085)

Examination of the service line piping revealed several corroded sections including material loss/wastage and through-wall penetration in certain spots (**Photo Nos. 21 – 27**). The presence of material loss/wastage on the OD surface, coupled with the contours of the through-wall penetrations, made it evident that the corrosion initiated on the OD surface and propagated inward.



Photo No. 21 (C-207)



Photo No. 22 (C-208)



Photo No. 23 (C-220)



Photo No. 24 (C-236)



Photo No. 25 (069)



Photo No. 26 (070)



Photo No. 27 (C-223)

ITEM C – Service line to 1437 South 8th Street (plastic) with Tap.

Objectives: Visually examine and document condition.

A paper tag was observed affixed to the service line associated with the adjoining residence (1437 South 8th Street) containing the following tag information:

DATE: 1-2-2020
LOCATION: 1435 S. 8th
DESCRIPTION: Service main connection to 1437

Refer to **Photo Nos. 28 – 33**.

VISUAL EXAMINATION

ITEM C consisted of a 69-inch long section of 6-inch diameter cast iron pipe with a service tap located approximately 10 inches from one of its ends (**Photo Nos. 28 – 29**). The service tap was connected to a 21-inch long, 1-inch diameter, yellow colored, plastic tube (0.11 inch wall thickness). Both ends of the cast iron pipe exhibited circumferential fractures. However, while one end was oxidized with a light coating of red rust, the other end was relatively clean and bright, suggesting that the former may have become wet following retrieval (**Photo Nos. 30 – 31**, respectively). Examination of both ends confirmed the presence of black colored patches suspected to be graphitization.



Photo No. 28 (C-155)



Photo No. 29 (C-165)



Photo No. 30 (093)

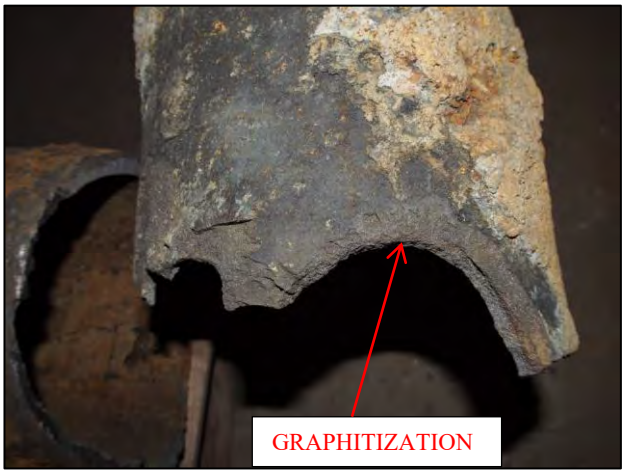


Photo No. 31 (103)

Additional cracking was observed in the 6-inch diameter cast iron pipe near one end associated with the service tap (**Photo Nos. 32 – 33**). The cracking was a longitudinal extension of the fractured end as well as a circumferential extension intersecting the tap.



Photo No. 32 (092)



Photo No. 33 (099)

ITEM D – 6" cast iron main.

Objectives: Characterize material and determine cause for fracture.

Refer to **Photo Nos. 34 –102**.

SAMPLE IDENTIFICATION

As part of the metallurgical evaluation, samples were cut from **ITEM D** and were given identifications in a systematic manner. Any and all sample identifications that were created during this

investigation were inscribed onto the samples themselves and a sketch detailing each item has been provided for reference purposes in **ATTACHMENT F**–Sample Identification and Dimensions. Further, the NORTH – SOUTH directions of the pipe were also inscribed onto each sample in order to maintain orientation.

DIMENSIONAL MEASUREMENTS

Nominal dimensions, i.e. length, diameters (inside and outside), and wall thickness were measured and are also included herewith in **ATTACHMENT F** for documentation purposes.

VISUAL EXAMINATION

ITEM D consisted of a 65-inch long, 6-inch diameter cast iron pipe with a metal pipe repair clamp (Dresser® Style 360 Repair Clamp PN 0360-0684-210) located in the approximate middle of the pipe section (**Photo Nos. 34 – 36**). Handwritten markings found on the pipe itself as well as the surface of the clamp identified the TOP of the pipe and North (N) and South (S) directions denoting orientation as installed in the ground. It was understood that during the investigation process PGW workers installed a repair clamp across the breach, which was attributed to the reported incident, to secure the damaged region.



Photo No. 34 (B-073)



Photo No. 35 (B-086)



Photo No. 36 (B-091)

The NORTH end exhibited a circumferential cut while the SOUTH end exhibited a jagged circumferential fracture, most likely induced during its retrieval following the reported incident (**Photo Nos. 37 – 38**, respectively). Visual examination of the fractured SOUTH end of **ITEM D** revealed the presence of a darkened region along the fracture surface, suggesting graphitization, which reduces the effective wall thickness by corrosion process (**Photo No. 39**).

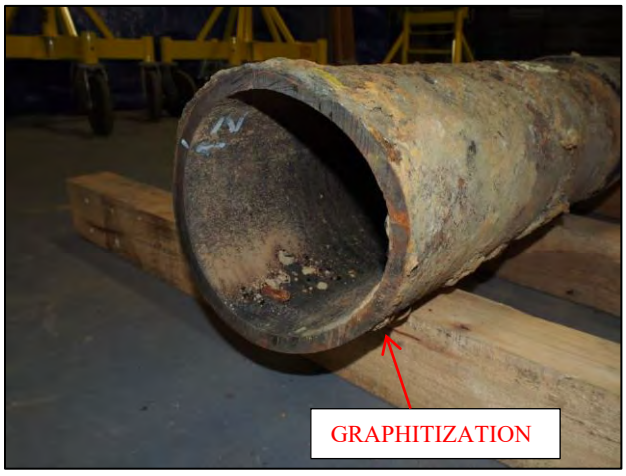


Photo No. 37 (B-092)



Photo No. 38 (B-088)

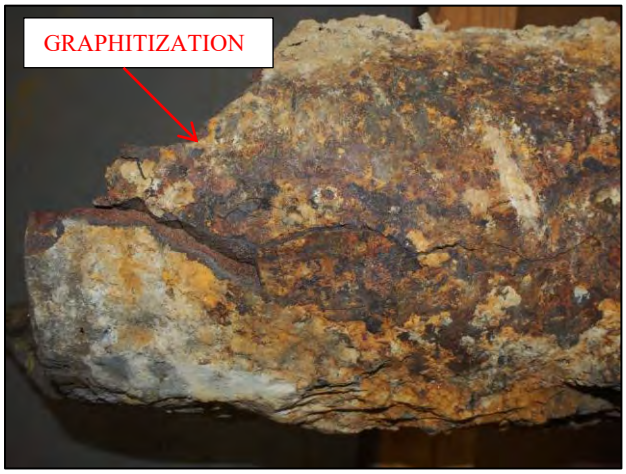


Photo No. 39 (B-097)

The OD surface of **ITEM D** exhibited a buildup of soil deposits and corrosion product. Some of the material adhering to the surface was carefully removed by mechanical scraping and chipping while most of it remained tightly adhering to the pipe, indicating that it bonded to the OD surface (**Photo No. 40**). The hard soil deposits, which consisted of hardened masses of scale product, were collected and sealed in a plastic bag. Since the deposits and scale did not contain any significant amount of actual soil or dirt, but rather, were comprised of corrosion scale mixed with soil deposits, no further testing was performed on the deposits. However, the samples are available for subsequent testing if deemed necessary.



Photo No. 40 (B-100)

The inside surface of the pipe was coated with a shiny, black tar-like substance. The buildup along one radial axis of the pipe's diameter, formed by gravity, confirmed the orientation of the pipe, i.e. TOP and BOTTOM. The texture and softness of the coating was not consistent with any traditional means of lining the ID surface of a pipe. Rather, the material appeared to be a deposit or condensate. It was understood that PGW or its predecessor used to manufacture gas, which is generally done by

processing coke. This process produces a byproduct that can condense onto surfaces such as the ID of piping. A sample of the coating was collected and preserved should testing be deemed warranted.

After the repair clamp was removed, the breach location was exposed for further investigation (**Photo Nos. 41 – 43**). It was observed that the underlying pipe's OD surface was intentionally cleaned, which typically is performed in order to properly install a repair clamp. The surface must be cleaned and devoid of protrusions in order for the elastomeric gasket material to form an airtight seal around the circumference of the pipe. The breach comprised of a single circumferential fracture that separated the cast iron main into two segments: 37-inch long SOUTH end and 28-inch long NORTH end (approximately).



Photo No. 41 (B-109)



Photo No. 42 (B-107)



Photo No. 43 (B-108)

Both mating fracture surfaces of **ITEM D** were visually examined in the as-received, or uncleaned, condition. The mating fracture surfaces were mirror images of each other but were covered with red colored corrosion, i.e. rust, thereby requiring cleaning (**Photo Nos. 44 – 48**). Preliminary inspection of the mating fracture surfaces did not reveal the presence of a darkened region spanning

the thickness of the wall, which would have suggested a pre-existing leak prior to the reported incident. In order to further examine the fracture topography, microstructure, mechanical properties, and chemical composition, samples had to be cut/removed for further studies.



Photo No. 44 (B-113)



Photo No. 45 (B-120)



Photo No. 46 (B-122)



Photo No. 47 (B-123)



Photo No. 48 (B-127)

In order to document the sections to be cut/removed from **ITEM D**, the mating sections were subsequently marked and identified as follows (**Photo Nos. 49 – 50**):

D SOUTH end remained as "parent" item
D1 The fracture surface on the SOUTH end associated with the breach
D2 Mating fracture surface on the NORTH end associated with the breach
D3 Ring section removed from the NORTH end adjacent to **D2** for hardness and chemistry
D4 NORTH end after **D2** and **D3** were removed for mechanical testing

The ring sections identified above were subsequently dry cut using a horizontal band saw. The saw cut dust was collected and preserved from both the NORTH and SOUTH sections should any testing be required.



Photo No. 49 (B-202)



Photo No. 50 (B-147)

Upon cutting the pipe segments, sedimentation strata were observed at the BOTTOM of the pipe (**Photo No. 51**). A black tar-like substance was found adhering to the inside wall followed by a brown sand-like substance. Samples of both were collected should testing be warranted.



Photo No. 51 (B-191)

The cut edges of the rings containing the mating fracture surfaces were measured for wall thickness and depth of graphitic corrosion. Sketches of the wall thickness and graphitic corrosion damage can be found in **ATTACHMENT F** – Sample Identification and Dimensions. The wall thickness measurements showed that the thickness across the pipe's cross-section was asymmetrical ranging from 0.35 inch to 0.49 inch. Given the reported age of the pipe, it was suspected that the pipe was fabricated by vertical pit casting, which was the foremost process of the time. If indeed it was a product of vertical pit casting, the asymmetrical wall thickness can be attributed to a shift in the core of the pipe's mold when it was first cast. Vertical pit castings are known to exhibit such core shifting, resulting in an uneven wall thickness. In addition, examination of the cut surfaces on the ring samples cut from **ITEM D** revealed the presence of casting flaws randomly distributed within the cross-section, which is typical for an early 20th century cast iron pipe.

Varying degrees of graphitization were observed at the ends of the cast iron main as well in subsequent cut edges (**Photo Nos. 52 – 63**). The depth of material loss as a result of the corrosion varied location to location; however, there appeared notable material loss along the length of **ITEM D,** especially between the 7 and 12 o'clock positions as viewed in the NORTH direction. While there was no indication of any through-wall penetrations formed by graphitization or any other type of corrosion or mechanical damage, the effective wall thickness of the pipe was reduced (up to 73%) as a result of graphitization (**TABLE A**).

Re: Philadelphia Gas Works
September 30, 2020

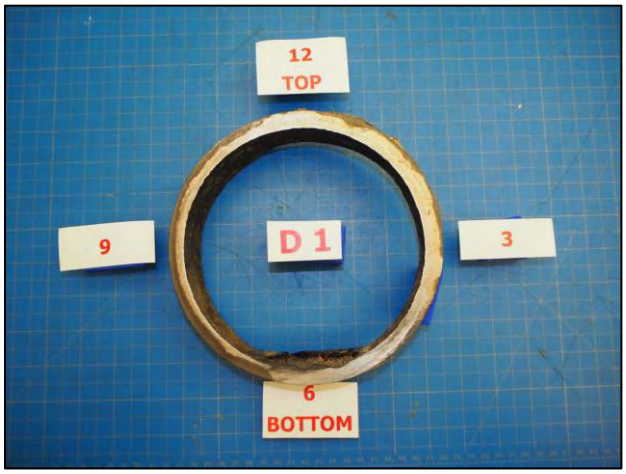


Photo No. 52 (C-018)

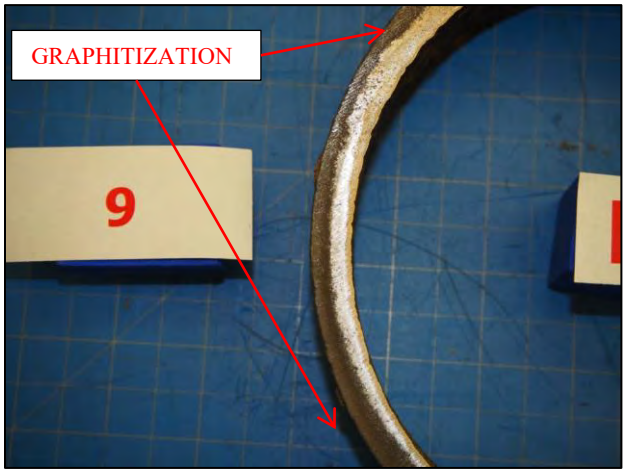


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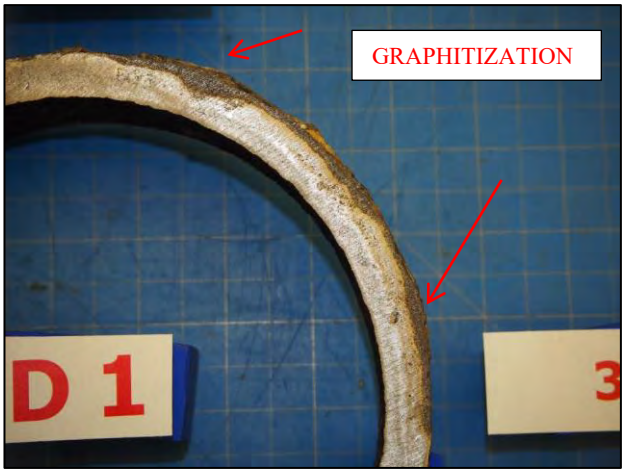


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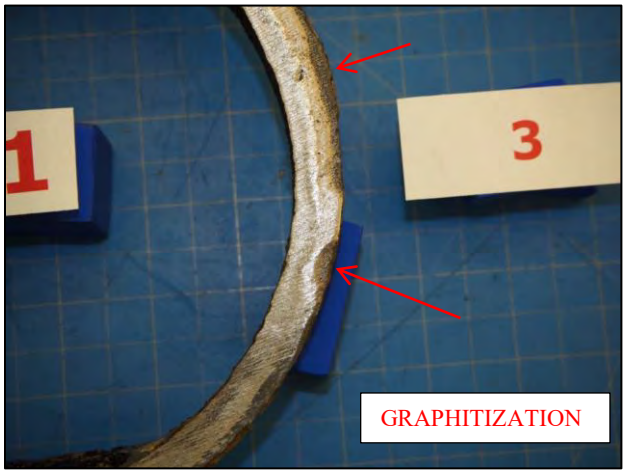


Photo No. 55 (C-020)



Photo No. 56 (C-026)

Re: Philadelphia Gas Works
September 30, 2020

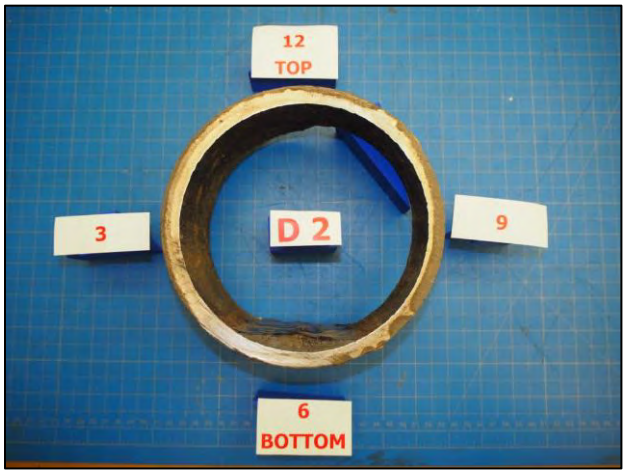


Photo No. 57 (C-042)

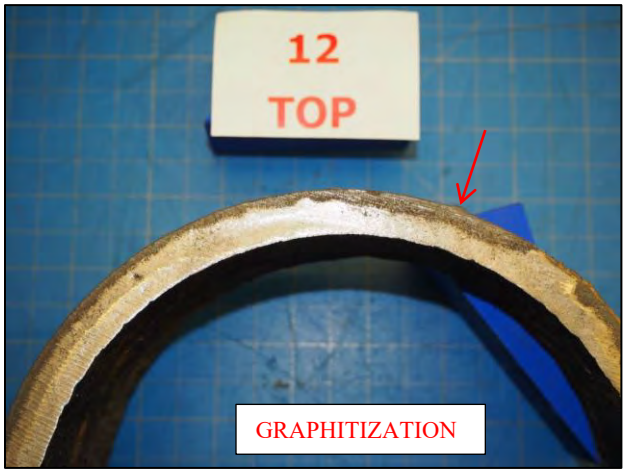


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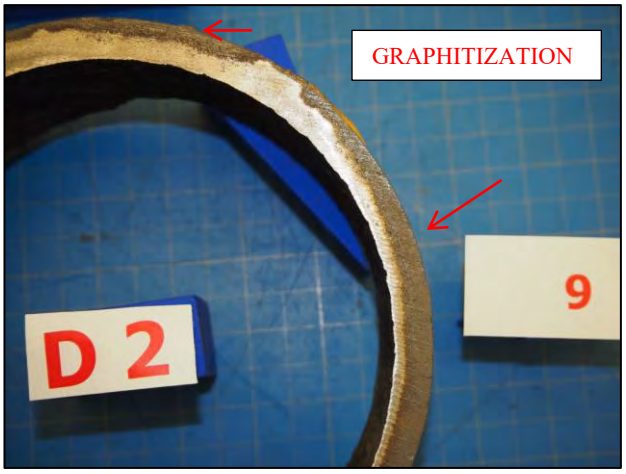


Photo No. 59 (C-044)

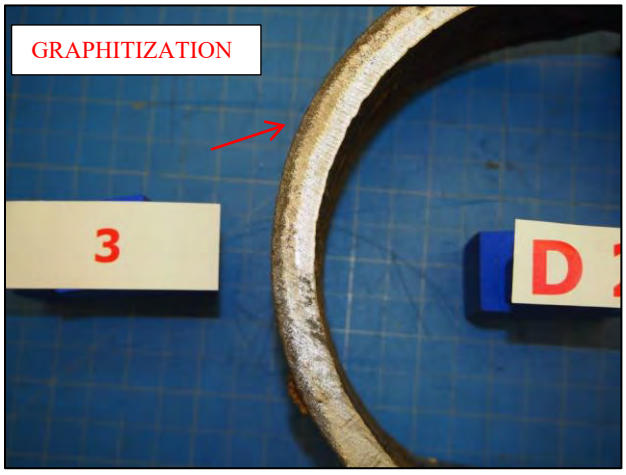


Photo No. 60 (C-046)

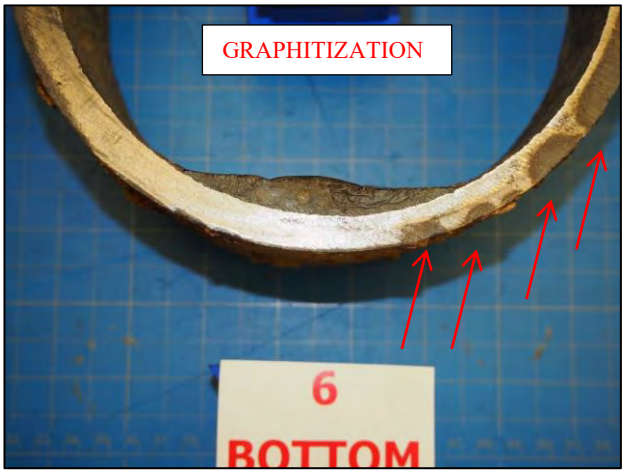


Photo No. 61 (C-045)

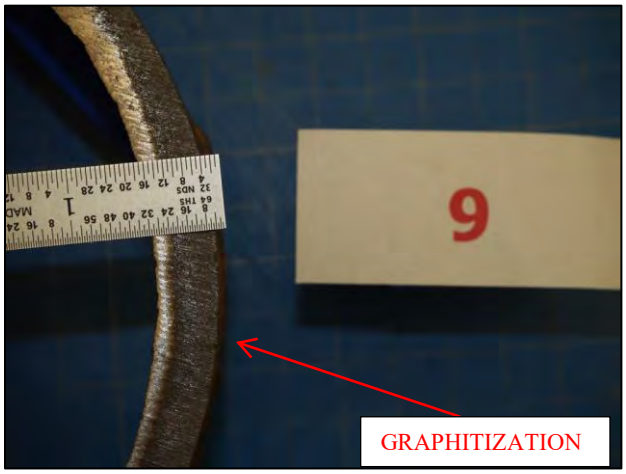


Photo No. 62 (C-048)

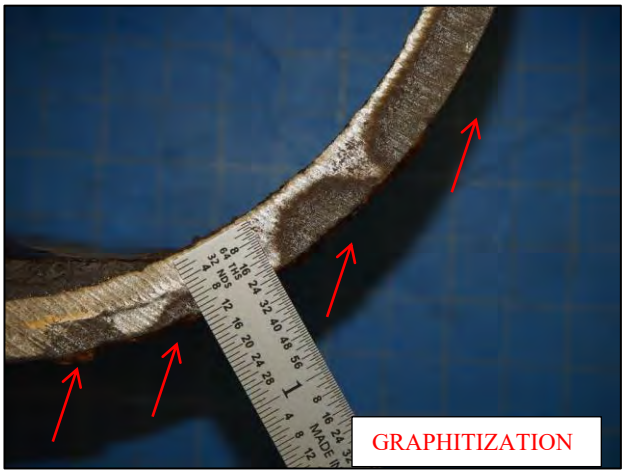


Photo No. 63 (C-050)

TABLE A
Wall Thickness Measurements on Cut Edge

	D1					D2				
O'clock Position	**12**	**3**	**6**	**7**	**9**	**12**	**3**	**6**	**7**	**9**
Original Wall Thickness, in.	0.4475	0.4875	0.3695	0.3455	0.3835	0.4865	0.4900	0.3960	0.3965	0.4175
Depth of Graphitization	0.2110	0.078	- - -	0.2690	0.2135	0.1210	0.1595	- - -	0.2480	0.261
Effective Wall Thickness, in.	0.2365	0.4095	0.3695	0.0765	0.1700	0.3655	0.3305	0.3960	0.1485	0.1565
% Wall Loss	47	16	0	73	56	25	33	0	63	63

X-RAY RADIOGRAPHY

Ring sections **D1** and **D2**, which contained the mating fracture surfaces of the breach, along with ring section **D3**, were subjected to radiographic studies performed by Janx Radiography, 17 Kennedy Boulevard, East Brunswick, New Jersey at the facilities of AEL. Chain of Custody remained with AEL the entire time during the radiographic studies. The cross-sections of the ring sections were documented.

Radiographic views were taken at 0 and 90 degree angles respective to the 12 o'clock position for documentation purposes. Radiographic imaging showed the ring sections exhibiting random, localized wall thickness losses (patchy distributions of graphitic corrosion) around their respective circumferences (**Photo Nos. 64 – 65**).

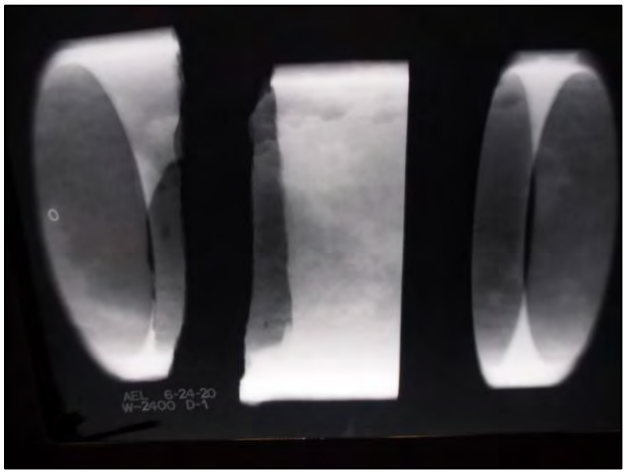


Photo No. 64 (H-183)



Photo No. 65 (H-185)

FRACTOGRAPHIC STUDIES

As noted above, the mating fracture surfaces exhibited uniformly oxidized topographies with no indication of a pre-existing leak (**Photo Nos. 66 – 67**). There was no evidence of plastic deformation, which is typical for gray cast iron with the application of a tensile or bending overloading condition. Judging from the topography, the fracture resulted from a one-time overload condition.

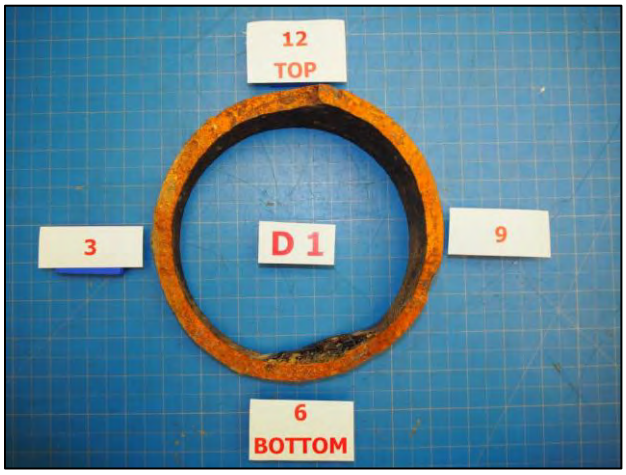


Photo No. 66 (C-009)

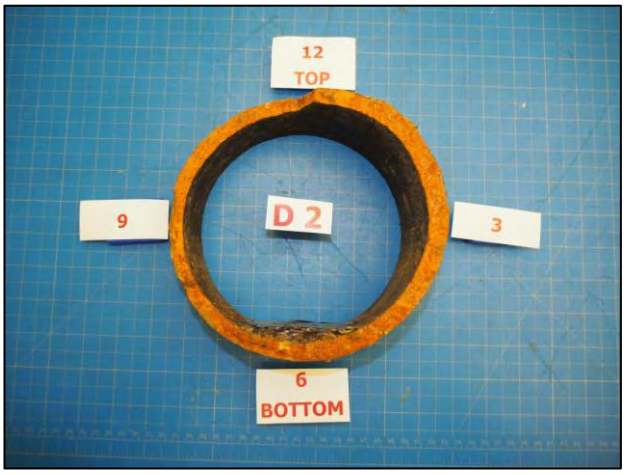


Photo No. 67 (C-030)

Based on the fracture profile, the fracture appeared to have initiated near the BOTTOM of the pipe and propagated along its circumference towards the TOP, thereby forming a lip morphology near the 12 o'clock position (**Photo Nos. 68 – 69**).



Photo No. 68 (C-091)

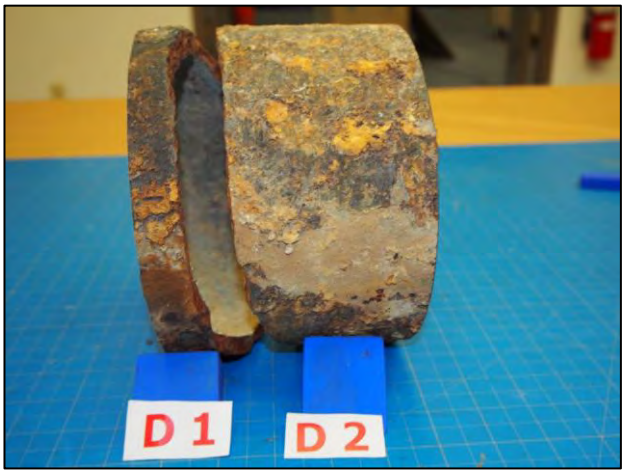


Photo No. 69 (C-106)

One side of the breach, D1, was cleaned in an ultrasonic bath with Alconox® solution to remove debris and surface deposits (**Photo No. 70**). Aside from mild cleaning of the fracture surface to remove any debris, the topography was found to be relatively devoid of any corrosion product, aside from uniform light rusting, or a pattern of oxidation that would suggest that a crack propagated to the outer diameter (OD) and caused a notable through-wall penetration for an extended period of time (**Photo Nos. 71 – 73**). There was no indication of a pre-existing leak location along the fracture surface, as evident by the uniformly colored topography.



Photo No. 70 (C-071)



Photo No. 71 (C-076)



Photo No. 72 (C-080)



Photo No. 73 (C-077)

The fracture surface was then examined via stereomicroscopy in the as-cleaned condition. Microscopic examination of the fracture surface showed brittle mode fracture of typical gray cast iron. It was evident that the topography about the circumference exhibited a uniform layer of red rust, with no indication of a pre-existing leak (**Photo Nos. 74 – 77**). Varying degrees of graphitization were noted along the OD surface.



Photo No. 74 (D-027 Stereo Position 12)



Photo No. 75 (D-030 Stereo Position 3)

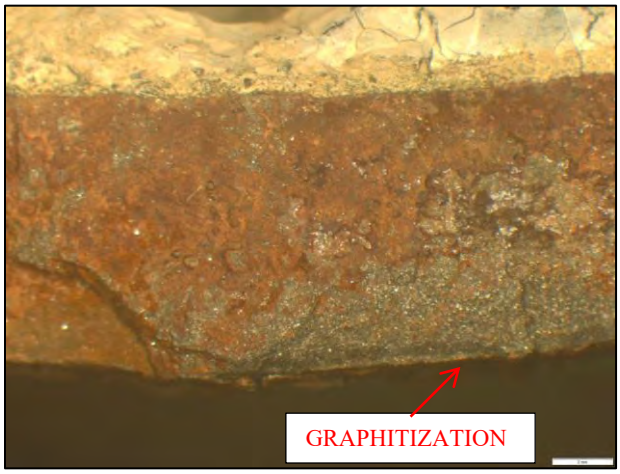


Photo No. 76 (D-029 Stereo Position 6)



Photo No. 77 (D-028 Stereo Position 9)

Based on the as-failed conditions of the mating fracture surfaces, it was evident that a crack developed at/near the bottom of the pipe and propagated along in both the clockwise and counter-clockwise directions along its circumference until the two crack fronts arrested near the TOP. Examination of the cross-sections at the fracture as well as along cut edges revealed material loss via graphitization, which can serve as a stress riser(s) under the application of external force.

MICROSTRUCTURAL STUDIES

Microspecimens intersecting ring section **D1** were prepared using standard metallographic procedure as per ASTM E3-11(2017) *"Standard Guide for Preparation of Metallographic Specimens"* (**Photo Nos. 78 – 79**). As per the protocol, a minimum of four microspecimens were taken for microstructural studies, along the circumference at the 12, 3, 6, and 9 o'clock positions and the samples were identified as **D1-1**, **D1-2**, **D1-4**, **D1-8**, respectively. In addition to the originally proposed microspecimens for ring section **D1**, a fifth microspecimen (**D1-6**) was prepared intersecting a darkened patch of metal, believed to have experienced graphitic corrosion, at the 7 o'clock position. The microspecimens were then examined via Light Optical Microscopy (LOM) in both the unetched and etched conditions.

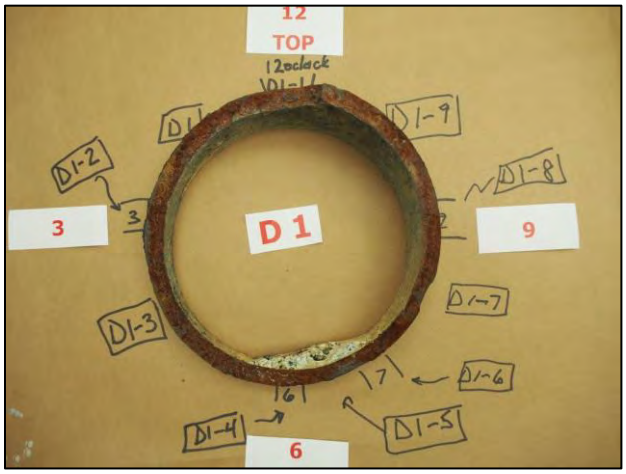


Photo No. 78 (C-107)

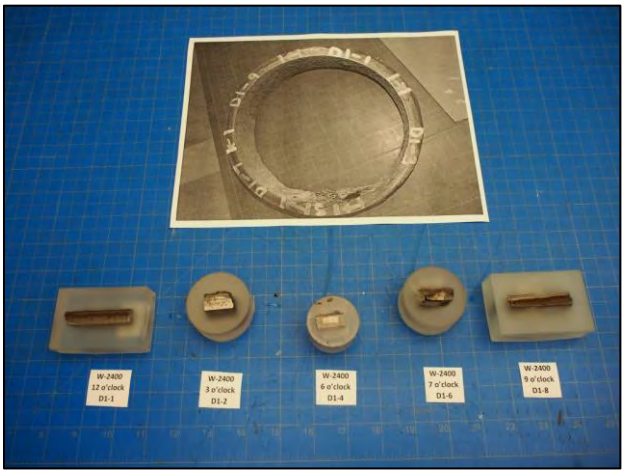


Photo No. 79 (F-39)

Examination of the as-polished surfaces of the five microspecimens intersecting the fracture surface confirmed and documented the extent of graphitization that occurred over the 91 years of service (**Photo Nos. 80 – 89**). **TABLE B** contains the wall thickness measurements taken at the fracture. While the 6 o'clock position (**D1-4**) exhibited little or no graphitization in its cross-section, the 7 o'clock position (**D1-6**) showed corrosion damage (63% wall loss) that reduced the effective wall thickness of the pipe to 37% at the fracture plane. The 9 o'clock position (**D1-8**) exhibited graphitization 70% (wall loss) of the original wall thickness while the 3 o'clock position (**D1-2**) was 32% (wall loss) at the fracture plane. None of the microspecimens exhibited through-wall graphitic corrosion.

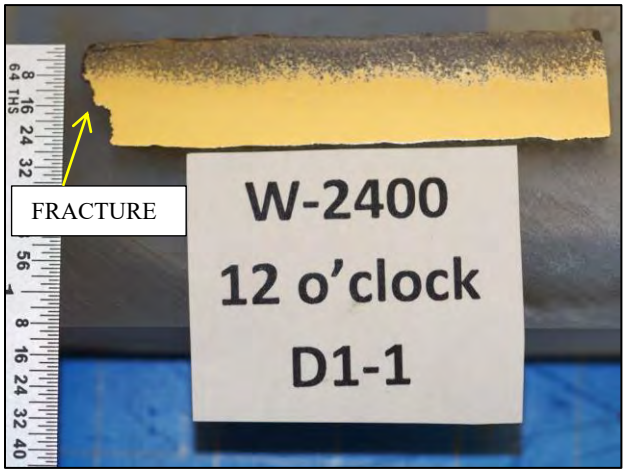


Photo No. 80 (G-22)

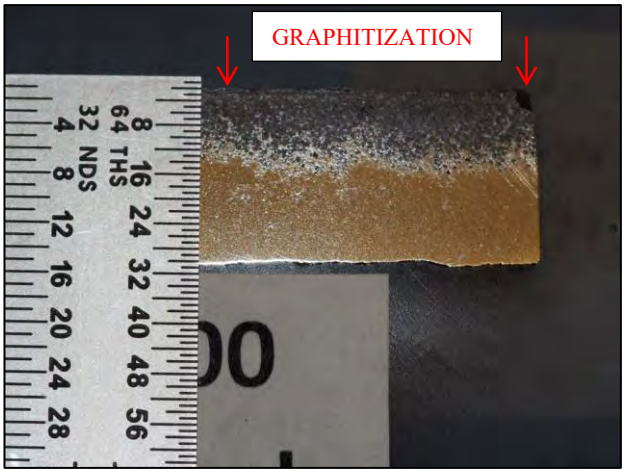


Photo No. 81 (G-25)

Re: Philadelphia Gas Works
September 30, 2020
Page 28 of 38

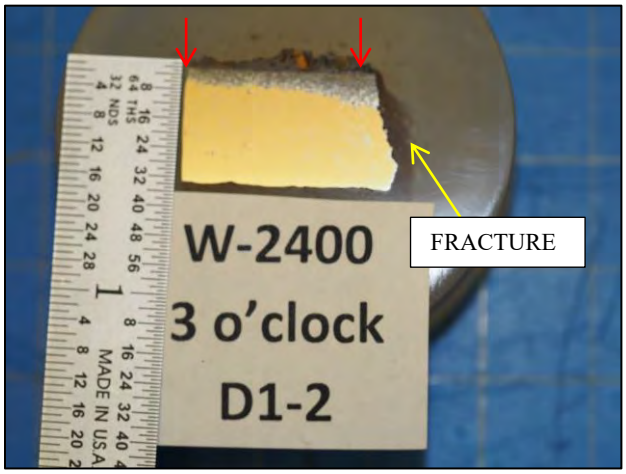


Photo No. 82 (G-29)

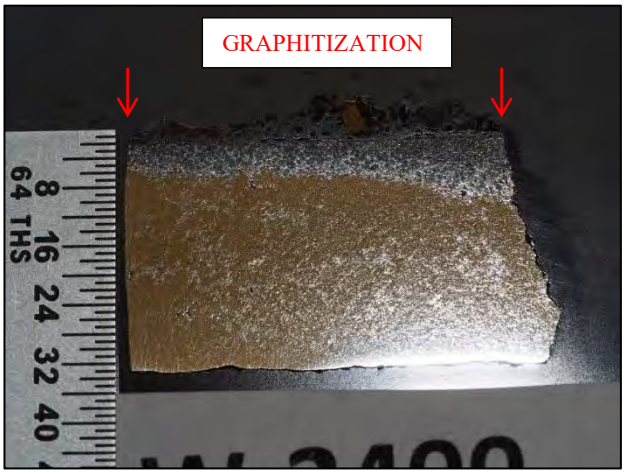


Photo No. 83 (G-33)

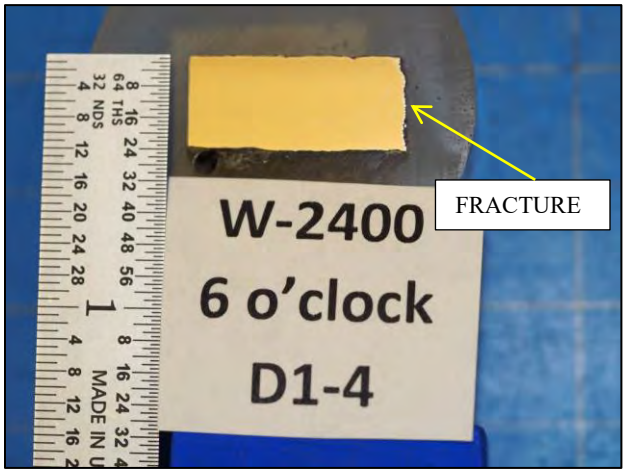


Photo No. 84 (G-38)

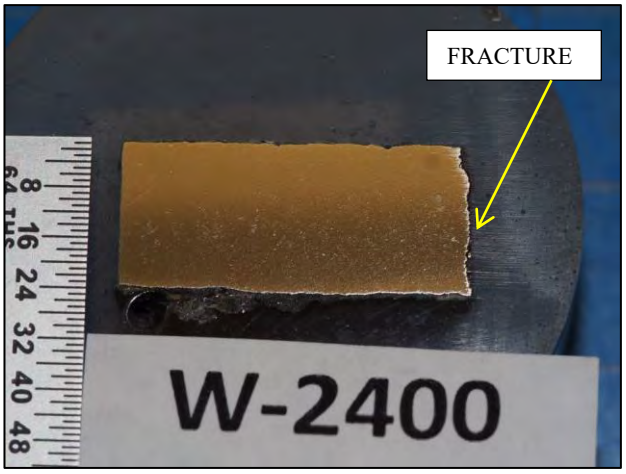


Photo No. 85 (G-40)

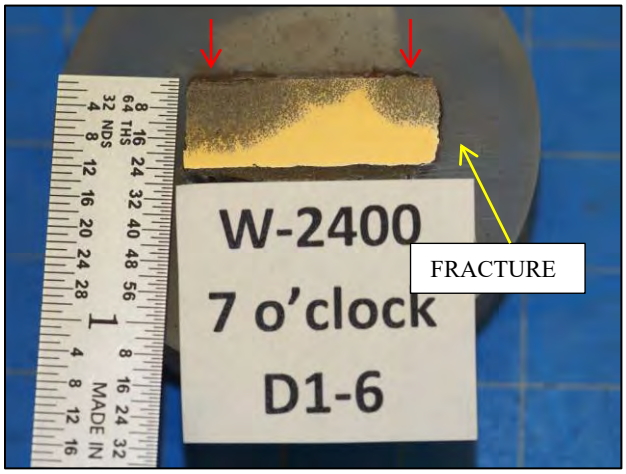


Photo No. 86 (G-43)

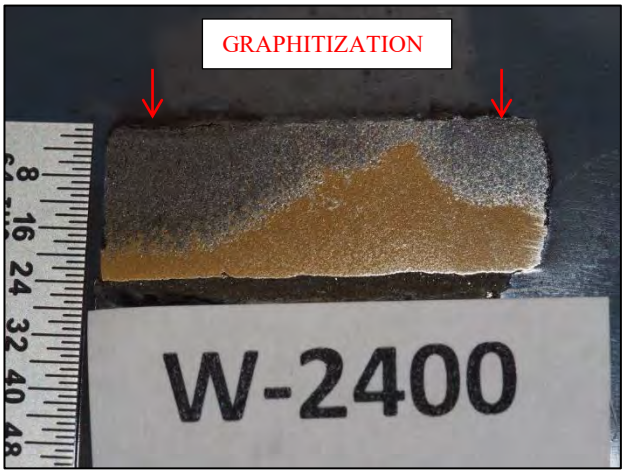


Photo No. 87 (G-47)

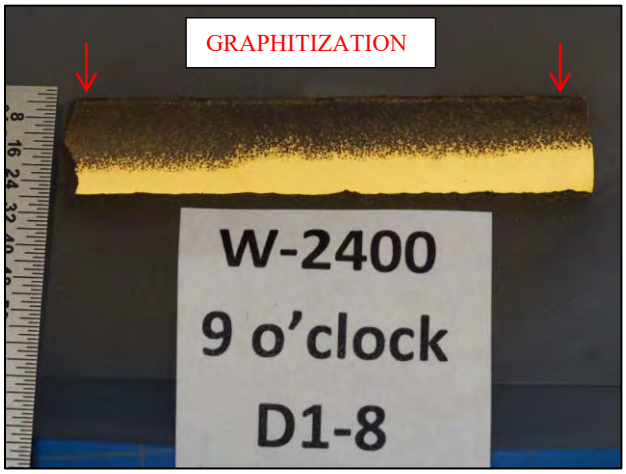


Photo No. 88 (G-51)

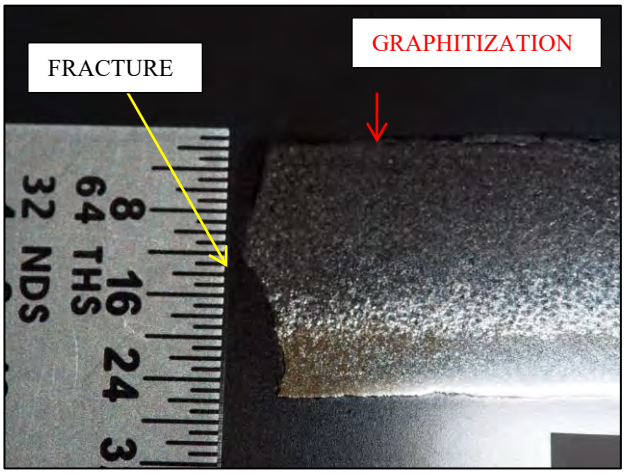


Photo No. 89 (G-53)

TABLE B
Wall Thickness Measurements on Cut Edge

	D1				
	12	**3**	**6**	**7**	**9**
Original Wall Thickness, in.	0.4475	0.4875	0.3695	0.3455	0.3835
Depth of Graphitization	0.1820	0.1540	- - -	0.2165	0.2685
Effective Wall Thickness, in.	0.2655	0.3335	0.3695	0.1290	0.1150
% Wall Loss	41	32	0	63	70

The microspecimens were then examined via Light Optical Microscopy (LOM) in both the unetched and etched conditions. The bulk microstructure of the pipe consisted predominately of Type C distribution of graphite (superimposed flake sizes, random orientation) with Type A (uniform distribution, random orientation), flake size 3-4, in a Pearlite matrix (**Photo No. 90**). Type C graphite, also referred to as Kish graphite, is typical for pit cast iron pipes due to the inherent slow cooling rates. Kish graphite greatly reduces the mechanical properties of cast iron and produces a rough surface finish upon machining.

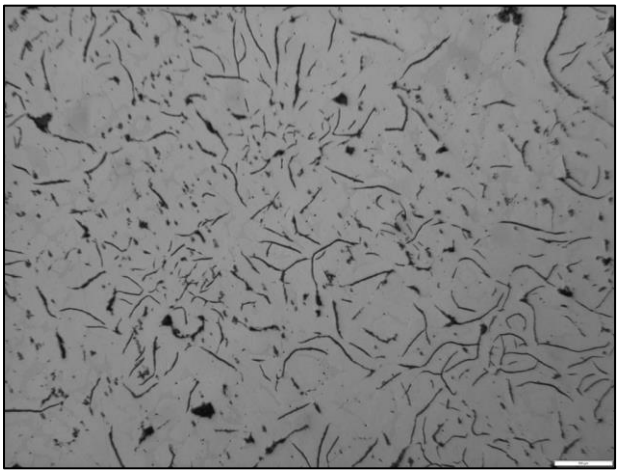


Photo No. 90 (I-012 Micro D1-1 Unetched)

Random distributions of iron-phosphide eutectic (Fe-P), also known as steadite phase, within a predominately Pearlite phase were also observed throughout the microstructure of all the specimens (**Photo No. 91**). Steadite has a low melting point (1705°F) and is typically the last microstructural constituent to form upon solidification, which generally occurs at the grain boundaries.

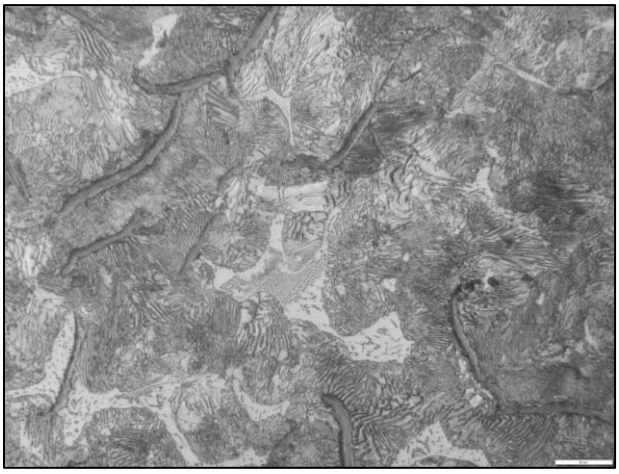


Photo No. 91 (I-013 Micro D1-1 Etched)

The microstructure, comprised mostly of Pearlite phase, was consistent with Class 60 type gray cast iron. However, the presence of steadite phase is a hard constituent that makes the cast iron more brittle and can decrease the mechanical properties of the casting.

Nonmetallic inclusions and casting defects, i.e., porosities, slag inclusion, shrinkage, etc. ranged in severity along the circumference (**Photo Nos. 92 – 94**). All the microspecimens exhibited varying degrees of internal defects dispersed through the pipe wall thickness.

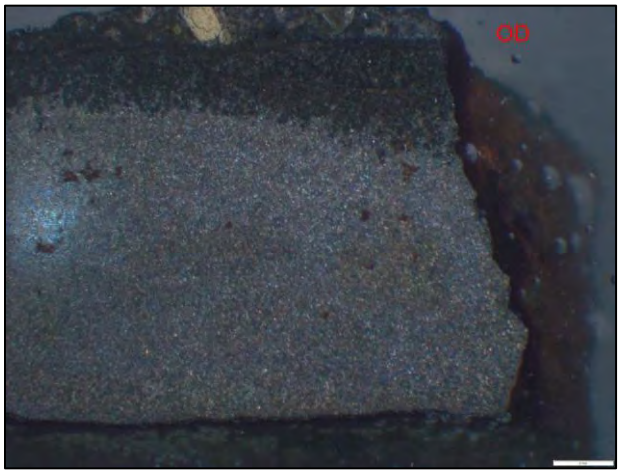


Photo No. 92 (I-001 Micro D1-2 Etched)

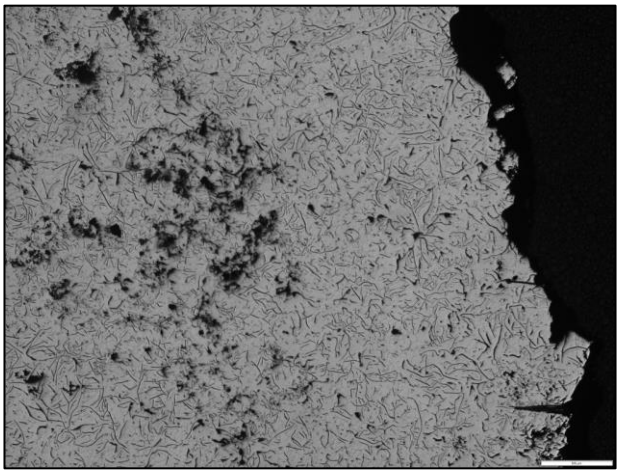


Photo No. 93 (I-006 Micro D1-2 Unetched)

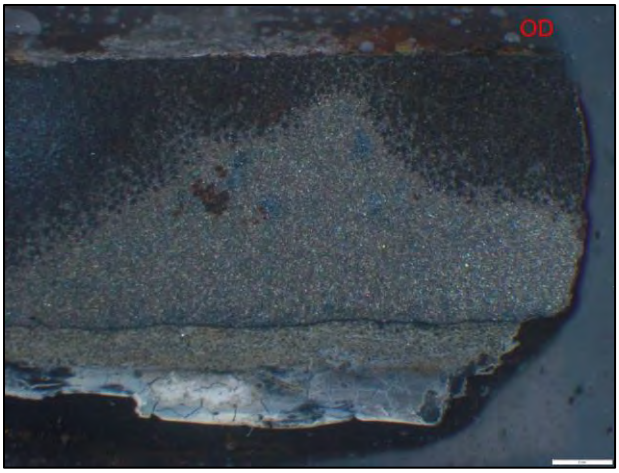


Photo No. 94 (I-001 Micro D1-6 Etched)

MECHANICAL TESTING (Performed by Independent Testing Laboratory – Quant Labs)

As part of the mechanical testing and chemical analysis, **ITEMS D3** and **D4** were submitted to Quant Corporation, 200 Travis Lane, Waukesha, Wisconsin for testing by an independent testing facility (**ATTACHMENT G** – Hardness, Ring, Talbot Strip Test Report, and Chemical Analysis)[1]. Hardness testing was performed as per the appropriate ASTM standards (see below) while the Ring and Talbot Strip Testing was performed as per ASA Specification A-21.3 *"Cast Iron Pit Cast Pipe for Gas"* (**ATTACHMENT H**).

[1] This attachment contains the original Quant report dated 7/16/20, as well as a corrected Quant report dated 9/30/20. The corrections in the updated report are on pages 2 and 3 of the Quant report with regard to the Talbot Strip Tests and Ring Tests tables.

Hardness Testing

Hardness testing was initially performed using Brinell scale with 3000-kg load as per ASTM E10-17 *"Standard Test Method for Brinell Hardness of Metallic Materials;"* however, it was reported that the pipe sample shattered upon application of the load. Such a phenomenon can occur if the material is too brittle and/or the specimen size is too thin for when the Brinell indenter was applied to the cross-section under the 3000-kg applied load. Therefore, hardness testing was performed using Rockwell B Scale (HRB) in accordance with ASTM E18-17 *"Standard Test Methods for Rockwell Hardness of Metallic Materials"* and subsequently converted to Brinell Hardness, HBN.

The following table contains the measured Rockwell hardness and equivalent Brinell values, (based on published conversion charts):

Reading No.	Rockwell B	Brinell, 10/3000
1	93	200
2	94	205
3	90	190
4	88	176
5	90	190
Average	**91**	**192**

Ring Tests

Two, 3-inch long, cast iron pipe segments were cut from pipe section **ITEM D4** as per ASA specification A-21.3, where the length of the ring shall be half of the nominal diameter of the pipe. These pipe segments were identified as ring segments **1** and **2**.

The ring segments cut off from the pipe segment were tested using the three-edge bearing method, as illustrated in the standard. The breaking load and the deflection at the time of the break were recorded. The Modulus of Rupture and Secant Modulus of Elasticity were then calculated in accordance with the formula provided in Paragraph 3-18.5 of ASA Specification A-21.3. The results of the calculations are compared with the values for the Modulus of Rupture (R) and Secant Modulus of Elasticity (E_S) also specified in Paragraph 3-18.5 of ASA Specification A-21.3.

They are summarized below:

Ring No.	R (psi)	E_s (psi)
1	41,833	2.368E+06
2	41,927	2.183E+06
Average	**41,880**	**2.270E+06**
ASA Specification A-21.3	31,000 min.	15,000,000 max

The calculated values for Modulus of Rupture and Secant Modulus of Elasticity from the ring testing are both considered to be acceptable and in compliance with the requirements of ASA Specification A-21.3.

Examination of the induced fracture surfaces of the Ring Test Sample Nos. 1 and 2 revealed varying degree of graphitization, similar to that of previously examined and above described ring samples from the cast iron main (**Photo Nos. 95 – 98**). Even with the extent of graphitization, the ring sections still met the requirements for Modulus of Rupture and Secant Modulus of Elasticity.



Photo No. 95 (H-077)

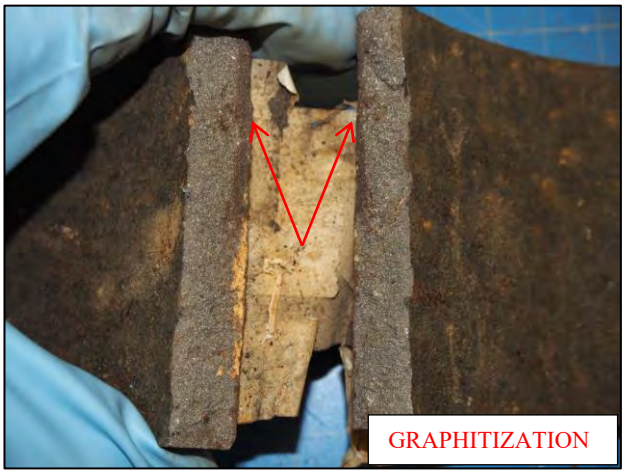


Photo No. 96 (H-082)



Photo No. 97 (H-090)

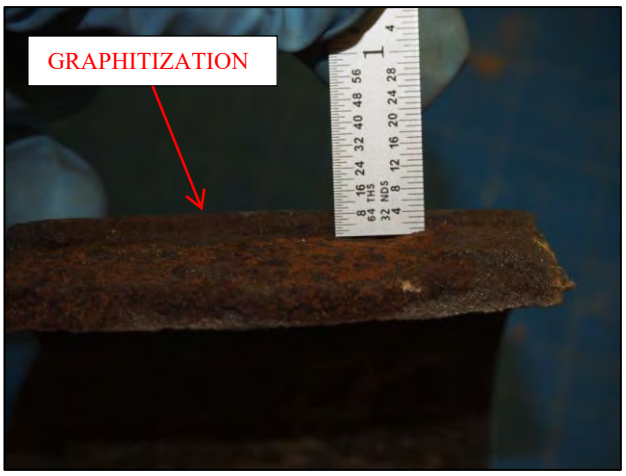


Photo No. 98 (H-095)

Talbot Strip Tests

According to ASA Specification A-21.3, two Talbot Strips were machined longitudinally from pipe section **D4** yielding Talbot Strip Nos. **1** and **2**.

Talbot Strip Test bars removed from pipe segment **D4** were tested according to the method described in ASA Specification A-21.3, provided in **ATTACHMENT H**. The breaking loads and the corresponding deflections were observed and recorded (**ATTACHMENT G**).

Re: Philadelphia Gas Works
September 30, 2020
Page 34 of 38

The Modulus of Rupture (R) and Secant Modulus of Elasticity (E_S) values were then calculated in accordance with the formula provided in Paragraph 3-18.4 of ASA Specification A-21.3. The results of the calculations, provided in **ATTACHMENT G** and tabulated below, were compared with the values for R and E_S, also specified in Paragraph 3-18.4 of ASA Specification A-21.3:

Specimen No.	(R) psi	(E_S) psi
1	27,838	5.624E+06
2	23,852	5.369E+06
Average	**25,845**	**5.489E+06**
ASA Specification A-21.3	30,000 min.	10,000,000 max.

The Modulus of Rupture values of both Talbot strip specimens were NOT acceptable (less than 30,000 psi minimum while the Secant Modulus of Elasticity for the two Talbot strip specimens met the requirement of 10,000,000 psi maximum, respectively).

Examination of the Talbot strip samples after testing revealed a reduction in effective wall thickness due to graphitization (**Photo Nos. 99 – 102**). The low values may be attributed to the presence of steadite phase in the microstructure.

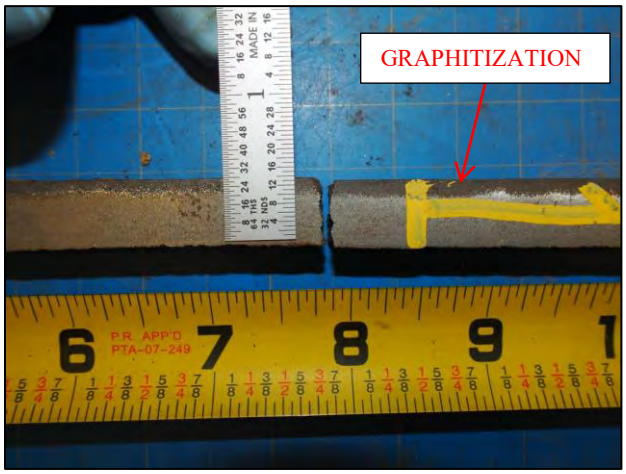


Photo No. 99 (H-156)

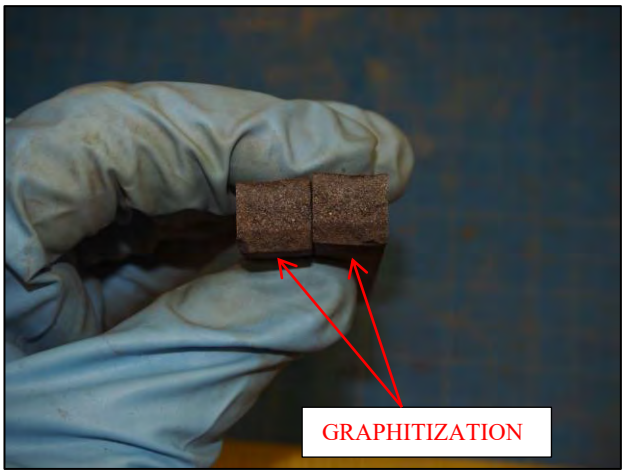


Photo No. 100 (H-165)

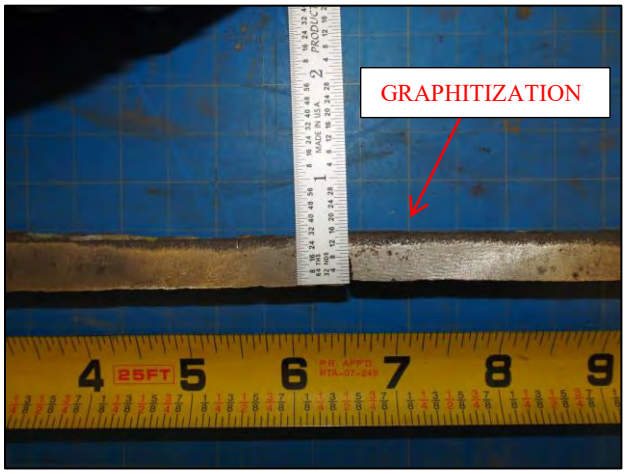


Photo No. 101 (H-139)

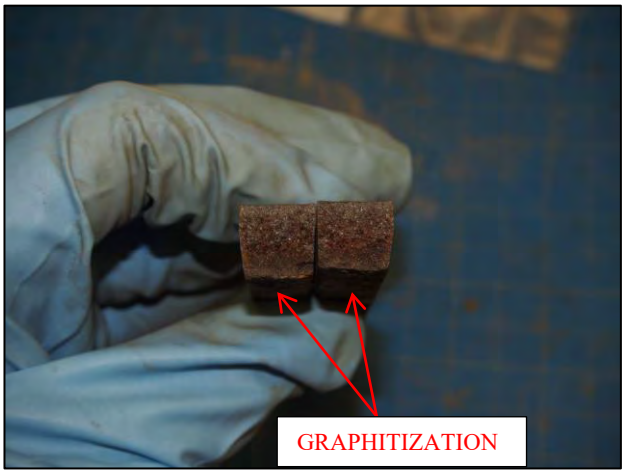


Photo No. 102 (H-149)

CHEMICAL ANALYSIS (Performed by Independent Testing Laboratory – Quant Labs)

Chemical analysis was performed on **ITEM D3** via Optical Emission Spectroscopy (OES) with carbon and sulfur as per ASTM E1019-2011 *"Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys by Various Combustion and Fusion Techniques."* **ATTACHMENT G** – Chemical Analysis Report contains the independent test report and associated Chain of Custody Form. The following table contains a summary of the results (wt%):

ELEMENT	CAST IRON PIPE (D3)	GRAY CAST IRON (NOMINAL)	ASA A-21.3, 3-3.2 Specification*
Carbon	3.44	2.5 / 4.0	- - -
Manganese	0.43	0.2 / 1.0	- - -
Silicon	1.52	1.0 / 3.0	- - -
Phosphorus	***1.326***	0.02 / 1.0	0.90 max
Sulfur	0.101	0.02 / 0.25	0.12 max
Chromium	0.03	- - -	- - -
Nickel	0.02	- - -	- - -
Molybdenum	<0.01	- - -	- - -
Copper	0.24	- - -	- - -
Titanium	0.068	- - -	- - -
Tin	0.029	- - -	- - -
Tungsten	0.009		
Iron	Remainder		

*Per ASA A-21.3, 3-3.2 *"ASA Specification 'Cast Iron Pit Cast Pipe for Gas'"*

As the above table shows, all elements are within the range of a gray cast iron, except for ***phosphorous*** content. The carbon equivalent was found to be above eutectic (CE 4.3) as given by the equation given below.

Carbon equivalent calculated
$CE = C + P/3 + Si/3 = 4.4$

Based on the carbon equivalent, the cast iron pipe material is considered hypereutectic (greater than 4.3). To some extent, the presence of manganese, sulfur and phosphorus influence the tensile strength of plain gray cast iron. Sulfur is significant because it affects the solidification behavior of the molten iron upon casting. For this reason, the sulfur content of the melt is usually controlled within limits and with a selected ratio to the manganese content. Generally, the minimum manganese content is 1.7 times the sulfur content plus 0.12% manganese, which assures that sufficient manganese will combine with sulfur (to form manganese sulfides) instead of with iron. An excess of manganese or phosphorus can cause dispersed internal porosity. As noted in the microstructural studies noted above, several of the microspecimens exhibited internal porosity dispersed throughout the pipe wall thickness.

WEATHER DATA

The daily weather data for the month of December 2019 as well as the hourly data for December 17–20, 2019 was obtained from the National Oceanic & Atmospheric Administration (NOAA) (**ATTACHMENT I** – Weather Data). The data was collected from the Philadelphia International Airport weather station, which is the nearest weather station to the reported loss location. In the month of December 2019, the Philadelphia area experienced a few consecutive days with below freezing temperatures leading up to the date of loss on December 19, 2019.

It is likely that the ground froze and thawed hundreds of times over the 91 years of service for the subject cast iron pipe section. Each freeze and thaw cycle induces stresses in pipes and could cause movement, albeit in small increments.

CONCLUSIONS

Based on the laboratory evaluations and the foregoing, the incident 6-inch cast iron main was suitable for its intended use when originally laid underground circa 1928. The fact that it remained in service for approximately 91 years without incident is a testament of the pipe material being acceptable for its intended use.

The fracture of the incident pipe initiated near the bottom and propagated along the circumference of the pipe. As noted above, graphitization up to 73% was observed in the pipe's cross-section, which reduces the effective wall thickness and localized mechanical integrity of the pipe and can serve as the crack initiation site with an applied external force. The fracture surface displayed uniform color and dull luster along the circumference, indicating that there was no evidence of a pre-existing leaking condition prior to the reported incident and that the fracture occurred as a one-time overload condition.

The cast iron main exhibited graphitic corrosion attack around its circumference whereby the mechanical strength of the wall may have been compromised, leaving patches of weak graphitized cast iron, or graphite network. The extent of observed graphitic corrosion reached approximately 73% of

the wall thickness over the 91 years of service. Graphitic corrosion is a term that describes the network of graphite flakes that remain in the material after the iron oxidizes. The physical environment for the pipe plays a significant role in the deterioration rate of the cast iron material. The soil properties that affect or accelerate the corrosion rate include electrical resistivity, chemical and microbiological content, moisture content, redox potential, and aeration. With time and/or changing service environmental conditions, graphitization can lead to pipe failure or leakage.

Chemical analysis results from the subject cast iron main were found to be similar to gray cast iron with the exception of phosphorous content, which can lead to the formation of a hard, brittle phase known as steadite. Localized areas of the material exhibited atypical Talbot strip test results, most likely due to the presence of steadite, which is an unwanted microstructural phase.

Gray cast iron pipes in service today were either manufactured by pit casting or centrifugally spun casting. In the mid-19th century, vertical casting was the most commonly used method to produce cast iron piping. Centrifugal casting was developed in the 1920s and became the primary method for producing cast iron pipe in the 1930s. Characteristically, pit cast iron generally has a lower fracture toughness and mechanical strength than that of centrifugally spun cast iron due to the presence of larger graphite flakes in the microstructure, which serve as sites for crack initiation. In addition, due to the inherent nature of the casting process, pit casting tends to have more casting defects and wall thickness variations than that of centrifugally spun casting.

Casting defects can contribute to the failure of gray cast iron pipes. Although such defects are generally expected to cause failure in a shorter span of service, i.e. less than 91 years, the presence of said defects locally weaken the pipe and serve as stress risers should external forces be applied to it whether by soil disturbances induced from repeated thermal cycling of the soil, new construction, repairs, undermining. Pit cast pipes are known to have issues with non-uniform wall thickness, which can contribute to uneven stress distribution. In addition, inclusions, porosity, and shrinkage voids, which are unintended microstructural constituents, tend to weaken cast iron. Porosity is a common casting defect where air becomes entrapped in the solidifying melt upon cooling. Inclusions such as undissolved ferrosilicon or oxides can also become entrapped in the metal as well. Such defects can act as stress risers and allow for crack formation. Corrosion-related damage, such as graphitization, reduces the wall thickness of the pipe and thereby creates a stress riser where material wastage occurs.

In conclusion, the incident pipe experienced an external bending force acting upon it where a through-wall crack initiated and propagated near its BOTTOM, where it was weakening progressively due to graphitic corrosion towards the TOP. Circumferential cracking is a common mode of failure for cast iron piping, when subjected to bending forces. Due to the inherent brittle nature of gray cast iron, the pipe will not plastically deform under bending loads but rather fracture. A crack initiates at the highest stressed region, whether it be at a thinned wall due to corrosion, large-sized casting flaw, or some other stress riser, and propagates rapidly along the pipe's circumference to alleviate the stresses induced by the bending forces. Such bending forces can occur as a result of frost upheaval during freeze/thaw cycles, poor bedding, loss of soil support or external force from soil disturbances near the buried pipe or undermining.

The writer reserves the right to amend or supplement his opinions should any additional information be provided. Kindly feel free to contact the undersigned should there be any need for further discussion on this matter.

Very truly yours,



John P. Gashinski, P.E., CFEI
Engineering Consultant
Materials Scientist

JPG/np

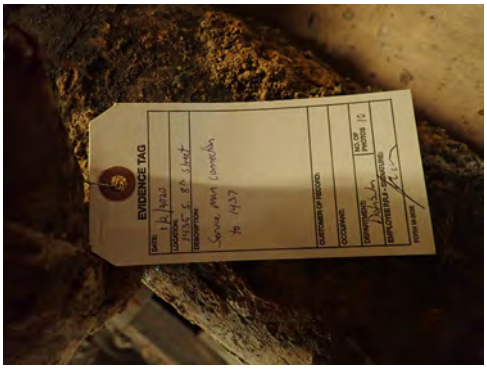
ATTACHMENT A



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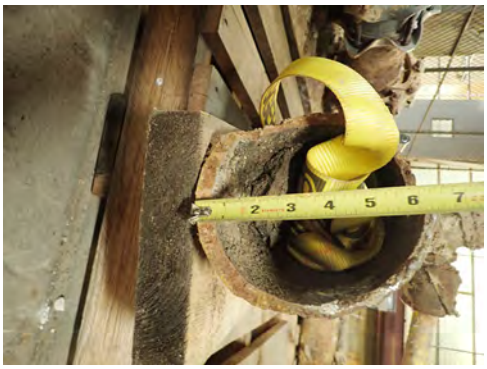
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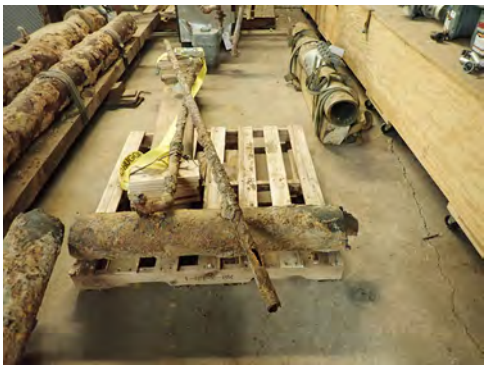
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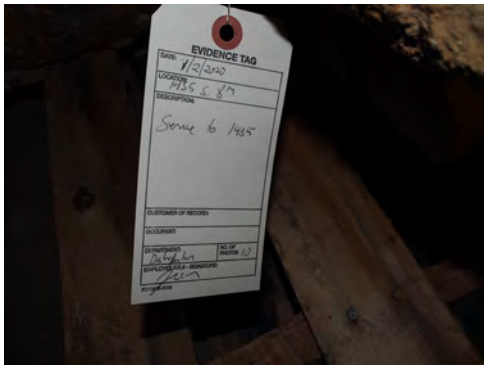
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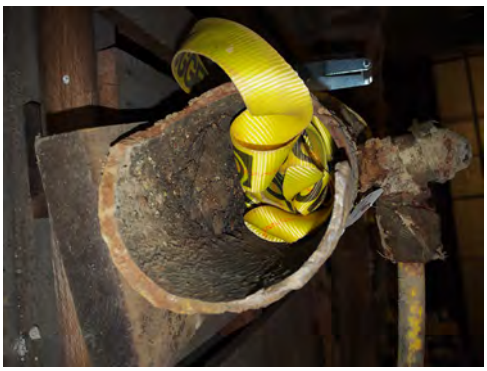
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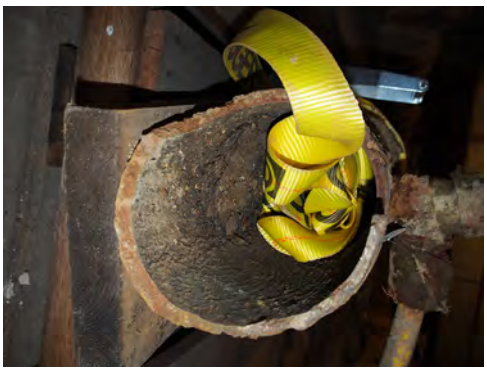
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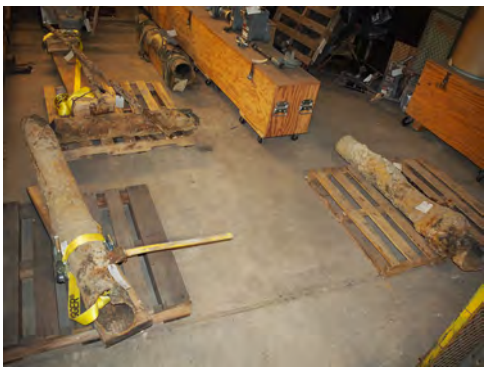
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W-2400-108.JPG

ATTACHMENT B

AFFILIATED ENGINEERING LABORATORIES, INC.
Engineering Consultants

Physical Location:
777 New Durham Road
Edison, NJ 08817

P.O. Box 3300
Edison, NJ 08818-3300

Phone (732) 429-1200
Fax (732) 429-1201
www.affiliatedinc.net

W-2400
Philadelphia Gas Works

PROTOCOL

Metallurgical evaluation of the submitted 6" cast-iron pipe section

Site Location:
1435 South 8th Street
Philadelphia, PA 19147
D/L: 12/19/19

March 3, 2020

INSPECTION LOCATION

Affiliated Engineering Laboratories, Inc.
777 New Durham Road
Edison, New Jersey 08817

GENERAL

- All images, documents and test results obtained using laboratory equipment will be compiled and subject to distribution by CD mailing, flash drive, or Sharefile link.
- The proposed protocol may be added to and/or modified prior to and during the testing as circumstances may warrant. Any departures from the above protocol will be duly noted. If modifications to the protocol are needed, they can be made as mutually agreed upon by the participating groups.
- All procedures are to be performed in accordance with ASTM and/or industry standard practices.
- Videotaping is allowed if the sound recording feature is disabled. Any attendee planning on documenting any of the proceedings via videography must do so with NO SOUND during the recording.
- Chain of Custody will be maintained for each sample and sub sample. Evidence removed from the evidence storage facility for testing by an independent testing laboratory will be returned to the evidence storage facility in its post-inspection condition.
- In general, handling and preparations of material for testing will follow the protocol outlined in this document. All reasonable measures will be applied for proper handling, preparation, transfer and storage of the evidence materials.

ITEMS

- **A.** Service line to 1433 South 8th Street (plastic) with Tap
- **B.** Service line to 1435 South 8th Street (steel) with Tap
- **C.** Service line to 1437 South 8th Street (plastic) with Tap
- **D.** 6" cast iron main (5' 8" section)

Non-destructive Evaluation (ITEMS A, B, C, and D)

1. Visual inspection of the submitted pipe sections in as-received condition.

2. Dimensional measurements.

3. Visual and macroscopic examination of the mating fracture surfaces and the surrounding areas of the cast iron sections (**ITEM D**) with photographic documentation. Examination of the three service lines (**ITEMS A, B, and C**) will also be performed on the surfaces as well as the taps.

Destructive Testing (ITEM D only)

1. Two ring section samples containing the mating fracture surfaces will be cut from the corresponding pipe pieces. A third ring will be cut below one of the fracture surfaces for hardness and chemical analysis.

2. X-ray Radiography will be performed on ring section samples.

3. The fresh cut surfaces of the ring section samples will be examined visually as well as via stereomicroscope to assess the pipe condition, i.e. extent of graphitization. The mating fracture surfaces will be examined by stereomicroscope.

    i. Cleaning of the surfaces may be needed to remove any dirt or debris that may be obscuring the topography.
    ii. Ultrasonic bath with Alconox® solution

4. Microspecimens intersecting one of the mating fracture surfaces will be prepared using standard metallographic procedure in accordance with ASTM E3-11 (2017) *Standard Guide for Preparation of Metallographic Specimens*. A minimum of 4 microspecimens will be taken along the circumference at the 12, 3, 6, and 9 o'clock positions for microstructural studies(*). The other corresponding fracture surface ring will be preserved for any future testing or examination should it be requested at a later date.

5. Depending on the condition of the fracture surface, fractographic studies of the surfaces contained on the aforementioned microspecimens will be performed using Scanning Electron Microscopy (SEM) prior to them being encased in polymeric mounts in Step 4(*).

6. Hardness of the third ring sample (not containing a fracture surface) will be measured using a Brinell hardness tester in accordance with ASTM E10-18 *Standard Test Method for Brinell Hardness of Metallic Materials*.

    i. A small sample of material will be cut/removed from the ring and sent to an independent testing laboratory along with the appropriate chain of custody.

7. Chemical analysis of the third ring sample (not containing a fracture surface) will be performed via Optical Emission Spectroscopy (OES). Carbon and Sulfur will be analyzed by LECO fusion process.

    i. A small sample of material will be cut/removed from the ring and sent to an independent testing laboratory along with the appropriate chain of custody.

8. Talbot strip test samples will be machined longitudinally from one of the mating pipe pieces and bend tests will be conducted in a tensile machine. (Given the condition of the pipe material).

    i. Sample material will be sent to an independent testing laboratory with the appropriate chain of custody for machining and testing.

9. Additional ring section samples will be cut from the pipe section for compressive testing which will be performed in a universal tensile machine. (Given the condition of the pipe material).

    i. Sample material will be sent to an independent testing laboratory with the appropriate chain of custody for machining and testing.

Kindly feel free to contact me should there be any need for further discussion on this matter.

Very truly yours,



John P. Gashinski, PE, CFEI
Engineering Consultant
Materials Scientist

ATTACHMENT C

Affiliated
Engineering
Laboratories, Inc.

Chain of Custody

Caption: Philadelphia Gas Works - 1435 South 8th Street

File No.: **W-2400**

Engineer: JPG

Item No.	Quantity	Description
1		CRATE 100 x 50 x 31
2		CRATE 80 x 36 x 28
		1 MAIN 3 SERVICES
		TOTAL WITH KEYS TO CRATE

	Released By	Received By	Reason
Signature:			
Print Name:	Thomas Monahan	D. ZAWORNICK	
Company:	PGW	Affiliated Engineering Labs	
Date:	5/28/20	10-26-2020	
Signature:			
Print Name:			
Company:			
Date:			

Please print and sign in the appropriate boxes above and return a copy to:

Affiliated Engineering Laboratories, Inc.
777 New Durham Road
Edison, New Jersey 08817

Phone: (732) 429-1200
Fax: (732) 429-1201

ATTACHMENT D

Caption: Philadelphia Gas Works - South 8th Street | Date: 6/24 & 25/2020 | File No.: W-2400

IN ATTENDENCE AT THE FACILITY OF AFFILIATED ENGINEERING LABORATORIES, INC.

John Gashinski, P.E., CFEI - Affiliated Engineering Laboratories, Inc.

David Zawodniak - Affiliated Engineering Laboratories, Inc. - Lead Technician

VIRTUAL ATTENDEES

Wednesday, June 24, 2020

Bernadette Betzler
Colleen Murray
Elena Bozhko
Cynthia Garner
Ellen Hugar
Jody DeMarco
Jim Jones
Kenneth Dybalski
Mark Lee
Mark Licurse
Vladimir Shteyn
Terri Cooper Smith
Tom Monahan
Christopher Whiteash
Steven G. Wigrizer

Thursday, June 25, 2020

Bernadette Betzler
Colleen Murray
Elena Bozhko

Ellen Hugar
Jody DeMarco

Mark Lee
Mark Licurse
Vladimir Shteyn
Terri Cooper Smith
Tom Monahan
Christopher Whiteash

ATTACHMENT E



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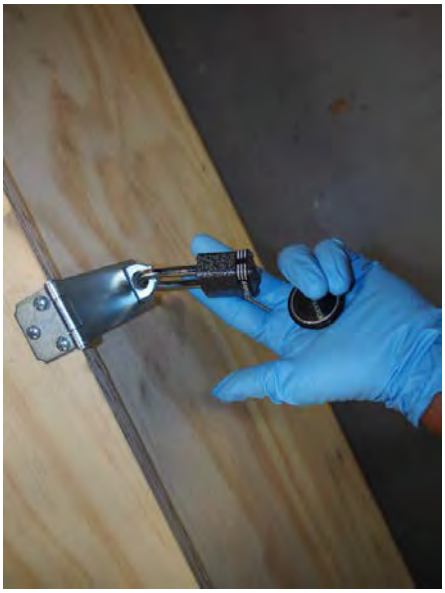
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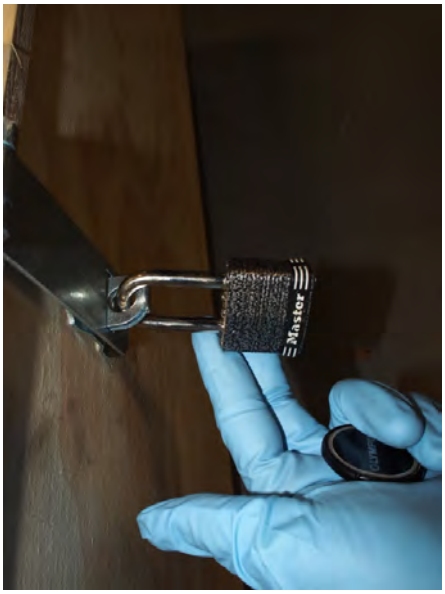
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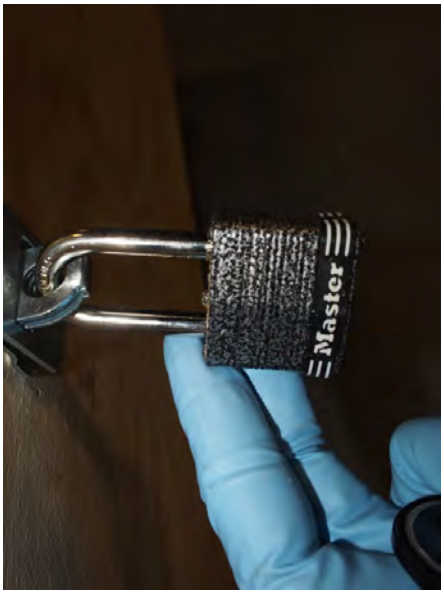
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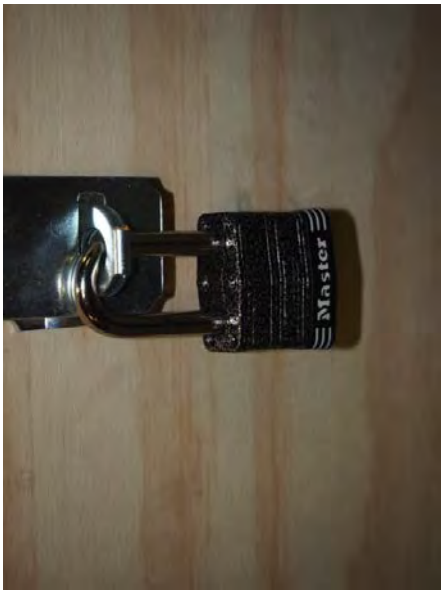
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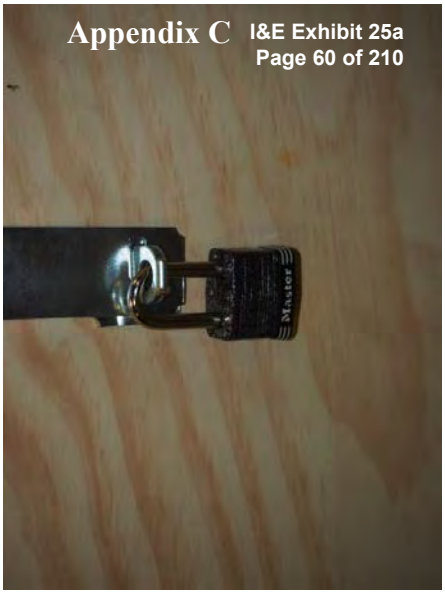
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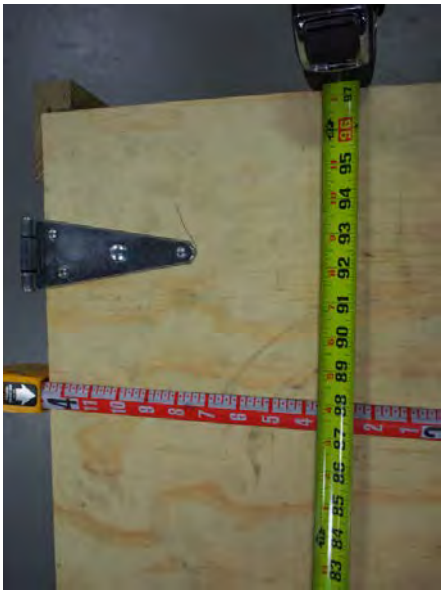
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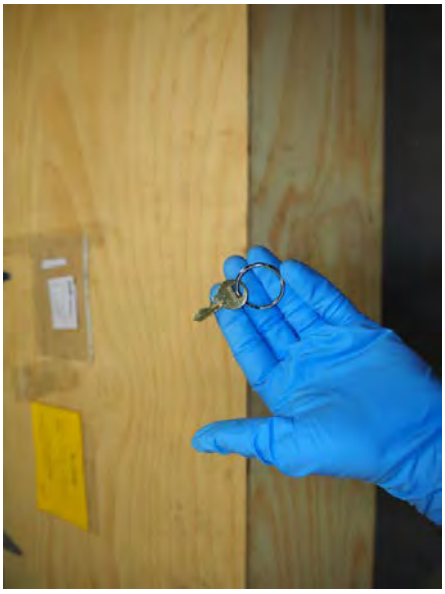
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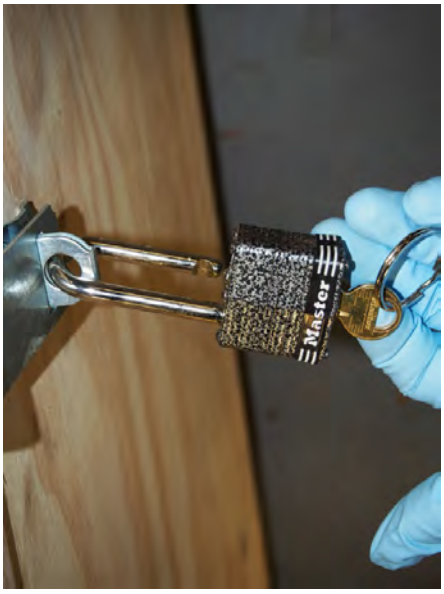
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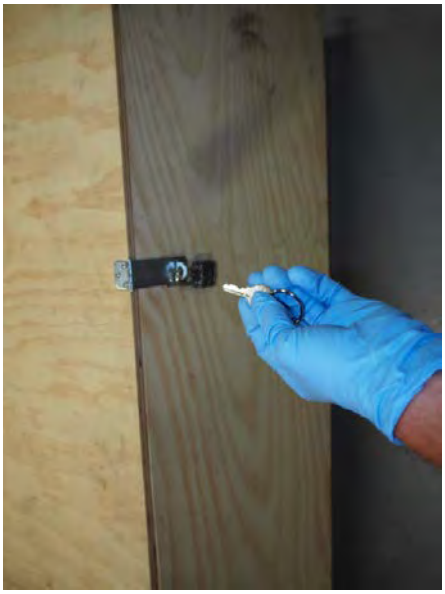
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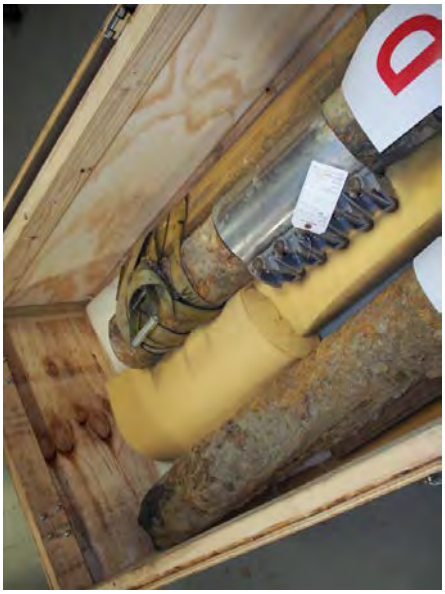
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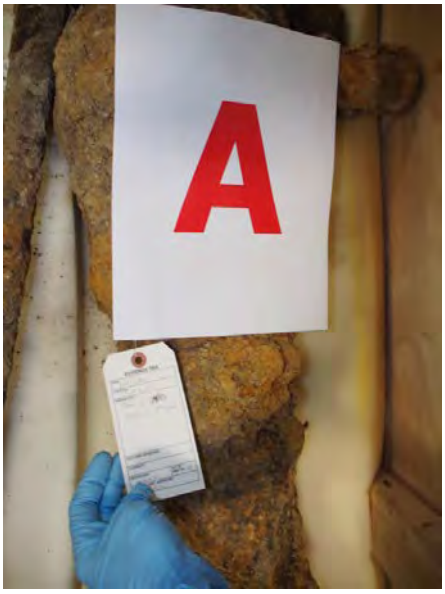
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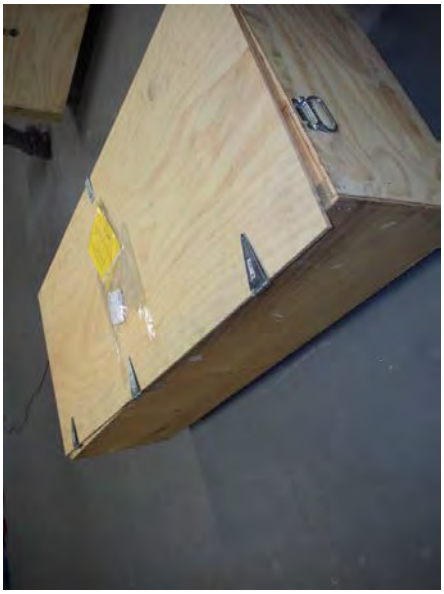
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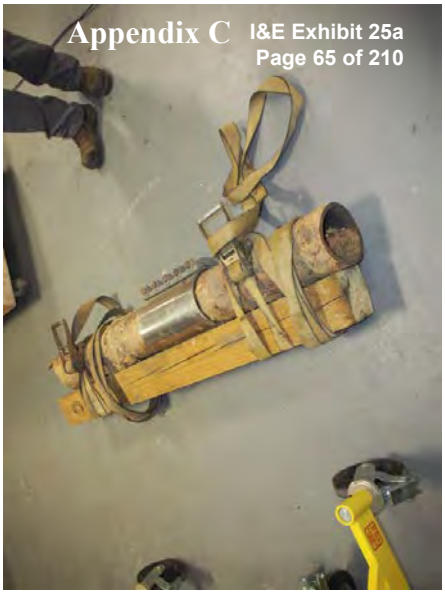
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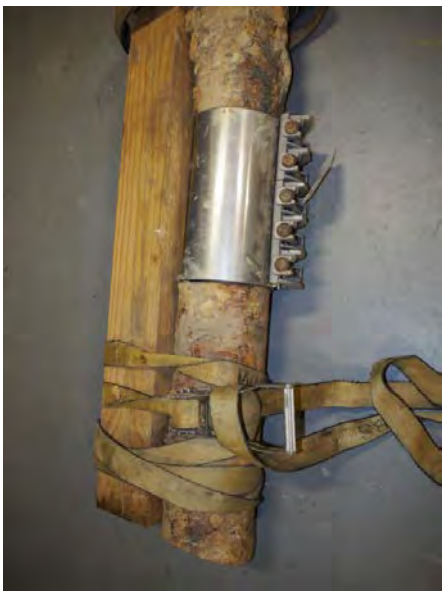
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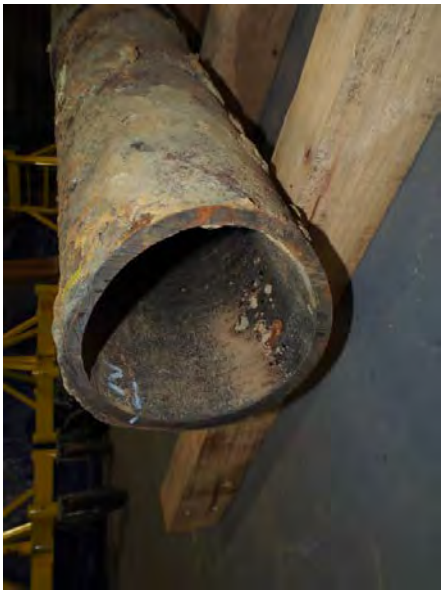
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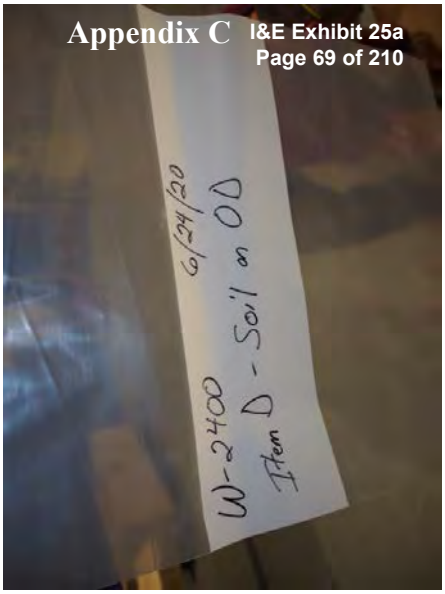
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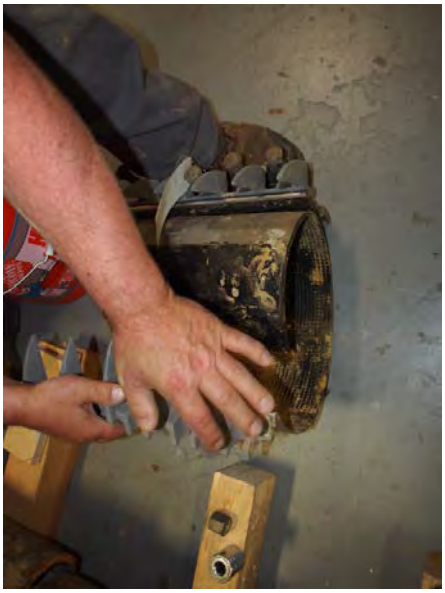
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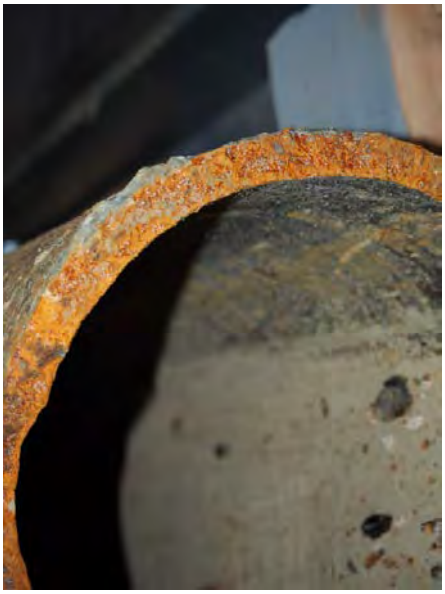
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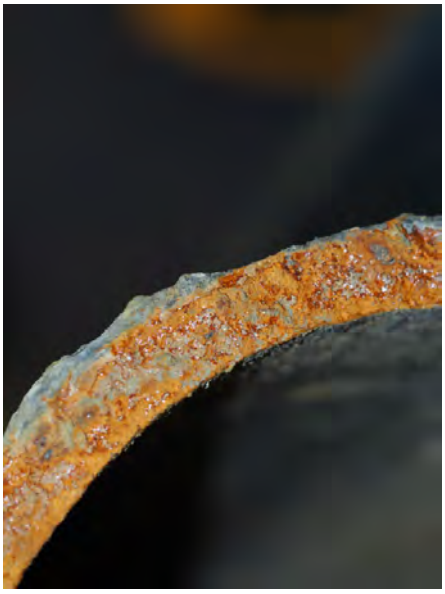
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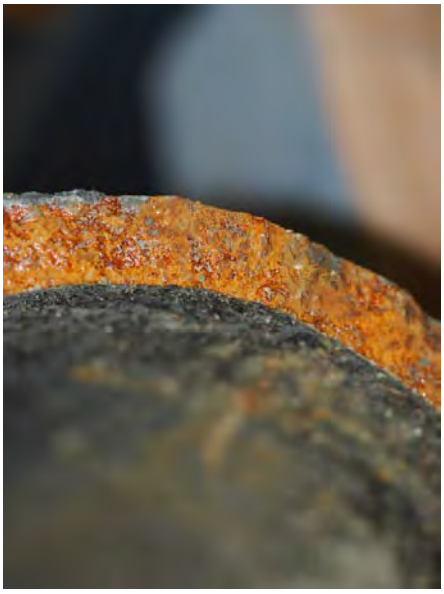
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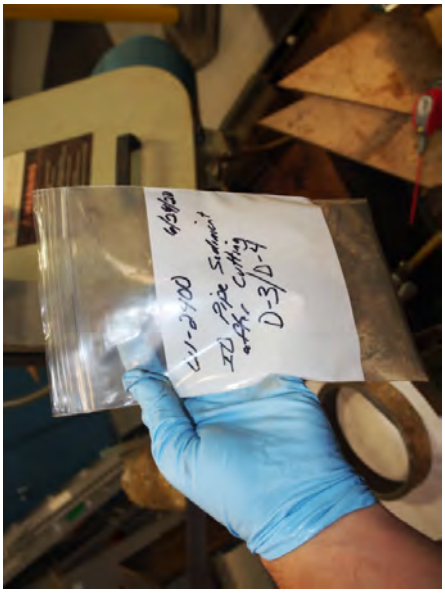
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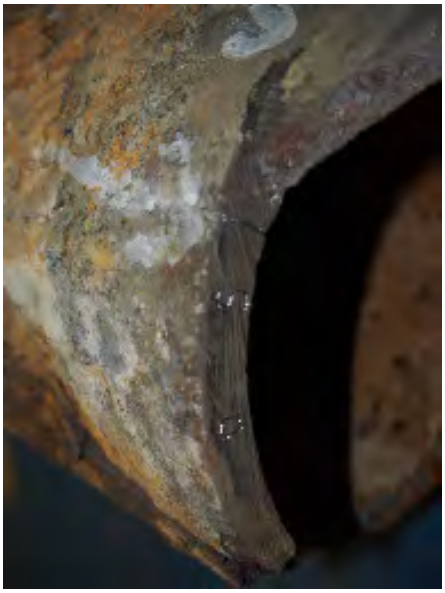
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W-2400-B-207.JPG



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W-2400-B-209.JPG



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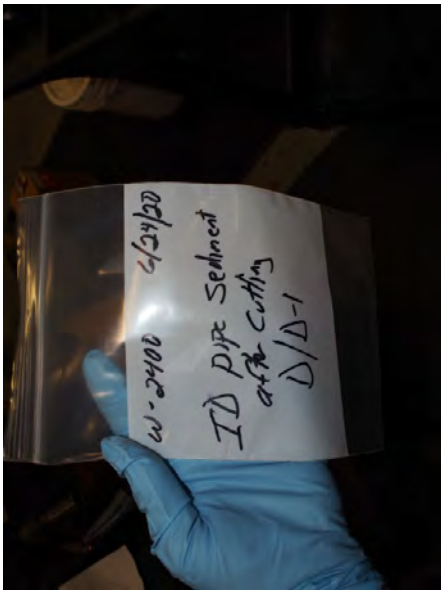
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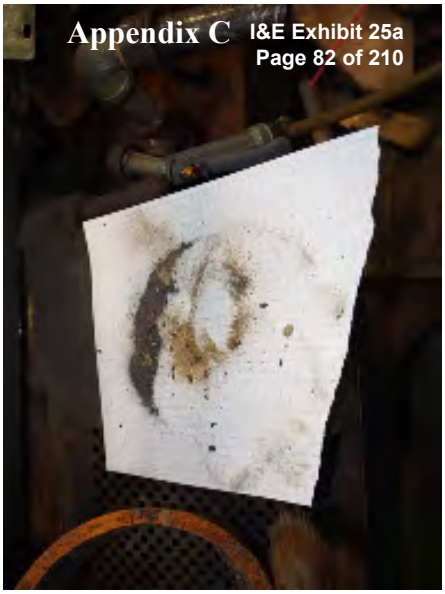
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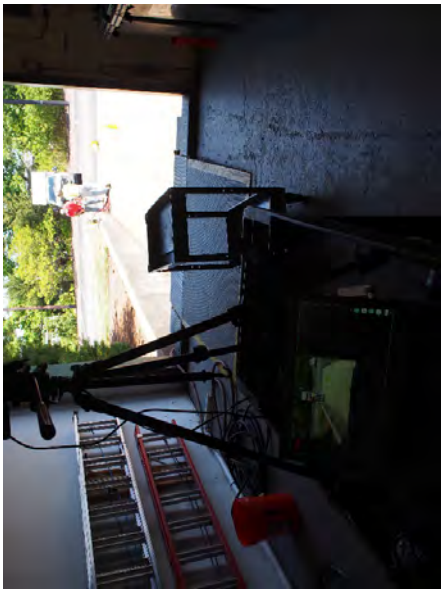
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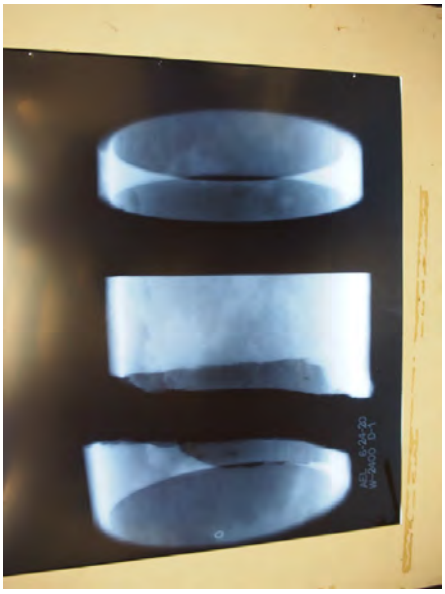
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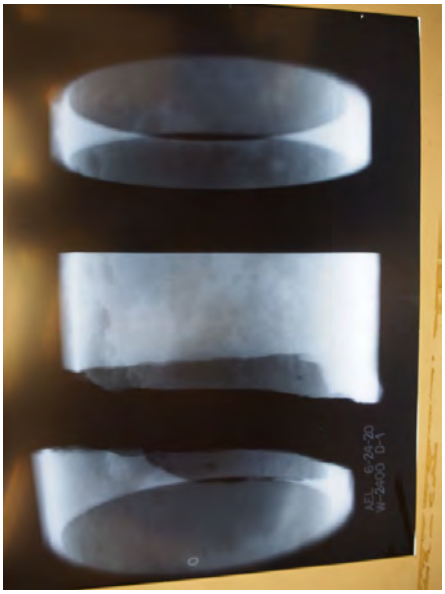
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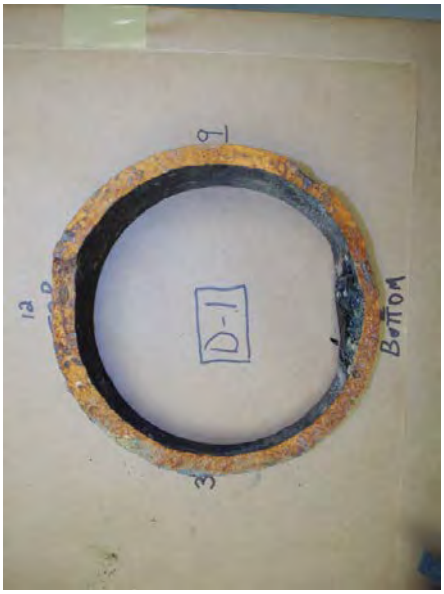
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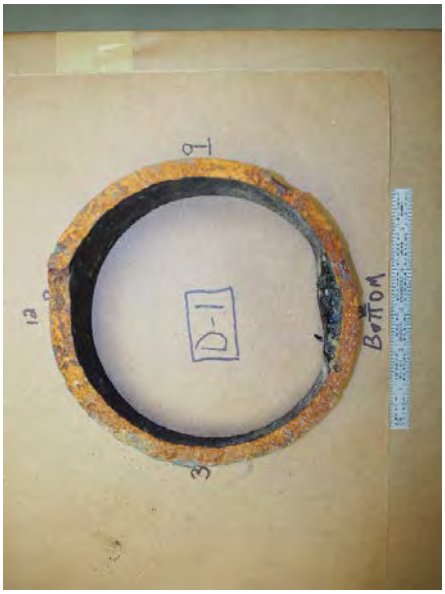
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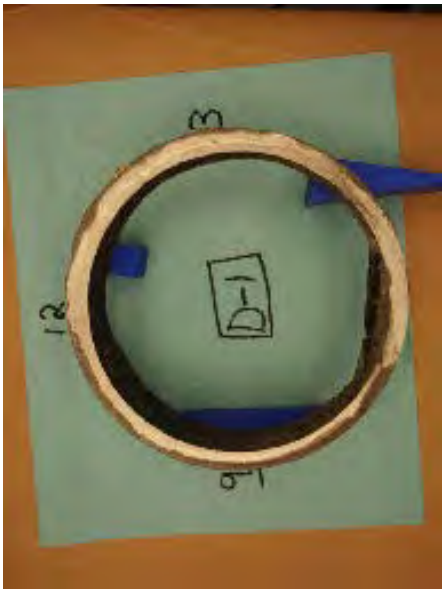
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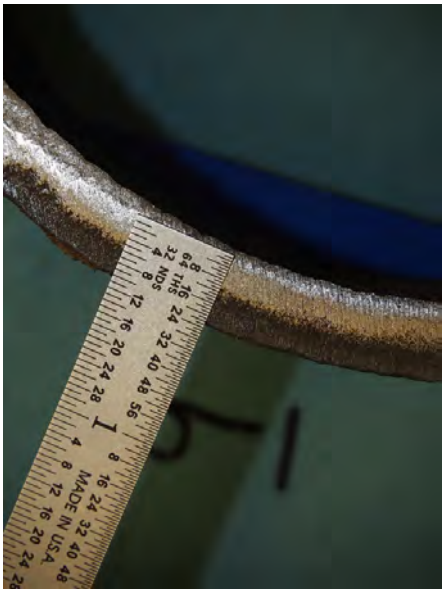
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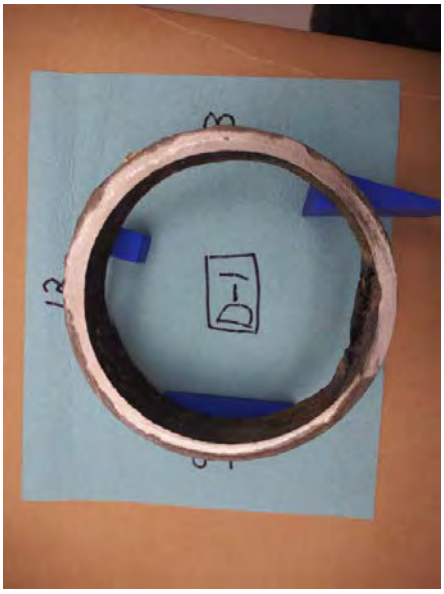
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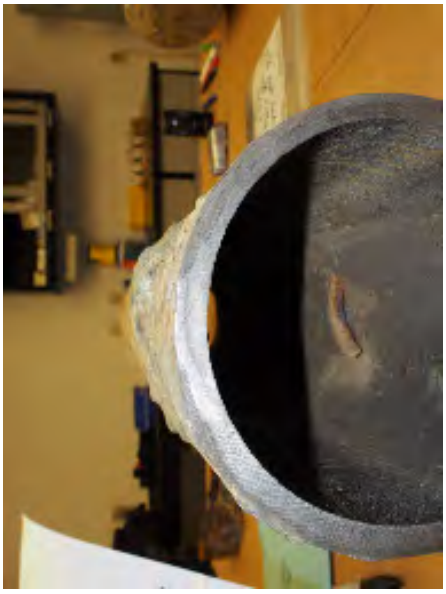
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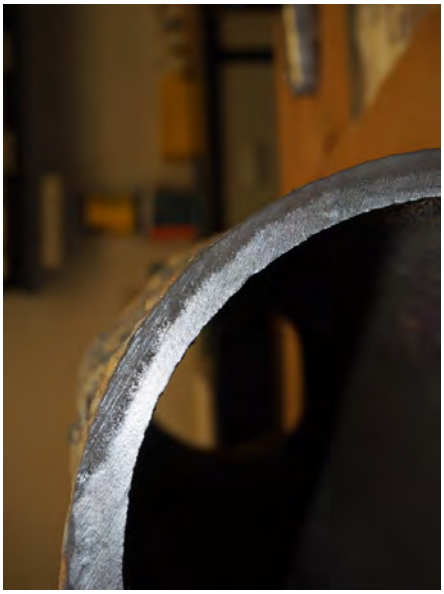
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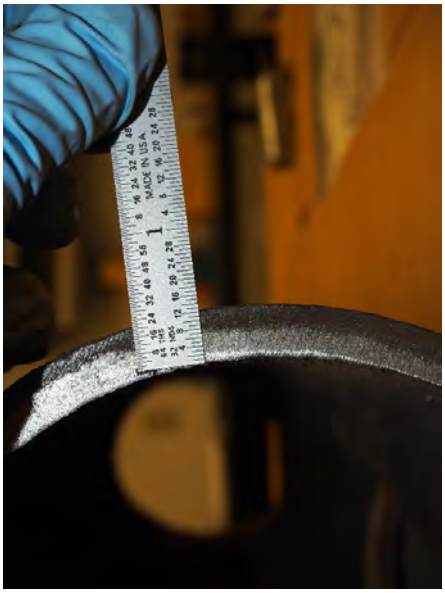
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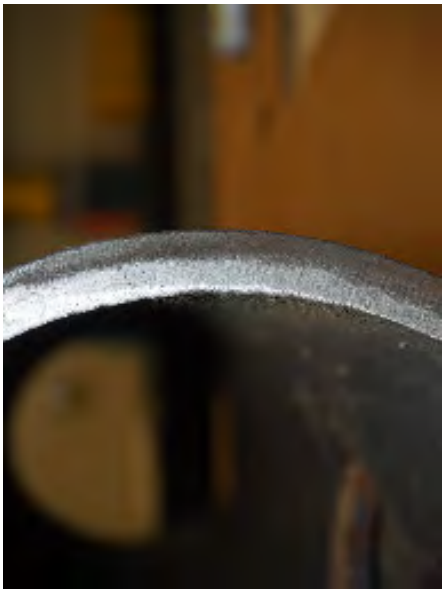
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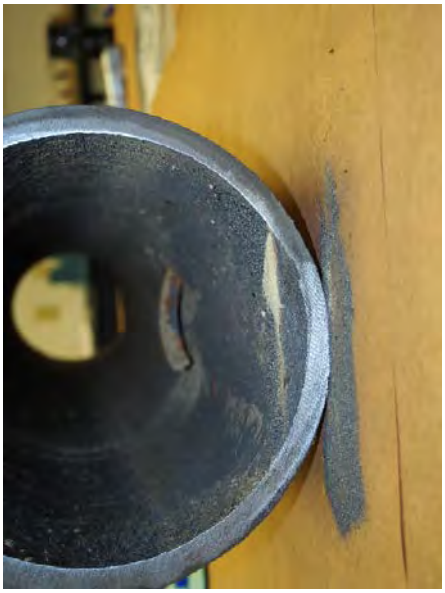
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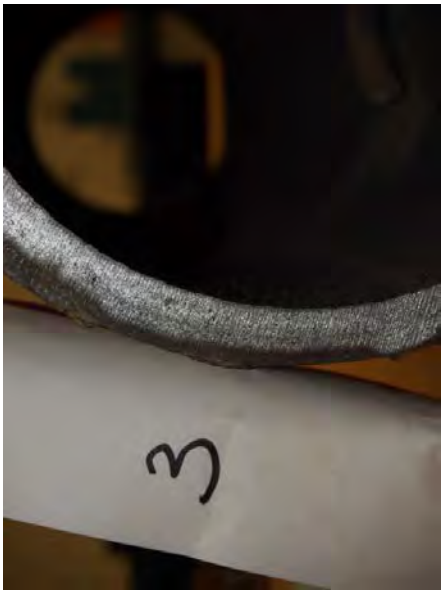
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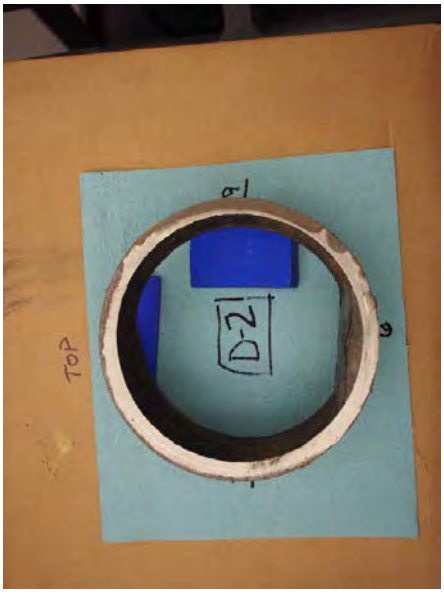
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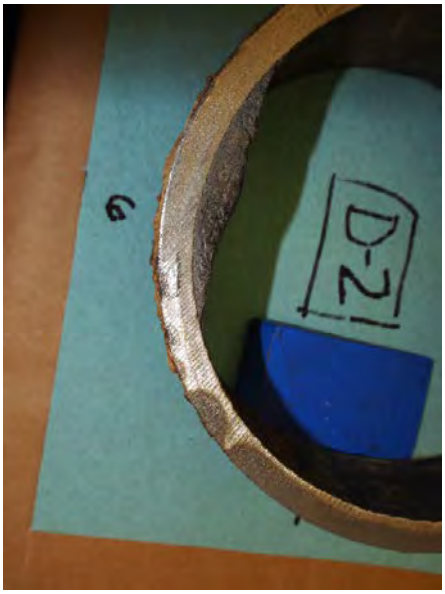
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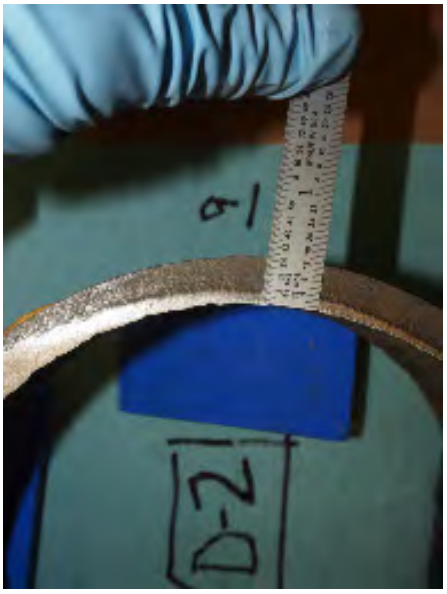
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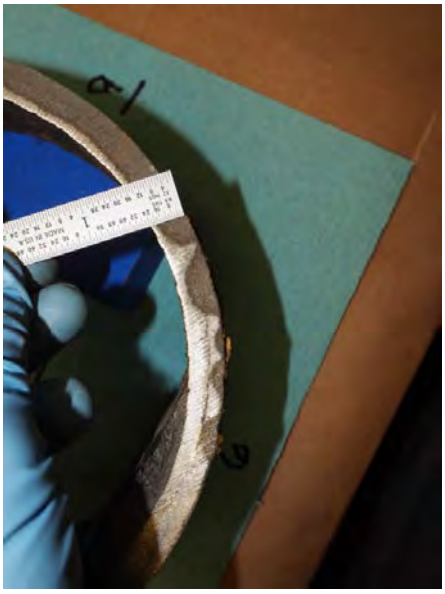
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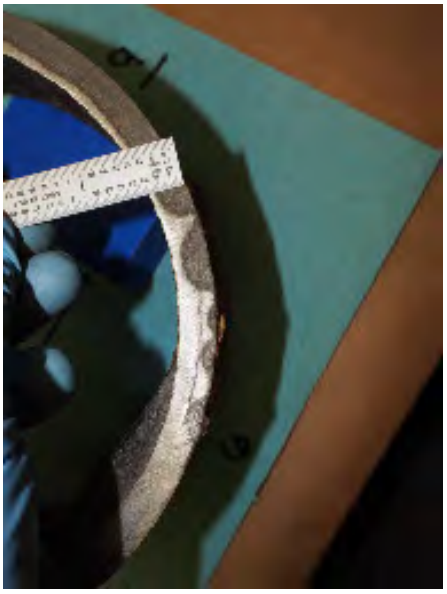
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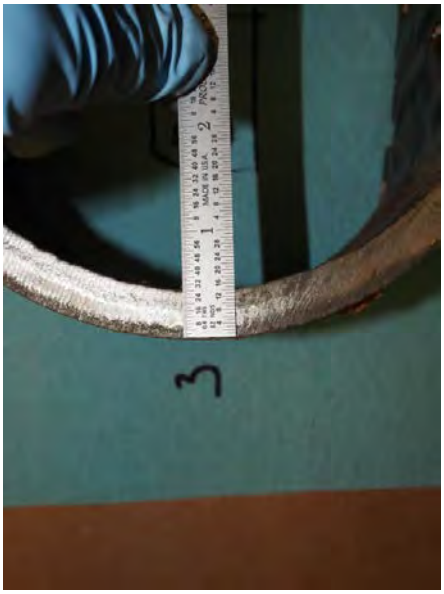
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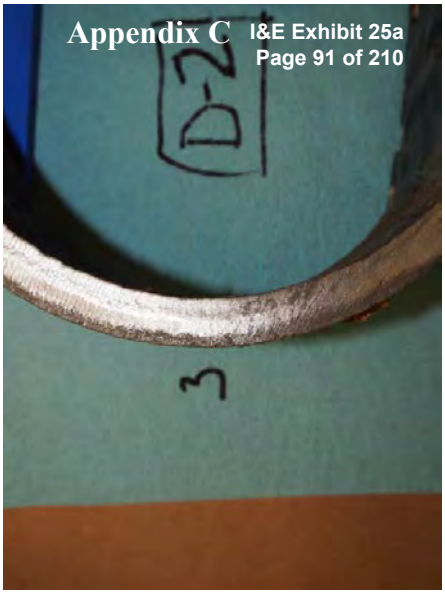
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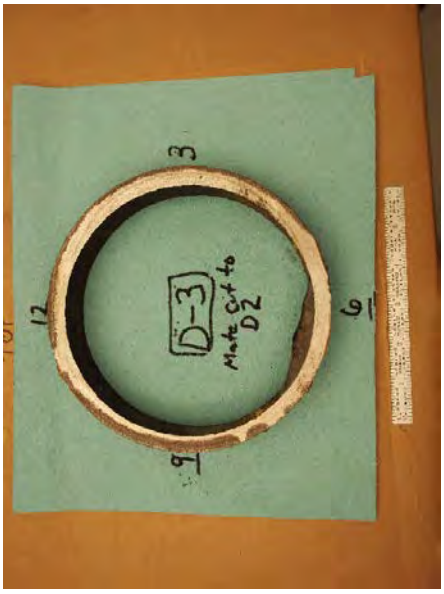
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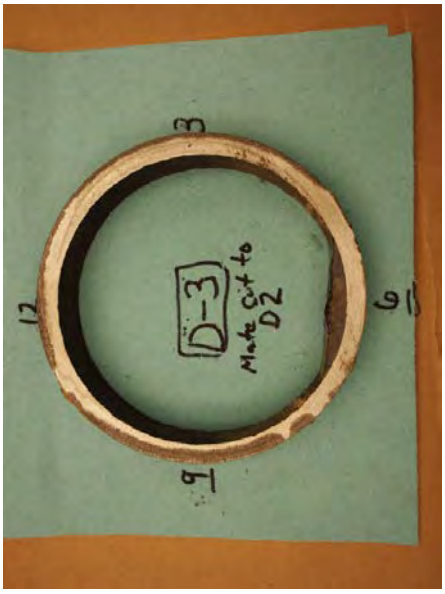
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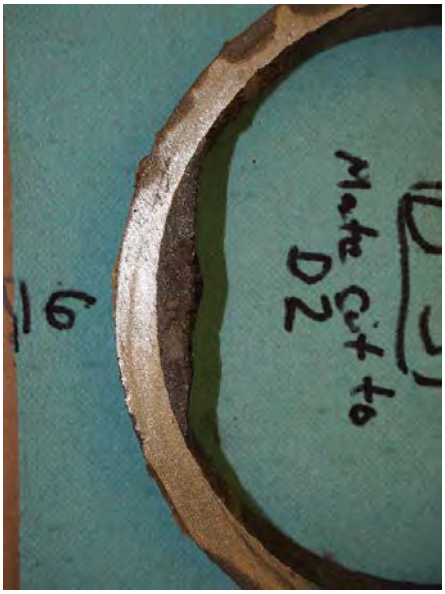
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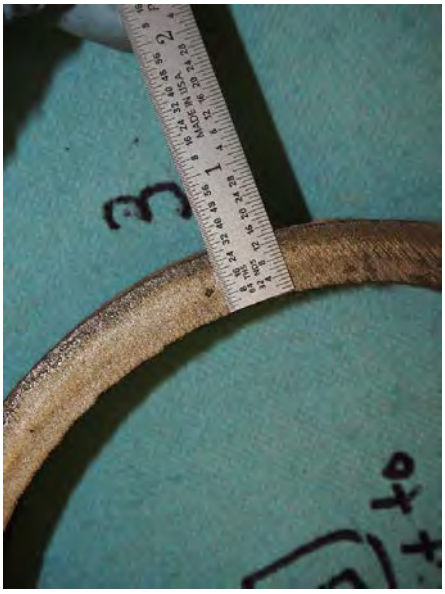
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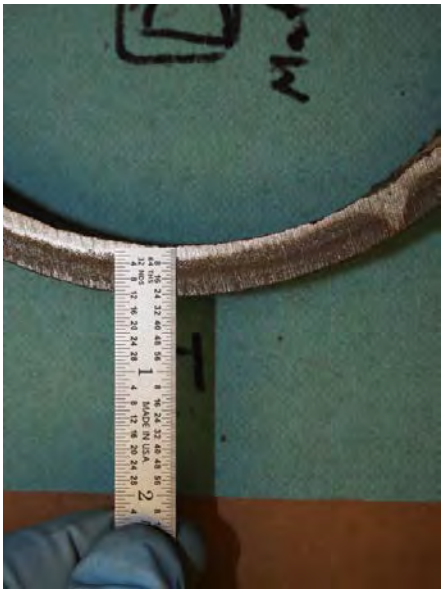
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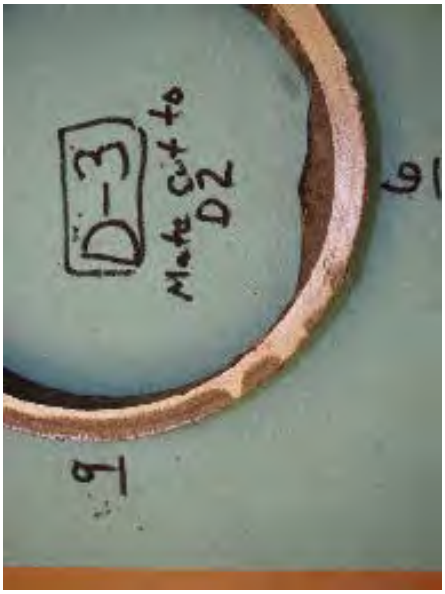
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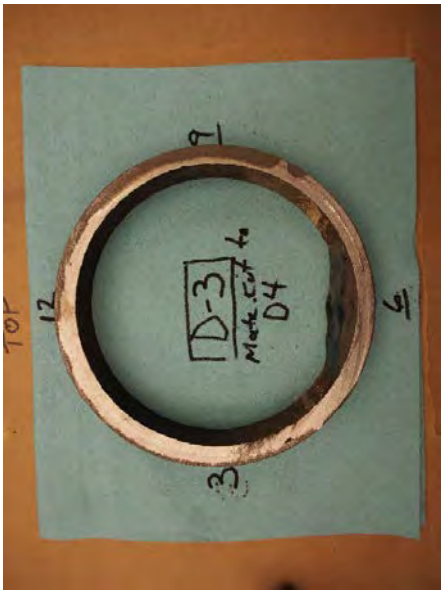
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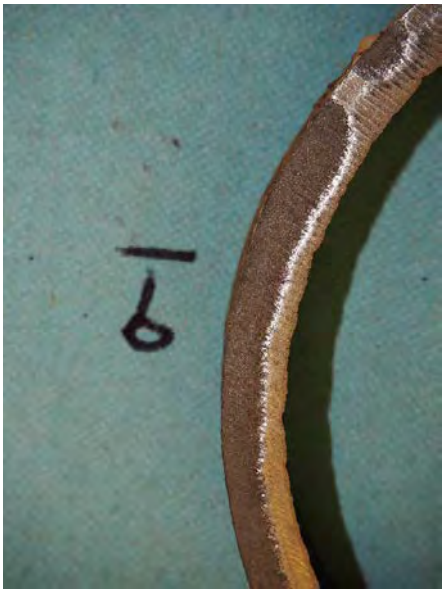
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W-2400-B-321.JPG



W-2400-B-322.JPG



W-2400-B-323.JPG



W-2400-B-324.JPG



W-2400-B-325.JPG



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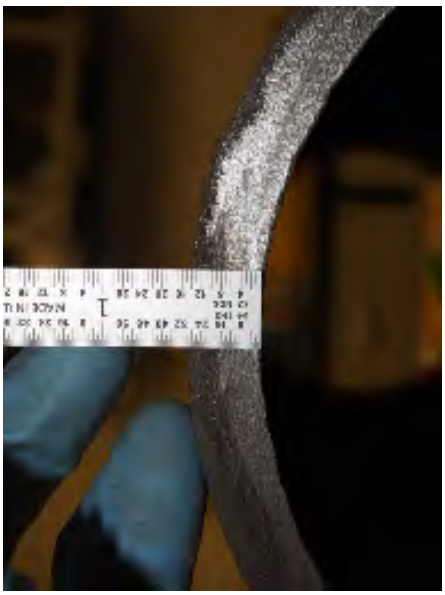
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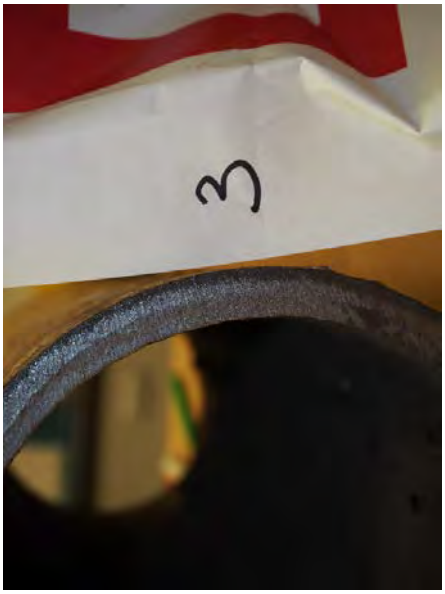
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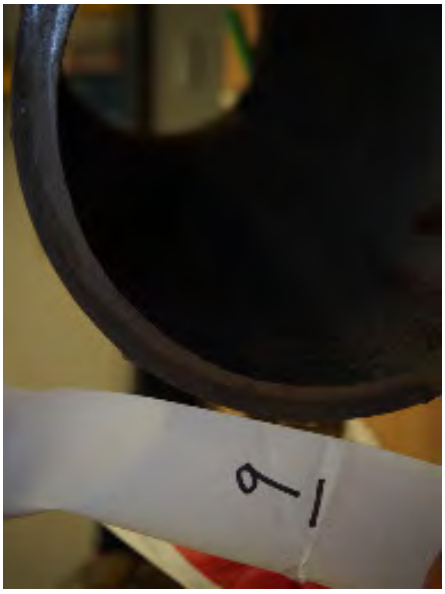
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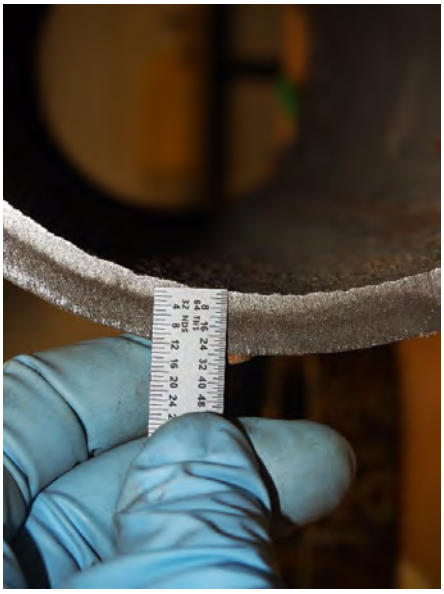
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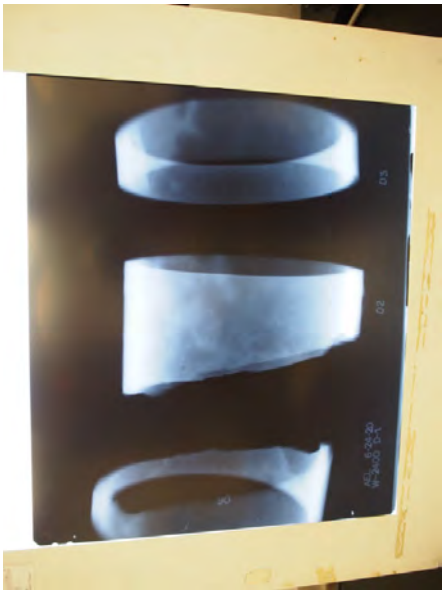
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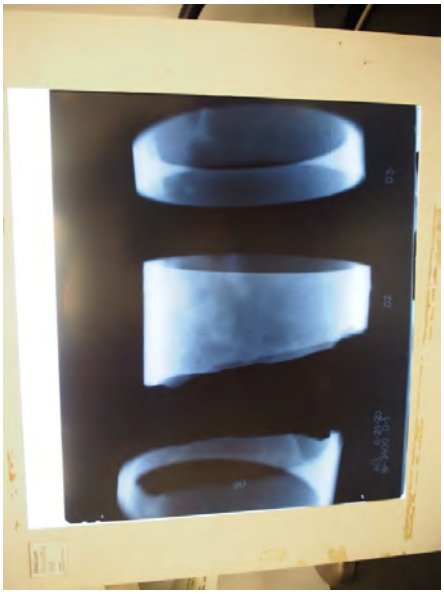
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W-2400-B-346.JPG



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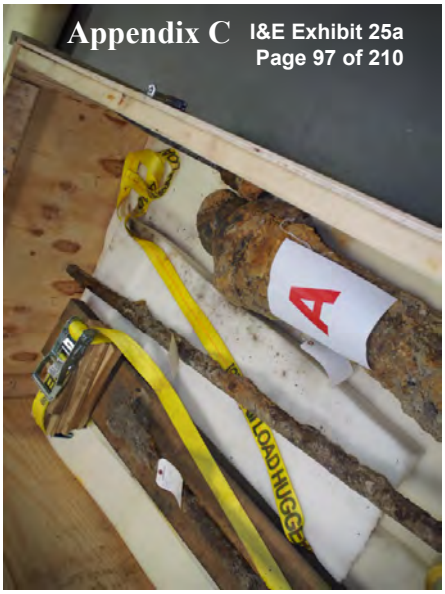
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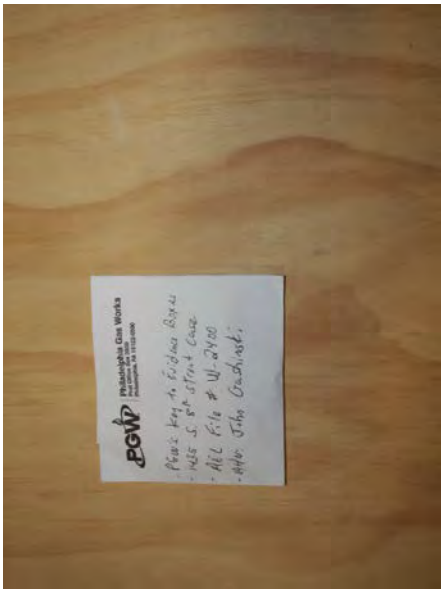
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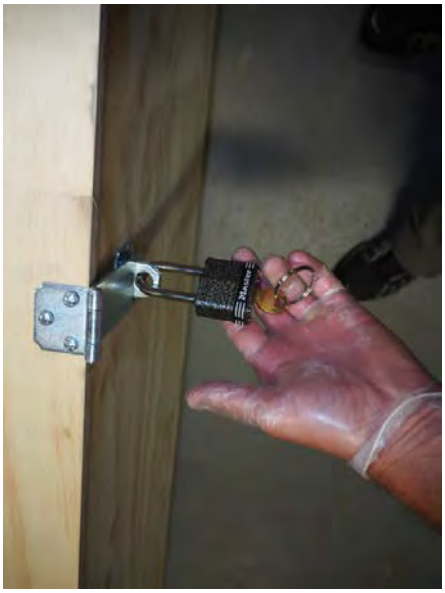
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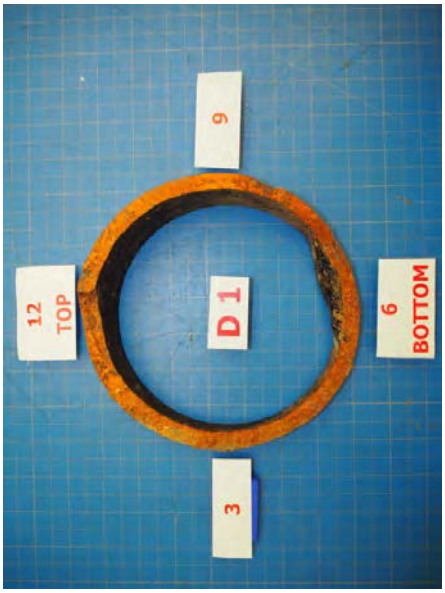
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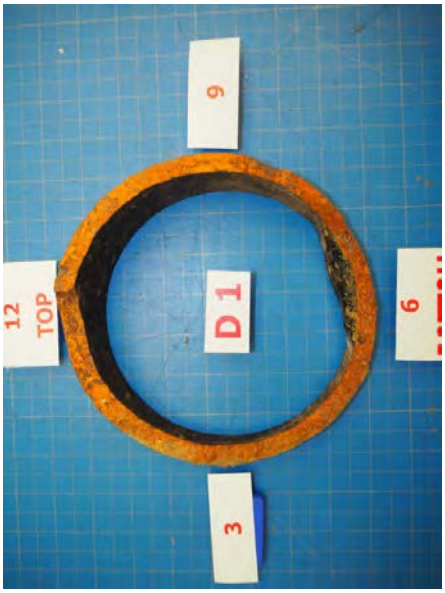
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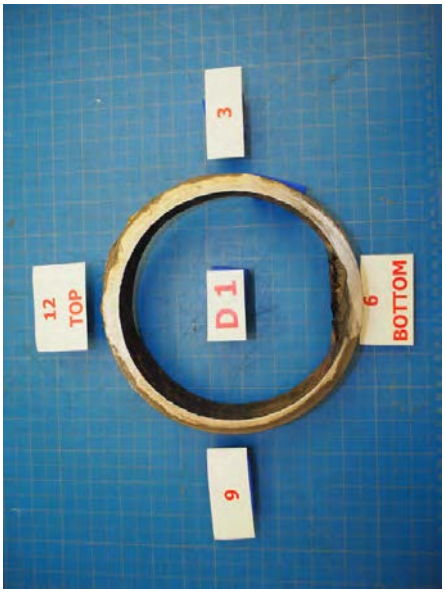
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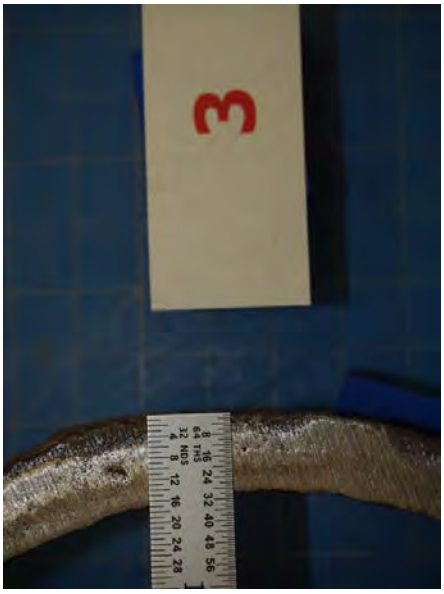
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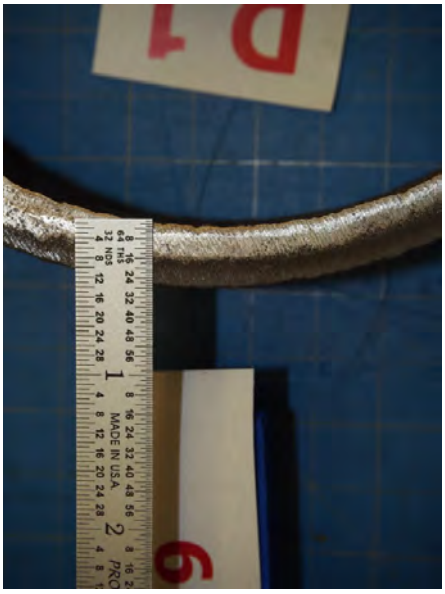
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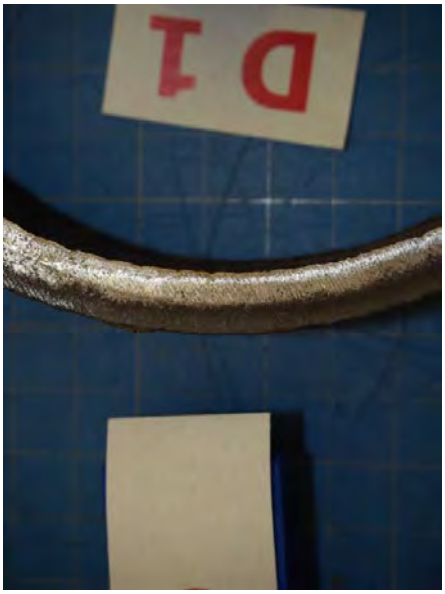
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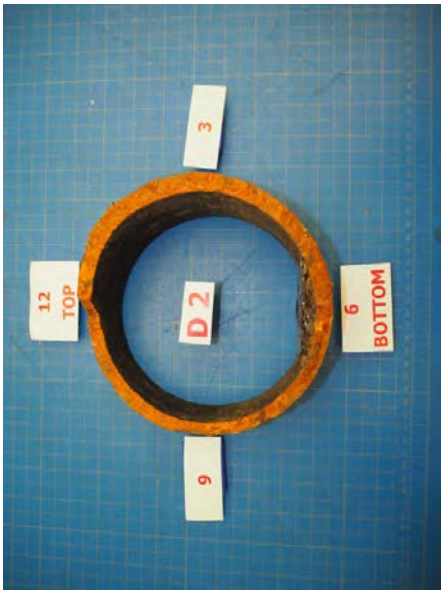
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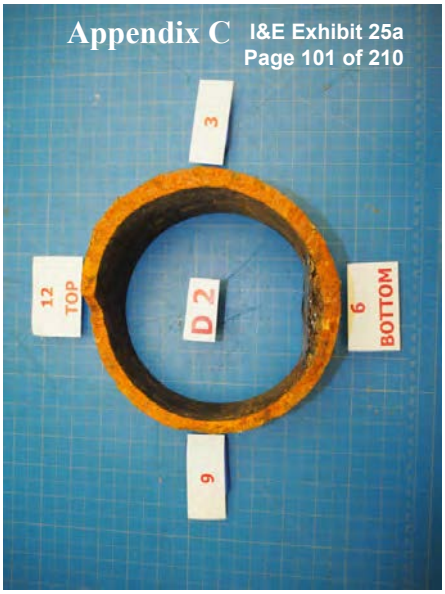
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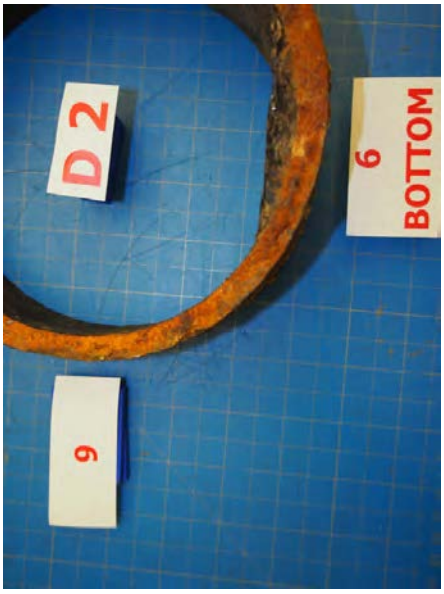
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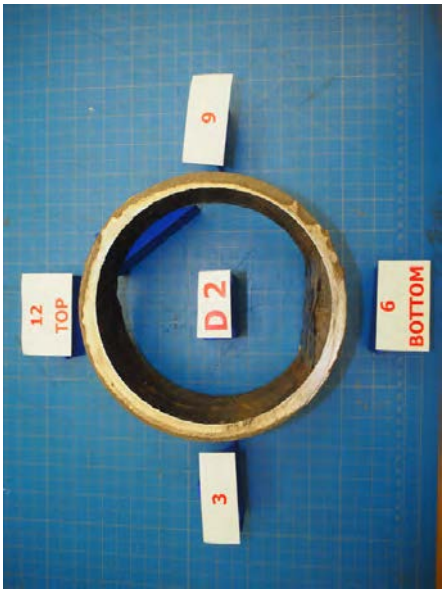
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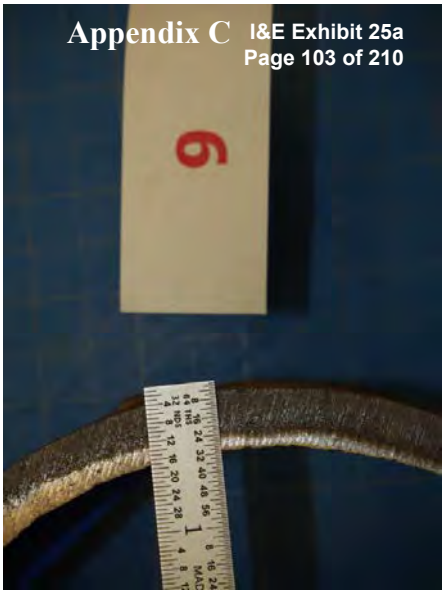
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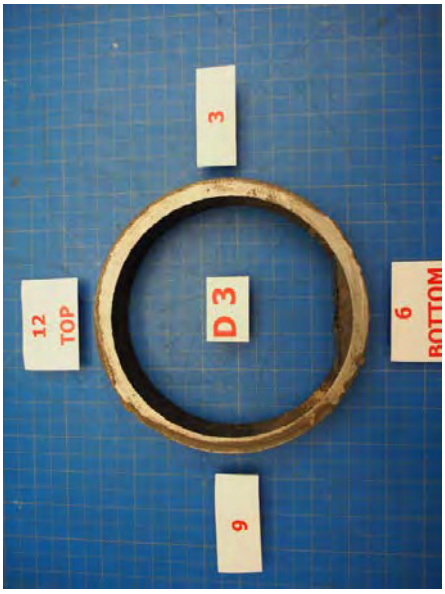
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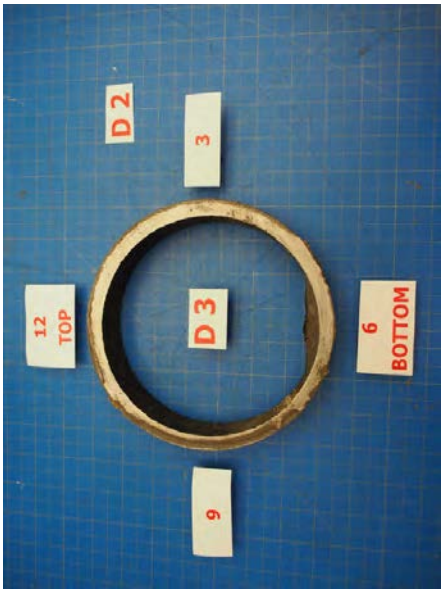
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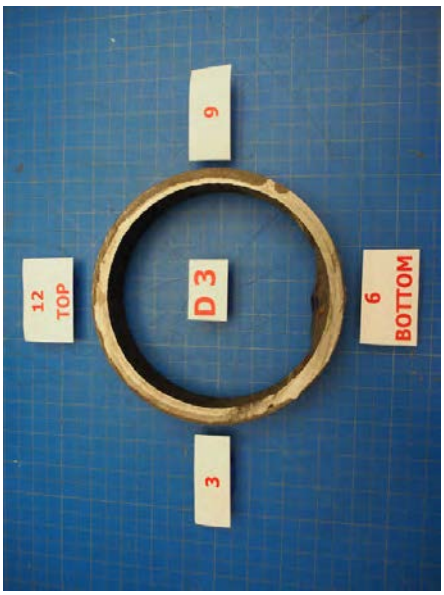
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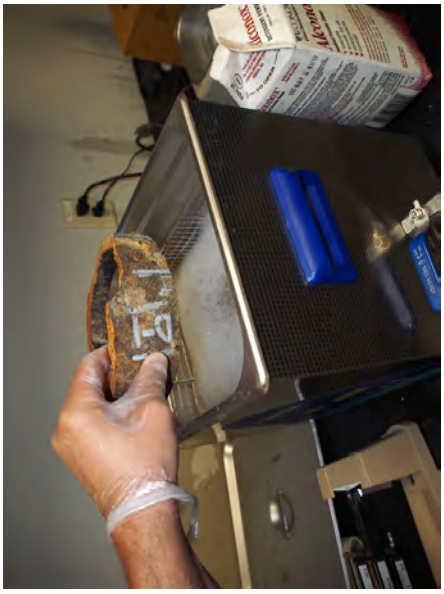
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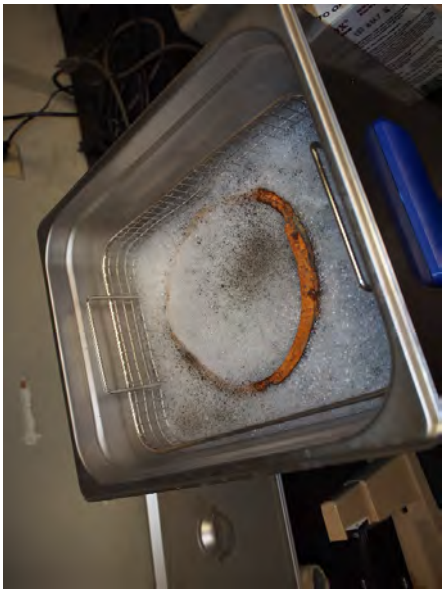
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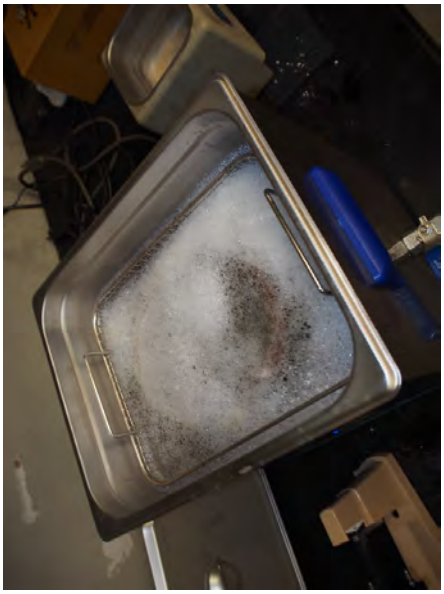
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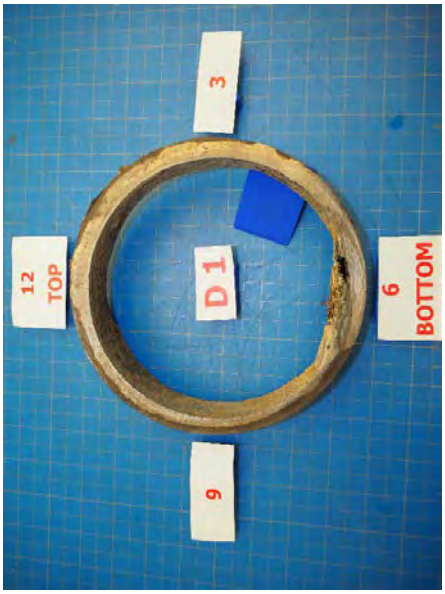
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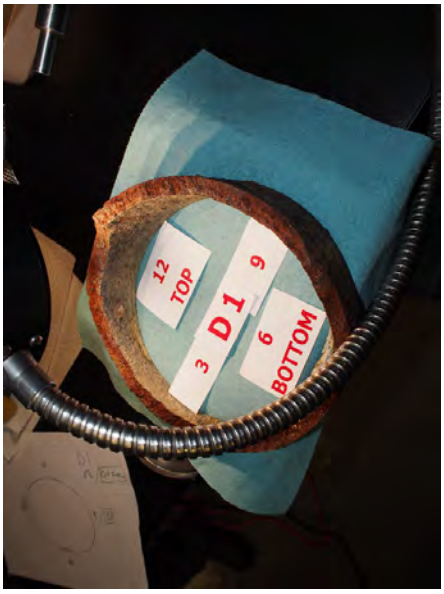
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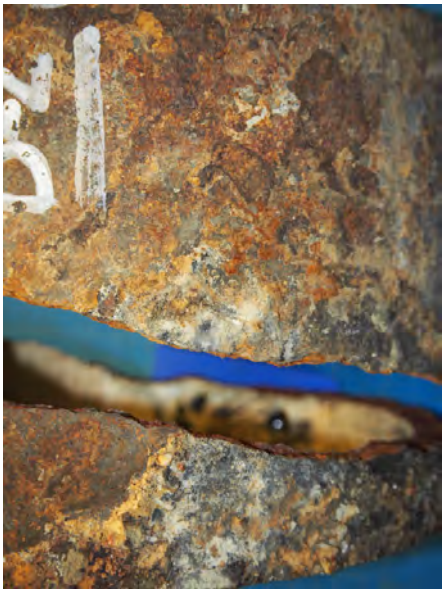
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W-2400-C-096.JPG



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W-2400-C-101.JPG



W-2400-C-102.JPG



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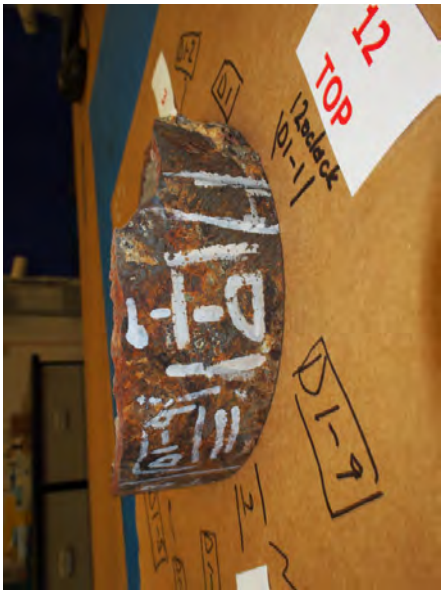
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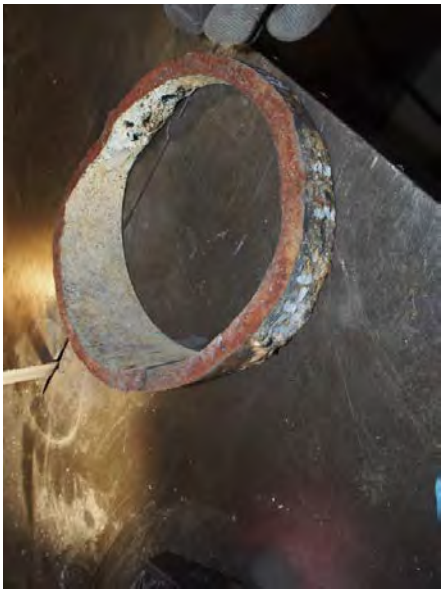
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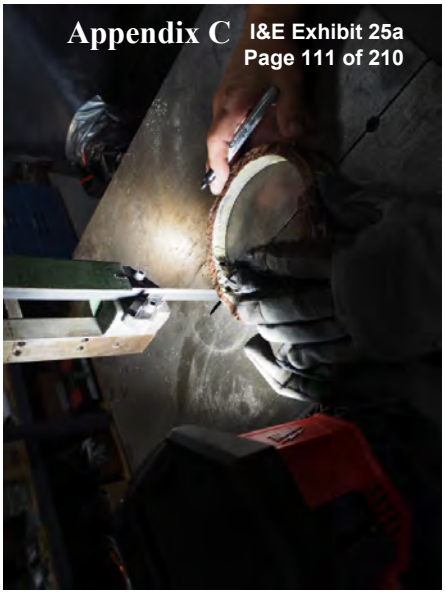
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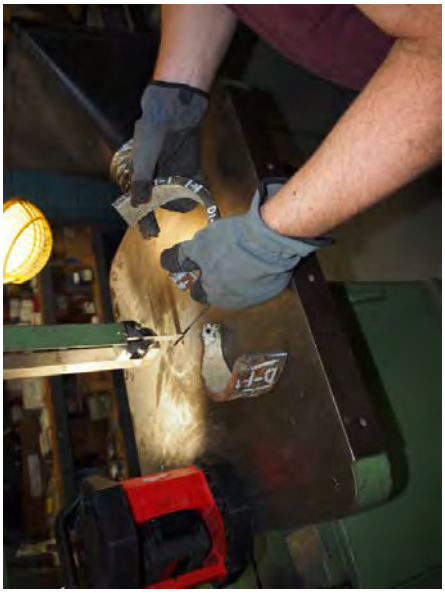
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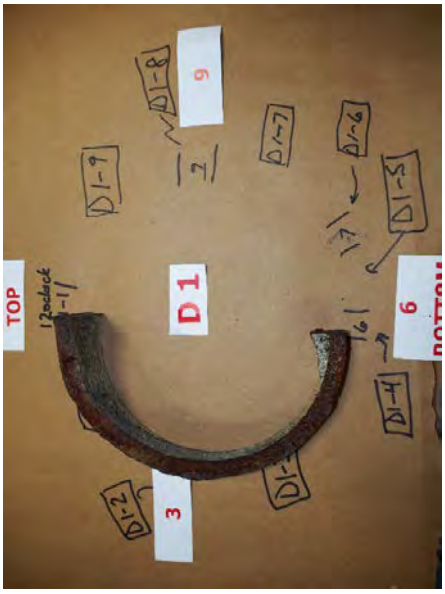
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W-2400-C-121.JPG



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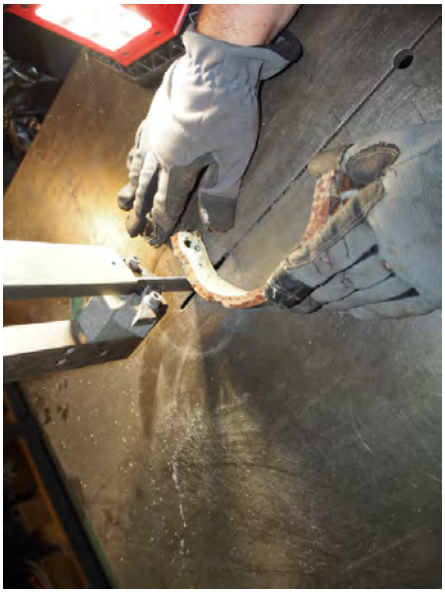
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W-2400-C-124.JPG



W-2400-C-125.JPG



W-2400-C-126.JPG



W-2400-C-127.JPG



W-2400-C-128.JPG



W-2400-C-129.JPG



W-2400-C-130.JPG



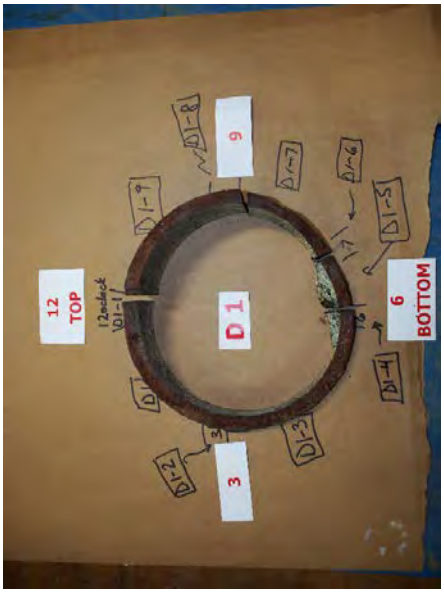
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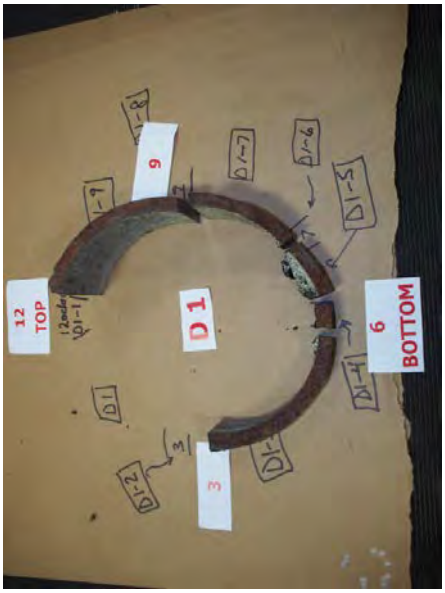
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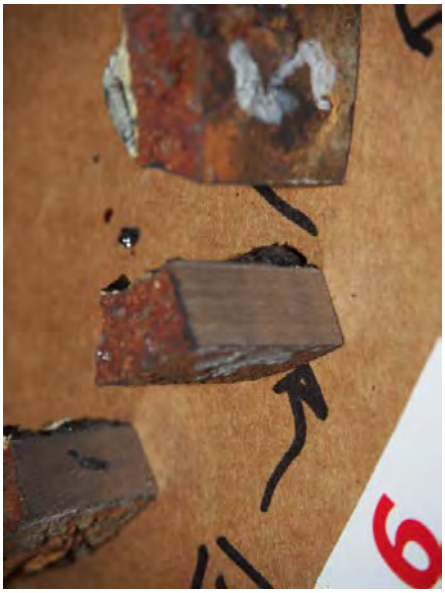
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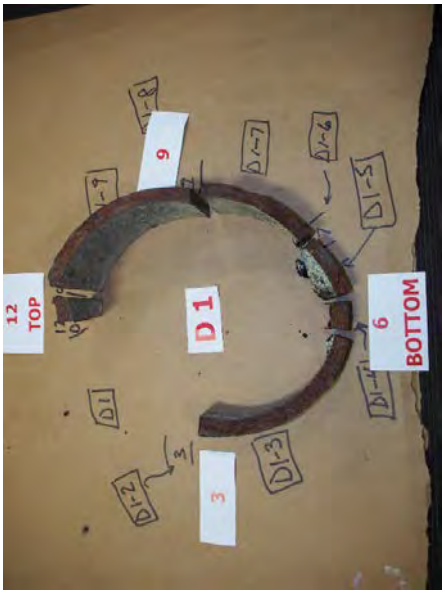
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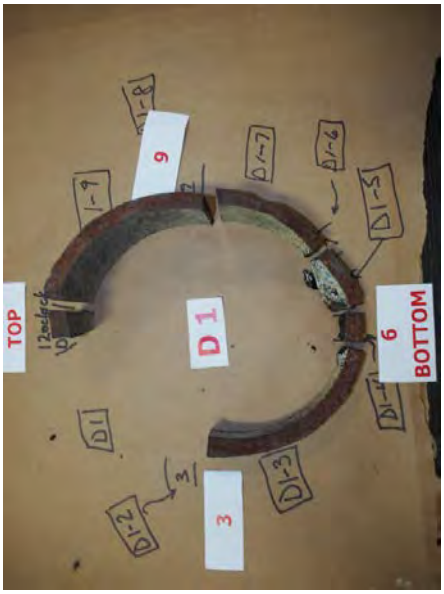
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W-2400-C-148.JPG



W-2400-C-149.JPG



W-2400-C-150.JPG



W-2400-C-151.JPG



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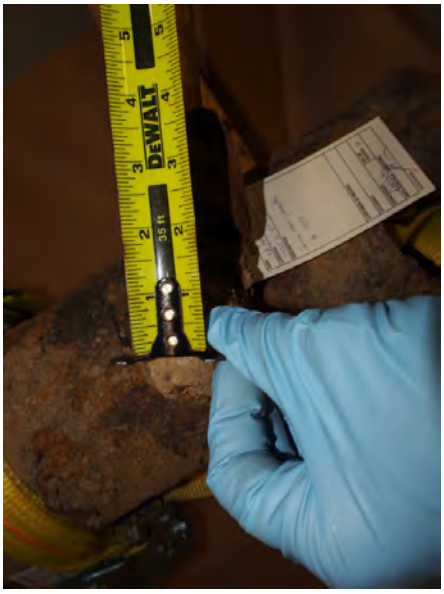
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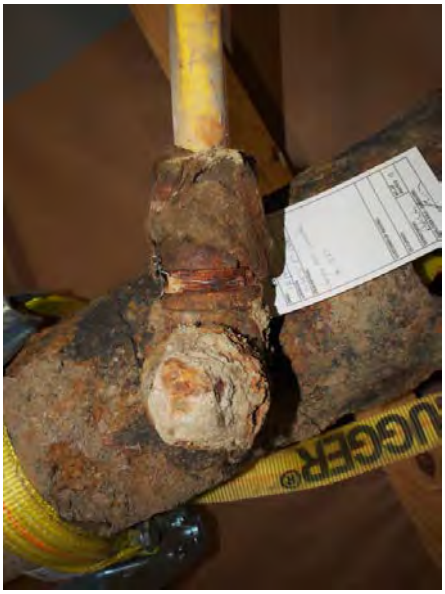
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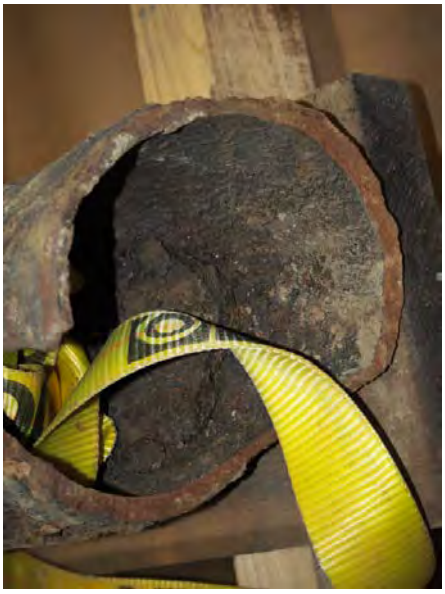
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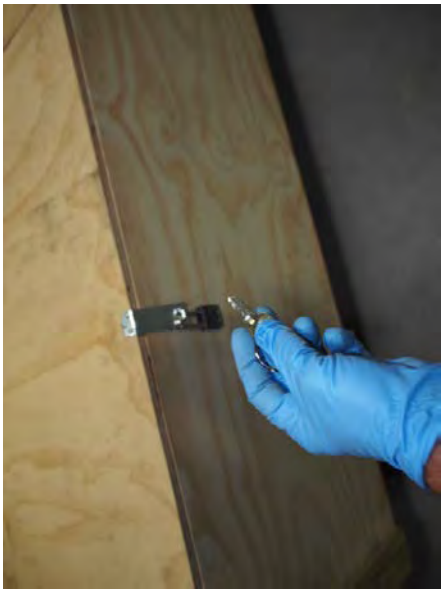
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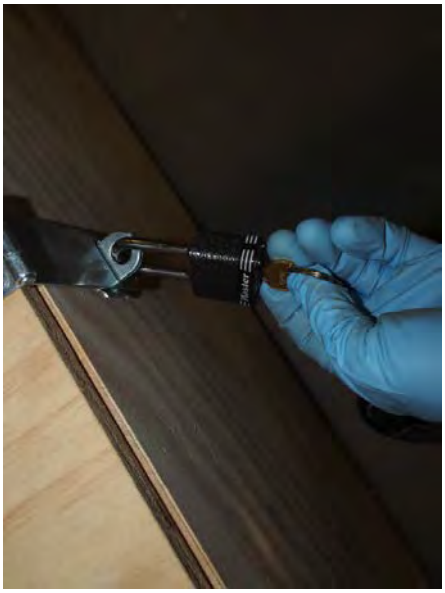
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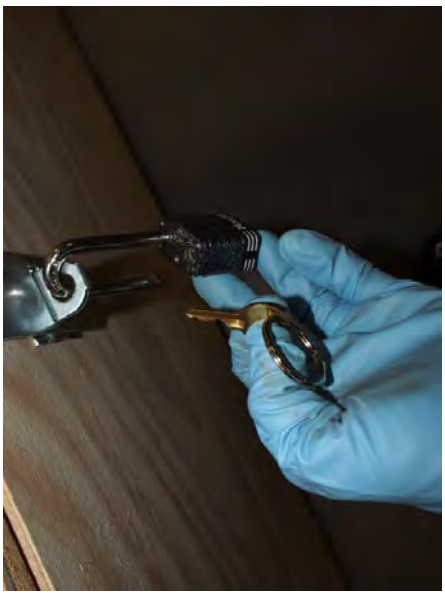
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W-2400-C-178.JPG



W-2400-C-179.JPG



W-2400-C-180.JPG



W-2400-C-181.JPG



W-2400-C-182.JPG



W-2400-C-183.JPG



W-2400-C-184.JPG



W-2400-C-185.JPG



W-2400-C-186.JPG



W-2400-C-187.JPG



W-2400-C-188.JPG



W-2400-C-189.JPG



W-2400-C-190.JPG



W-2400-C-191.JPG



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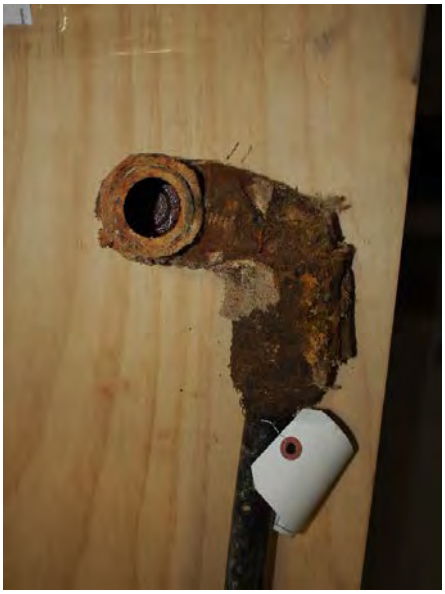
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W-2400-C-201.JPG



W-2400-C-202.JPG



W-2400-C-203.JPG



W-2400-C-204.JPG



W-2400-C-205.JPG



W-2400-C-206.JPG



W-2400-C-207.JPG



W-2400-C-208.JPG



W-2400-C-209.JPG



W-2400-C-210.JPG



W-2400-C-211.JPG



W-2400-C-212.JPG



W-2400-C-213.JPG



W-2400-C-214.JPG



W-2400-C-215.JPG



W-2400-C-216.JPG



W-2400-C-217.JPG



W-2400-C-218.JPG



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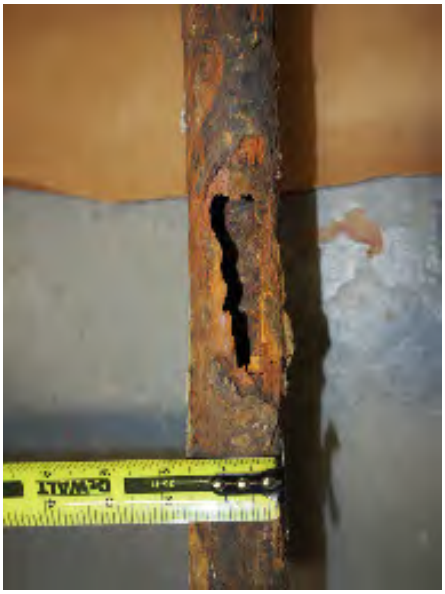
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W-2400-C-228.JPG



W-2400-C-229.JPG



W-2400-C-230.JPG



W-2400-C-231.JPG



W-2400-C-232.JPG



W-2400-C-233.JPG



W-2400-C-234.JPG



W-2400-C-235.JPG



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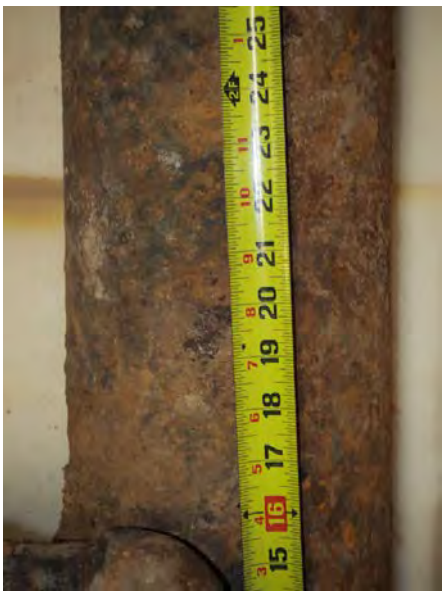
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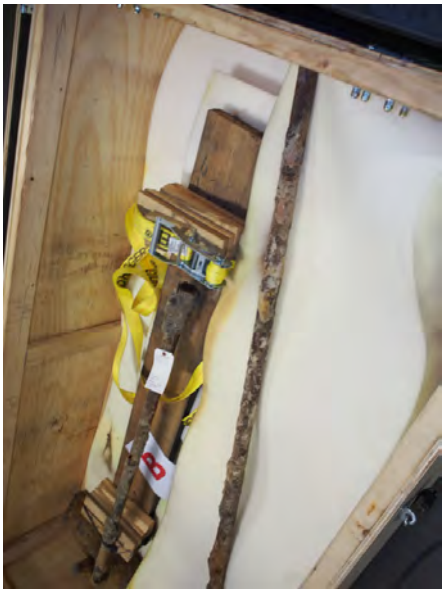
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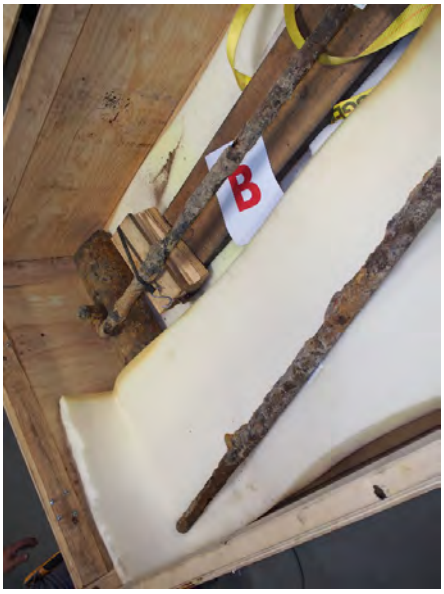
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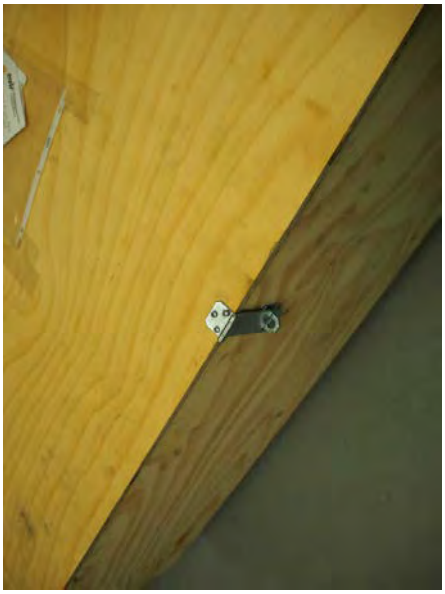
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W-2400-C-253.JPG



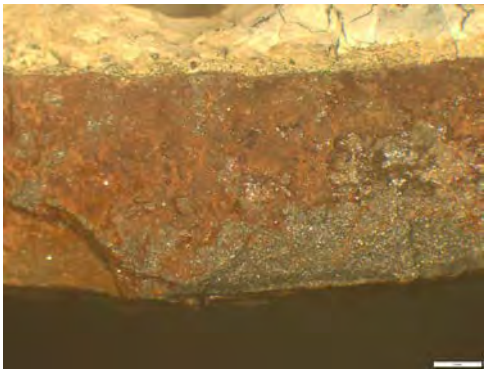
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W-2400-D-027 Stereo Position 12.j...



W-2400-D-028 Stereo Position 9.jpg



W-2400-D-029 Stereo Position 6.jpg



W-2400-D-030 Stereo Position 3.jpg



W-2400-D-031 Stereo Position 3.jpg



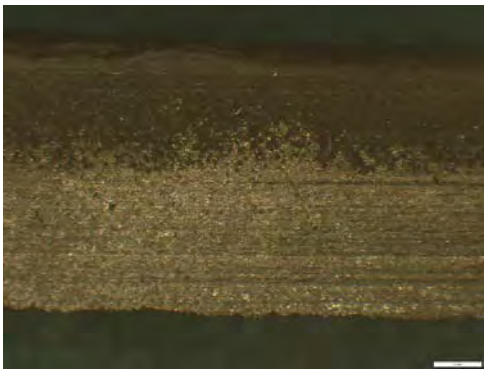
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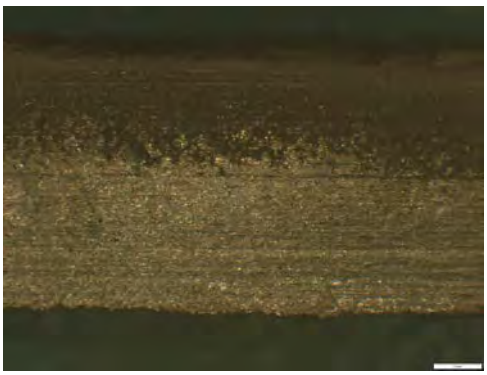
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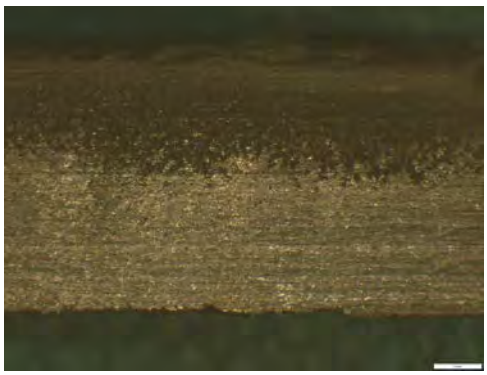
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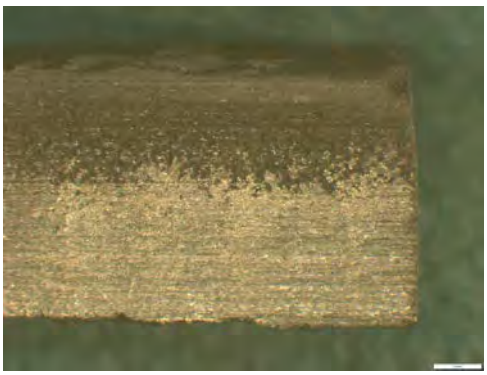
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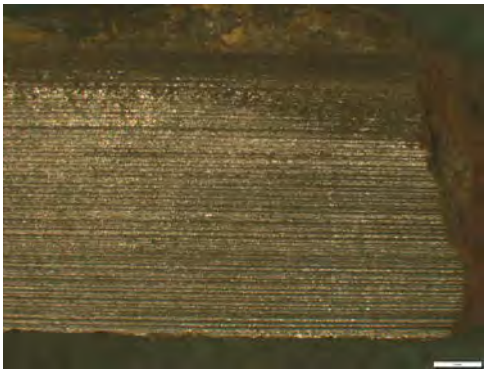
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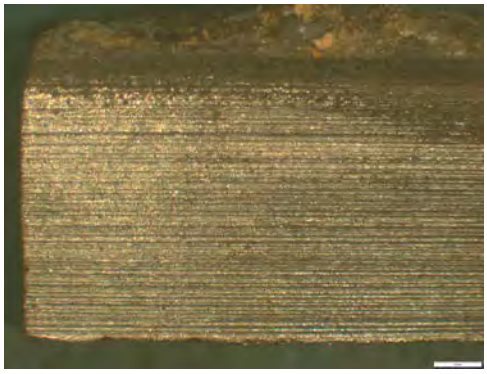
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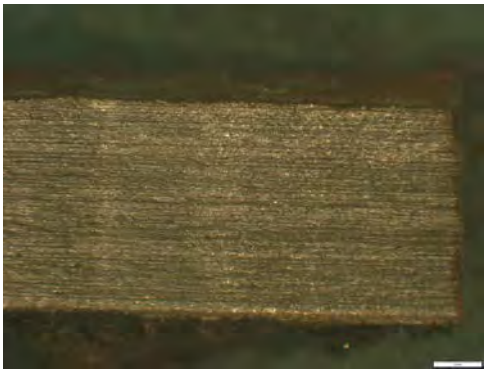
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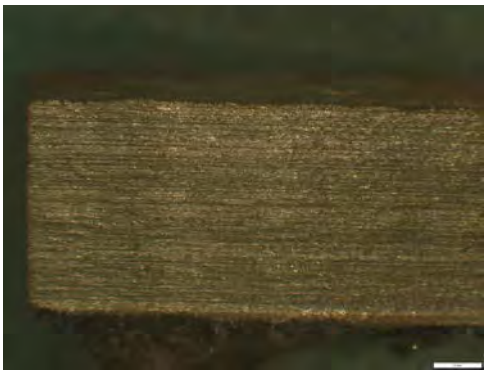
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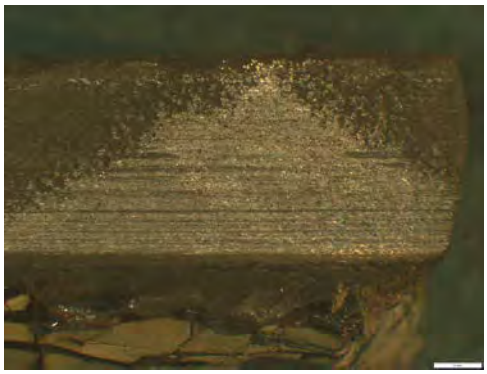
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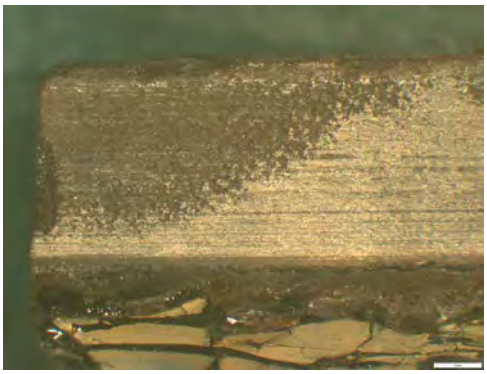
W-2400-D-041 Stereo D-1-4 Positi...



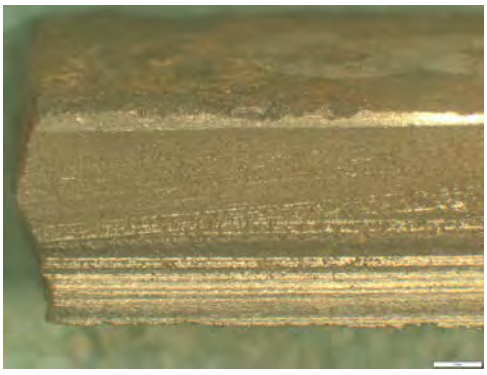
W-2400-D-042 Stereo D-1-4 Positi...



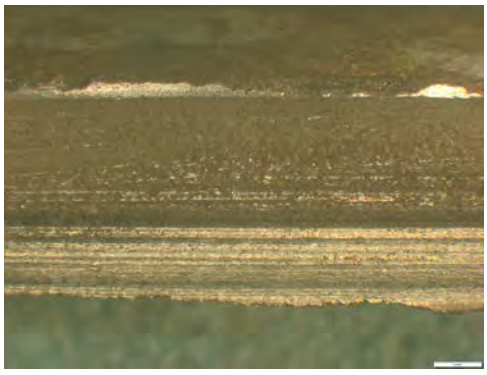
W-2400-D-043 Stereo D-1-6 Positi...



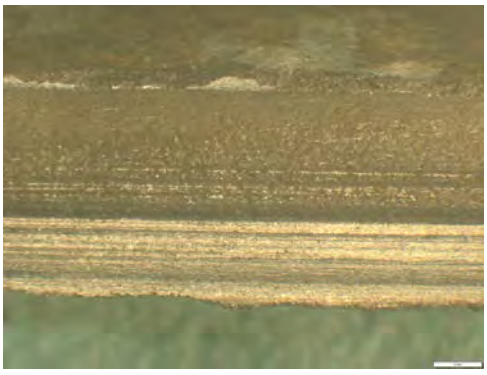
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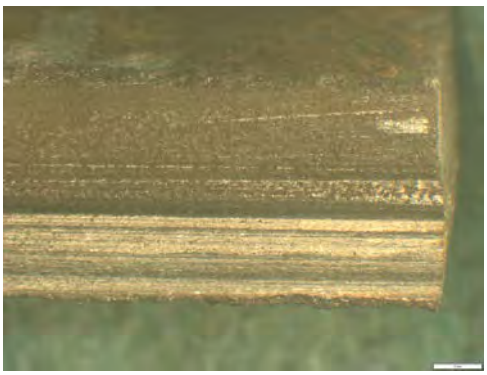
W-2400-D-045 Stereo D-1-8 Positi...



W-2400-D-046 Stereo D-1-8 Positi...



W-2400-D-047 Stereo D-1-8 Positi...



W-2400-D-048 Stereo D-1-8 Positi...



W-2400-E-001.JPG



W-2400-E-002.JPG



W-2400-E-003.JPG



W-2400-E-004.JPG



W-2400-E-005.JPG



W-2400-E-006.JPG



W-2400-E-007.JPG



W-2400-E-008.JPG



W-2400-E-009.JPG



W-2400-E-010.JPG



W-2400-E-011.JPG



W-2400-E-012.JPG



W-2400-E-013.JPG



W-2400-E-014.JPG



W-2400-E-015.JPG



W-2400-E-016.JPG



W-2400-E-017.JPG



W-2400-E-018.JPG



W-2400-E-019.JPG



W-2400-E-020.JPG



W-2400-E-021.JPG



W-2400-E-022.JPG



W-2400-E-023.JPG



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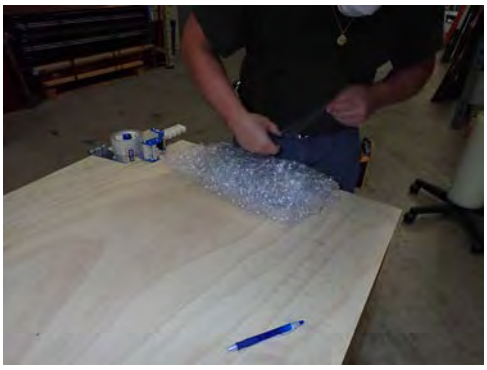
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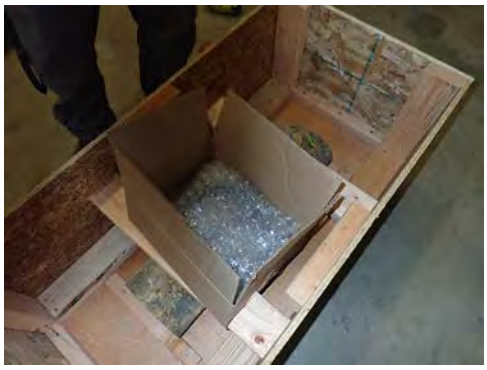
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W-2400-E-031.JPG



W-2400-E-032.JPG



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W-2400-E-034.JPG



W-2400-E-035.JPG



W-2400-E-036.JPG



W-2400-E-037.JPG



W-2400-E-038.JPG



W-2400-E-039.JPG



W-2400-E-040.JPG



W-2400-E-041.JPG



W-2400-E-042.JPG



W-2400-E-043.JPG



W-2400-E-044.JPG



W-2400-E-045.JPG



W-2400-E-046.JPG



W-2400-E-047.JPG



W-2400-E-048.JPG



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W-2400-F-02.JPG



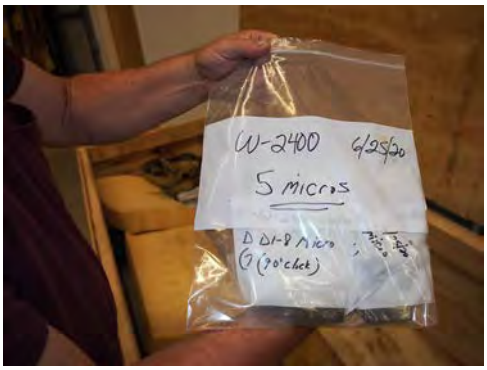
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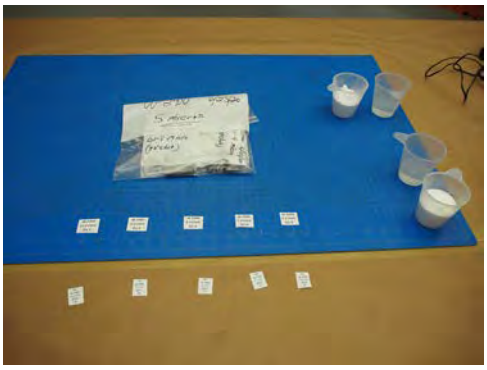
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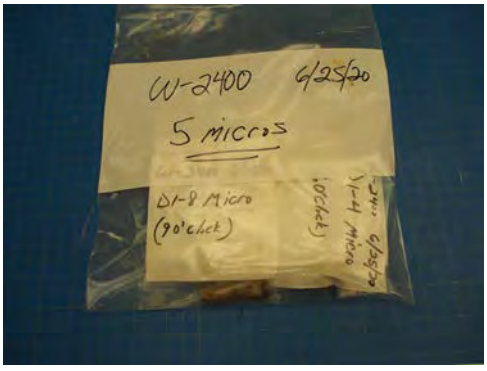
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W-2400-F-11.JPG



W-2400-F-12.JPG



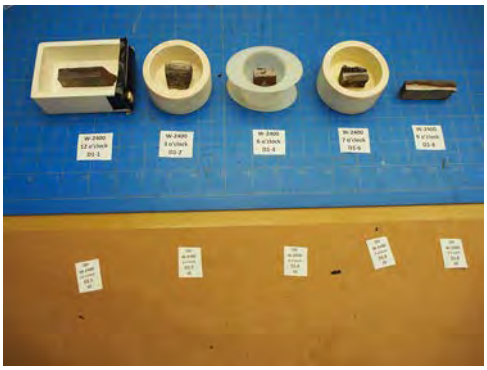
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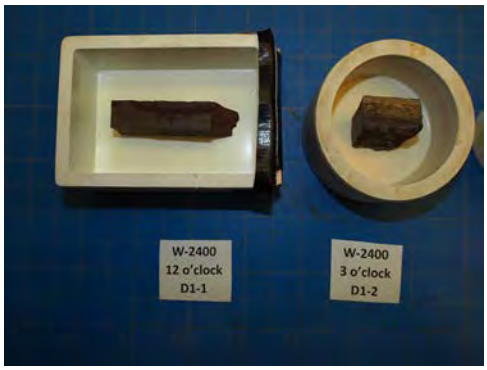
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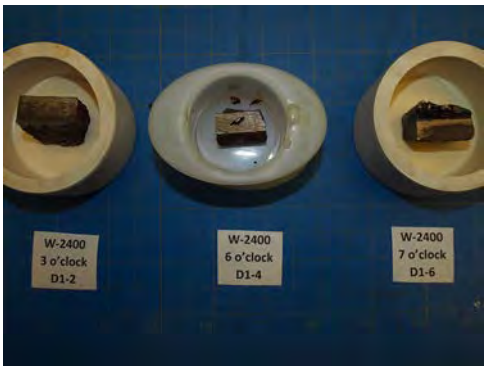
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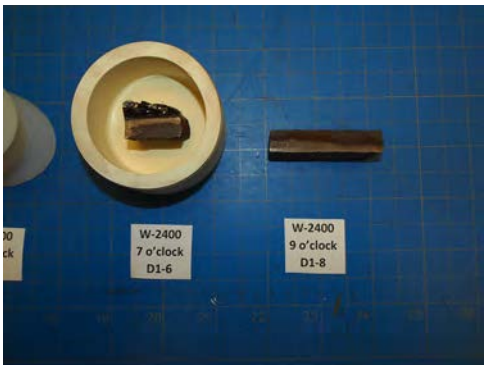
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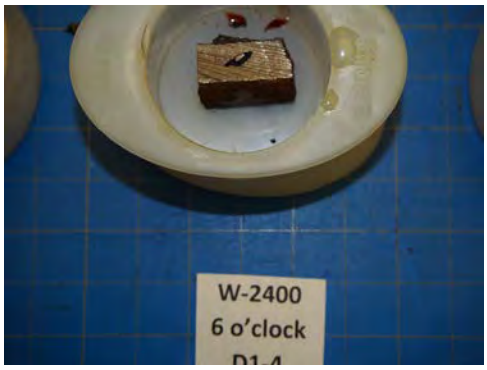
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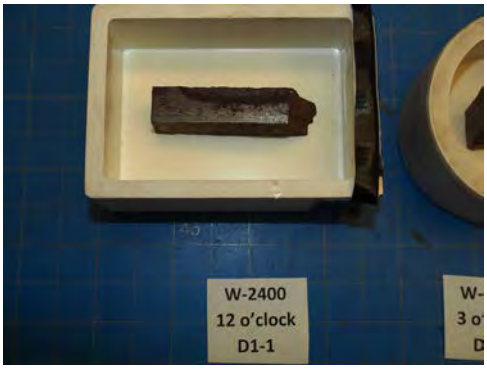
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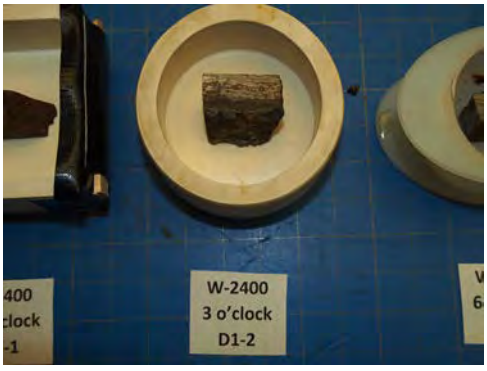
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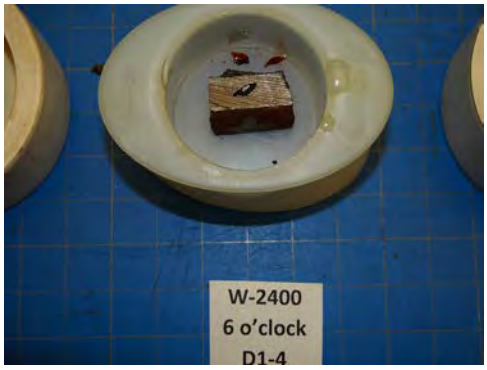
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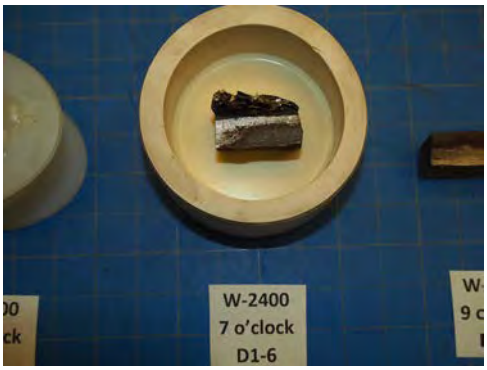
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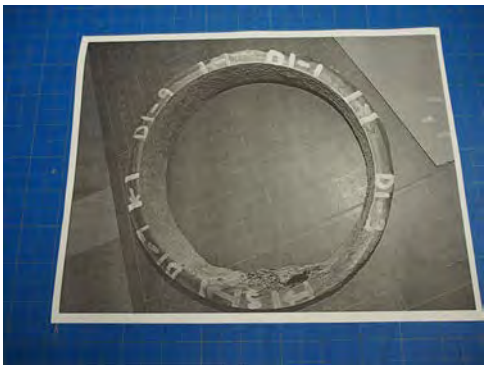
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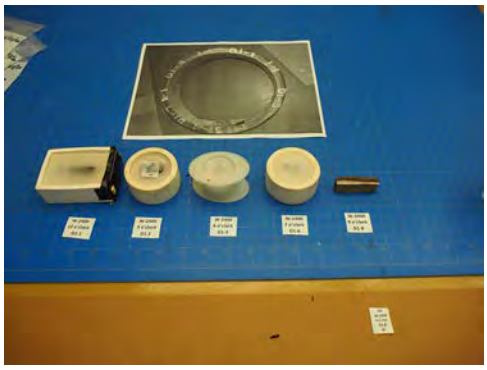
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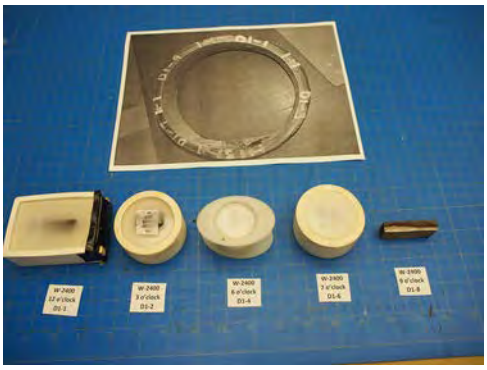
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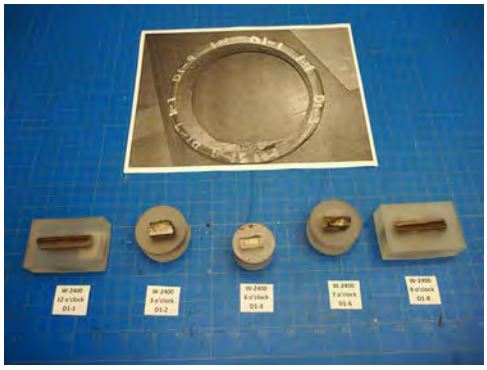
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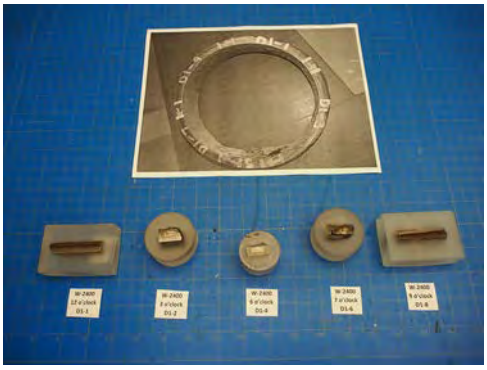
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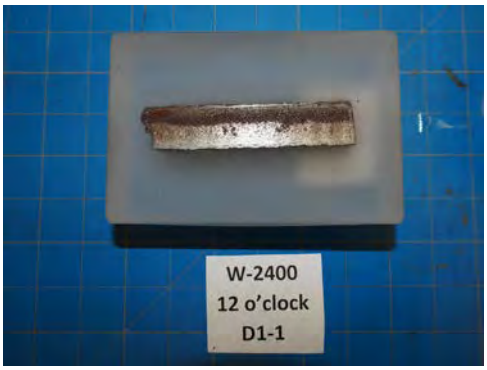
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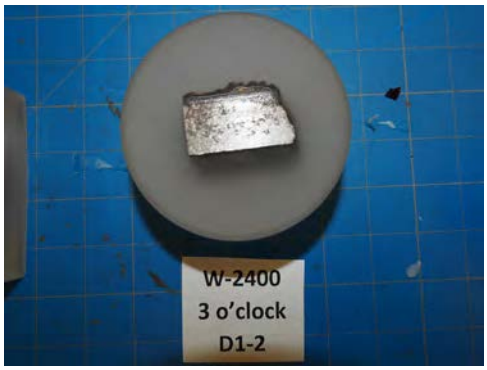
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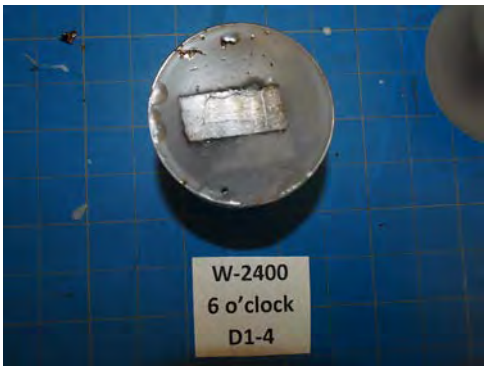
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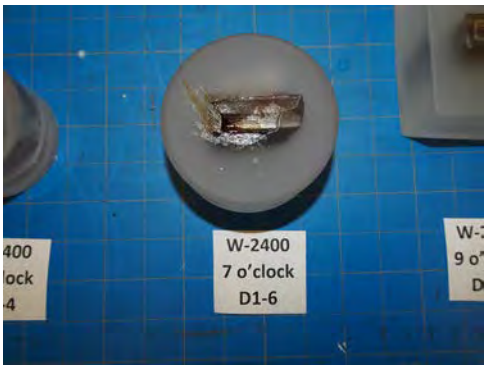
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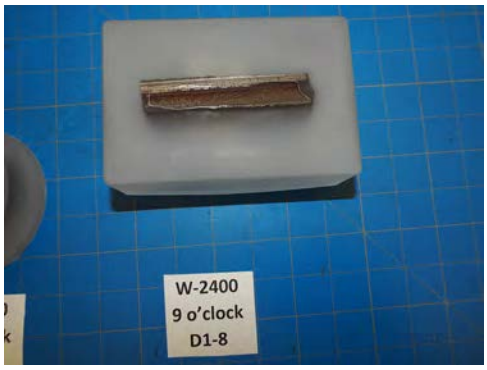
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W-2400-F-46.JPG



W-2400-F-47.JPG



W-2400-F-48.JPG



W-2400-F-49.JPG



W-2400-F-50.JPG



W-2400-F-51.JPG



W-2400-F-52.JPG



W-2400-F-53.JPG



W-2400-F-54.JPG



W-2400-G-01.JPG



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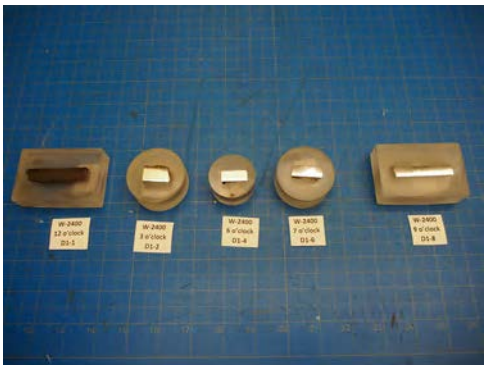
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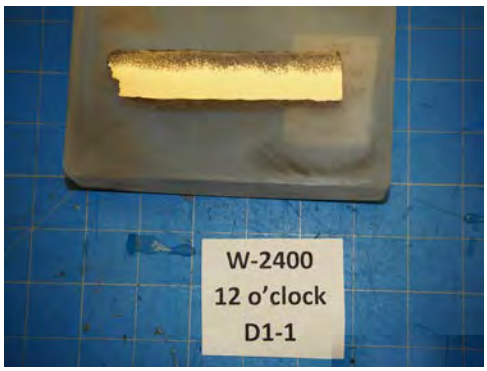
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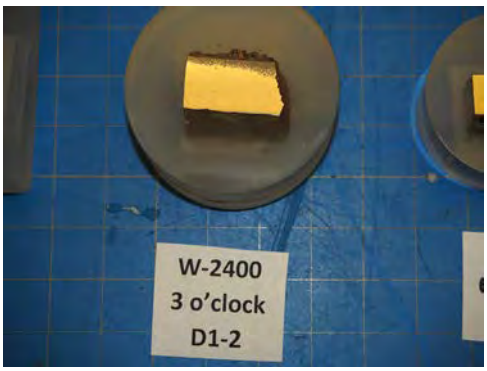
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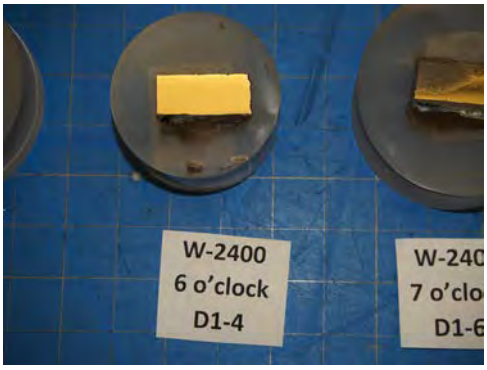
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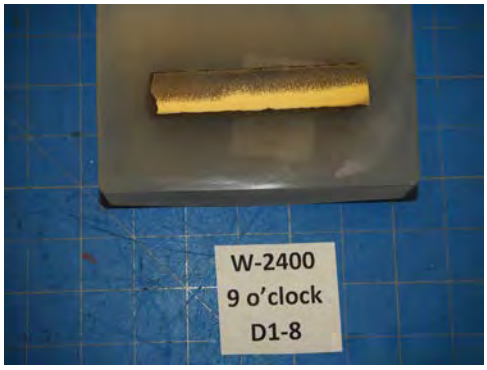
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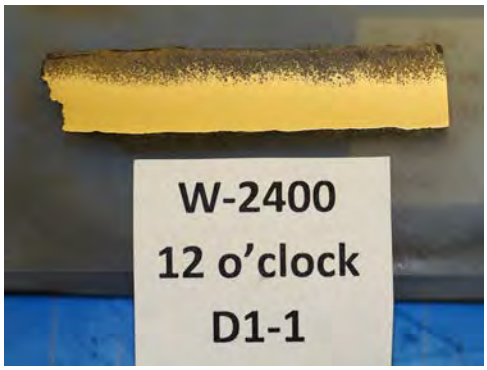
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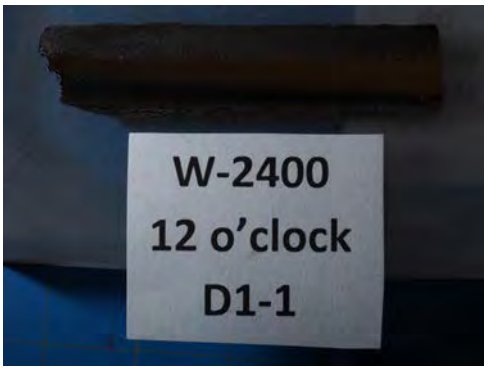
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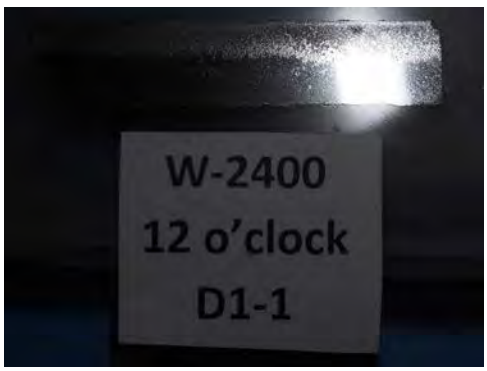
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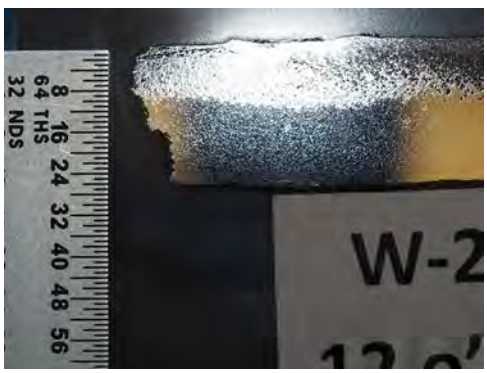
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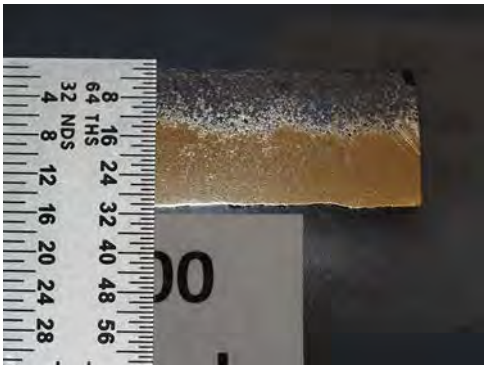
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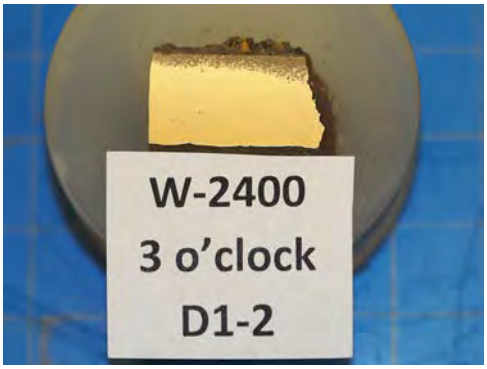
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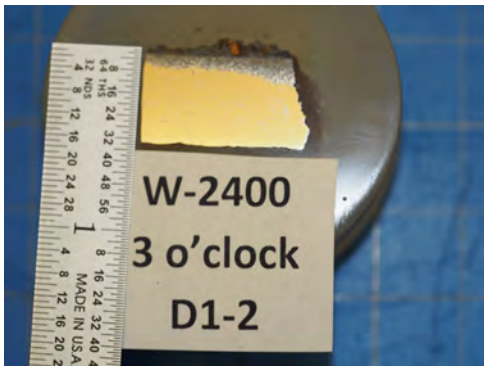
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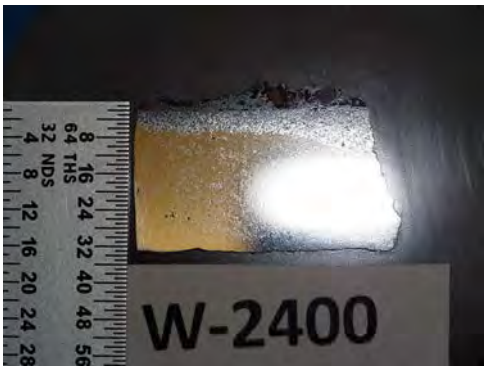
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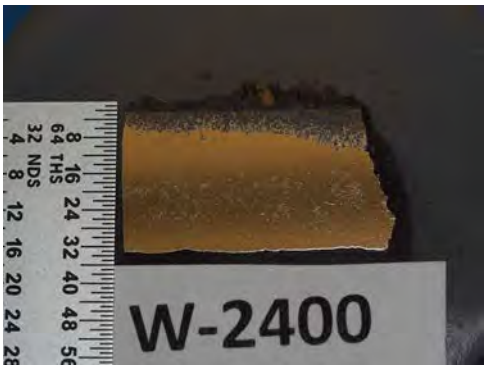
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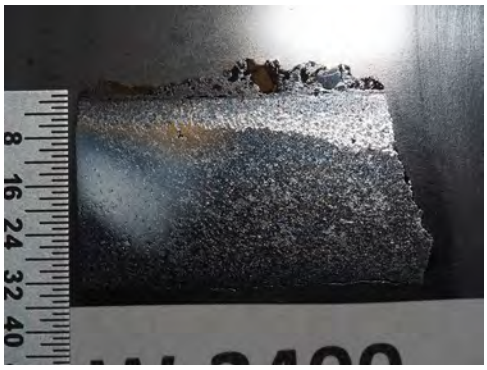
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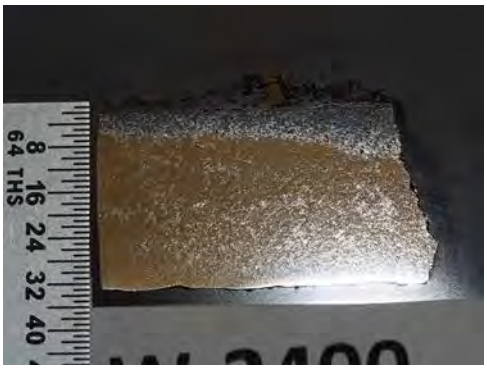
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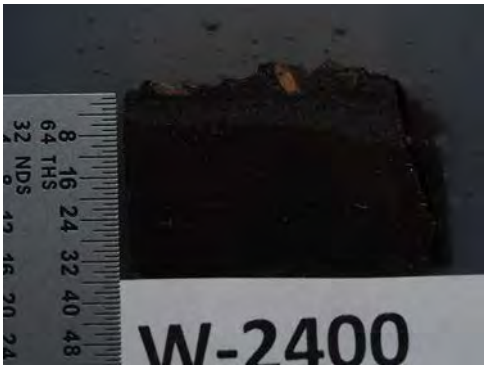
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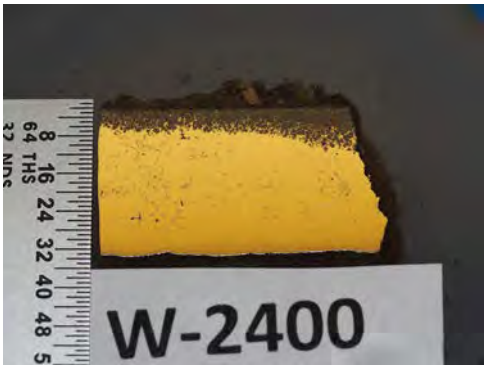
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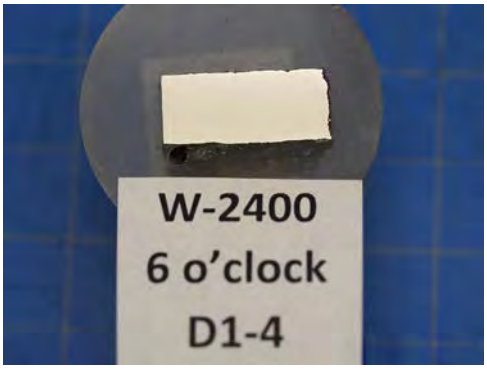
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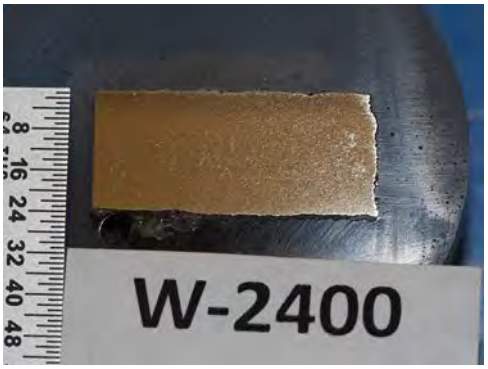
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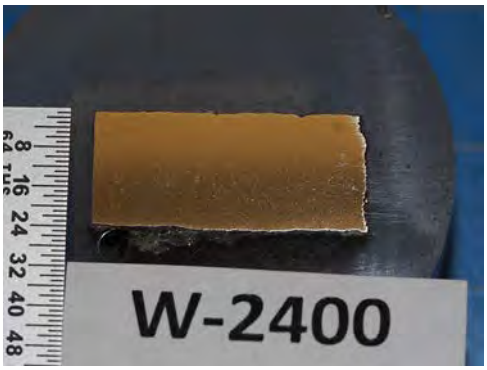
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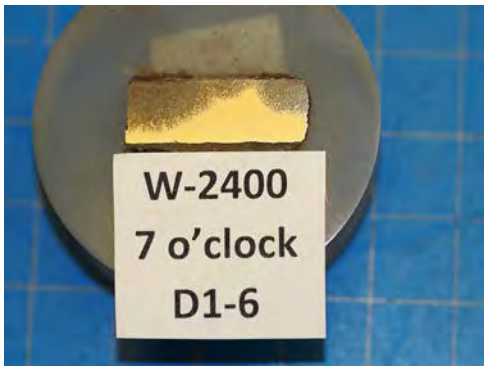
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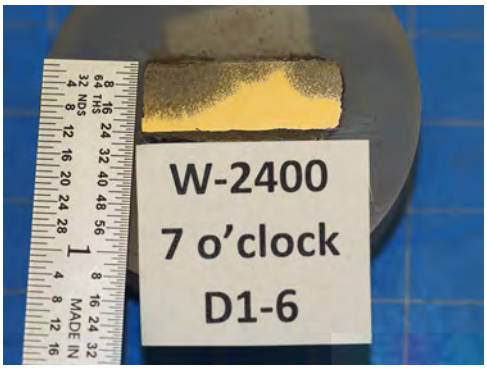
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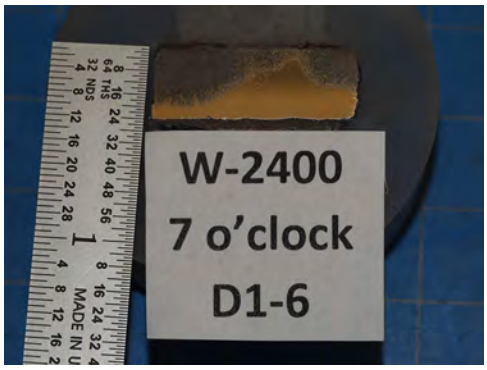
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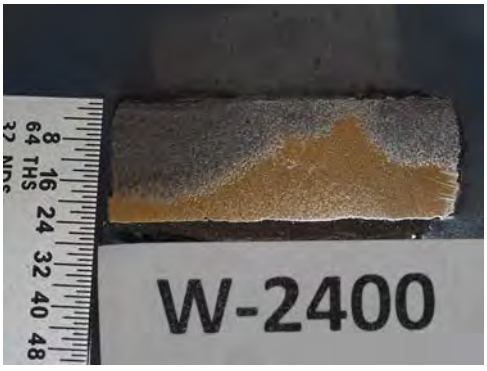
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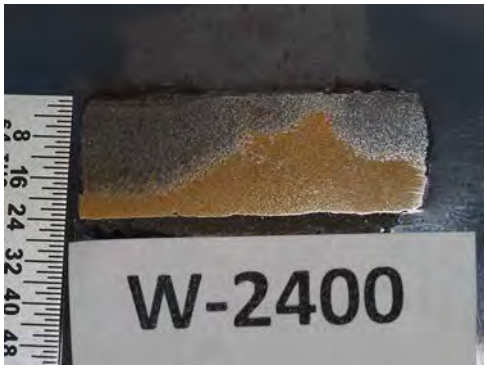
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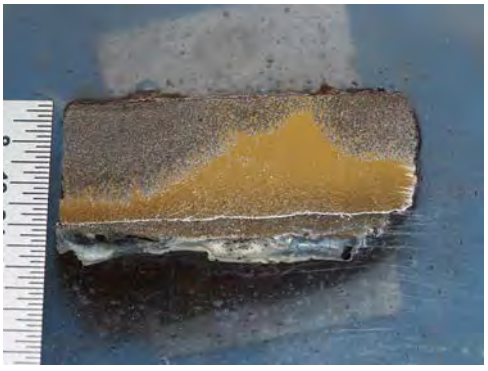
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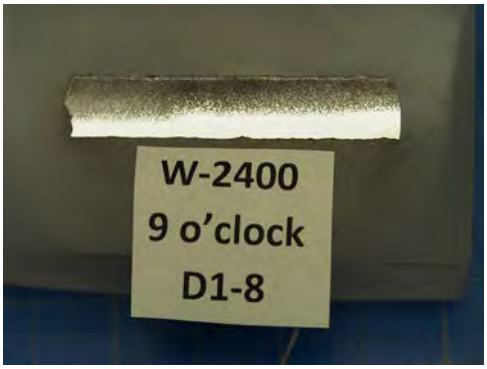
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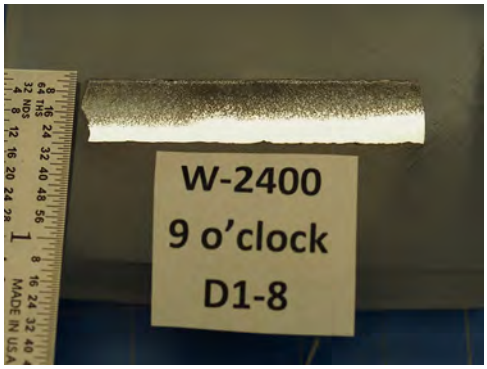
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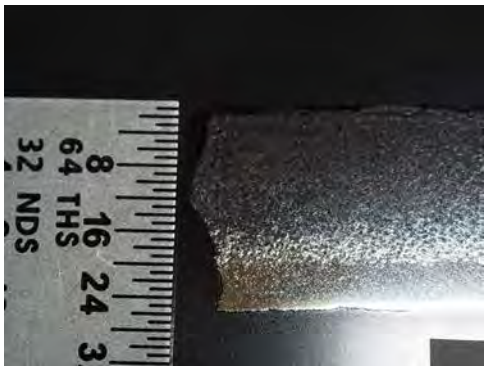
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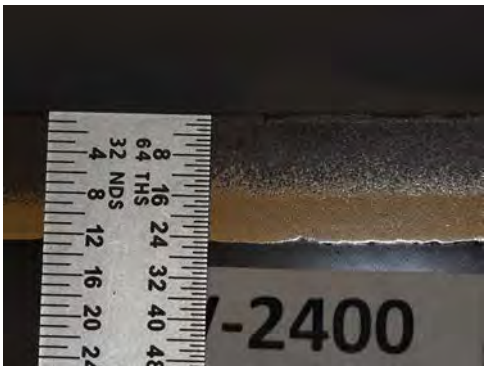
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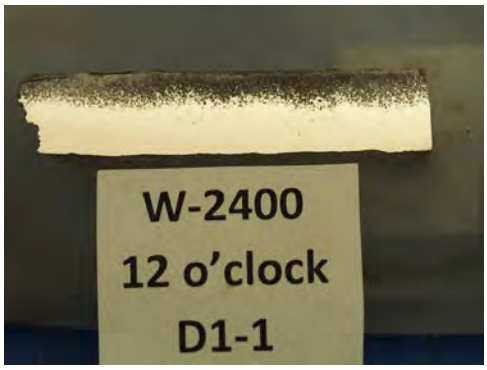
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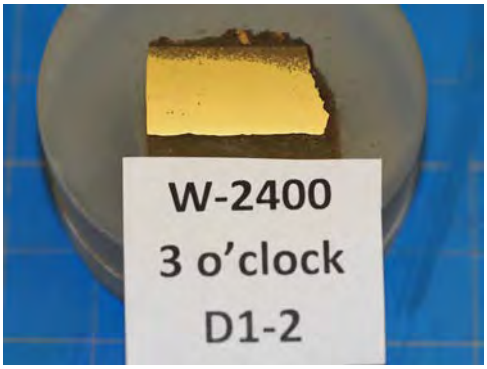
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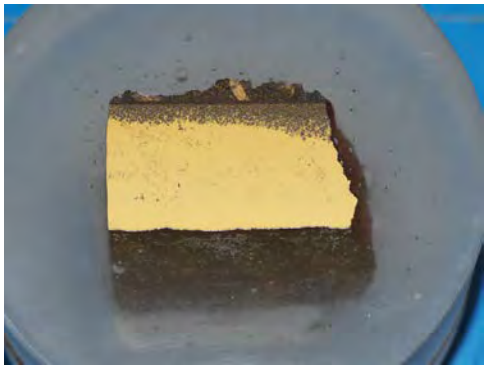
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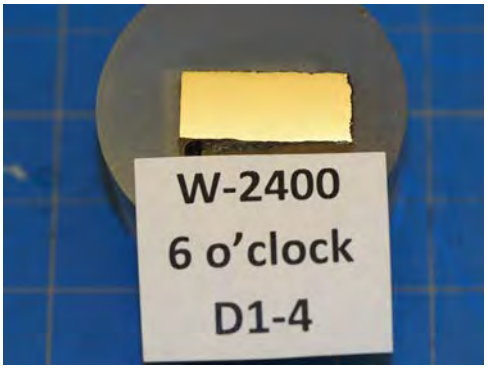
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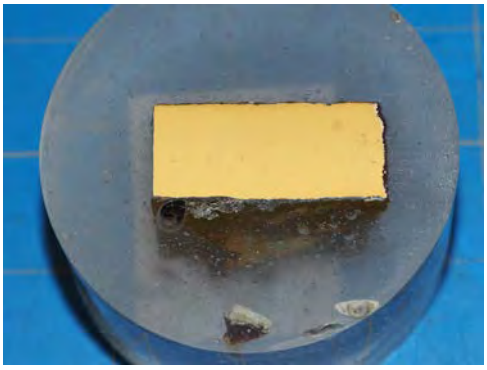
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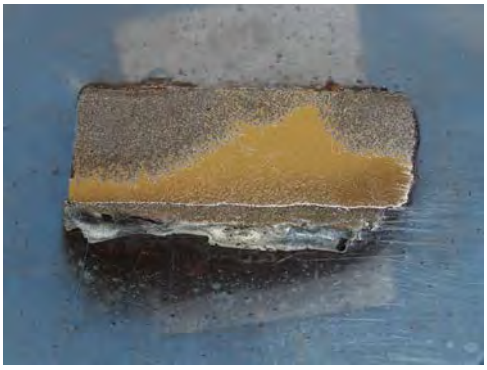
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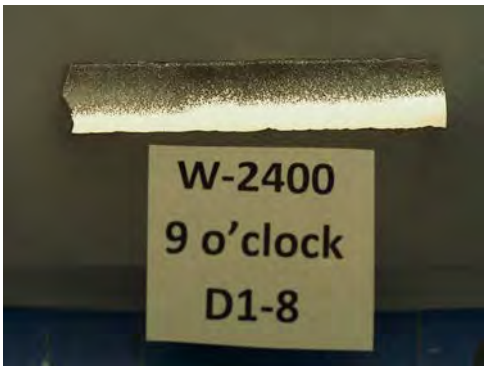
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W-2400-G-64.JPG



W-2400-G-65.JPG



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W-2400-H-002.JPG



W-2400-H-003.JPG



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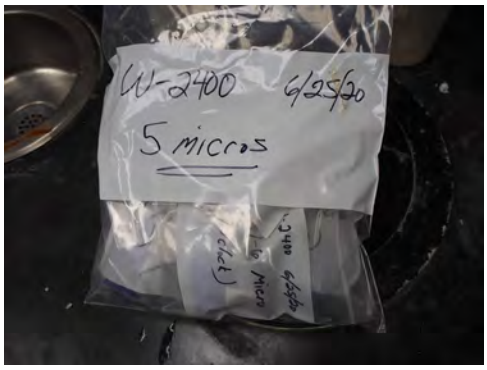
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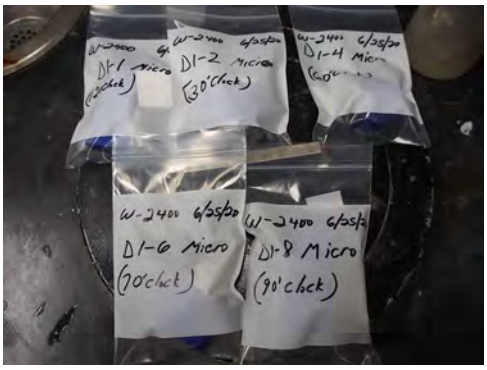
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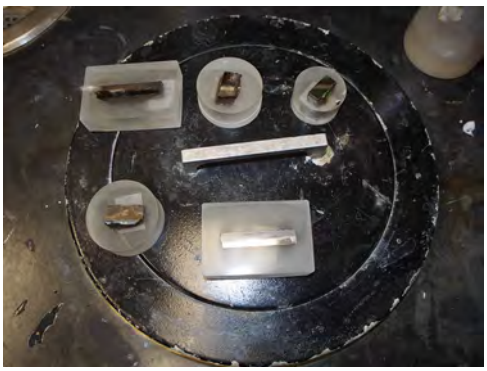
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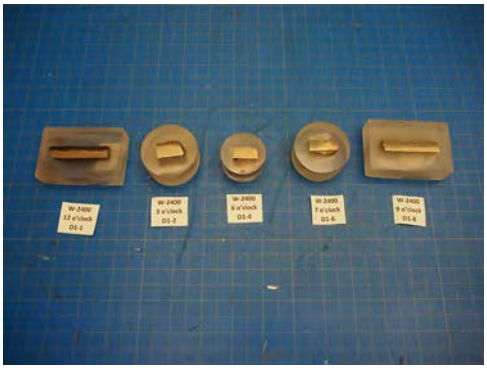
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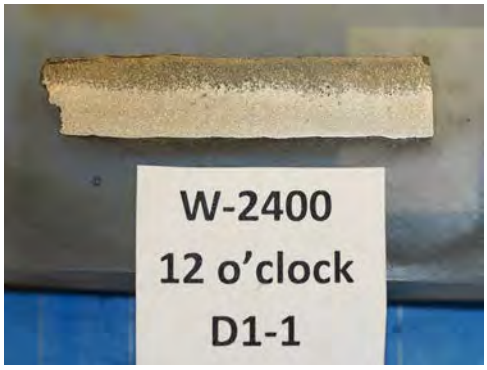
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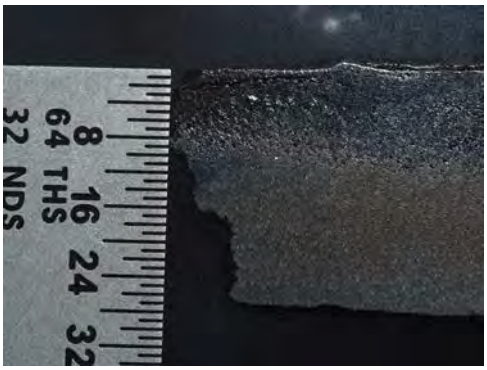
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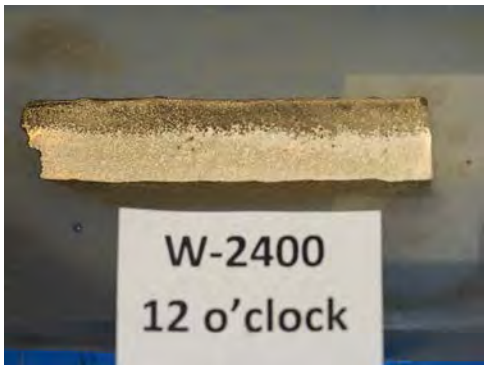
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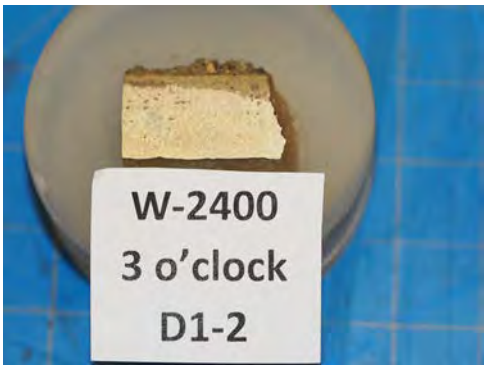
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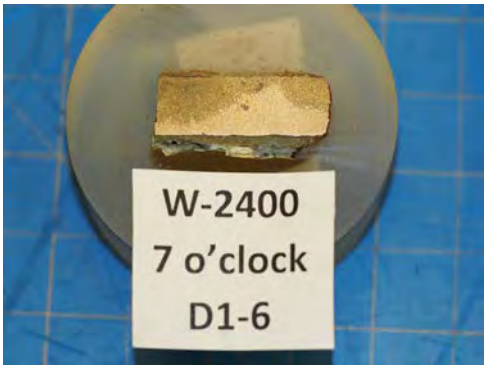
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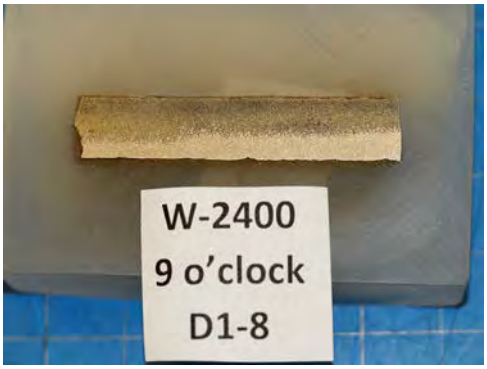
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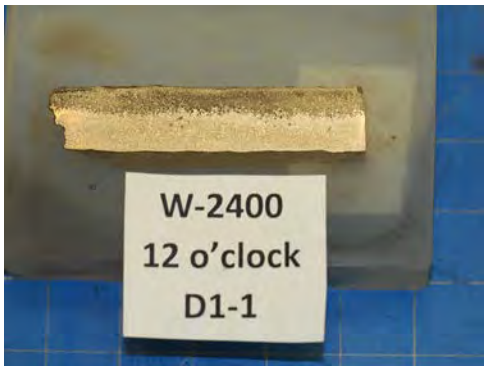
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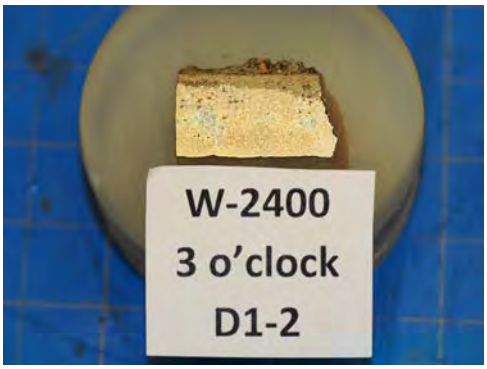
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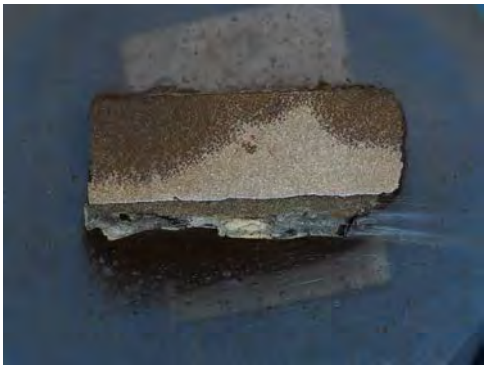
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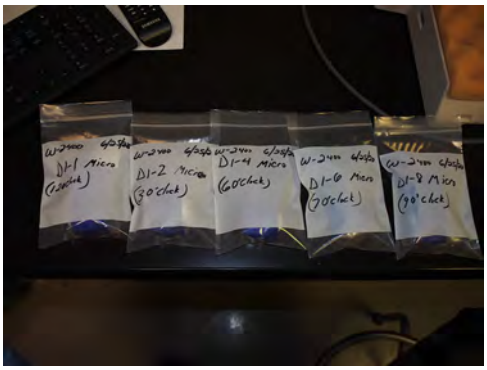
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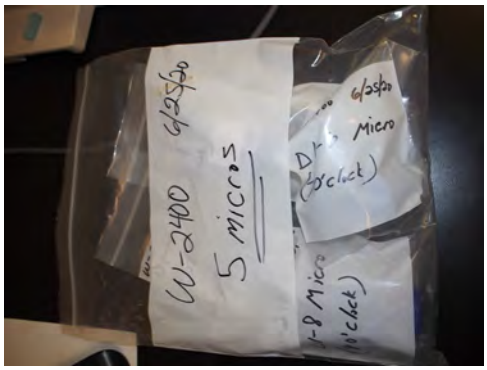
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W-2400-H-043.JPG



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W-2400-H-045.JPG



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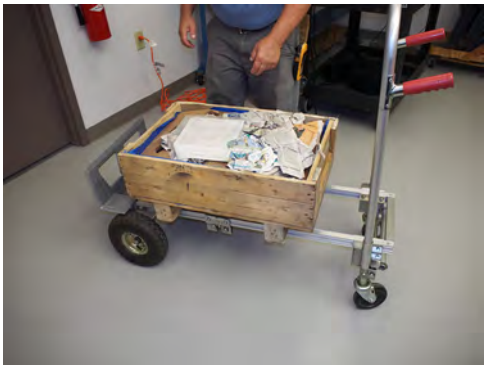
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W-2400-H-052.JPG



W-2400-H-053.JPG



W-2400-H-054.JPG



W-2400-H-055.JPG



W-2400-H-056.JPG



W-2400-H-057.JPG



W-2400-H-058.JPG



W-2400-H-059.JPG



W-2400-H-060.JPG



W-2400-H-061.JPG



W-2400-H-062.JPG



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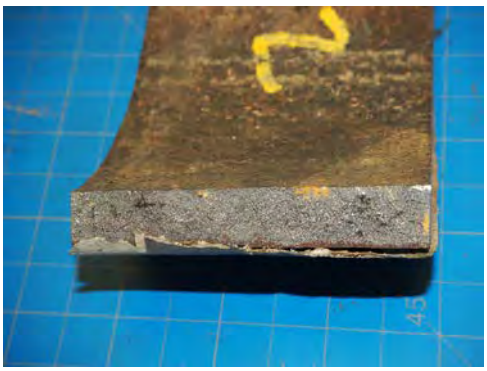
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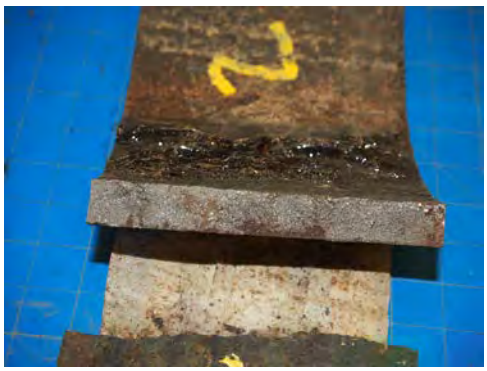
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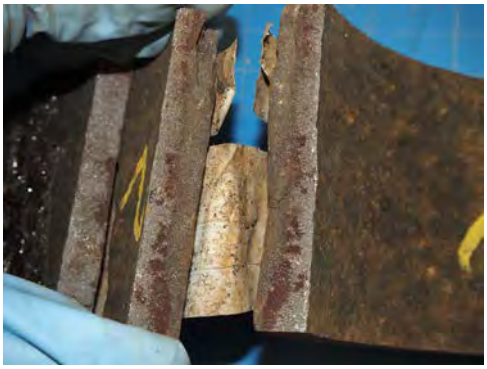
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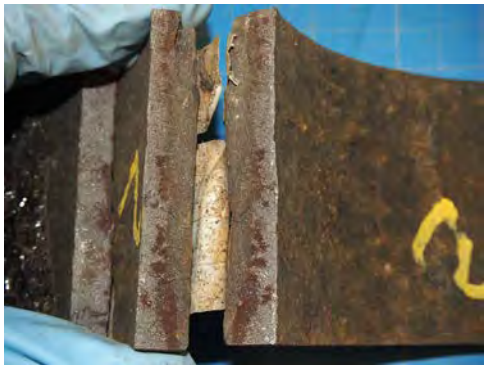
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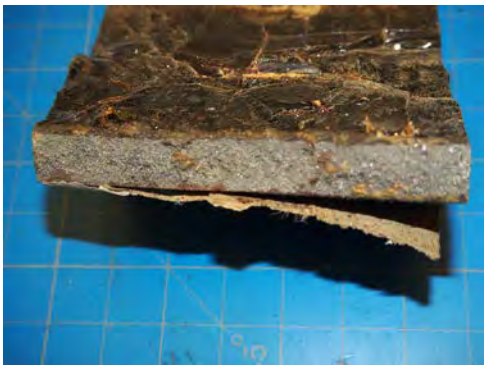
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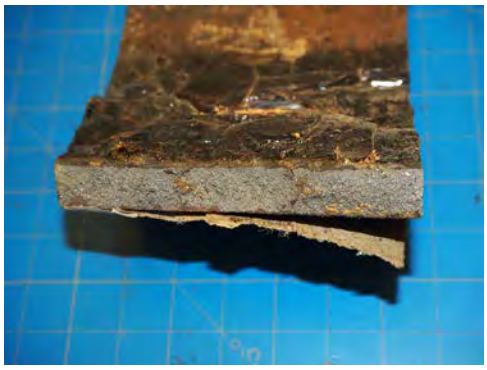
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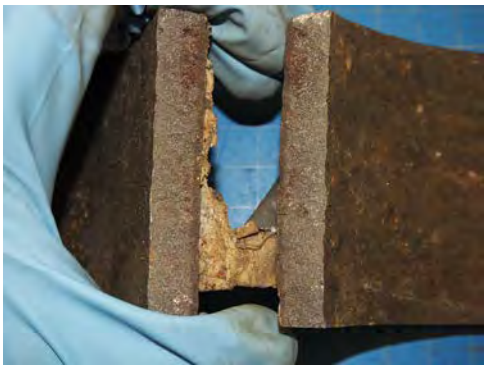
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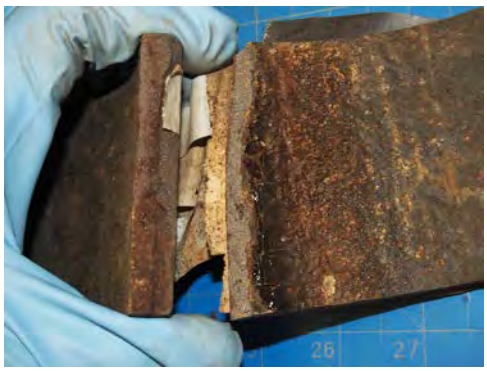
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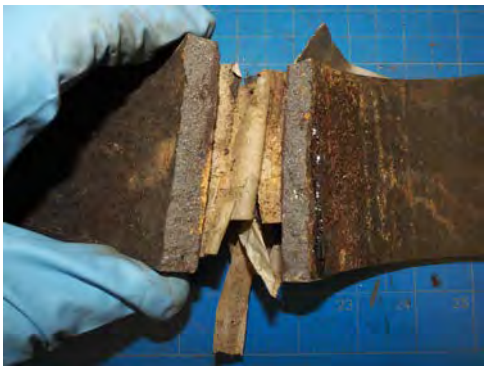
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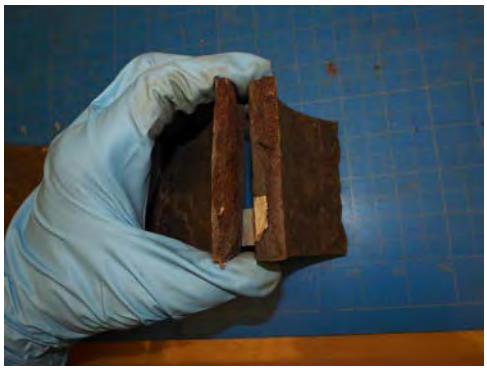
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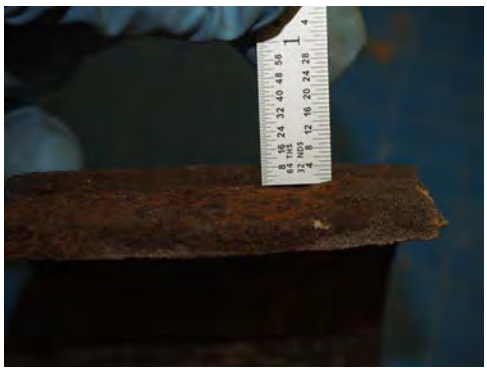
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W-2400-H-097.JPG



W-2400-H-098.JPG



W-2400-H-099.JPG



W-2400-H-100.JPG



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W-2400-H-103.JPG



W-2400-H-104.JPG



W-2400-H-105.JPG



W-2400-H-106.JPG



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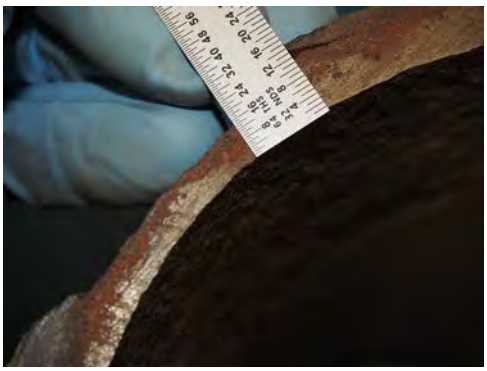
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W-2400-H-119.JPG



W-2400-H-120.JPG



W-2400-H-121.JPG



W-2400-H-122.JPG



W-2400-H-123.JPG



W-2400-H-124.JPG



W-2400-H-125.JPG



W-2400-H-126.JPG



W-2400-H-127.JPG



W-2400-H-128.JPG



W-2400-H-129.JPG



W-2400-H-130.JPG



W-2400-H-131.JPG



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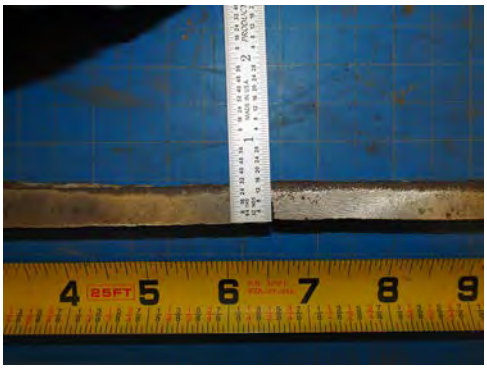
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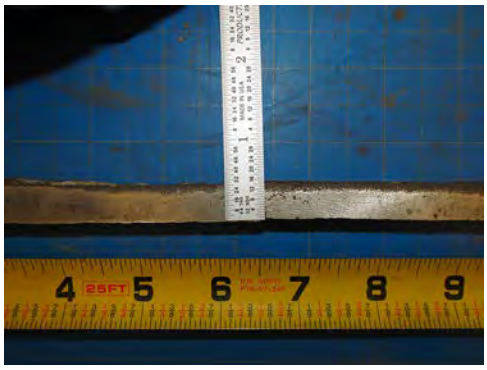
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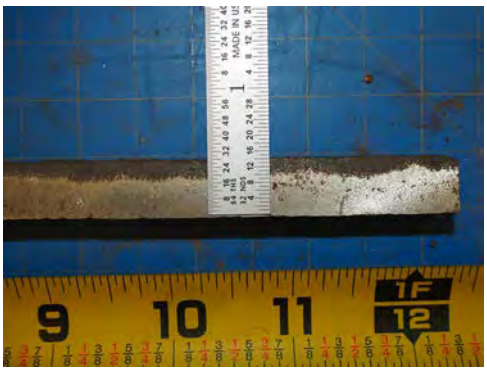
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W-2400-H-142.JPG



W-2400-H-143.JPG



W-2400-H-144.JPG



W-2400-H-145.JPG



W-2400-H-146.JPG



W-2400-H-147.JPG



W-2400-H-148.JPG



W-2400-H-149.JPG



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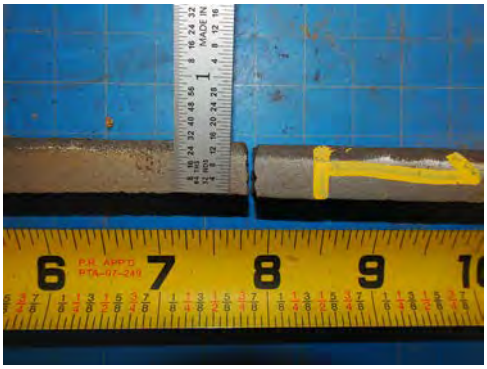
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W-2400-H-155.JPG



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W-2400-H-157.JPG



W-2400-H-158.JPG



W-2400-H-159.JPG



W-2400-H-160.JPG



W-2400-H-161.JPG



W-2400-H-162.JPG



W-2400-H-163.JPG



W-2400-H-164.JPG



W-2400-H-165.JPG



W-2400-H-166.JPG



W-2400-H-167.JPG



W-2400-H-168.JPG



W-2400-H-169.JPG



W-2400-H-170.JPG



W-2400-H-171.JPG



W-2400-H-172.JPG



W-2400-H-173.JPG



W-2400-H-174.JPG



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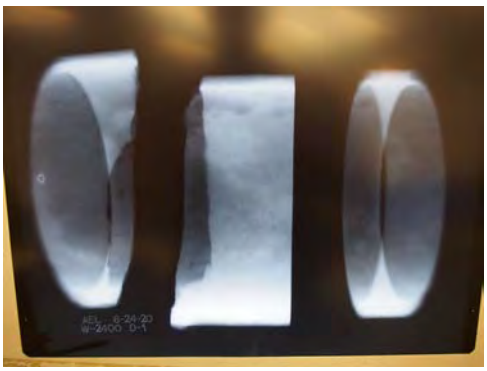
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W-2400-H-178.JPG



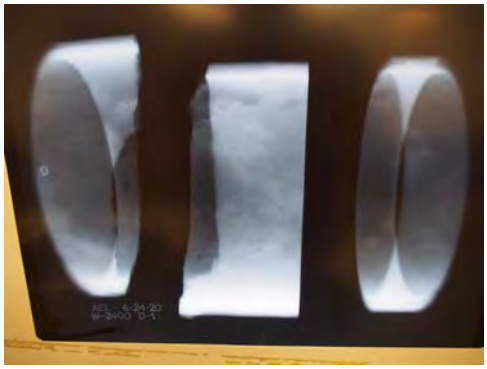
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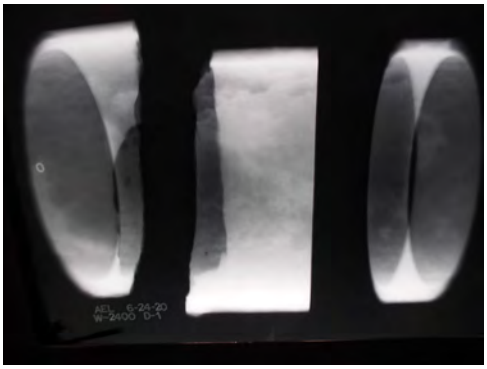
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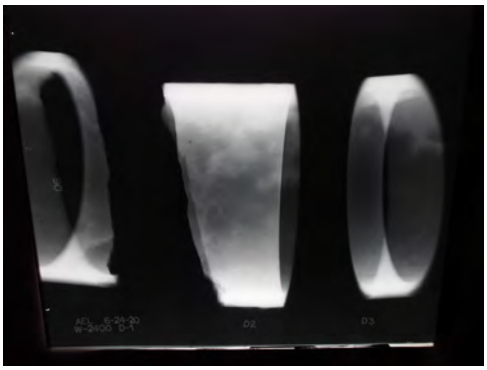
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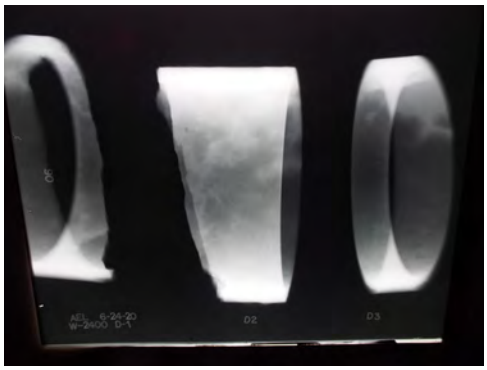
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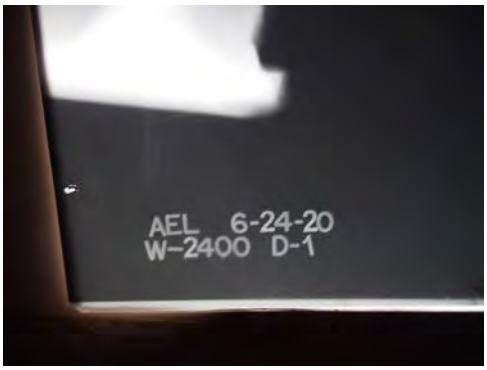
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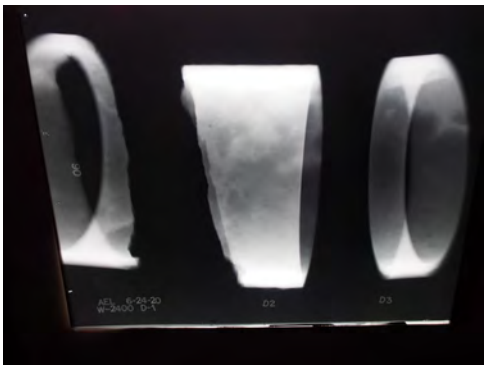
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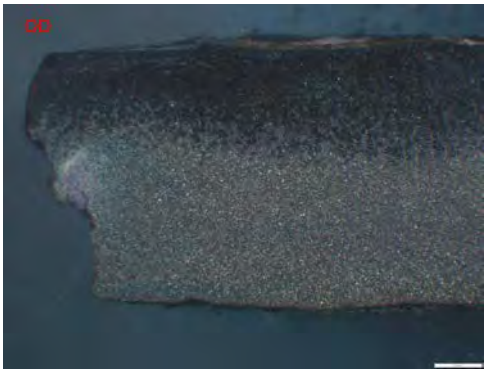
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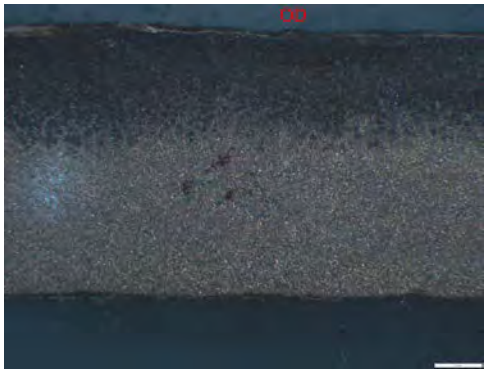
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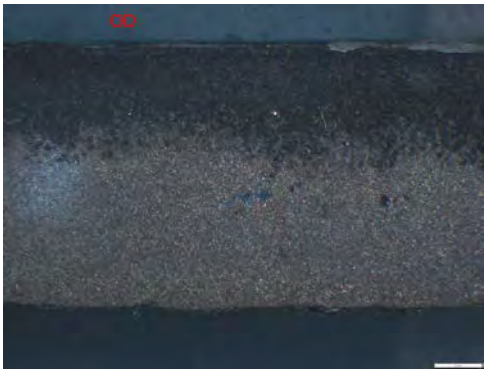
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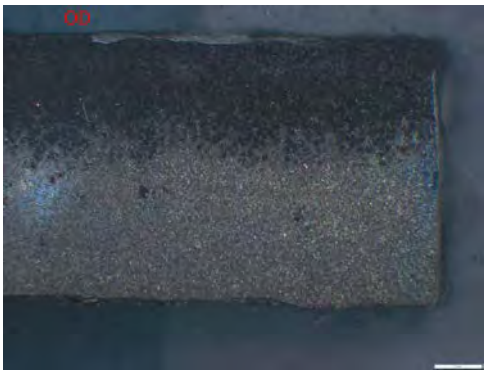
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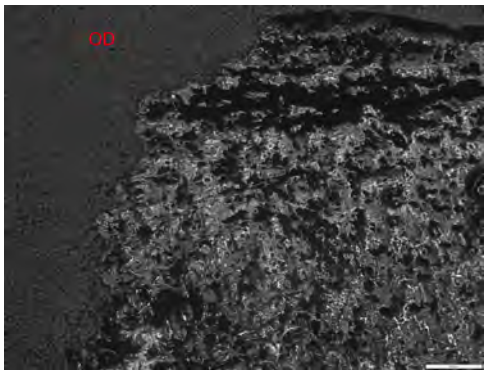
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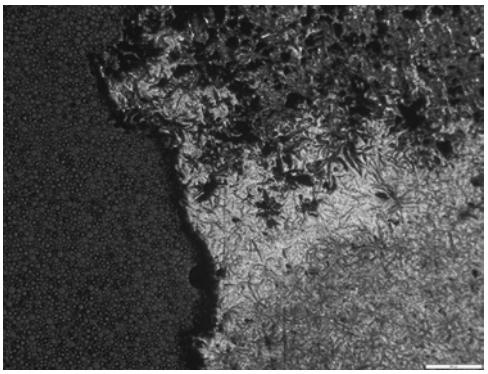
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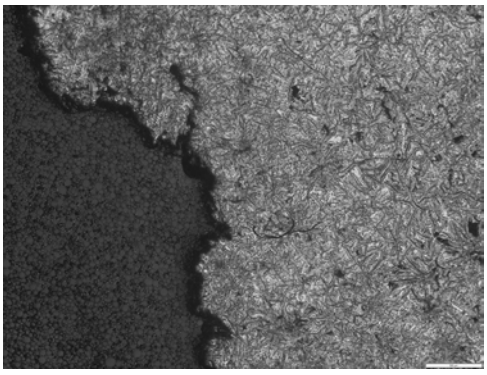
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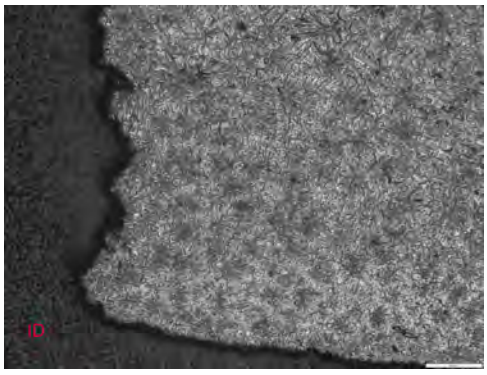
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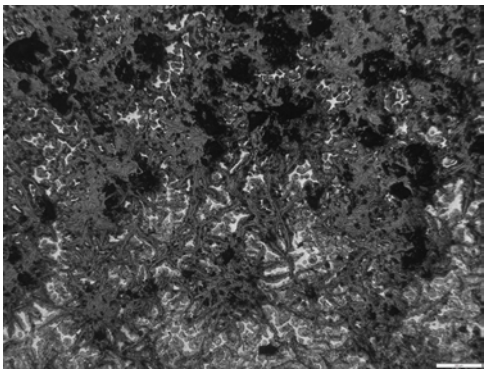
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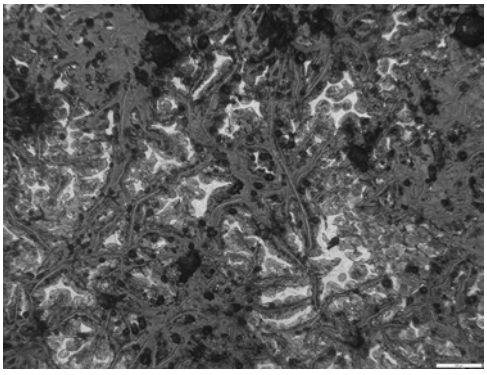
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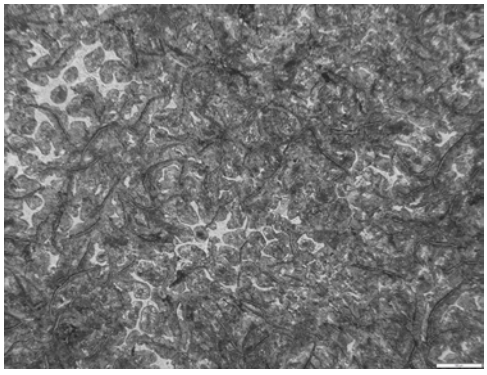
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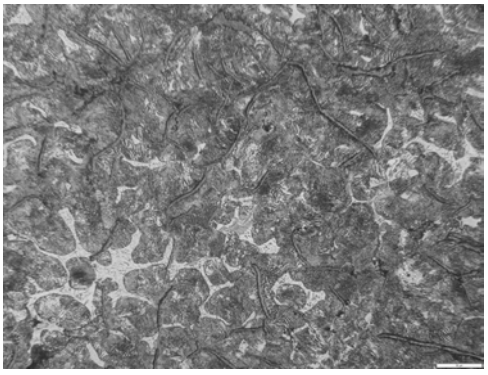
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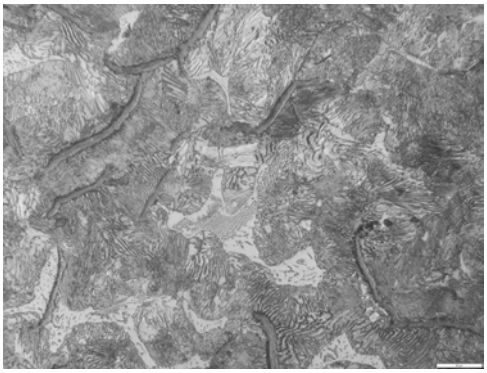
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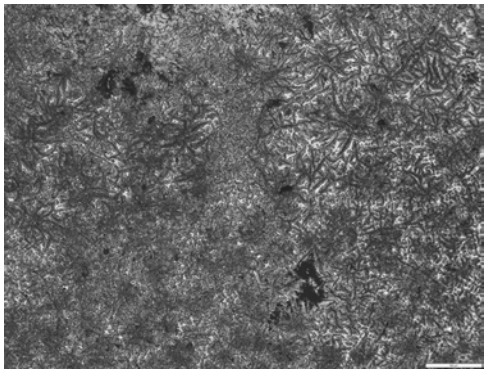
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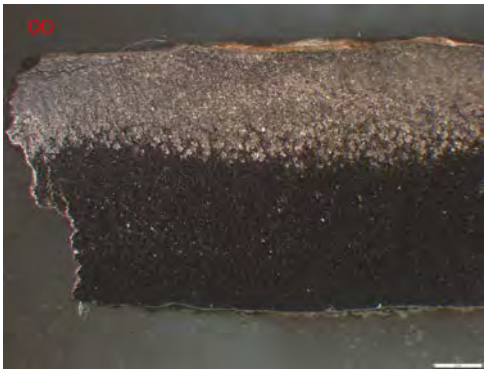
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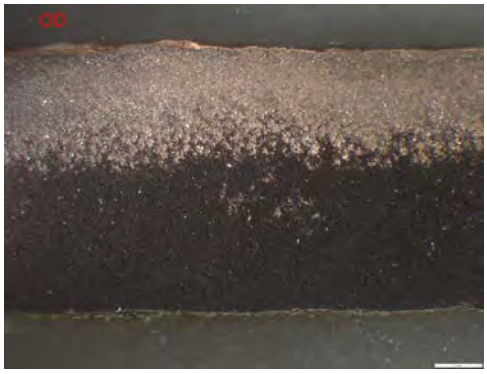
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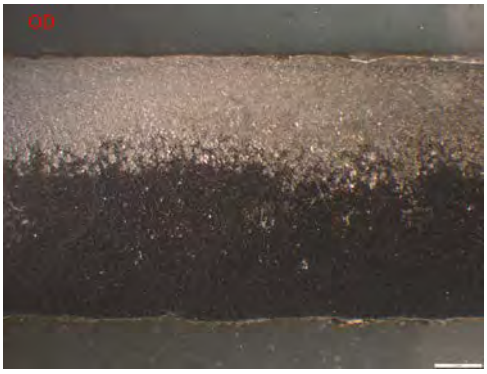
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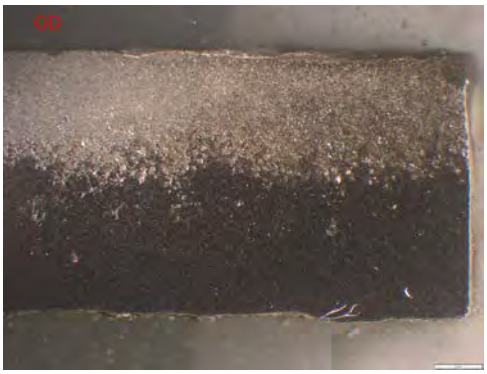
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W-2400-I-002 Micro D1-1 Unetche...



W-2400-I-003 Micro D1-1 Unetche...



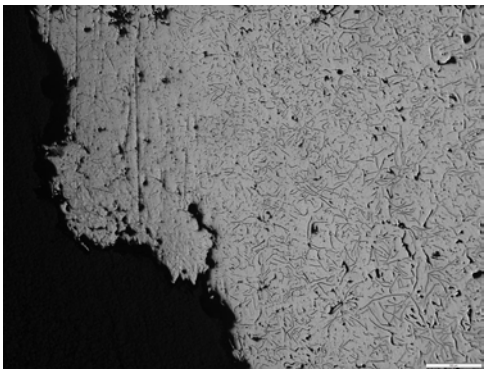
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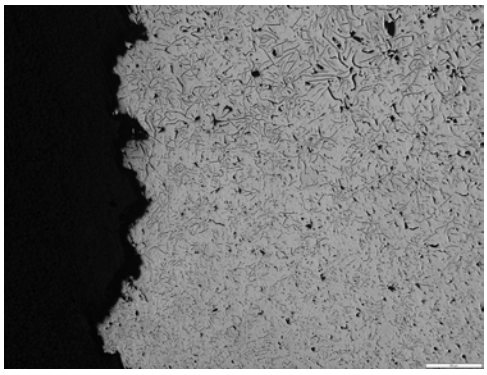
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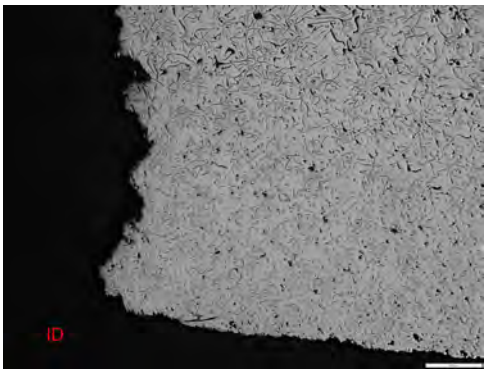
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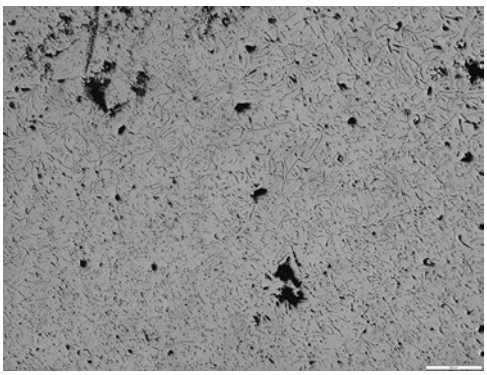
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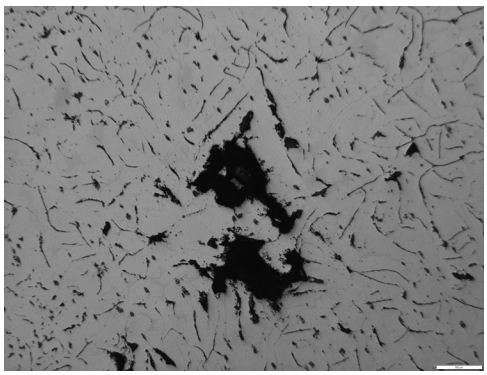
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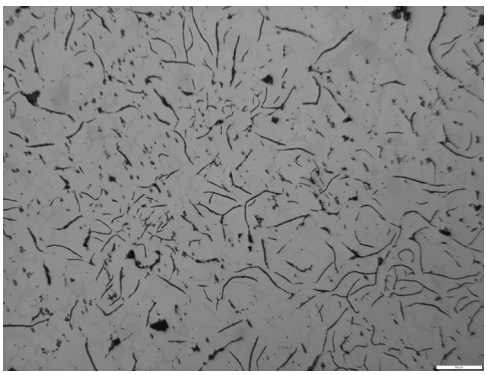
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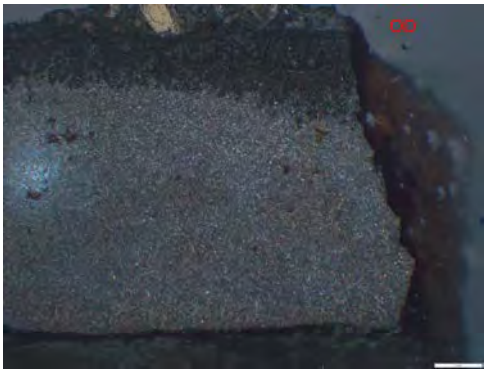
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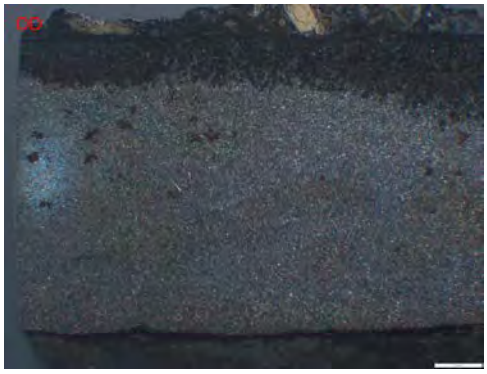
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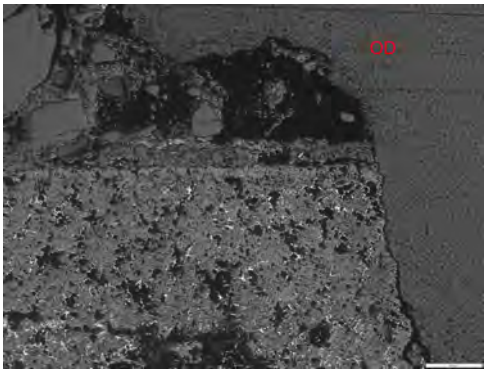
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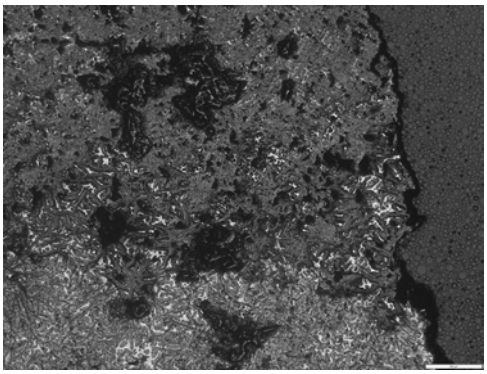
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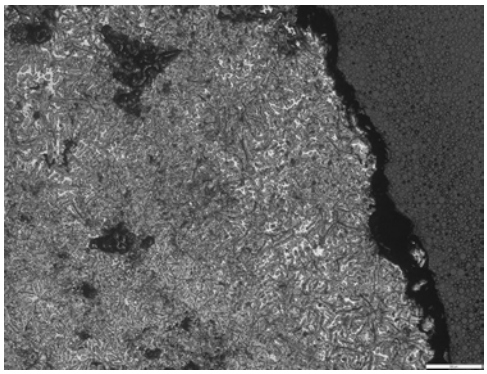
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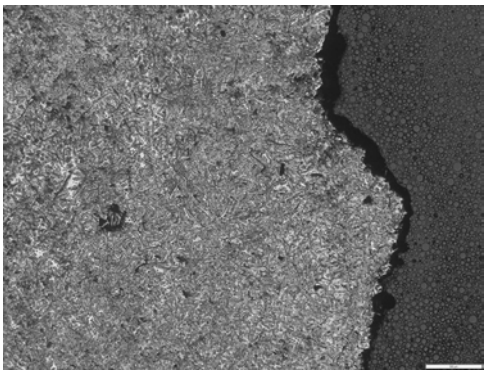
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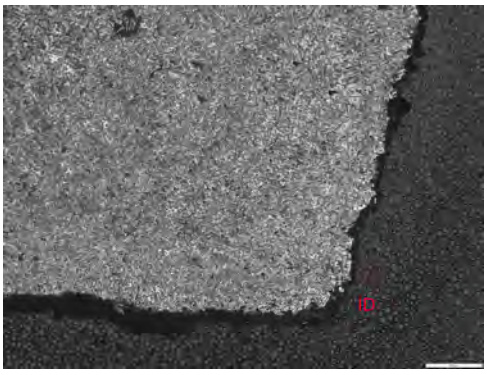
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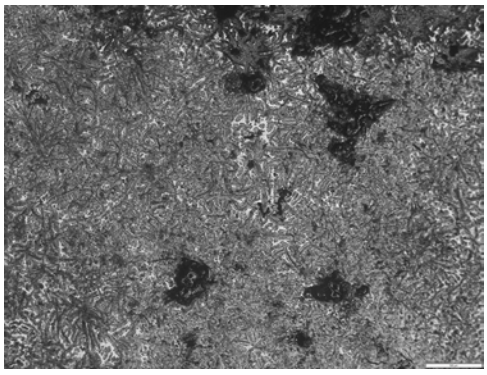
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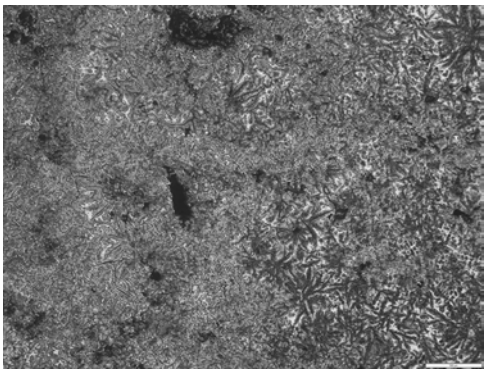
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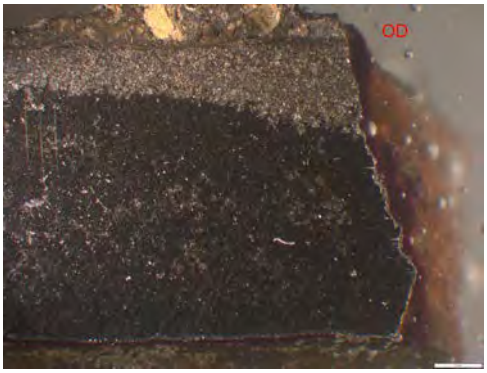
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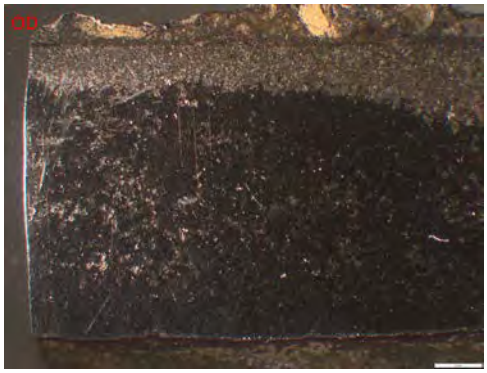
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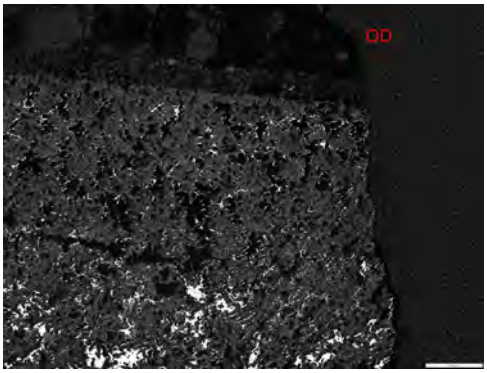
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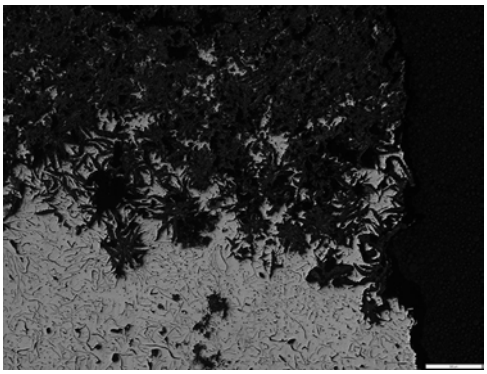
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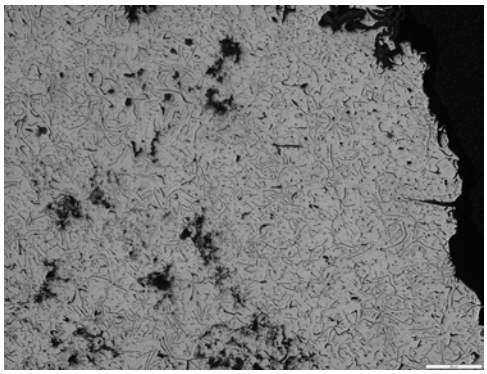
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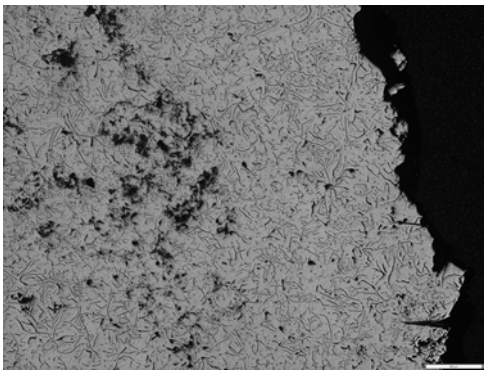
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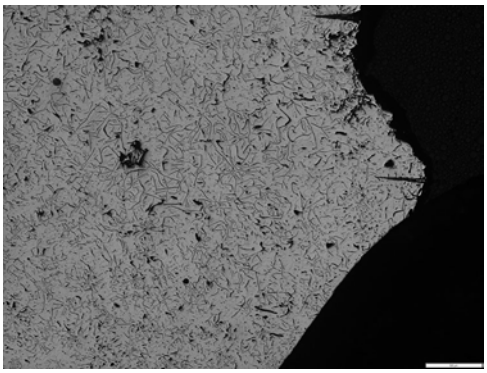
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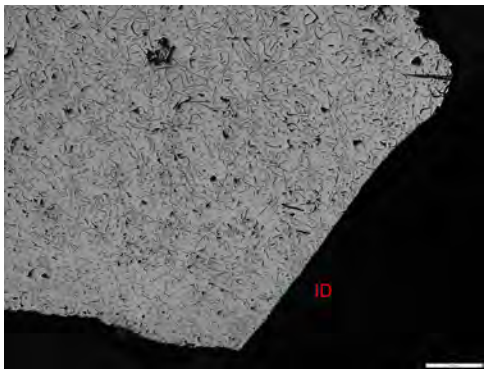
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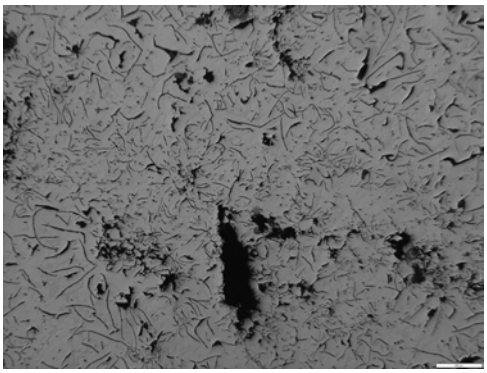
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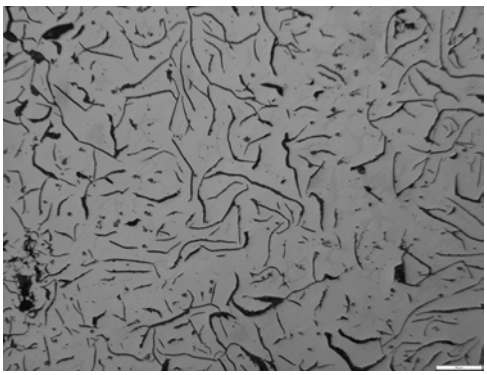
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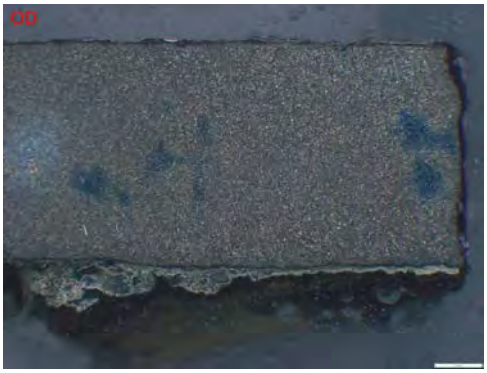
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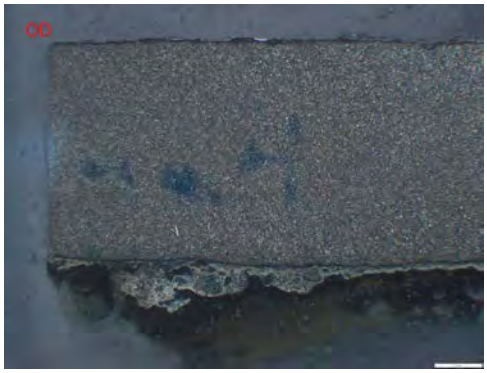
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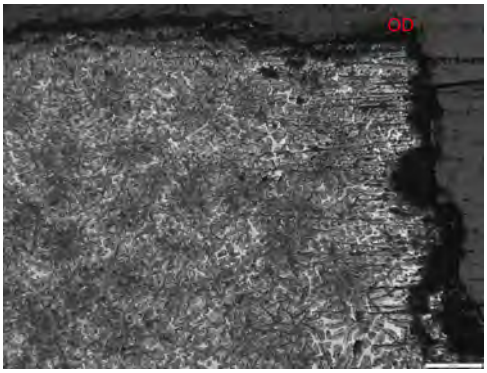
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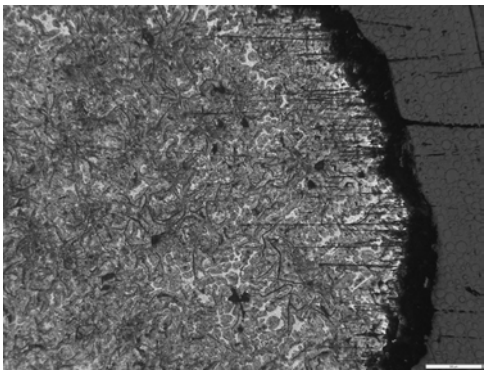
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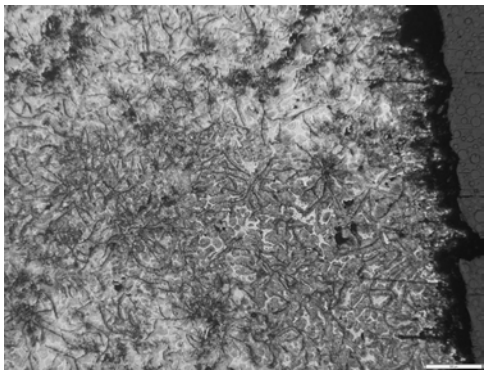
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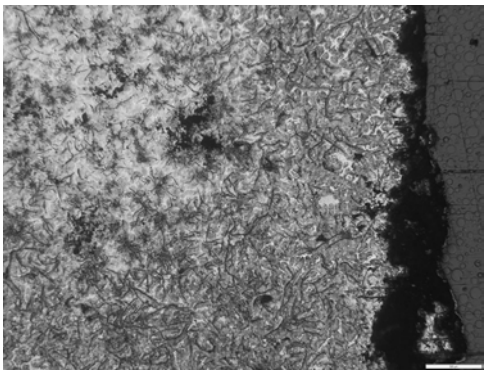
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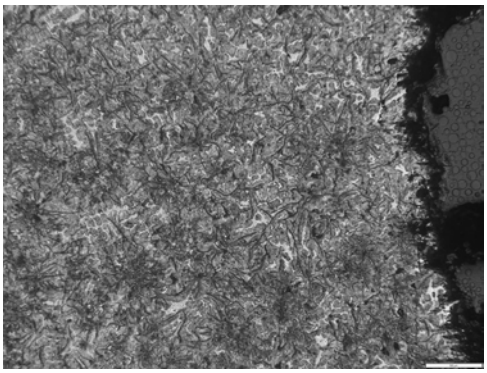
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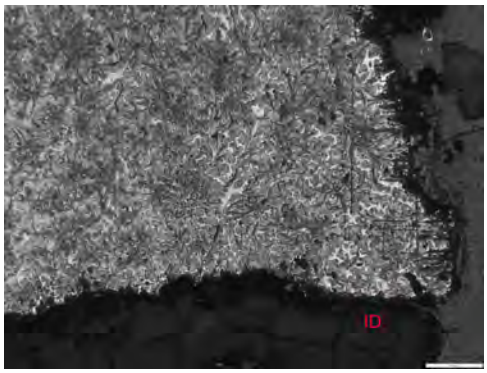
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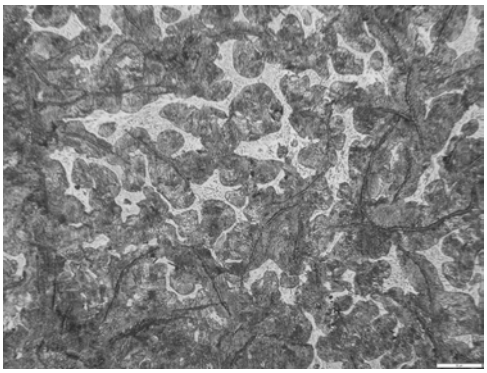
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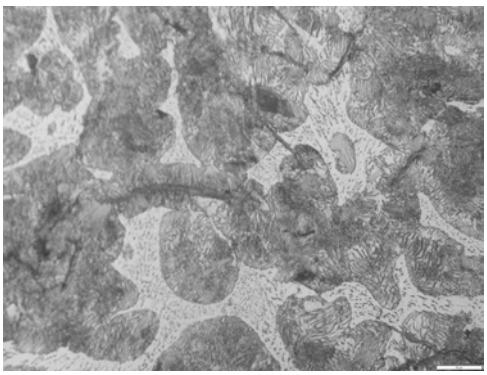
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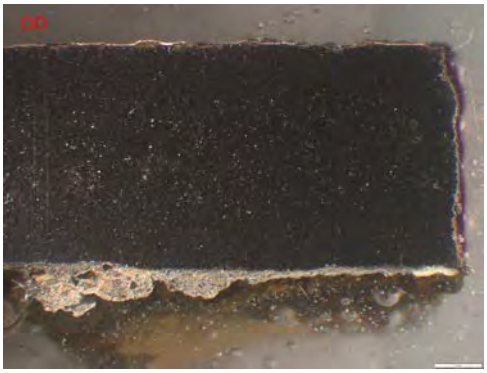
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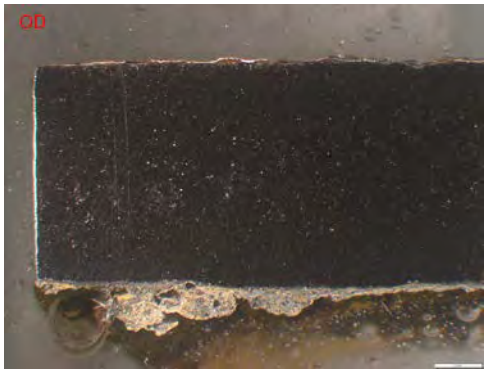
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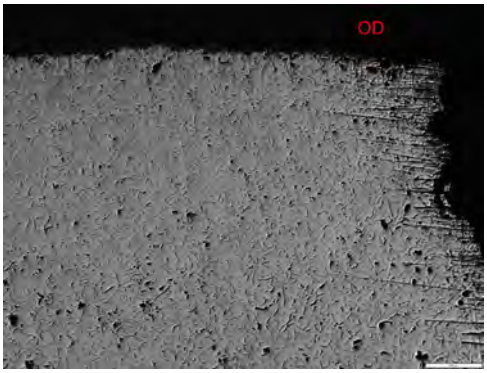
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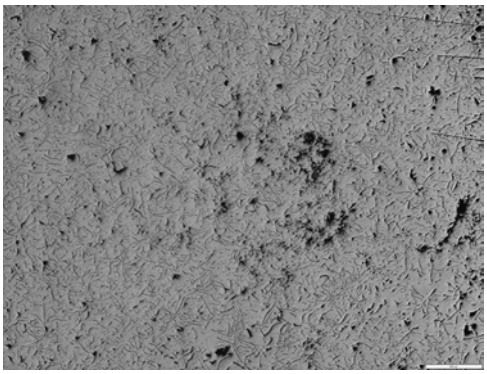
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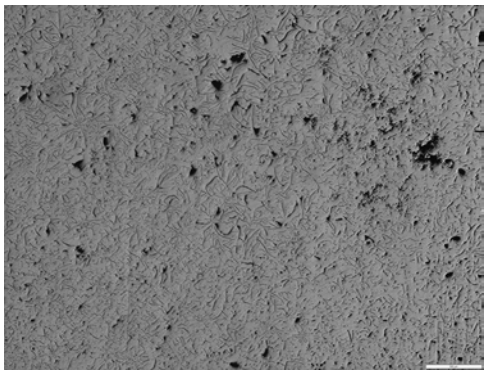
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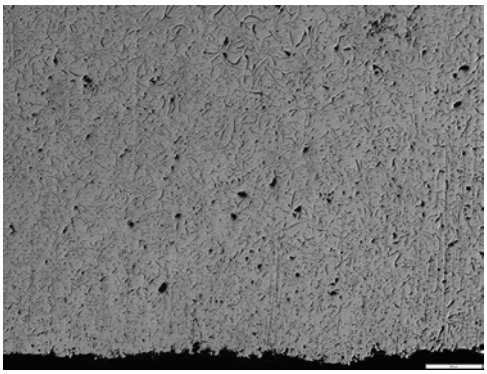
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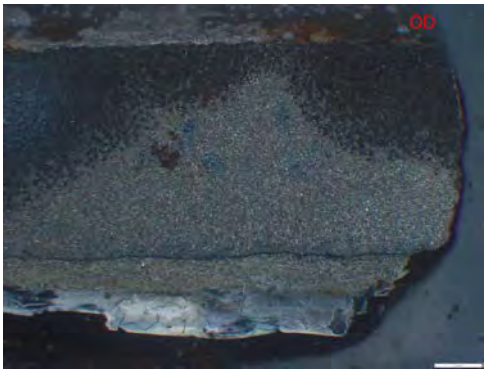
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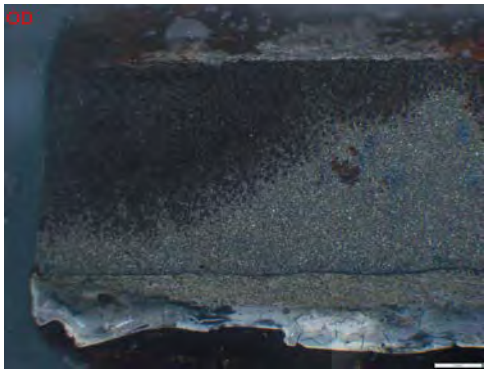
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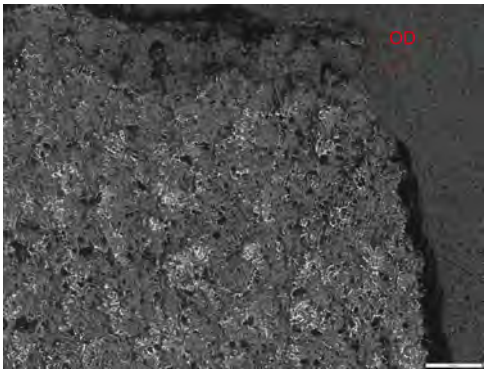
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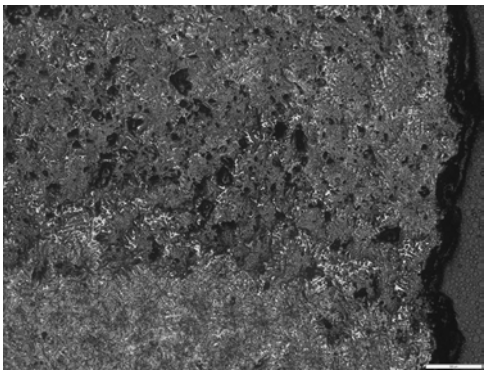
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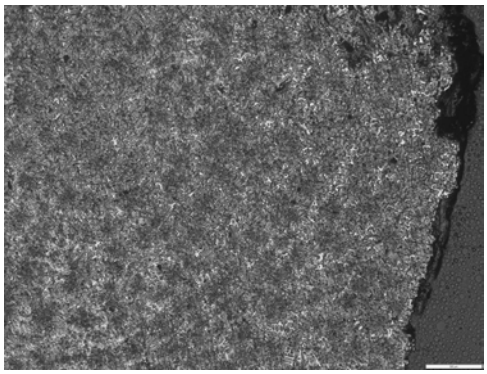
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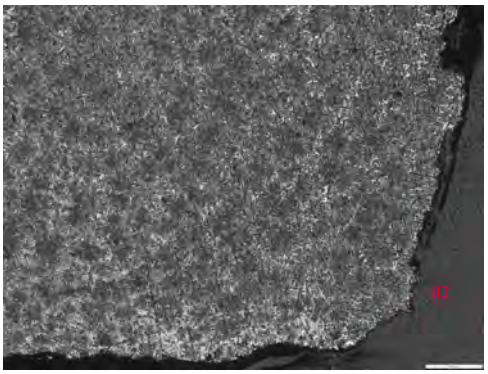
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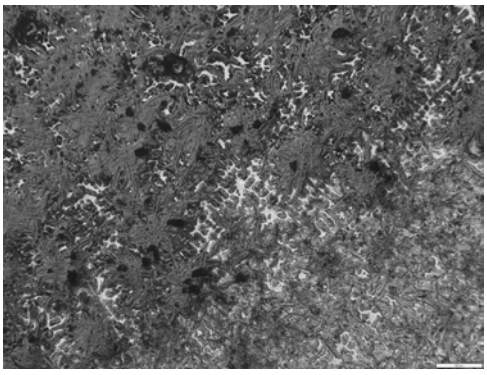
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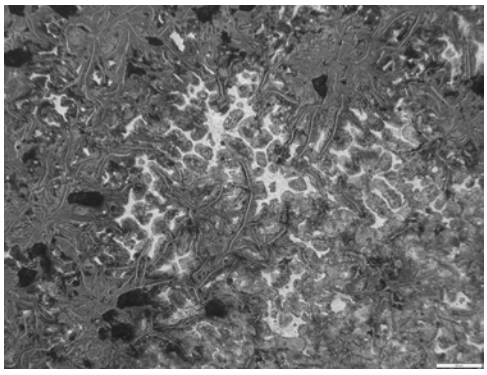
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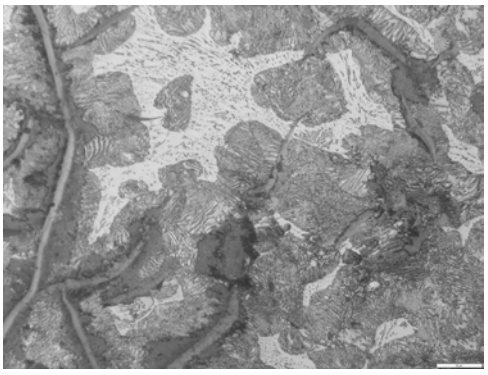
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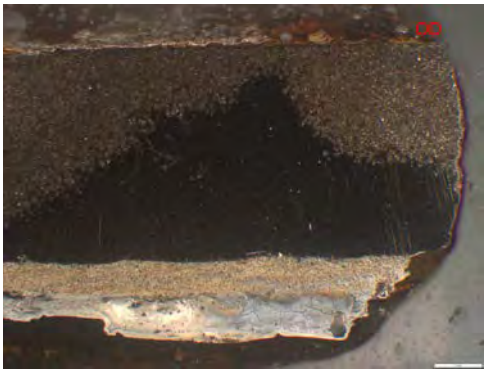
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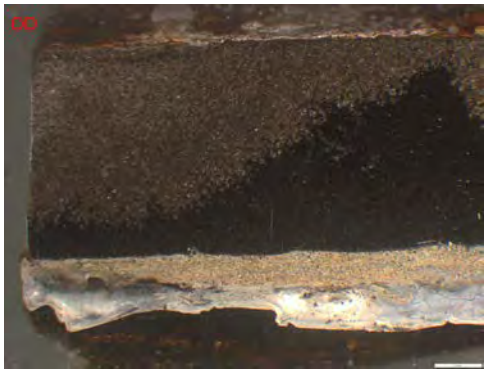
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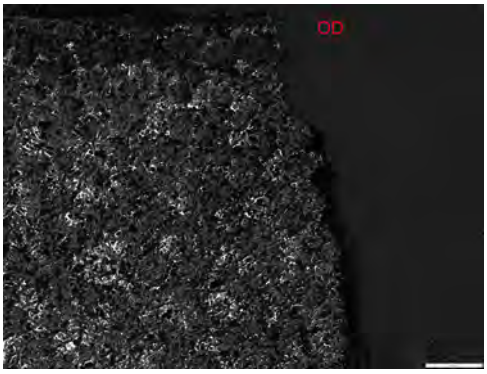
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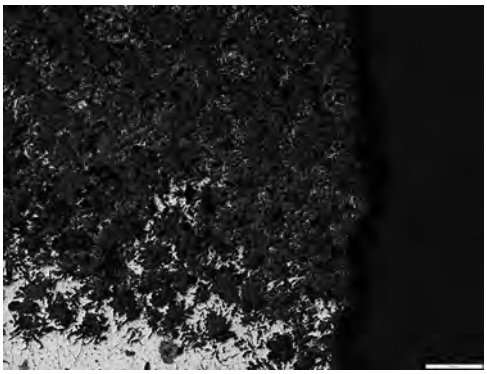
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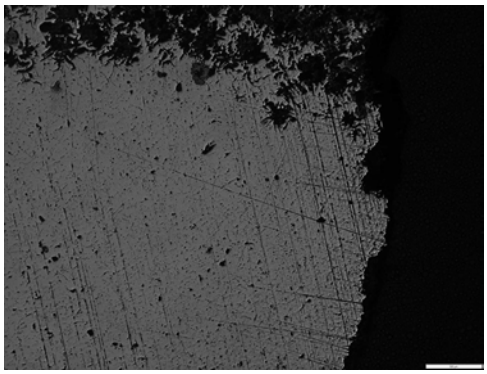
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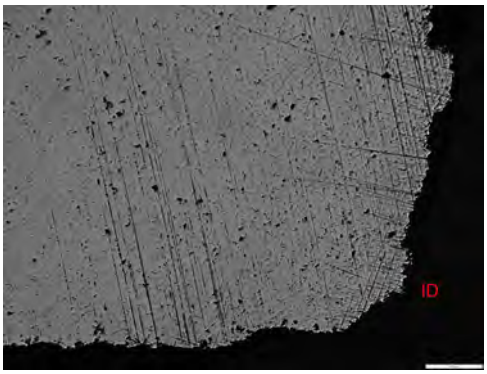
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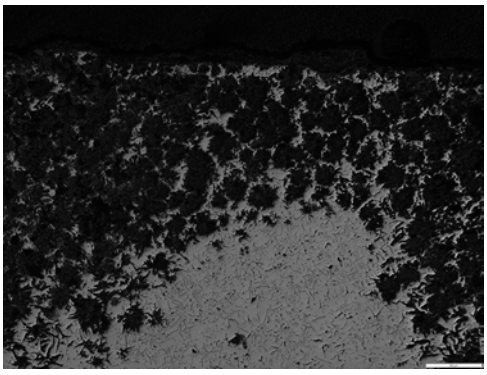
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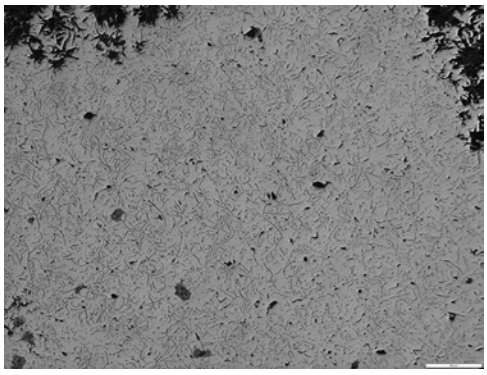
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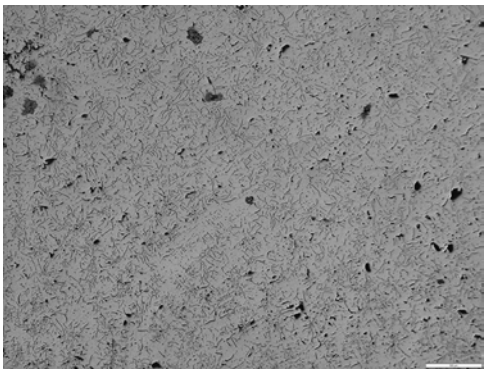
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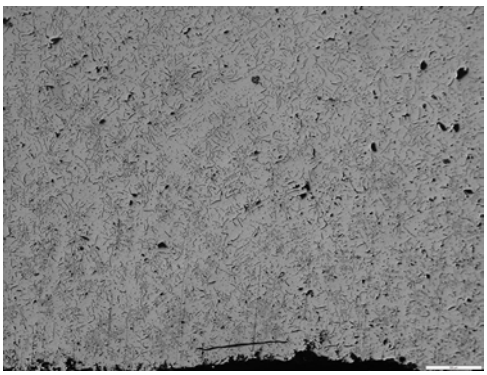
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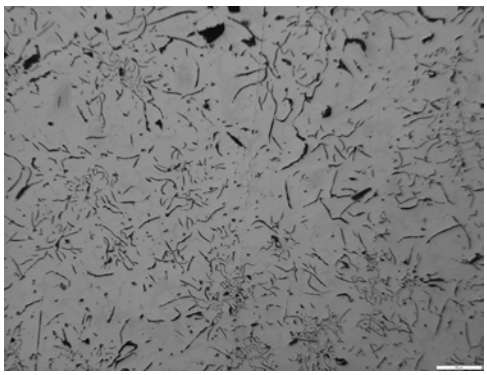
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W-2400-I-009 Micro D1-6 Unetche...



W-2400-I-010 Micro D1-6 Unetche...



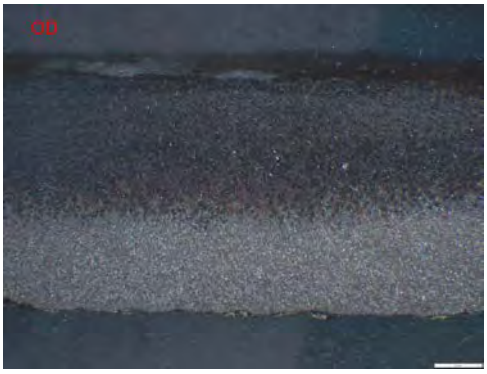
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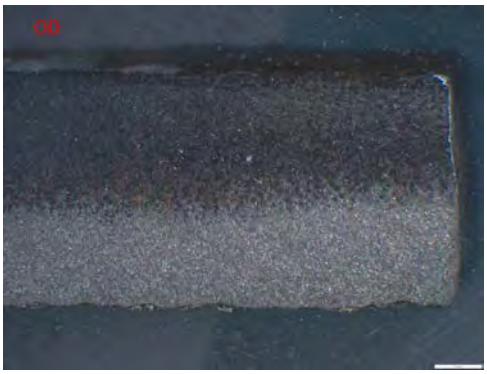
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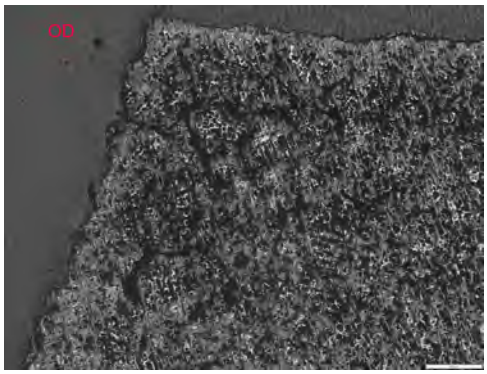
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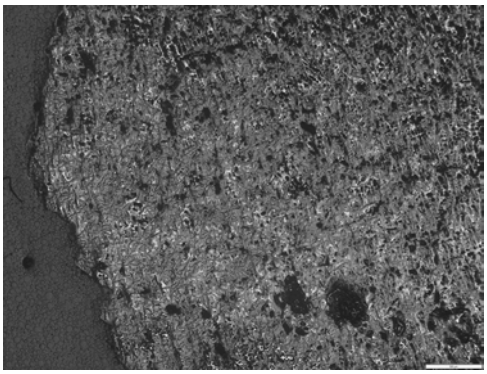
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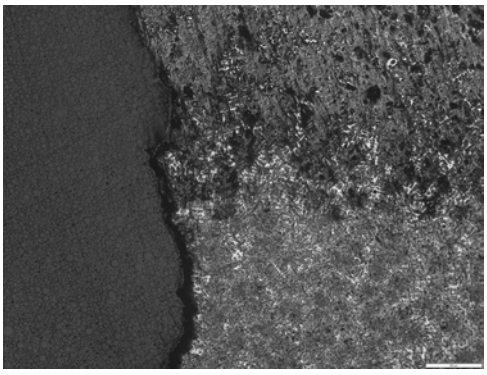
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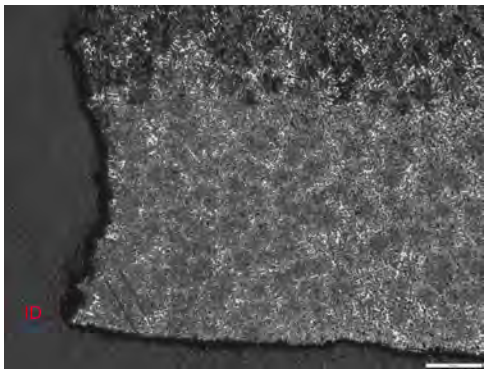
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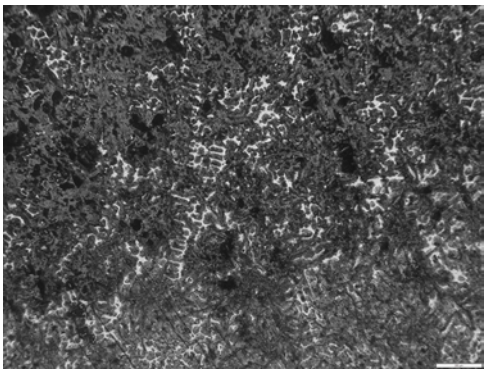
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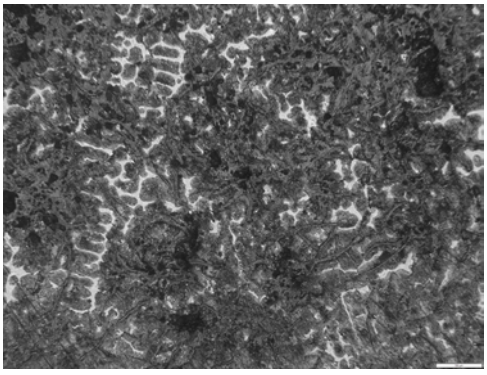
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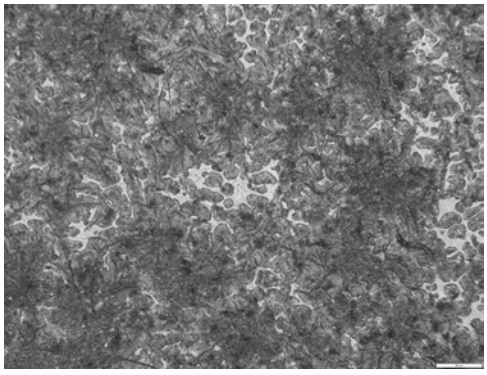
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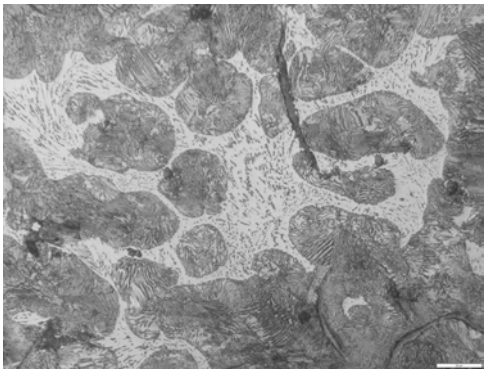
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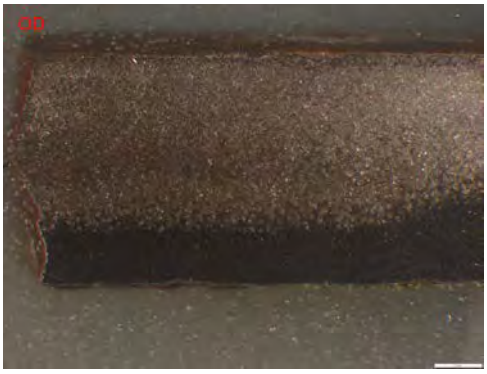
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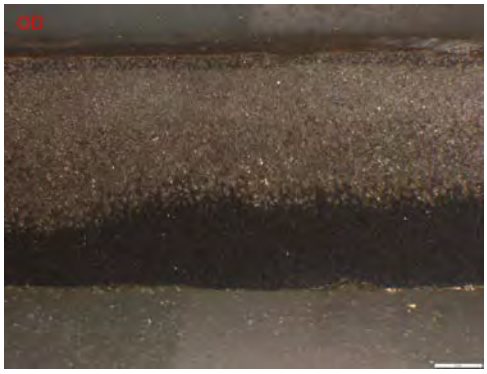
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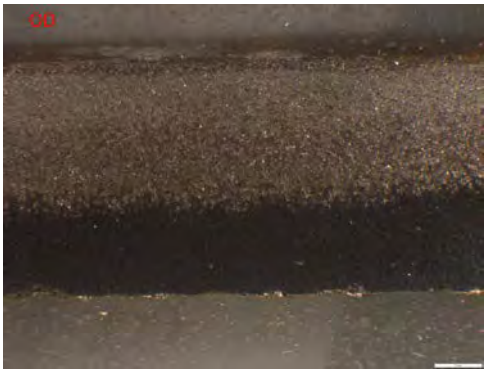
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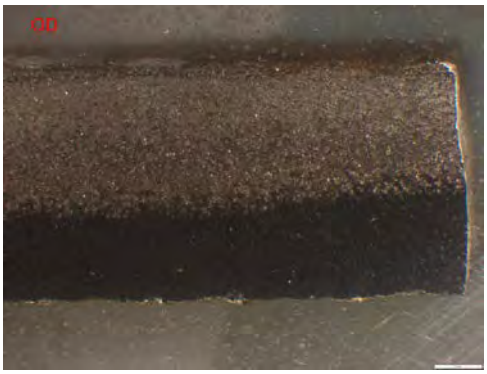
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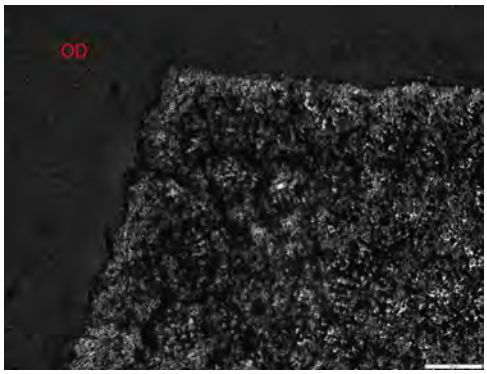
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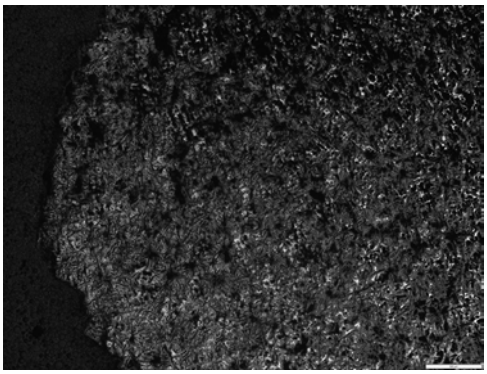
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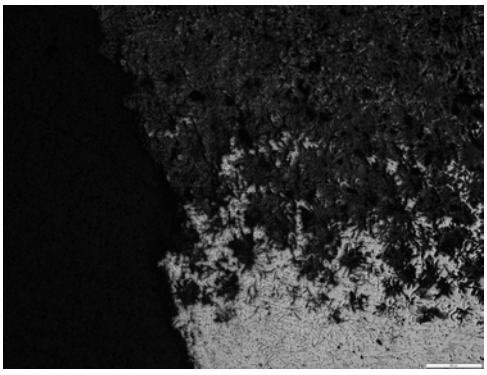
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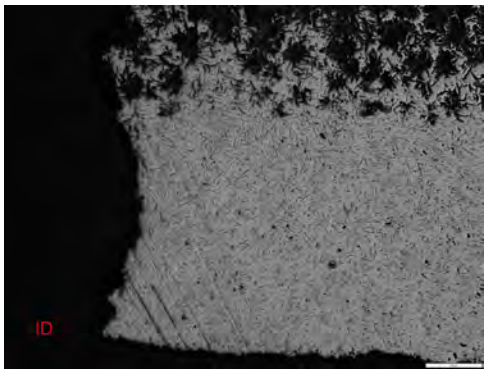
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W-2400-I-006 Micro D1-8 Unetche...



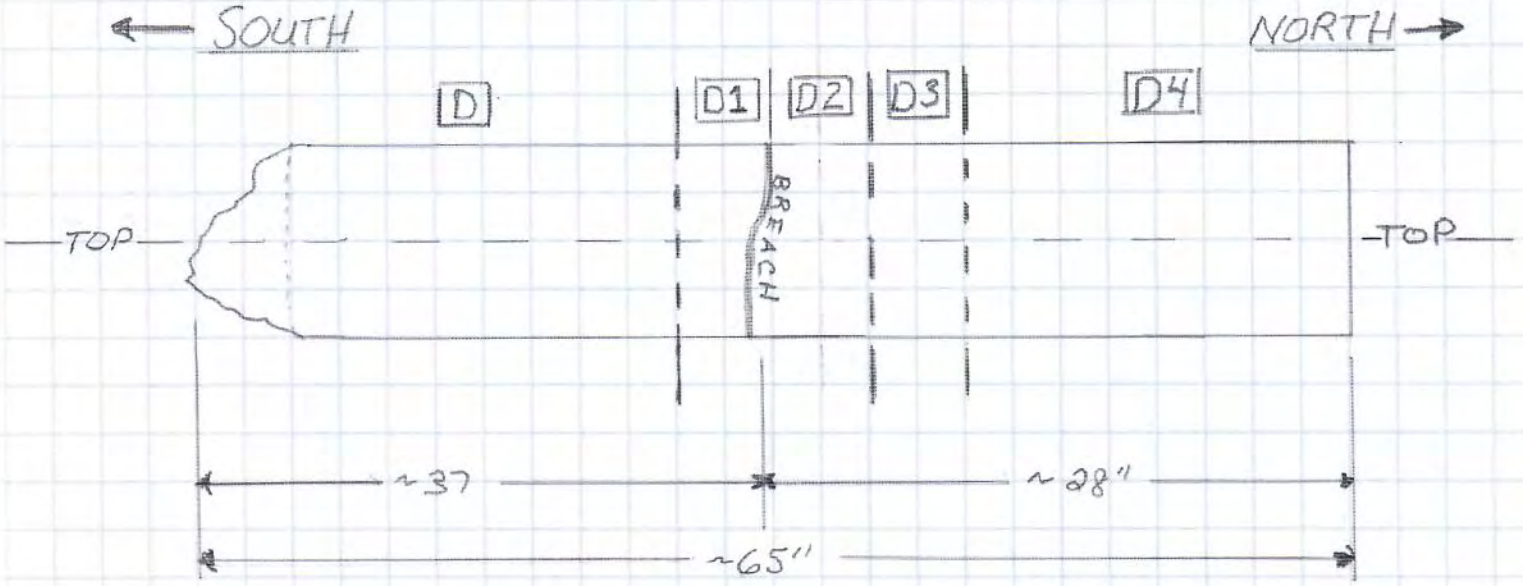
W-2400-I-007 Micro D1-8 Unetche...



W-2400-I-008 Micro D1-8 Unetche...

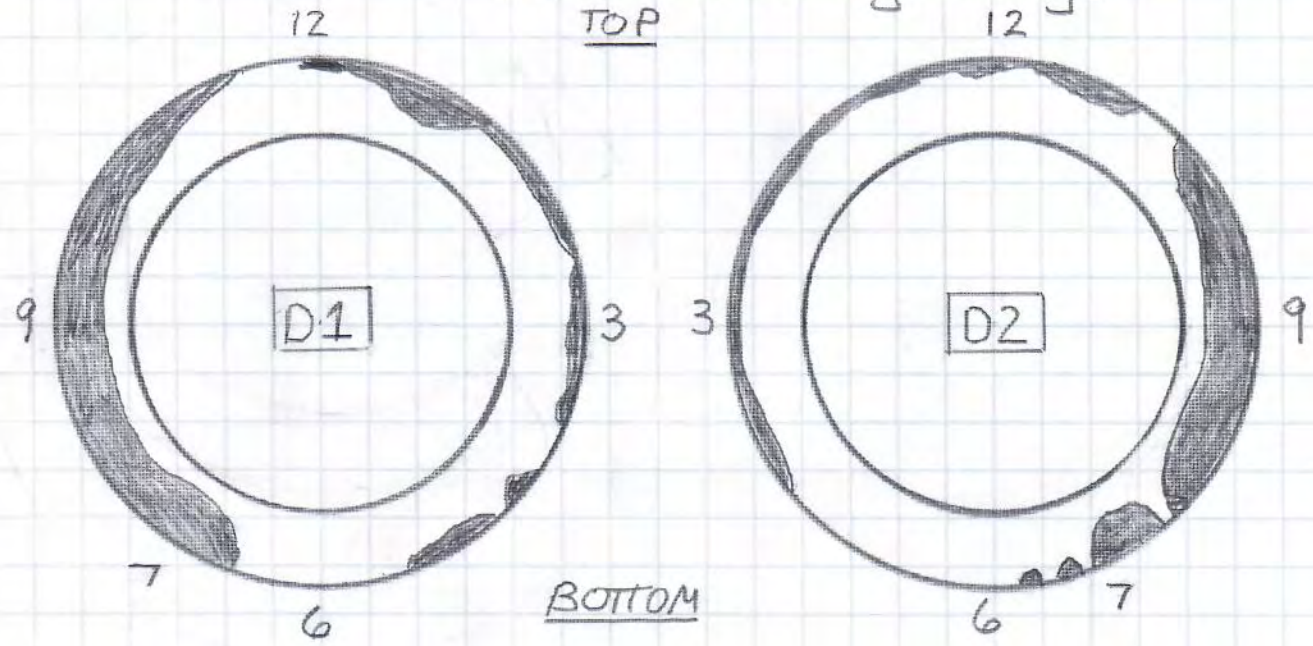
ATTACHMENT F

ITEM D



$ID_{NOM} = 6"$

WALL THICKNESS
Measured on Cut Edge of Rings



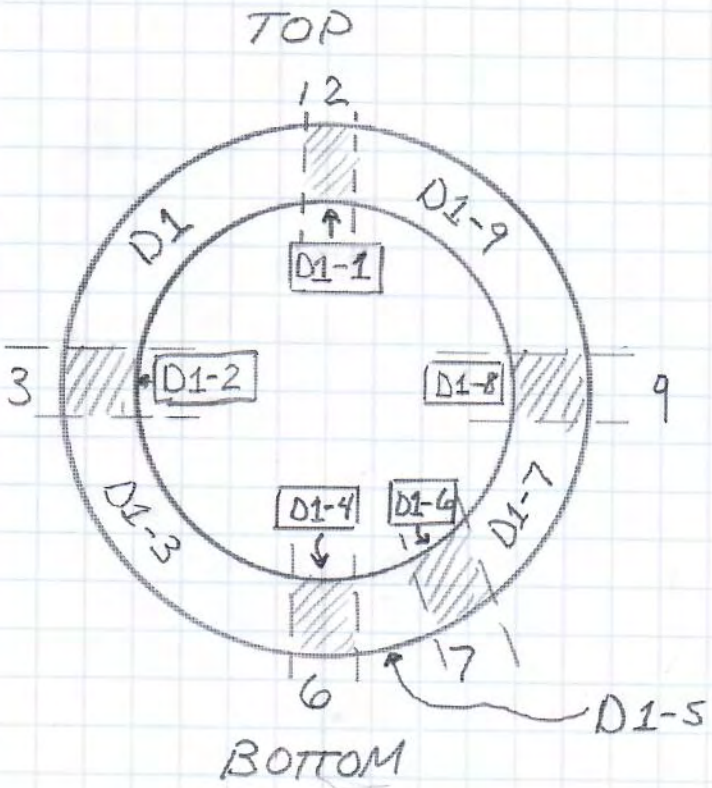
Orientation as Viewed in NORTH direction

Not Drawn to scale

Wall Thickness Measurements on Cut Edge

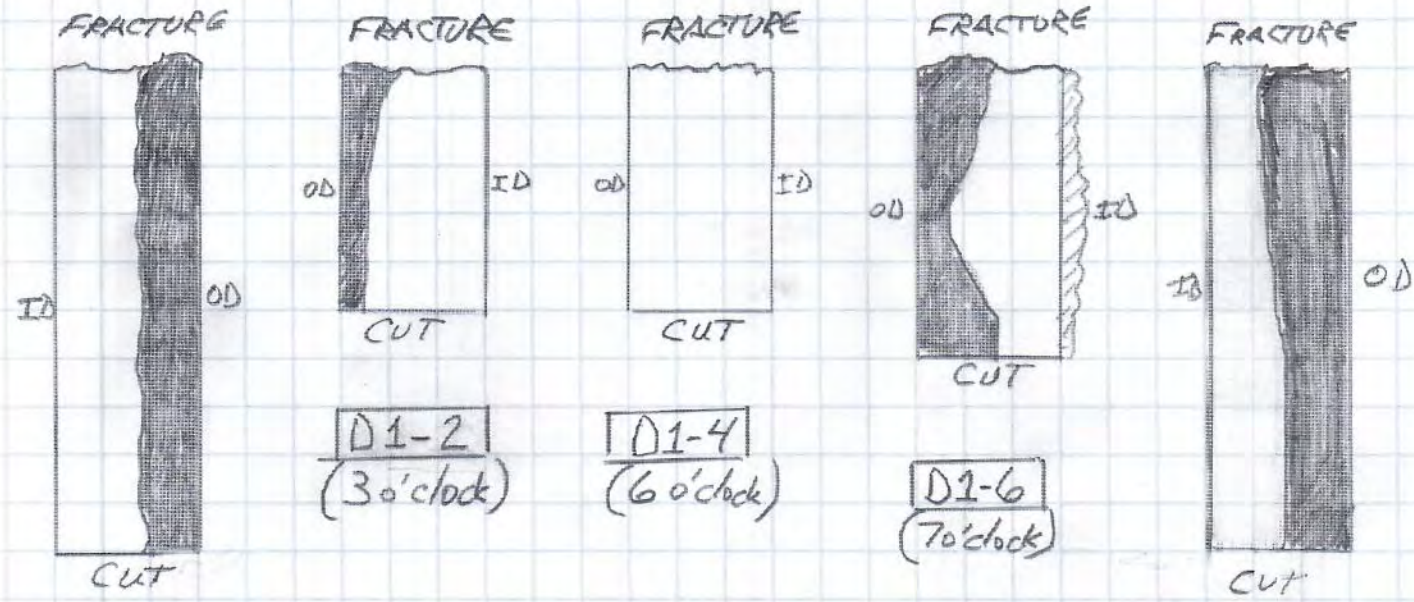
	D1					D2				
	12	3	6	7	9	12	3	6	7	9
Orginal Wall Thickness, inch	0.4475	0.4875	0.3695	0.3455	0.3835	0.4865	0.4900	0.3960	0.3965	0.4175
Depth of Graphitization, inch	0.2110	0.078	–	0.2690	0.2135	0.1210	0.1595	–	0.2480	0.261
Effective Wall Thickness, inch	0.2365	0.4095	0.3695	0.0765	0.1700	0.3655	0.3305	0.3960	0.1485	0.1565
% Wall Loss	47	16	0	73	56	25	33	0	63	63

D1 Microspecimens & Sample ID's



Not Drawn to Scale

Microspecimen Profiles



Wall Thickness Measurements at Fracture

	D1				
	12	3	6	7	9
Original Wall Thickness, inch	0.4475	0.4875	0.3695	0.3455	0.3835
Depth of Graphitization, inch	0.1820	0.1540	—	0.2165	0.2685
Effective Wall Thickness, inch	0.2655	0.3335	0.3695	0.1290	0.1150
% Wall Loss	41	32	0	63	70

Not Drawn to Scale

ATTACHMENT G

Original Quant Report

QUANT

Attn: Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
777 New Durham Road
Edison, NJ 08817

jgashinski@aelgroup.net
cyanik@aelgroup.net

TEST REPORT

QUANT Report No. 138210 Client Reference: W-2400
Report Date: 7-16-2020 Received on: 7-6-2020

Subject: Material Composition, Hardness, Talbot Strip, and Ring Testing of a Cast Iron Pipe Section (Samples D3 and D4), 6" I.D. x ½" Wall x 23" L. (Philadelphia Gas Works) for Conformance to ASA Specification A-21.3 ("Cast Iron Pit Case Pipe for Gas", 1952).

1. Material Composition (ASTM E351, ASA A-21.3, 3-3.2).

% of Element (wt.)

Element	6" I.D. Pipe Section	ASA A-21.3, 3-3.2
Carbon	3.44	--
Manganese	0.43	--
Silicon	1.52	--
Phosphorous	1.326	0.90 max.
Sulfur	0.101	0.12 max.
Chromium	0.03	--
Nickel	0.02	--
Molybdenum	<0.01	--
Copper	0.24	--
Titanium	0.068	--
Tin	0.029	--
Tungsten	0.009	--
Iron	Rem.	--
Grade:	**Gray Iron**	**--**

The carbon content was determined (ASTM E1019) on a solid section removed from the pipe wall (Sample D3).

The phosphorous content exceeds the 0.90% maximum limit for the ASA A-21.3, 3-3.2 requirement.

Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
Quant Report 138210

2. Hardness Tests (ASTM E10, E18, E140).

Five Brinell Impressions (10/3000 kg) were placed directly on a pipe wall section (Sample D3, milled on the O.D. and the I.D.) each resulting in the sample shattering. Hardness was then performed using the Rockwell B Scale and converting to Brinell Hardness, HBW.

Reading	Rockwell B, HRB	Brinell, HBW, 10/3000
1.	93	200
2.	94	205
3.	90	190
4.	88	176
5.	90	190
Average:	91	192

3. Talbot Strip Tests (ASA A-21.3, 3-18.4).

Talbot Strip						Sample	Pipe
Modulus of Rupture		**W**	**t**	**d**	**R**	Material	Cast Iron
$R(psi) = \frac{10W}{td^2}$	#1	339	0.497	0.495	27,838	ID	6”
	#2	294	0.497	0.498	23,852		
	Avg	317	0.497	0.497	25,833		
W = breaking load (lbs) t = width of strip (in) d = depth of strip (in) Requirement: R > 30,000 lbs.							

Secant Modulus of Elasticity		**R**	**d**	**y**	**E_s**
$E_s(psi) = \frac{213W}{td^3 y} = \frac{21.3R}{dy}$	#1	27,838	0.495	0.213	5.624E+06
	#2	23,852	0.498	0.190	5.369E+06
	Avg	25,833	0.497	0.202	5.500E+06
W = breaking load (lbs) t = width of strip (in) d = depth of strip (in) y = deflection of strip at center @ W (in) R = modulus of rupture (psi) Requirement: $E_s < 1.0e^7$					

The two tested gray iron strips did not meet the Talbot Modulus of Rupture Requirement of 30,000 PSI minimum. The Secant Modulus of Elasticity for the two strips did meet the $<1.0e^7$ Requirement.

Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
Quant Report 138210

4. Ring Tests (ASA A-21.3, 3-18.5).

Ring

Modulus of Rupture

$$R(psi) = \frac{0.225W(d+t)}{bt^2}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
Requirement: R > 31,000 lbs

	W	d	t	b	R
#1	4327	6.020	0.460	3.028	41,833
#2	4894	6.020	0.487	3.055	41.927
Avg	4611	6.020	0.473	3.042	41,923

Secant Modulus of Elasticity

$$R(psi) = \frac{0.225W(d+t)^3}{bt^3y} = \frac{0.236R(d+t)^2}{ty}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.5e^7$

	R	d	t	y	E_s
#1	41,833	6.020	0.460	0.381	2.368E+06
#2	41,927	6.020	0.487	0.394	2.183E+06
Avg	41.923	6.020	0.473	0.388	2.275E+06

Both 3” long sections of the 6” I.D. pipe met the requirements of both the Modulus of Rupture (R) and the Secant Modulus of Elasticity (E_s).

It is our policy to retain components and sample remnants for a minimum of thirty (30) days from the report date, after which time they may be discarded. The data herein represents only the item(s) tested. This report shall not be reproduced, except in full, without prior permission of QUANT Corporation.

David C. Marshall
Laboratory Director

Corrected Quant Report

QUANT

Attn: Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
777 New Durham Road
Edison, NJ 08817

jgashinski@aelgroup.net
cyanik@aelgroup.net

TEST REPORT

QUANT Report No. 138210 (Corrected) Client Reference: W-2400
Report Date: 9-30-2020 Received on: 7-6-2020

Subject: Material Composition, Hardness, Talbot Strip, and Ring Testing of a Cast Iron Pipe Section (Samples D3 and D4), 6" I.D. x ½" Wall x 23" L. (Philadelphia Gas Works) for Conformance to ASA Specification A-21.3 ("Cast Iron Pit Case Pipe for Gas", 1952).

1. Material Composition (ASTM E351, ASA A-21.3, 3-3.2).

% of Element (wt.)

Element	6" I.D. Pipe Section	ASA A-21.3, 3-3.2
Carbon	3.44	--
Manganese	0.43	--
Silicon	1.52	--
Phosphorous	1.326	0.90 max.
Sulfur	0.101	0.12 max.
Chromium	0.03	--
Nickel	0.02	--
Molybdenum	<0.01	--
Copper	0.24	--
Titanium	0.068	--
Tin	0.029	--
Tungsten	0.009	--
Iron	Rem.	--
Grade:	**Gray Iron**	**--**

The carbon content was determined (ASTM E1019) on a solid section removed from the pipe wall (Sample D3).

The phosphorous content exceeds the 0.90% maximum limit for the ASA A-21.3, 3-3.2 requirement.

Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.

Quant Report 138210 (Corrected)

2. Hardness Tests (ASTM E10, E18, E140).

Five Brinell Impressions (10/3000 kg) were placed directly on a pipe wall section (Sample D3, milled on the O.D. and the I.D.) each resulting in the sample shattering. Hardness was then performed using the Rockwell B Scale and converting to Brinell Hardness, HBW.

Reading	Rockwell B, HRB	Brinell, HBW, 10/3000
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Average:	91	192

3. Talbot Strip Tests (ASA A-21.3, 3-18.4).

Talbot Strip						Sample	Pipe
Modulus of Rupture		**W**	**t**	**d**	**R**	Material	Cast Iron
$R(psi) = \frac{10W}{td^2}$	#1	339	0.497	0.495	27,838	ID	6”
	#2	294	0.497	0.498	23,852		
	Avg	317	0.497	0.497	25,845		
W = breaking load (lbs) t = width of strip (in) d = depth of strip (in) Requirement: R > 30,000 lbs.							

Secant Modulus of Elasticity		**R**	**d**	**y**	**E_s**
$E_s(psi) = \frac{213W}{td^3 y} = \frac{21.3R}{dy}$	#1	27,838	0.495	0.213	5.624E+06
	#2	23,852	0.498	0.190	5.369E+06
	Avg	25,845	0.497	0.202	5.489E+06
W = breaking load (lbs) t = width of strip (in) d = depth of strip (in) y = deflection of strip at center @ W (in) R = modulus of rupture (psi) Requirement: $E_s < 1.0e^7$					

The two tested gray iron strips did not meet the Talbot Modulus of Rupture Requirement of 30,000 PSI minimum. The Secant Modulus of Elasticity for the two strips did meet the $<1.0e^7$ Requirement.

Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
Quant Report 138210 (Corrected)

4. Ring Tests (ASA A-21.3, 3-18.5).

Ring

Modulus of Rupture

$$R(psi) = \frac{0.225W(d+t)}{bt^2}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
Requirement: R > 31,000 lbs

	W	d	t	b	R
#1	4327	6.020	0.460	3.028	41,833
#2	4894	6.020	0.487	3.055	41.927
Avg	4611	6.020	0.473	3.042	41,880

Secant Modulus of Elasticity

$$R(psi) = \frac{0.225W(d+t)^3}{bt^3y} = \frac{0.236R(d+t)^2}{ty}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.5e^7$

	R	d	t	y	E_s
#1	41,833	6.020	0.460	0.381	2.368E+06
#2	41,927	6.020	0.487	0.394	2.183E+06
Avg	41,880	6.020	0.473	0.388	2.270E+06

Both 3” long sections of the 6” I.D. pipe met the requirements of both the Modulus of Rupture (R) and the Secant Modulus of Elasticity (E_s).

It is our policy to retain components and sample remnants for a minimum of thirty (30) days from the report date, after which time they may be discarded. The data herein represents only the item(s) tested. This report shall not be reproduced, except in full, without prior permission of QUANT Corporation.

David C. Marshall
Laboratory Director

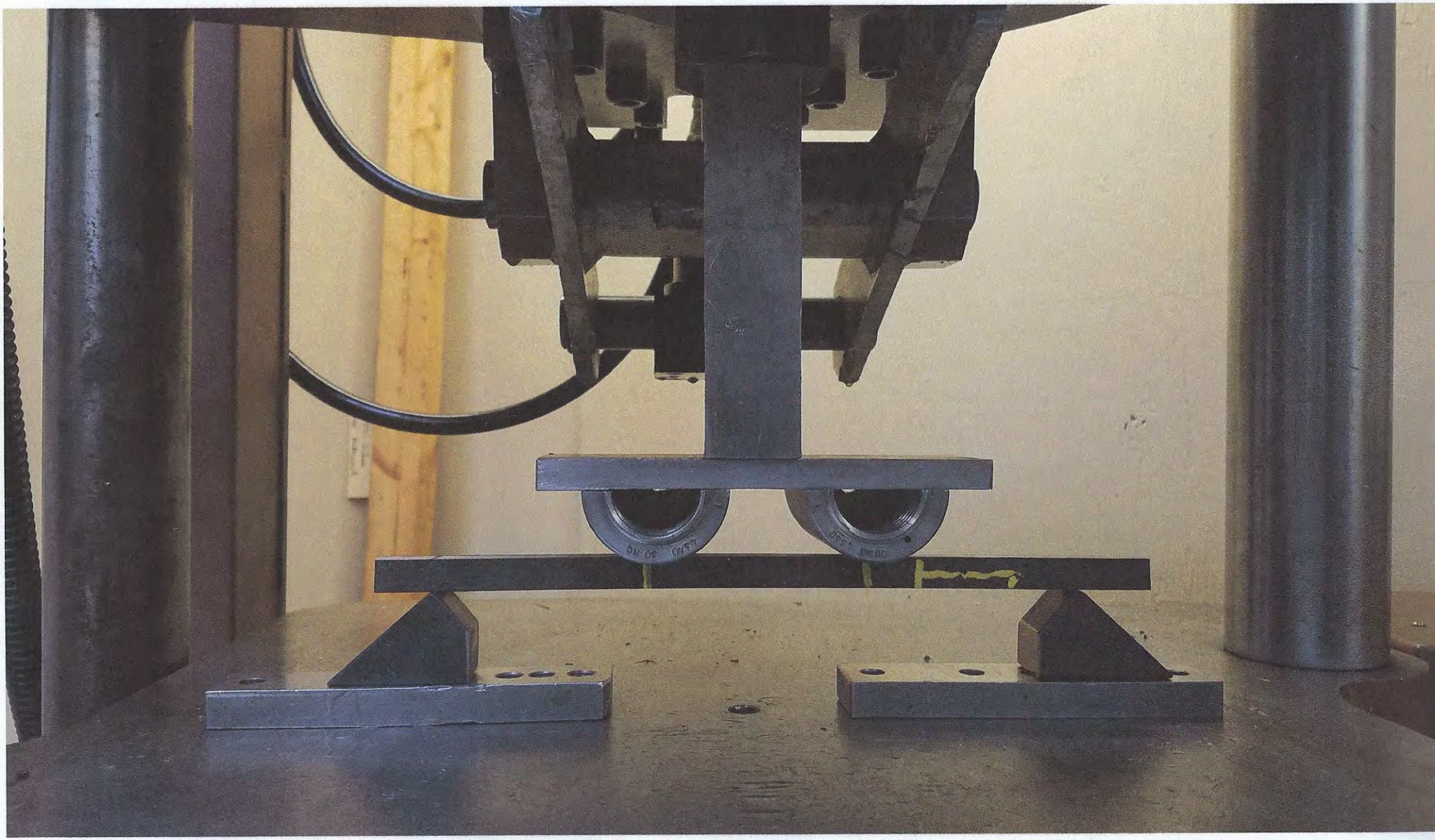


Fig. 1 – Fixture for Testing the Talbot Strips

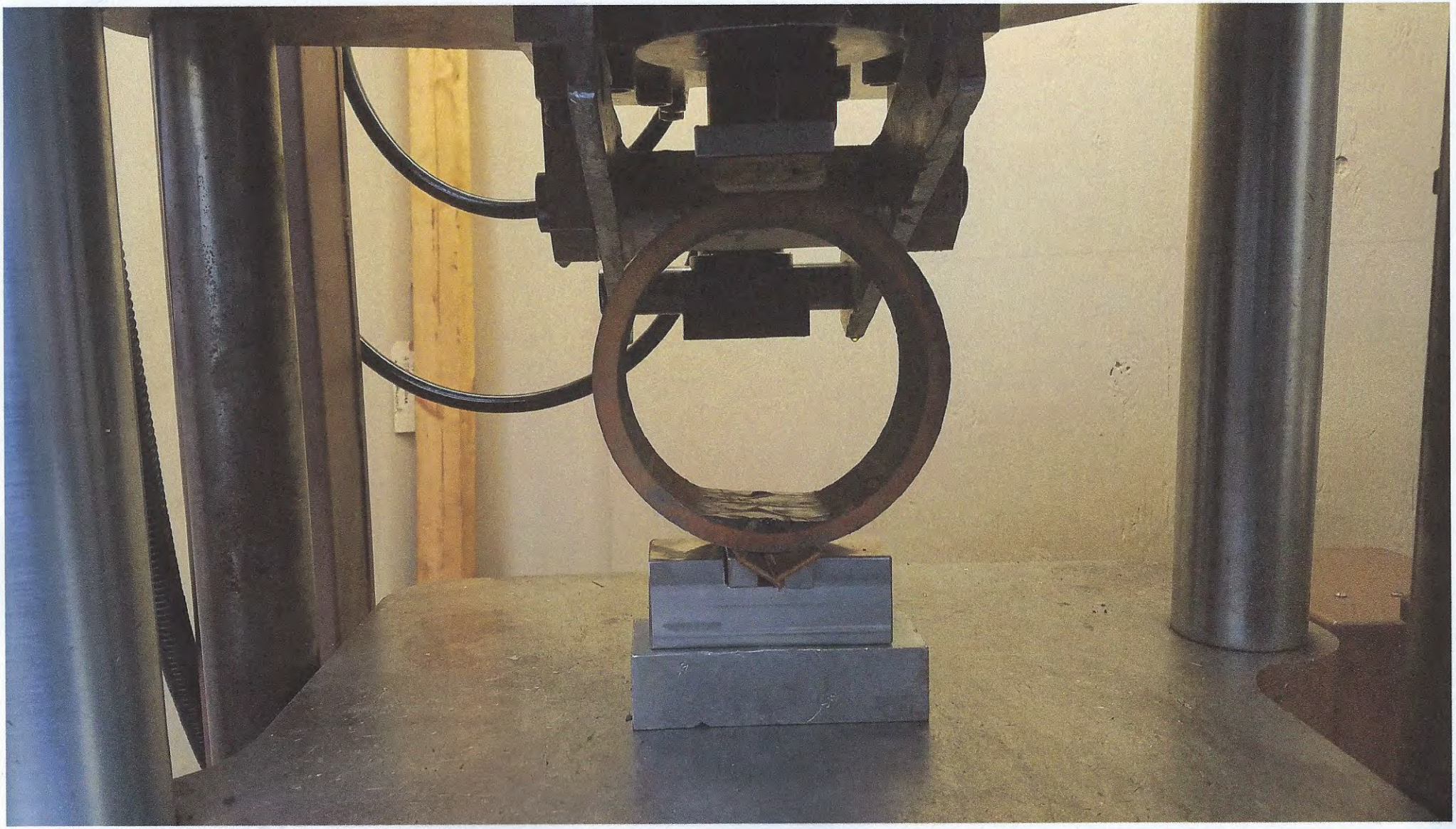


Fig. 2 – Fixture for Testing Pipe Rings



Fig. 3 – Test Samples Removed from 6" I.D. Pipe (D3 and D4)

Quant #:	138210	07/10/2020
Sample #:	#1 Strip	
Material:	Cast Iron	
Job/Lot #:	Affiliated MRD LLC	
Dia. Before Test:	6.00 ID	
Wall Thickness:	.500	
Break Location:	NA	

Test Tensile Test
Procedure LOAD

Test Date	07-10-2020	Tested By	G. R. Roth
Test Time	02:46:03 PM	Test Counter	00007711
Elapsed Time	00:01:49	Area	10.210 In²
Tensile Strgth	33.2 PSI	Peak Load	339 Lbs
Breaking Load	-15 Lbs		

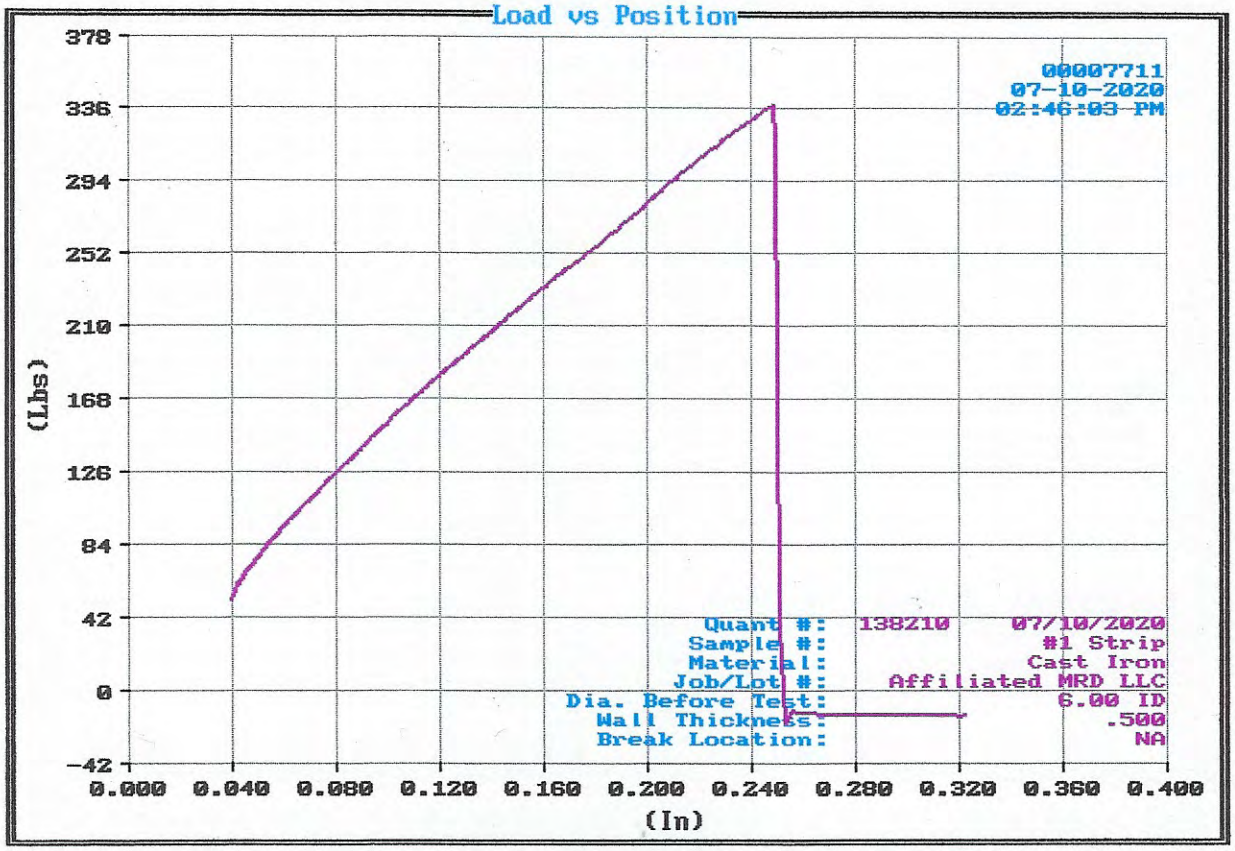


Fig. 4 – Breaking (peak) load, W, of Talbot Strip #1

Quant #:	138210 07/10/2020
Sample #:	#2 Strip
Material:	Cast Iron
Job/Lot #:	Affiliated MRD LLC
Dia. Before Test:	6.00 ID
Wall Thickness:	.500
Break Location:	NA

Test Tensile Test
Procedure LOAD

Test Date	07-10-2020	Tested By	G. R. Roth
Test Time	02:54:49 PM	Test Counter	00007712
Elapsed Time	00:01:55	Area	10.210 In²
Tensile Strgth	28.8 PSI	Peak Load	295 Lbs
Breaking Load	-14 Lbs		

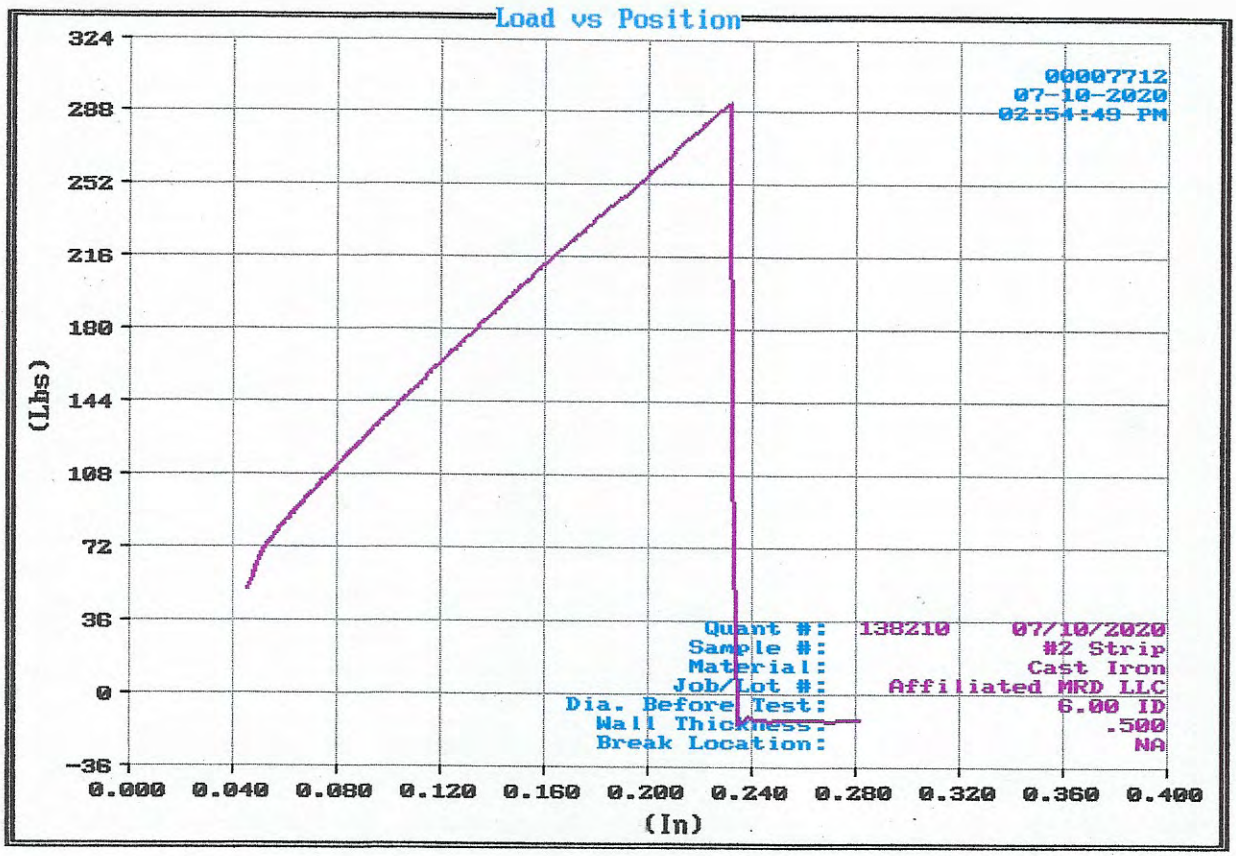


Fig. 5 – Breaking (peak) load, W, of Talbot Strip #2

Quant #:	138210 07/10/2020
Sample #:	#1 Ring
Material:	Cast Iron
Job/Lot #:	Affiliated MRD LLC
Dia. Before Test:	6.00 ID
Wall Thickness:	.500
Break Location:	NA

Test Tensile Test
Procedure LOAD

Test Date	07-10-2020	Tested By	G. R. Roth
Test Time	03:19:13 PM	Test Counter	00007713
Elapsed Time	00:14:39	Area	10.210 In²
Tensile Strgth	423.8 PSI	Peak Load	4327 Lbs
Breaking Load	4326 Lbs		

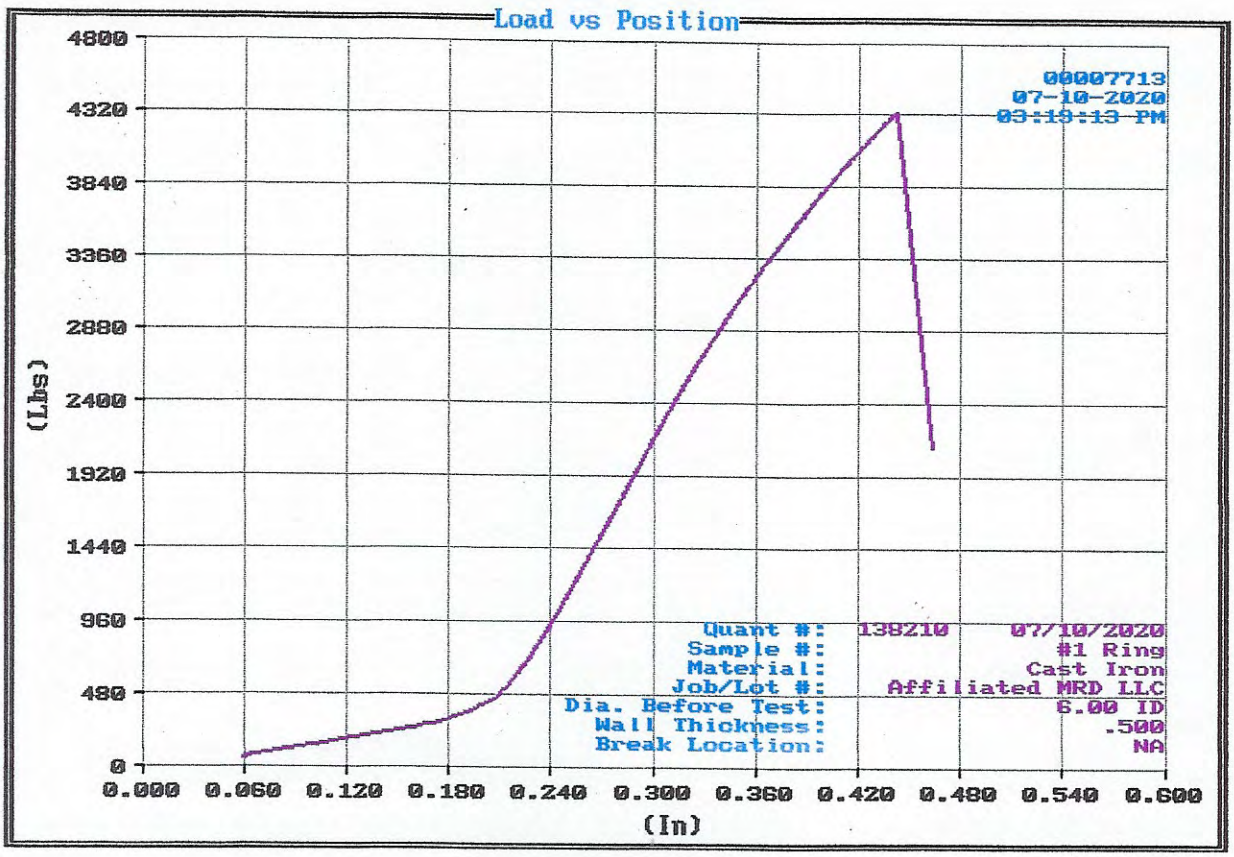


Fig. 6 – Breaking (peak) load, W, of Cast Pipe Ring #1

Quant #:	138210 07/10/2020
Sample #:	#2 Ring
Material:	Cast Iron
Job/Lot #:	Affiliated MRD LLC
Dia. Before Test:	6.00 ID
Wall Thickness:	.500
Break Location:	NA

Test Tensile Test
Procedure LOAD

Test Date	07-10-2020	Tested By	G. R. Roth
Test Time	03:39:03 PM	Test Counter	00007714
Elapsed Time	00:16:41	Area	10.210 In²
Tensile Strgth	479.3 PSI	Peak Load	4895 Lbs
Breaking Load	4892 Lbs		

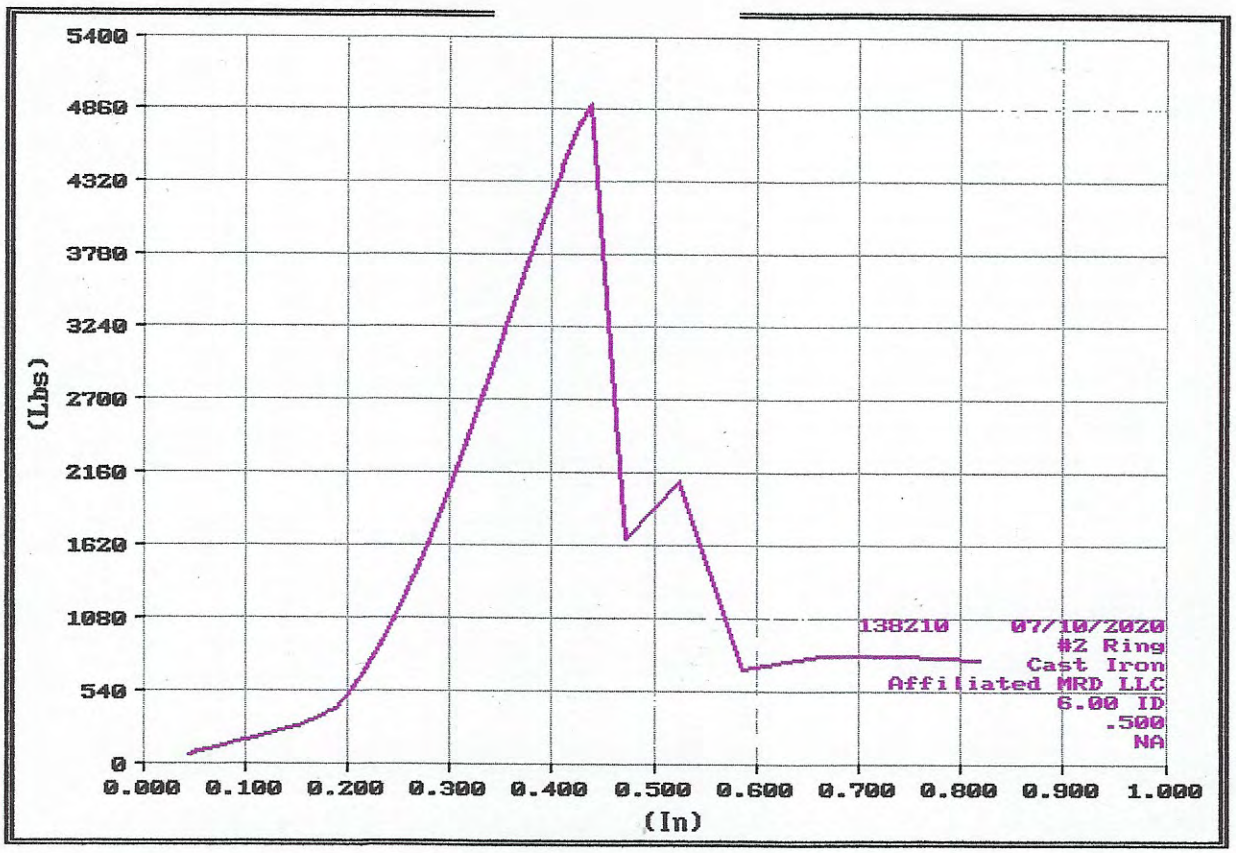


Fig. 7 – Breaking (peak) load, W, of Cast Pipe Ring #2

138210

JUL 6 2020

Affiliated
Engineering
Laboratories, Inc.

Chain of Custody

Caption: PGW

File No.: W-2400

Engineer: JPG

Item No.	Quantity	Description
1	1	Sample D3 for Brinell hardness testing and chemical analysis by ICP
2	1	Sample D4 for Mechanical Testing (ring and Talbot strip)

	Released By	Received By	Reason
Signature:		Dave Marshall	
Print Name:	John Gashinski	DAVID C. MARSHALL	Sample Testing
Company:	Affiliated Engineering Labs	Quant Corp.	
Date:	7/1/20	7-6-20	
Signature:	D. C. Marshall		
Print Name:	DAVID C. MARSHALL	John Gashinski	Return of Samples
Company:	Quant Corp.	Affiliated Engineering Labs	
Date:	7-22-20	8/12/20	

Please print and sign in the appropriate boxes above and return a copy to:

Affiliated Engineering Laboratories, Inc.
777 New Durham Road
Edison, New Jersey 08817

Phone: (732) 429-1200
Fax: (732) 429-1201

ATTACHMENT H

ASA
A.21.3–1952

American Standard

SPECIFICATIONS

for

CAST IRON PIT CAST PIPE FOR GAS

Users of this document should make reference to "American Recommended Practice Manual for the Computation of Strength and Thickness of Cast Iron Pipe" (ASA A21.1) for complete information concerning the conditions which various thicknesses of pipe are designed to meet. The foreword of the Manual also contains a statement regarding the history of the specifications and references to other related documents.

SPONSORS

AMERICAN GAS ASSOCIATION
AMERICAN SOCIETY FOR TESTING MATERIALS
AMERICAN WATER WORKS ASSOCIATION
NEW ENGLAND WATER WORKS ASSOCIATION

ASA
A.21.3–1952

AMERICAN STANDARD SPECIFICATIONS
for
CAST IRON PIT CAST PIPE FOR GAS

This specification covers cast iron pit cast pipe for gas. Pit cast pipe are pipe cast vertically with dry sand molds and cores.

Section 3-1. Description of Pipe. The pipe shall be made with bell and spigot ends, plain ends or such other type of ends as may be agreed upon at the time of purchase. Pipe with bell and spigot ends shall conform accurately to the dimensions given in Table 3.1. Pipe with other types of ends shall comply with the dimensions agreed upon but in all other respects shall fulfill the specifications hereinafter given. Pipe shall be straight and shall be true circles in section, with their inner and outer surfaces concentric. They shall be at least 12 ft. in nominal laying length, except as provided for cut pipe in Sect. 3-10.

Section 3-2. Casting of Pipe. The pipe shall be cast in dry sand molds in a vertical position. Pipe 16 inches or less in diameter shall be cast with the bell end up or down as specified in the proposals. Pipe 20 inches or more in diameter shall be cast with the bell end down. The pipe shall not be stripped or taken from the pit while showing color of heat, but shall be left in the flasks for a sufficient length of time to prevent unequal contraction by subsequent exposure.

Section 3-3. Quality of Iron.

(3-3.1) All pipes shall be made of cast iron of good quality, and of such character and so adapted in chemical composition to the thickness of the pipe to be cast, that the iron in the pipe shall be strong, tough, resilient, of even grain and soft enough for satisfactory drilling and cutting and it shall comply with the physical specifications given in Sect. 3-16, 3-17, and 3-18. The metal shall be remelted in a cupola or other suitable furnace.

(3-3.2) The iron in the pipe shall not contain more than 0.90 per cent of phosphorus nor more than 0.12 per cent of sulphur. Samples

for chemical analysis shall be taken by drilling completely through from skin to skin each of the acceptance test specimens; but not to exceed three specimens per heat.

Section 3-4. Quality of Castings. The pipe shall be smooth, free from scales, lumps, blisters, sand holes and defects of every nature which unfit them for the use for which they are intended. No plugging, filling, burning-in or welding will be allowed except as permitted by the purchaser.

Section 3-5. Foundry Records.

(3-5.1) *Casting*—A record of the melting and pouring temperatures of the iron shall be furnished the purchaser if requested.

(3-5.2) *Chemical Analyses*—Chemical analyses shall be made by the manufacturer from each heat to determine total carbon, manganese, phosphorus, sulphur and silicon; duplicate copies of test reports shall be furnished the purchaser on request.

Section 3-6. Marking Pipe. Every pipe shall have distinctly cast upon it the initials of the maker's name. When cast especially to order, each pipe larger than 4-inch may also have cast upon it figures showing the year in which it was cast and a number signifying the order in point of time in which it was cast, the figures denoting the year being above and the number below, thus:

1950	1950	1950
1	2	3

etc., also any initials, not exceeding four, which may be required by the purchaser. The letters and figures shall be cast on the outside and shall have dimensions as indicated below.

Diameters of Pipe, Inches, Inclusive	Height of Letter, Inches	Relief, Inch
4 to 10	¾	$\frac{3}{32}$
12 to 20	1¼	$\frac{3}{32}$
24 & larger	1¾	⅛

The weight and the class shall be conspicuously painted in white in the inside or outside of each pipe after the coating (if used) has become hard.

Section 3-7 Inspection by Purchaser.

(3-7.1) *Definition of Word "Purchaser."* Wherever the word "Purchaser" is used herein it shall be understood to mean the actual purchaser of the pipe or his authorized agents acting within the scope of the duties entrusted to them.

(3-7.2) *Power of Purchaser to Inspect.* The purchaser shall have free access at all times to all parts of any manufacturing plant which concern the manufacture of articles to be made for him. He may inspect the material, the pattern work, molding, and casting of the pipe, and the coating (if used). The forms, sizes, uniformity and conditions of all pipe herein referred to shall be subject to his inspection and approval, and he may reject, without subjection to hydrostatic test, any pipe which is not in conformity with the specifications or drawings. Any pipe rejected shall be marked "rejected" and any marks pertaining to the purchaser shall be chipped or erased from such pipe.

(3-7.3) *Manufacturer to Furnish Men and Material.* The manufacturer shall provide all tools, testing equipment, materials, labor and facilities necessary for the required testing, inspection and weighing of the pipe at the foundry.

(3-7.4) *Report of Purchaser's Inspection.* The purchaser shall make written report daily at the foundry office of all pipe rejected, noting causes for rejection.

Section 3-8. Inspection and Certification by Manufacturer. Should the purchaser have no inspector at the works, the manufacturer shall, if required by the purchaser, furnish a sworn statement that the inspection and all of the tests have been made as specified, this statement to contain the results of all specified tests.

Section 3-9. Pipe to be Delivered Sound. All the pipe must be delivered in all respects sound and comformable to these specifications. The inspection shall not relieve the manufacturer of any of his obligations in this respect, and any defective pipe which may have passed the purchaser at the works or elsewhere shall be at all times liable to rejection when discovered, until the final completion and adjustment of the contract; provided, however, that the manufacturer shall not be held liable for pipe found to be cracked after they have been accepted at the agreed point of delivery, unless there shall be unmistakable evidence that the casting was originally defective or damaged before acceptance. Care shall be taken in handling the pipe not to injure the coating (if used) and no pipe or other material of any kind shall be placed in the pipe during transportation.

Section 3-10. Cut Pipe. Defective spigot ends on pipe may be cut off in a manner which will produce a square end. Cut pipe shall be shipped with plain ends or shall have an iron or steel band shrunk into a groove or welded securely on the pipe, as may be agreed upon at time of purchase. Not more than 8 per cent of the total number of pipe of each size shall be cut, and no cut pipe shall be furnished which is less than 11 ft. 0 in. in laying length, unless it has been used by purchaser's order for strip and ring tests in which case a length of not less than 10 ft. 0 in. shall be accepted.

Section 3-11. Tolerances or Maximum Permitted Variations from Standard.

(3-11.1) *Tolerances in Diameter of Pipe and Sockets.* Outside diameters of pipe barrels and spigot beads and diameters of sockets shall be kept as nearly as practicable to the specified dimensions. They shall be tested with circular gauges. Tolerances or maximum permitted variations from standard dimensions are listed below.

Nominal Diameter in Inches	Tolerance, Plus or Minus in Inches
4 to 16	.06
20 & 24	.08
30, 36 & 42	.10
48	.12
54	.15
60	.15

(3-11.2) *Tolerances in Thickness.* The tolerances, or maximum permitted variations from standard in thickness of pipe and in dimensions of bells are listed below:

Nominal Diameter in Inches, inclusive	Tolerance, Plus or Minus, in Inches
4 to 8	.07
10 to 24	.08
30 to 60	.10

NOTE: In pipe barrel thickness, tolerances .02 inch greater than those listed above shall be permissible over areas not exceeding 8 inches in length in any direction.

(3-11.3) *Allowable Percentage of Variation in Weight.* The weight of no single pipe shall be less than the nominal tabulated weight by more than 5% for pipe 16 inches or less in diameter, and 4% for pipe more than 16 inches in diameter. The total excess weight to be paid for on orders of 25 tons or more shall not exceed 2% of the nominal weight, and on orders less than 25 tons shall not exceed 5% of the nominal weight. An order is hereby defined as including all the pipe ordered under the terms of a specific contract or purchase order or a single order placed under the terms of a standing contract.

Section 3-12. Cleaning and Inspecting. All pipe shall have gates, fins and other roughnesses chipped or ground off and shall be thoroughly cleaned, checked as to dimensions and also subjected to a careful surface inspection, a hammer test, and a rolling test, before the coating (if used) is applied.

Section 3-13. Hydrostatic Test. Each pipe shall be subjected to a hydrostatic proof test.

The pipe shall be under the test pressure for at least one-half minute, and while under pressure shall be subjected to a hammer or shock test. Any pipe showing defects by leaking, sweating, or otherwise, shall be rejected. The test pressures shall be in accordance with the table on the following page.

Section 3-14. Weighing. Each length of pipe shall be weighed and the weight and class plainly marked on the outside or inside of the bell or spigot end. Unless otherwise stated in the contract, a ton shall be 2,000 lb. avoirdupois.

Section 3-15. Exterior Coatings. Coating (if used) which is to be applied to the pipe, shall be specified in the agreement made at time of purchase.

Section 3-16. Tests of Material. The acceptability of iron used in cast iron pipe as regards physical characteristics shall be determined by the testing of bars cast from the same iron as the pipe, or, if specified by the purchaser, by the testing of Talbot strips and/or rings cut from the pipe as described in Sect. 3-18. Such strip and/or ring tests shall be paid for by the purchaser at prices to be agreed upon. By special arrangement bursting tests of pipe may be made as provided in Sect. 3-19. In any case the test bars shall be made and tested and results given to the purchaser if requested. The smallest pipe on which ring tests may be required is the 6-inch. The observations and the computed results hereinafter required shall be recorded and if requested reported to the purchaser.

TABLE OF PRESSURES FOR HYDROSTATIC TESTS

Nominal Diameter of Pipe, Inches	Barrel Thickness, Inches From	To	Test Pressures, Lb. per sq.in.
4 to 12	All Thicknesses		400
16	.58	.75	300
16	.76	.95	350
20	.66	.85	250
20	.86	1.05	350
24	.74	.90	200
24	.91	1.00	300
24	1.01	1.17	400
30	.87	1.05	200
30	1.06	1.30	300
30	1.31	1.39	400
36	.97	1.15	200
36	1.16	1.45	300
36	1.46	1.54	350
42	1.07	1.35	200
42	1.36	1.60	300
42	1.61	1.71	350
48	1.18	1.50	200
48	1.51	1.90	300

Note: Unless otherwise arranged between the manufacturer and the purchaser, pipe thicker than those listed in the above table shall be tested at the highest pressures listed for the given diameter.

Section 3-17. Test Bars.

(3-17.1) *Dimensions.* Test bars shall be 2 inches wide, 1 inch thick, and not less than 26 inches long. Individual test bars may vary as much as 2 per cent from standard width, or standard thickness, or both, but the patterns and molding practice shall be such that the errors shall in general not exceed 1 per cent.

(3-17.2) *Methods of Casting.* The bars shall be cast vertically in well-faced, dry sand molds provided with suitable pouring basin and mounted on a suitable refractory foundation. Metal for the bars shall be obtained by using a small heated ladle taking its metal from the main ladle from which the pipe is to be poured and after all alloys and other additional metal, except cast iron pipe for cooling, have been added to the main ladle and become melted. The bars shall not be removed from the mold before they have cooled to 500°F.

(3-17.3) *When Cast and to What Pipe Applicable.* Except as hereinafter provided for special cases, one pair of test bars of the metal used shall be cast with iron from the first ladle, another pair with iron from the approximately middle ladle, and a third pair with iron from the last ladle of iron taken during a day's run or heat from the cupola in which the iron for the pipe is melted. If the heat lasts for more than 6 hours, then additional pairs of bars shall be cast at approximately uniform intervals so as to give an extra pair of bars for each 3 hours during which the heat lasts in excess of 6 hours. In case the charging of the cupola is to be changed one or more times during the day's run or heat in order to produce a different iron, the time of taking test bars shall be varied in such a way as to obtain representative tests of the iron at least at the beginning and end of each period during which the iron is intended to be constant in quality; and in case such period exceeds four hours additional pairs of bars shall be taken at such times as will provide a pair of bars for each two hours during which this special mixture is used. At least one bar from each pair shall be broken, but the manufacturer shall have the right to break both bars in which case the better bar shall be taken as representative. Bars showing flaws in fracture may be disregarded.

(3-17.4) *Test Bar Requirements to Indicate Acceptable Iron; Retests may be made at Contractor's Option using Talbot Strips and/or Rings.* In order that the iron shall be acceptable the average results from the single bars representing the respective pair of bars cast during the heat or period shall comply with the requirements hereinafter specified and, in addition, no representative bar shall be more than 5 percent below the minimum requirements in either corrected breaking load or corrected deflection. In case the test bars do not measure up to these requirements the manufacturer may make one or more Talbot strip tests and/or ring tests of specimens cut from such of the pipe as may be agreed upon as best representing the iron at the time when the deficient test bars were cast. In the absence of the purchaser the manufacturer may select the pipe from which rings and/or strips shall be cut. The results from these rings and/or strips shall be kept as a foundry record available to any purchaser who requires a report of tests on the 2-inch by 1-inch bars. Any Talbot strip tests or ring

tests made under this provision shall be at the expense of the manufacturer. If these supplementary Talbot strip tests and/or ring tests do not meet the requirements, the pipe cast in that heat or period, or such a part thereof as may be agreed to by the purchaser, shall be rejected.

(3-17.5) *Method of Testing.* The bars shall be broken as beams by placing them flatwise on supports 24 inches apart and applying the load at the center of the span. The breaking load and the corresponding deflection shall be observed and recorded.

(3-17.6) *Correcting Observed Breaking Loads and Deflections.* The bars shall be measured at the point of application of the load and the results corrected to standard 2 inch by 1 inch cross section by the conventional beam formula as follows:

Corrected breaking load = observed breaking load multiplied by $\frac{2}{bd^2}$

Corrected deflection at breaking = observed deflection at breaking multiplied by d

where b = measured width and
d = measured depth
of the bar at point of application of load

In the formula above the deflection and all dimensions are in inches.

(3-17.7) *Requirements as to Strength and Deflection of 2 inch by 1 inch Bars.* In order to indicate acceptable metal, the corrected breaking loads and deflections of the representative 2 inch by 1 inch test bars for a given heat or period interpreted as provided in paragraph 3-17.4 above, shall comply with such of the following tabulated requirements as pertain to the thickness range within which fall the particular pipes which are under consideration.

TABLE OF MINIMUM CORRECTED BREAKING LOADS & DEFLECTIONS

Metal Thickness of Pipe, Inches	Minimum Center Breaking Load, Pounds	Minimum Center Deflection at Breaking, Inch
Below .61	1900	.30 + .0001 (Breaking Load — 1900)
.61 to .90	2000	.30 + .0001 (Breaking Load — 2000)
.91 to 1.60	2200	.30 + .0001 (Breaking Load — 2200)
1.61 to 2.50	2300	.30 + .0001 (Breaking Load — 2300)

Note: For thicknesses exceeding 2.50 inches the form of test specimen and the test requirements shall be as agreed upon in the purchase contract.

Section 3-18. Talbot Strip Tests and Ring Tests.

(3-18.1) *Dimensions.* Rings shall have a length equal to half the nominal diameter of the pipe unless the diameter exceeds 24 inches, in which case the length of ring shall be 12 inches. Strips shall be not less than 11 inches long and for 24-inch and larger pipe may be cut from the least stressed portions of rings (see Sect. 3-18.4) after the rings have been broken. The end 2 inches of the pipe shall not be included in ring or strip.

Note: To make both ring and strip tests on a pipe will therefore require at the least (on 6 inch pipe) 16 inches of pipe, at the most (on 20 inch pipe) 23 inches of pipe, and on pipe larger than 20 inches, 14 inches of pipe.

(3-18.2) *Method of Sampling.* The purchaser who has expressly specified Talbot strip tests and/or ring tests as acceptance tests of the pipe may select at random from each run, or heat, one or more pipe from which test specimens are to be cut. In the absence of the purchaser or his representative, the pipe from which test specimens are to be taken may be selected by the manufacturer. If the purchaser should wish to test the uniformity of a run or heat, he may divide it into two or more periods and have a separate set of acceptance tests for pipe in each period.

(3-18.3) *Defective Specimens; Retests.* If any test specimen shows defective machining or obvious lack of continuity of metal, it shall be discarded and replaced by another specimen selected by the purchaser. If the test specimens first selected fail to meet the requirements specified hereinafter and the purchaser permits a retest, at least twice the number of specimens that failed shall be selected by the purchaser for retest from a pipe cast in the same run or period. In case a ring from a pipe 24 inches in diameter or larger fails to meet specifications, the purchaser may accept strip tests, two specimens to be cut from the failed ring at points of low stress as described in Sect. 3-18.4. In any case of retest the pipe cast during the run or period shall be acceptable only when all retest specimens meet the requirements. All retests shall be made at the expense of the manufacturer.

(3-18.4) *Talbot Strip Tests.* Two Talbot strips shall be machined longitudinally from each pipe selected by the purchaser for testing by this method. If ring tests are also made and the pipe are 24 inches or larger these Talbot strips may be cut from a part of the ring little stressed in the ring test, i.e., near one of the elements marked (a) in

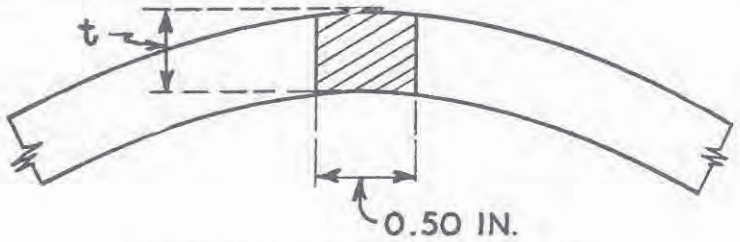


FIG. 3.1. Position from which Talbot Strip Is Cut

Fig. 3.2. (See Sect. 3-18.5.) The strips in any case will be in cross section as indicated in Fig. 3.1, i.e., will have for their width the thickness of the pipe and for their thickness 0.50 inch. Their length will be the length of the ring, 12 inches; or, if not cut from a ring, at least 11 inches. These strips shall be tested as a beam on supports 10 inches apart with loads applied perpendicularly to the machined faces at two points 3⅓ inches from the supports. The breaking load and the corresponding deflection shall be observed and recorded.

The strip shall be accurately calipered at point of rupture and the modulus of rupture, R, shall be calculated by the usual beam formula which for this case reduces to the expression:

$$R = \frac{10W}{td^2}$$

The secant modulus of elasticity, E_s, in lb. per sq.in. shall be computed by the formula:

$$E_s = \frac{213W}{td^3y} = \frac{21.3R}{dy}$$

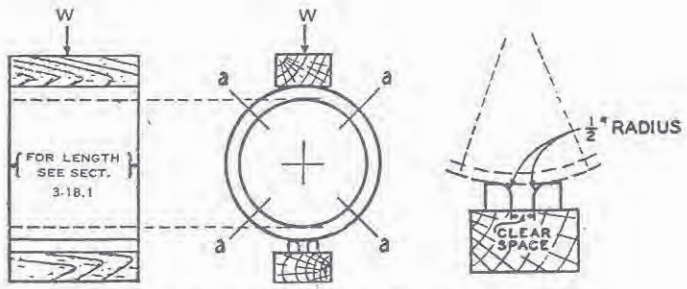


FIG. 3.2. Assembly for Ring Test

where R = modulus of rupture, lb. per sq.in.
E_s = secant modulus of elasticity, lb. per sq.in.
W = breaking load, lb.
d = depth of strip in inches (intended to be 0.50 in.)
t = width of strip, inches (pipe thickness)
y = deflection of strip at center at breaking load, inches.

To be acceptable a Talbot strip shall have the modulus of rupture, R, not less than 30,000 lb. per sq.in. and the secant modulus of elasticity, E_s, not more than 10,000,000 lb. per sq.in. If the results from either strip are up to the specifications the test shall be regarded as satisfactory.

(3-18.5) *Ring Tests.* Each ring shall be tested by the three-edge-bearing method as indicated in Fig. 3.2. The lower bearing for the ring shall consist of two strips with vertical sides having their interior top corners rounded to a radius of approximately ½ inch. The strips shall be of hard wood or of metal. If of metal a piece of leather belting about 3/16 inch thick shall be laid over them. They shall be straight and shall be securely fastened to a rigid block with their interior vertical faces spaced at a distance apart as given in the following table:

Diam. of Pipe	Clear Space
12-inch and smaller	½ inch
16-inch to 24-inch inclusive	1 inch
30-inch and larger	2 inch

The upper bearing shall be a rigid wooden block, straight and true from end to end. The upper and lower bearings shall extend the full length of the outside of the ring. The ring shall be placed symmetrically between the two bearings, and the center of application of the load shall be so placed that the vertical deformations at the two ends of the ring shall be equal. If the ring is not uniform in thickness, it shall be so placed that the thick and thin portions are near the ends of the horizontal diameter. A record of the breaking load and the corresponding vertical deformation of each ring tested shall be made. In order to be acceptable the modulus of rupture computed from the formula

$$R = 0.954\,\frac{W(d+t)}{bt^2}$$

shall be not less than 31,000 lb. per sq. in., and the secant modulus of elasticity computed from the formula which follows on page 116.

$$E_s = \frac{0.225\,W(d+t)^3}{bt^3y} = \frac{0.236\,R(d+t)^2}{ty}$$

shall not exceed 15,000,000 lb. per sq.in.

b = length of ring, inches
d = average inside diameter of ring, inches
t = average thickness of metal along line of fracture, inches
y = maximum vertical deflection of ring, inches
W = breaking load, in lb.
R = modulus of rupture, lb. per sq.in.
E_s = secant modulus of elasticity, lb. per sq.in.

The modulus of elasticity shall not be determined in rings from pipe less than 12 inches in diameter.

Section 3-19. Full-Length Bursting Tests.

By special arrangement between purchaser and manufacturer, the bursting tensile strength shall be determined by testing full length pipe (less amount cut off for ring and strip test specimens, see Section 3-18.1 and 3-18.2) to destruction by hydraulic pressure. Bells may be removed to facilitate testing. A suitable means for holding the end thrust shall be used which will not subject the pipe to endwise tension or compression, or other parasitic stresses. A calibrated pressure gauge shall be used for determining the bursting pressure. This gauge shall be connected to the interior of the test pipe by a separate connection from that which supplies water for the test. Unit tensile strength in bursting shall be obtained by the use of the formula:

$$S = \frac{Pd}{2t}$$

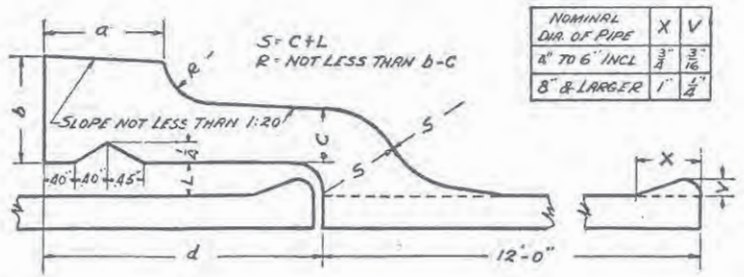
Where: S = bursting tensile strength of the iron, lbs. per sq.in.
P = internal pressure at bursting, lbs. per sq.in.
d = average inside diameter of pipe, inches
t = minimum average thickness of the pipe along the principal line of break, inches

Measurements of thickness shall be taken along the principal line of break at one foot intervals.

The minimum average thickness along the principal line of break shall be obtained by averaging the measurements at the thinnest section at a weight of two and at the adjacent sections on each side at a weight of one each or if the thinnest section is at the end of the break, by averaging this thinnest section measurement at a weight of two and the measurements of the adjacent section and the next section at a weight of one each.

Table No. 3.1

STANDARD DIMENSIONS OF BELLS, SOCKETS, SPIGOT BEADS and OUTSIDE DIAMETERS of PIT CAST PIPE FOR GAS also WEIGHTS OF BELLS AND OF SPIGOT BEADS



NOMINAL DIA. OF PIPE	X	V
4" TO 6" INCL	3/4"	13/16"
8" & LARGER	1"	1 1/4"

Nominal Diam.	Thickness of Pipe From	Thickness of Pipe To	Outside Diam. of Pipe	DIMENSIONS OF BELLS: Diam. of Socket	Thickness of Joint L	Depth of Socket d	a	b	c	Wt. of Bell	Wt. of Spigot Bead
4	.40	.50	4.80	5.80	0.50	3.50	1.50	1.30	.65	25.0	0.3
6	.43	.58	6.90	7.90	0.50	3.50	1.50	1.40	.70	35.0	0.5
8	.46	.63	9.05	10.05	0.50	4.00	1.50	1.53	.78	52.0	1.1
10	.50	.60	11.10	12.10	0.50	4.00	1.50	1.50	.69	58.0	1.4
	.61	.68	11.10	12.10	0.50	4.00	1.50	1.65	.85	69.0	1.4
12	.54	.65	13.20	14.20	0.50	4.00	1.50	1.50	.70	66.0	1.6
	.66	.79	13.20	14.20	0.50	4.00	1.50	1.75	.90	84.0	1.6
16	.58	.67	17.40	18.66	0.63	4.00	1.75	1.67	.77	106.0	2.1
	.68	.85	17.40	18.66	0.63	4.00	1.75	1.90	1.00	128.0	2.1
20	.66	.82	21.60	22.86	0.63	4.00	1.75	1.87	0.87	146.0	2.6
	.83	.97	21.60	22.86	0.63	4.00	1.75	2.30	1.15	196.0	2.6
24	.74	.85	25.80	27.06	0.63	4.00	2.00	1.97	0.92	188.0	3.2
	.86	1.00	25.80	27.06	0.63	4.00	2.00	2.50	1.25	265.0	3.2
30	.87	1.01	31.74	33.00	0.63	4.50	2.00	2.30	1.15	309.0	3.9
	1.02	1.19	31.74	33.00	0.63	4.50	2.00	2.60	1.32	376.0	3.9
36	.97	1.12	37.96	39.22	0.63	4.50	2.00	2.50	1.25	419.0	4.6
	1.13	1.32	37.96	39.22	0.63	4.50	2.00	2.80	1.44	459.0	4.6
42	1.07	1.30	44.20	45.46	0.63	5.00	2.00	2.80	1.40	538.0	5.4
	1.31	1.46	44.20	45.46	0.63	5.00	2.00	3.02	1.52	609.0	5.4
48	1.18	1.30	50.50	51.76	0.63	5.00	2.00	3.00	1.50	657.0	6.1
	1.31	1.50	50.50	51.76	0.63	5.00	2.00	3.32	1.67	774.0	6.1
	1.51	1.60	50.50	51.76	0.63	5.00	2.00	3.80	1.95	890.0	6.1

All dimensions given in inches. All weights given in pounds.

Table No. 3.2
STANDARD THICKNESSES, DIAMETERS AND WEIGHTS OF PIT CAST PIPE FOR GAS
Dimensions in Inches — Weights in Pounds

Nominal Diam.	Thickness Class	Thickness	Outside Diam.	Inside Diam.	Wt. of Barrel Per Ft.	Wt. of Bead	Wt. of Bell	Wt. Based on 12 Ft. Length*	
								Per Length	Avg. Per Ft.
1	2	3	4	5	6	7	8	9	10
4	1	.40	4.80	4.00	17.3	0.3	25.0	235	19.6
	2	.43	4.80	3.94	18.4	0.3	25.0	245	20.4
	3	.46	4.80	3.88	19.6	0.3	25.0	260	21.7
	4	.50	4.80	3.80	21.1	0.3	25.0	280	23.3
6	1	.43	6.90	6.04	27.3	0.5	35.0	365	30.4
	2	.46	6.90	5.98	29.0	0.5	35.0	383	32.1
	3	.50	6.90	5.90	31.4	0.5	35.0	410	34.2
	4	.54	6.90	5.82	33.7	0.5	35.0	440	36.7
	5	.58	6.90	5.74	35.9	0.5	35.0	465	38.8
8	1	.46	9.05	8.13	38.7	1.1	52.0	520	43.3
	2	.50	9.05	8.05	41.9	1.1	52.0	555	46.2
	3	.54	9.05	7.97	45.0	1.1	52.0	595	49.6
	4	.58	9.05	7.89	48.2	1.1	52.0	630	52.5
	5	.63	9.05	7.79	52.0	1.1	52.0	675	56.2
10	1	.50	11.10	10.10	52.0	1.4	58.0	685	57.1
	2	.54	11.10	10.02	55.9	1.4	58.0	730	60.8
	3	.58	11.10	9.94	59.8	1.4	58.0	775	64.6
	4	.63	11.10	9.84	64.7	1.4	69.0	845	70.4
	5	.68	11.10	9.74	69.5	1.4	69.0	905	75.4
12	1	.54	13.20	12.12	67.0	1.6	66.0	870	72.5
	2	.58	13.20	12.04	71.8	1.6	66.0	930	77.5
	3	.63	13.20	11.94	77.6	1.6	66.0	1000	83.3
	4	.68	13.20	11.84	83.4	1.6	84.0	1085	90.4
	5	.73	13.20	11.74	89.2	1.6	84.0	1155	96.2
	6	.79	13.20	11.62	96.1	1.6	84.0	1240	103.3
16	1	.58	17.40	16.24	95.6	2.1	106.0	1255	104.6
	2	.63	17.40	16.14	103.6	2.1	106.0	1350	112.5
	3	.68	17.40	16.04	111.4	2.1	128.0	1465	122.1
	4	.73	17.40	15.94	119.3	2.1	128.0	1560	130.0
	5	.79	17.40	15.82	128.6	2.1	128.0	1675	139.6
	6	.85	17.40	15.70	137.9	2.1	128.0	1785	148.8
20	1	.66	21.60	20.28	135.5	2.6	146.0	1775	147.9
	2	.71	21.60	20.18	145.4	2.6	146.0	1895	157.9
	3	.77	21.60	20.06	157.2	2.6	146.0	2035	169.6
	4	.83	21.60	19.94	169.0	2.6	196.0	2225	185.4
	5	.90	21.60	19.80	182.6	2.6	196.0	2390	199.2
	6	.97	21.60	19.66	196.1	2.6	196.0	2550	212.5
24	1	.74	25.80	24.32	181.8	3.2	188.0	2375	197.9
	2	.80	25.80	24.20	196.0	3.2	188.0	2545	212.1
	3	.86	25.80	24.08	210.2	3.2	265.0	2790	232.5
	4	.93	25.80	23.94	226.7	3.2	265.0	2990	249.2
	5	1.00	25.80	23.80	243.1	3.2	265.0	3185	265.4
30	1	.87	31.74	30.00	263.3	3.9	309.0	3470	289.2
	2	.94	31.74	29.86	283.8	3.9	309.0	3720	310.0
	3	1.02	31.74	29.70	307.1	3.9	376.0	4065	338.8
	4	1.10	31.74	29.54	330.4	3.9	376.0	4345	362.1
	5	1.19	31.74	29.36	356.3	3.9	376.0	4655	387.9
36	1	.97	37.96	36.02	351.7	4.6	419.0	4645	387.1
	2	1.05	37.96	35.86	379.9	4.6	419.0	4980	415.0
	3	1.13	37.96	35.70	407.9	4.6	459.0	5360	446.7
	4	1.22	37.96	35.52	439.3	4.6	459.0	5735	477.9
	5	1.32	37.96	35.32	474.1	4.6	459.0	6155	512.9
42	1	1.07	44.20	42.06	452.3	5.4	538.0	5970	497.5
	2	1.16	44.20	41.88	489.4	5.4	538.0	6415	534.6
	3	1.25	44.20	41.70	526.2	5.4	538.0	6860	571.7
	4	1.35	44.20	41.50	567.0	5.4	609.0	7420	618.3
	5	1.46	44.20	41.28	611.6	5.4	609.0	7955	662.9
48	1	1.18	50.50	48.14	570.4	6.1	657.0	7510	625.8
	2	1.27	50.50	47.96	612.8	6.1	657.0	8015	667.9
	5	1.37	50.50	47.76	659.7	6.1	774.0	8695	724.6
	4	1.48	50.50	47.54	711.1	6.1	774.0	9315	776.2
	5	1.60	50.50	47.30	766.9	6.1	890.0	10100	841.7

*Includes Bell and Spigot Bead. Calculated weight of pipe rounded off to nearest 5 pounds.

Table No. 3.3
STANDARD THICKNESSES AND WEIGHTS OF CAST IRON PIT CAST PIPE FOR GAS

NOTE: These weights are for pipe laid without blocks, on flat bottom trench, with tamped backfill, under 5 feet of cover. For other conditions see Table 3.2 and 3.4 hereof and the Manual.

Size Inches	CLASS 10			CLASS 50			CLASS 100			CLASS 150		
	10 Lb. Pressure			50 Lb. Pressure			100 Lb. Pressure			150 Lb. Pressure		
	Thickness Inches	Wt. Based on 12 Ft. Length*		Thickness Inches	Wt. Based on 12 Ft. Length*		Thickness Inches	Wt. Based on 12 Ft. Length*		Thickness Inches	Wt. Based on 12 Ft. Length*	
		Avg. Per Foot	Per Length		Avg. Per Foot	Per Length		Avg. Per Foot	Per Length		Avg. Per Foot	Per Length
4	.40	19.6	235	.40	19.6	235	.40	19.6	235	.40	19.6	235
6	.43	30.4	365	.43	30.4	365	.43	30.4	365	.43	30.4	365
8	.46	43.3	520	.46	43.3	520	.46	43.3	520	.46	43.3	520
10	.50	57.1	685	.50	57.1	685	.50	57.1	685	.50	57.1	685
12	.54	72.5	870	.54	72.5	870	.54	72.5	870	.54	72.5	870
16	.58	104.6	1255	.58	104.6	1255	.58	104.6	1255			
20	.66	147.9	1775	.66	147.9	1775	.71	157.9	1895			
24	.74	197.9	2375	.74	197.9	2375	.80	212.1	2545			
30	.87	289.2	3470	.87	289.2	3470						
36	.97	387.1	4645	.97	387.1	4645						
42	1.07	497.5	5970	1.07	497.5	5970						
48	1.18	625.8	7510	1.18	625.8	7510						

*Including Bell and Spigot Bead. Calculated weight of Pipe rounded off to nearest 5 pounds.

Table No. 3.4

STANDARD THICKNESSES OF CAST IRON PIT CAST PIPE FOR GAS

Thickness in Inches. Working Pressure in Pounds per Square Inch.
Thicknesses Include Allowances for Foundry Practice and Corrosion

Laying Condition A—Flat Bottom Trench, Without Blocks, Untamped Backfill
Laying Condition B—Flat Bottom Trench, Without Blocks, Tamped Backfill
Laying Condition C—Pipe Laid on Blocks, Untamped Backfill
Laying Condition D—Pipe Laid on Blocks, Tamped Backfill

Size Inches	Working Pressure	3½ FEET OF COVER				5 FEET OF COVER				8 FEET OF COVER			
		Laying Condition				Laying Condition				Laying Condition			
		A	B	C	D	A	B	C	D	A	B	C	D
4	10	.40	.40	.40	.40	.40	.40	.40	.40	.40	.40	.46	.40
	50	.40	.40	.40	.40	.40	.40	.40	.40	.40	.40	.50	.40
	100	.40	.40	.40	.40	.40	.40	.43	.40	.40	.40	.50	.40
	150	.40	.40	.40	.40	.40	.40	.43	.40	.40	.40	.50	.40
6	10	.43	.43	.46	.43	.43	.43	.50	.43	.43	.43	.54	.43
	50	.43	.43	.46	.43	.43	.43	.50	.43	.43	.43	.54	.43
	100	.43	.43	.46	.43	.43	.43	.50	.43	.43	.43	.58	.43
	150	.43	.43	.50	.43	.43	.43	.50	.43	.43	.43	.58	.43
8	10	.46	.46	.50	.46	.46	.46	.54	.46	.46	.46	.58	.46
	50	.46	.46	.54	.46	.46	.46	.54	.46	.46	.46	.63	.46
	100	.46	.46	.54	.46	.46	.46	.58	.46	.46	.46	.63	.46
	150	.46	.46	.54	.46	.46	.46	.58	.46	.46	.46	.63	.46
10	10	.50	.50	.54	.50	.50	.50	.58	.50	.50	.50	.68	.50
	50	.50	.50	.58	.50	.50	.50	.58	.50	.50	.50	.68	.54
	100	.50	.50	.58	.50	.50	.50	.63	.50	.54	.50	.68	.54
	150	.50	.50	.58	.50	.50	.50	.63	.50	.54	.50	.68	.58
12	10	.54	.54	.58	.54	.54	.54	.63	.54	.54	.54	.68	.58
	50	.54	.54	.58	.54	.54	.54	.63	.54	.58	.54	.73	.58
	100	.54	.54	.63	.54	.54	.54	.63	.54	.58	.58	.73	.58
	150	.54	.54	.63	.58	.58	.54	.68	.58	.63	.58	.79	.63
16	10	.58	.58	.68	.58	.58	.58	.68	.63	.68	.63	.79	.68
	50	.58	.58	.68	.63	.63	.58	.73	.63	.68	.63	.79	.73
	100	.63	.58	.73	.63	.63	.58	.73	.68	.73	.68	.85	.73
20	10	.66	.66	.77	.71	.71	.66	.83	.71	.77	.71	.90	.83
	50	.71	.66	.77	.71	.71	.66	.83	.77	.77	.71	.90	.83
	100	.71	.66	.83	.77	.77	.71	.83	.77	.83	.77	.97	.83
24	10	.74	.74	.80	.74	.80	.74	.86	.80	.86	.80	.93	.86
	50	.80	.74	.86	.80	.80	.74	.93	.86	.86	.80	1.00	.93
	100	.80	.74	.93	.86	.86	.80	.93	.86	.93	.86	1.00	.93
30	10	.87	.87	.94	.87	.94	.87	1.02	.94	1.02	.87	1.10	1.02
	50	.94	.87	1.02	.94	.94	.87	1.10	1.02	1.10	.94	1.19	1.10
36	10	1.05	.97	1.05	.97	1.05	.97	1.13	1.05	1.13	.97	1.22	1.13
	50	1.05	.97	1.13	1.05	1.13	.97	1.22	1.13	1.22	1.05	1.32	1.22
42	10	1.16	1.07	1.16	1.07	1.16	1.07	1.25	1.16	1.35	1.07	1.35	1.25
	50	1.16	1.07	1.25	1.16	1.25	1.07	1.35	1.25	1.35	1.16	1.46	1.35
48	10	1.27	1.18	1.37	1.18	1.37	1.18	1.37	1.27	1.48	1.18	1.60	1.37
	50	1.27	1.18	1.37	1.27	1.37	1.18	1.48	1.37	1.48	1.27	1.60	1.48

ATTACHMENT I

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Current Location: Elev: 10 ft. Lat: 39.8733° N Lon: -75.2268° W
Station: **PHILADELPHIA INTERNATIONAL AIRPORT, PA US WBAN: 72408013739 (KPHL)**

Local Climatological Data
Daily Summary
December 2019

Generated on 09/27/2020

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather	Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH / Direction = Degrees			
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type	TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
01	42	34	38	-4.5	72	29	35	27	0	0703	1637	RA DZ BR	0.65	0.0	0	29.63	29.73	11.5	31	030	28	030
02	39	35	37	-5.1	83	32	35	28	0	0704	1636	RA DZ SN BR	0.04	T	0	29.51	29.55	12.9	26	010	22	010
03	43	34	39	-2.8	49	21	33	26	0	0705	1636	SN	T	T	0	29.59	29.73	13.9	36	330	29	320
04	44	35	40	-1.4	71	30	36	25	0	0706	1636	RA SN BR	0.08	T	0	29.57	29.77	10.0	23	260	17	260
05	44	35	40	-1.1	54	24	34	25	0	0707	1636		0.00	0.0	0	29.85	29.88	13.9	39	290	28	280
06	51	32	42	1.3	57	28	36	23	0	0708	1636	RA	0.01	0.0	0	30.07	30.11	9.5	28	350	22	340
07	41	29	35	-5.4	46	17	30	30	0	0709	1636		0.00	0.0	0	30.36	30.39	7.6	24	310	18	350
08	44	25	35	-5.0	58	21	31	30	0	0710	1636	RA BR	T	0.0	0	30.43	30.47	4.6	22	170	13	190
09	56	41	49	9.3	91	45	46	16	0	0710	1636	RA DZ BR	1.31	0.0	0	30.00	30.00	7.9	29	220	22	220
10	58*	40	49	9.7	82	48	51	16	0	0711	1636	RA BR	0.17	0.0	0	29.87	29.89	12.8	34	300	26	320
11	40	32	36	-3.0	62	23	31	29	0	0712	1636	RA SN BR	0.08	0.1	T	30.26	30.33	10.8	27	250	21	260
12	39	26	33	-5.7	45	12	26	32	0	0713	1636		0.00	0.0	0	30.65	30.63	6.6	25	320	21	320
13	50	29	40	1.7	72	29	35	25	0	0714	1636	RA BR	0.51	0.0	0	30.29	30.32	7.1	25	030	15	030
14	55	44	50	12.0	73	35	41	15	0	0714	1637	RA DZ BR FG	0.17	0.0	0	29.43	29.75	11.8	38	260	30	260
15	50	37	44	6.3				21	0	0715	1637		0.00	0.0	0			15.2	38	260	30	260
16	38	33	36	-1.4	67	24	31	29	0	0716	1637	RA SN BR	0.38	T	0	30.19	30.23	6.4	19	040	13	030
17	38	34	36	-1.1	88	33	35	29	0	0716	1638	RA DZ BR	0.82	0.0	0	29.81	29.81	9.4	25	330	18	330
18	39	24	32	-4.9	51	17	28	33	0	0717	1638	SN	T	T	0	29.88	29.96	16.6	39	310	31	310
19	29	19*	24	-12.6	43	5	19	41	0	0718	1638		0.00	0.0	0	30.32	30.39	12.4	34	310	25	310
20	36	21	29	-7.3	49	12	24	36	0	0718	1639		0.00	0.0	0	30.53	30.58	7.0	23	340	17	340
21	36	22	29	-7.1	59	17	26	36	0	0719	1639		0.00	0.0	0	30.55	30.57	3.7	14	020	9	040
22	48	24	36	0.2	65	24	31	29	0	0719	1640		0.00	0.0	0	30.35	30.35	6.4	16	240	14	240
23	51	30	41	5.4	68	29	35	24	0	0720	1640	BR HZ	0.00	0.0	0	30.11	30.12	6.2	17	240	14	240
24	52	31	42	6.7	57	26	35	23	0	0720	1641		0.00	0.0	0	30.06	30.11	7.3	26	350	17	010
25	47	27	37	1.9	63	24	32	28	0	0721	1641		0.00	0.0	0	30.16	30.19	2.0	11	040	8	040
26	50	27	39	4.1	78	33	36	26	0	0721	1642	FG BR	0.00	0.0	0	30.22	30.29	3.8	14	040	10	040
27	54	41	48	13.3	79	41	44	17	0	0721	1643	RA	T	0.0	0	30.22	30.24	5.7	18	240	15	240
28	56	34	45	10.5	71	36	41	20	0	0722	1643	FG BR HZ	0.00	0.0	0	30.17	30.22	3.2	15	360	12	340
29	48	34	41	6.7	83	37	40	24	0	0722	1644	RA BR	0.36	0.0	0	30.13	30.13	4.7	23	080	13	040
30	47	40	44	9.8	88	41	43	21	0	0722	1645	RA DZ BR	0.63	0.0	0	29.70	29.73	13.5	33	040	26	040
31	47	39	43	9.0	73	34	39	22	0	0722	1646		0.00	0.0	0	29.67	29.70	9.2	26	290	20	290
	45.5	31.9	38.7							Monthly Averages | Totals			5.21	0.1		30.05	30.08	8.9				
	0.7	1.8	1.2	Departure from Normal (1981-2010)									1.65									

Degree Days					Number of days with...								
	Monthly		Season-to-date		Temperature				Precipitation		Snow	Weather	
	Total	Departure	Total	Departure	Max		Min						
Heating	814	-40	1625		>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"	T-Storms	Heavy Fog
Cooling	0	0	1570		0	1	15	0	13	9	0		

Date of 5-sec to 3-sec wind equipment change	Sea Level Pressure			Greatest...		
		Date	Time	24-Hr...		Snow Depth
2009-07-30	Maximum 30.74	12	1054	Precip	Snowfall	
	Minimum 29.24	14	1435	1.31	0.1	T
				Date		
				09-09	11-11	11

Station Augmentation

Name:PHILADELPHIA INTL AP, PA Lat: 39.87327 Lon: -75.22678 Elevation: N/A Distance: N/A Elements: PRECIP, SNOWFALL, SNOWDPTH, SNOWWTREQ Equipment: N/A

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Local Climatological Data
Hourly Observations
December 2019

Generated on 09/27/2020

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 10 ft. Lat: 39.8733° N Lon: -75.2268° W

Station: **PHILADELPHIA INTERNATIONAL AIRPORT, PA US WBAN: 72408013739 (KPHL)**

Date	Time (LST)	Station Type	Sky Conditions	Visibility	Weather Type (see documentation)	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Hum %	Wind Speed (MPH)	Wind Dir (Deg)	Wind Gusts (MPH)	Station Press (inHg)	Press. Tend	Net 3-Hr Change (inHg)	Sea Level Press. (inHg)	Report Type	Precip Total (in)	Altimeter Setting (inHg)
					AU | AW | MW	(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
17	0003	7	BKN:07 6 BKN:07 17 OVC:08 25	2.00	+RA:02 BR:1 |RA |RA	34	1.1	33	0.6	31	-0.6	89	9	040		30.07				FM-16	0.04	30.10
17	0054	7	BKN:07 5 BKN:07 23 OVC:08 28	2.00	RA:02 BR:1 |RA |RA	34	1.1	33	0.6	31	-0.6	89	11	030		30.05	8	+0.07	30.08	FM-15	0.25	30.08
17	0100	4	5	1.99	||RA	34	1.1	33	0.6	31	-0.6	89	11	030		30.01	8	+0.07	30.08	FM-12		
17	0147	7	BKN:07 6 OVC:08 30	3.00	RA:02 BR:1 |RA |RA	34	1.1	33	0.6	32	0.0	92	9	050		30.01				FM-16	0.18	30.04
17	0154	7	BKN:07 6 OVC:08 30	3.00	-RA:02 BR:1 |RA |RA	34	1.1	33	0.6	32	0.0	92	8	060		30.01			30.03	FM-15	0.18	30.04
17	0215	7	OVC:08 5	2.00	RA:02 BR:1 |RA |RA	35	1.7	34	1.1	32	0.0	89	9	040		30.00				FM-16	0.03	30.03
17	0254	7	BKN:07 6 OVC:08 14	2.50	RA:02 BR:1 |RA |RA	35	1.7	34	1.1	32	0.0	89	8	060		29.97			29.99	FM-15	0.10	30.00
17	0320	7	BKN:07 6 OVC:08 14	4.00	-RA:02 BR:1 |RA |RA	35	1.7	34	1.1	32	0.0	89	8	050		29.95				FM-16	0.03	29.98
17	0354	7	BKN:07 5 OVC:08 11	4.00	-RA:02 BR:1 |RA |RA	35	1.7	34	1.1	32	0.0	89	8	030		29.94	6	+0.11	29.97	FM-15	0.05	29.97
17	0446	7	BKN:07 7 OVC:08 16	4.00	-RA:02 BR:1 |RA |RA	35	1.7	34	1.1	33	0.6	93	10	040		29.91				FM-16	0.04	29.94
17	0454	7	BKN:07 7 OVC:08 16	4.00	-RA:02 BR:1 |RA |RA	35	1.7	34	1.1	33	0.6	93	8	040		29.90			29.92	FM-15	0.05	29.93
17	0514	7	BKN:07 7 OVC:08 18	6.00	-RA:02 BR:1 |RA |RA	35	1.7	34	1.1	33	0.6	93	10	050		29.89				FM-16	0.01	29.92
17	0542	7	BKN:07 6 OVC:08 18	6.00	-RA:02 BR:1 |RA |RA	35	1.7	34	1.1	33	0.6	93	11	040		29.87				FM-16	0.02	29.90
17	0554	7	OVC:08 5	7.00	-RA:02 |RA |RA	35	1.7	34	1.1	33	0.6	93	10	050		29.86			29.89	FM-15	0.01	29.89
17	0618	7	OVC:08 5	6.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	33	0.6	89	9	050		29.85				FM-16	T	29.88
17	0654	7	OVC:08 5	5.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	34	1.1	93	7	050		29.84	6	+0.10	29.87	FM-15	0.01	29.87
17	0700	4	5	4.97	||RA	36	2.2	35	1.7	34	1.1	93	7	050		29.80	6	+0.10	29.87	FM-12		
17	0704	7	OVC:08 4	4.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	34	1.1	93	7	050		29.83				FM-16	T	29.86
17	0750	7	OVC:08 4	2.50	-RA:02 BR:1 |RA |RA	37	2.8	36	2.2	34	1.1	87	15	040		29.81				FM-16	0.01	29.84
17	0754	7	OVC:08 4	2.50	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	34	1.1	93	10	040	21	29.81			29.83	FM-15	0.03	29.84
17	0807	7	OVC:08 4	3.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	34	1.1	93	13	040		29.80				FM-16	0.02	29.83
17	0831	7	OVC:08 5	4.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	33	0.6	89	8	050		29.81				FM-16	0.02	29.84
17	0854	7	OVC:08 6	4.00	BR:1 ||	36	2.2	35	1.7	33	0.6	89	8	040		29.81			29.83	FM-15	0.01	29.84
17	0916	7	OVC:08 5	2.50	-DZ:01 BR:1 |DZ |DZ	36	2.2	35	1.7	33	0.6	89	9	050		29.79				FM-16	T	29.82
17	0923	7	OVC:08 5	1.50	-DZ:01 BR:1 |DZ |DZ	36	2.2	35	1.7	33	0.6	89	6	050		29.79				FM-16	T	29.82
17	0954	7	OVC:08 5	1.50	-DZ:01 BR:1 |DZ |DZ	36	2.2	35	1.7	34	1.1	93	8	050		29.78	6	+0.06	29.80	FM-15	0.01	29.81
17	1011	7	OVC:08 5	2.00	-DZ:01 BR:1 |DZ |DZ	36	2.2	35	1.7	34	1.1	93	8	040		29.76				FM-16	T	29.79
17	1054	7	OVC:08 4	2.00	-DZ:01 BR:1 |DZ |DZ	37	2.8	36	2.2	34	1.1	89	11	040	18	29.74			29.76	FM-15	T	29.77
17	1137	7	OVC:08 3	1.25	-DZ:01 BR:1 |DZ |DZ	37	2.8	36	2.2	35	1.7	93	7	VRB		29.70				FM-16	T	29.73
17	1154	7	OVC:08 3	1.00	-DZ:01 BR:1 |DZ |DZ	37	2.8	36	2.2	35	1.7	93	8	040		29.69			29.71	FM-15	T	29.72
17	1245	7	OVC:08 3	2.00	-DZ:01 BR:1 |DZ |DZ	37	2.8	36	2.2	35	1.7	93	9	VRB		29.66				FM-16	T	29.69
17	1254	7	OVC:08 3	2.50	-RA:02 BR:1 |RA |RA	37	2.8	36	2.2	35	1.7	93	7	040		29.66	6	+0.12	29.68	FM-15	T	29.69
17	1300	4	2	2.49	||RA	37	2.8	36	2.2	35	1.7	93	7	040		29.62	6	+0.12	29.68	FM-12		
17	1310	7	OVC:08 3	1.50	RA:02 BR:1 |RA |RA	37	2.8	36	2.2	35	1.7	93	8	030		29.64				FM-16	0.01	29.67
17	1320	7	OVC:08 3	2.50	-RA:02 BR:1 |RA |RA	37	2.8	36	2.2	35	1.7	93	8	030		29.64				FM-16	0.05	29.67
17	1336	7	OVC:08 5	5.00	-RA:02 BR:1 |RA |RA	38	3.3	37	2.8	36	2.2	93	6	040		29.64				FM-16	0.05	29.67

17	1354	7	OVC:08 6	5.00	-RA:02 BR:1 |RA |RA	38	3.3	37	2.8	36	2.2	93	6	060		29.63			29.66	FM-15	0.06	29.66
17	1426	7	OVC:08 5	7.00	-RA:02 |RA |RA	38	3.3	37	2.8	35	1.7	89	8	350		29.63				FM-16	T	29.66
17	1454	7	OVC:08 6	9.00	-RA:02 |RA |RA	38	3.3	37	2.8	35	1.7	89	8	020		29.63			29.66	FM-15	T	29.66
17	1517	7	OVC:08 7	5.00	-RA:02 BR:1 |RA |RA	38	3.3	37	2.8	35	1.7	89	9	350		29.65				FM-16	T	29.68
17	1541	7	OVC:08 7	7.00	-RA:02 |RA |RA	37	2.8	36	2.2	34	1.1	89	11	350		29.65				FM-16	0.01	29.68
17	1554	7	OVC:08 8	8.00		37	2.8	36	2.2	34	1.1	89	10	340		29.66	5	0.00	29.68	FM-15	0.01	29.69
17	1605	7	OVC:08 8	4.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	33	0.6	89	6	350		29.67				FM-16	T	29.70
17	1614	7	OVC:08 8	6.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	33	0.6	89	10	360		29.67				FM-16	0.03	29.70
17	1625	7	BKN:07 7 OVC:08 11	3.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	33	0.6	89	10	340		29.67				FM-16	0.04	29.70
17	1637	7	OVC:08 9	6.00	-RA:02 BR:1 |RA |RA	36	2.2	35	1.7	33	0.6	89	10	330	17	29.68				FM-16	0.05	29.71
17	1654	7	OVC:08 9	7.00	-RA:02 |RA |RA	36	2.2	34	1.1	32	0.0	86	9	330		29.68			29.71	FM-15	0.05	29.71
17	1742	7	BKN:07 10 BKN:07 34 OVC:08 65	7.00	-RA:02 |RA |RA	36	2.2	34	1.1	32	0.0	86	10	VRB	18	29.70				FM-16	T	29.73
17	1754	7	BKN:07 10 BKN:07 34 OVC:08 65	7.00	-RA:02 |RA |RA	36	2.2	34	1.1	32	0.0	86	13	330		29.70			29.72	FM-15	T	29.73
17	1830	7	BKN:07 8 OVC:08 35	8.00		36	2.2	35	1.7	33	0.6	89	10	340		29.70				FM-16	T	29.73
17	1854	7	BKN:07 8 BKN:07 13 OVC:08 20	8.00		36	2.2	34	1.1	32	0.0	86	9	330		29.71	1	-0.06	29.74	FM-15	T	29.74
17	1900	4	8	7.46		36	2.2	34	1.1	32	0.0	86	9	330		29.67	1	-0.06	29.74	FM-12		
17	1901	7	FEW:02 8 BKN:07 14 OVC:08 21	8.00		36	2.2	34	1.1	32	0.0	86	9	330		29.70				FM-16		29.73
17	1954	7	BKN:07 14 BKN:07 23 OVC:08 80	8.00		37	2.8	35	1.7	32	0.0	82	7	320	17	29.72			29.75	FM-15	0.00	29.75
17	2021	7	SCT:04 14 SCT:04 25 OVC:08 80	10.00		37	2.8	35	1.7	32	0.0	82	10	330		29.73				FM-16		29.76
17	2054	7	FEW:02 14 OVC:08 80	10.00		37	2.8	35	1.7	32	0.0	82	7	320		29.73			29.75	FM-15	0.00	29.76
17	2154	7	FEW:02 32 BKN:07 90 BKN:07 110	10.00		38	3.3	35	1.7	31	-0.6	76	14	310		29.76	3	-0.05	29.79	FM-15	0.00	29.79
17	2254	7	BKN:07 32 OVC:08 90	10.00		38	3.3	35	1.7	30	-1.1	73	16	330		29.78			29.80	FM-15	0.00	29.81
17	2354	7	SCT:04 25 BKN:07 32 OVC:08 50	10.00		37	2.8	34	1.1	29	-1.7	73	14	330		29.79			29.82	FM-15	0.00	29.82
18	0054	7	BKN:07 30 OVC:08 45	10.00		37	2.8	33	0.6	27	-2.8	67	8	310		29.82	3	-0.06	29.85	FM-15	0.00	29.85
18	0100	4	26	9.94		37	2.8	33	0.6	27	-2.8	67	8	310		29.78	3	-0.06	29.85	FM-12		
18	0154	7	BKN:07 33 OVC:08 42	10.00		36	2.2	32	0.0	25	-3.9	64	14	330		29.83			29.86	FM-15	0.00	29.86
18	0254	7	BKN:07 38 BKN:07 55 OVC:08 70	10.00		36	2.2	32	0.0	24	-4.4	62	9	320		29.85			29.88	FM-15	0.00	29.88
18	0354	7	SCT:04 38 SCT:04 50	10.00		35	1.7	30	-1.1	22	-5.6	59	11	300		29.85	1	-0.04	29.88	FM-15	0.00	29.88
18	0454	7	FEW:02 50	10.00		34	1.1	29	-1.7	21	-6.1	59	13	290		29.87			29.90	FM-15	0.00	29.90
18	0554	7	CLR:00	10.00		33	0.6	29	-1.7	21	-6.1	61	7	290		29.88			29.91	FM-15	0.00	29.91
18	0654	7	CLR:00	10.00		32	0.0	28	-2.2	20	-6.7	61	7	260		29.90	3	-0.05	29.93	FM-15	0.00	29.93
18	0700	4		9.94		32	0.0	28	-2.2	20	-6.7	61	7	260		29.86	3	-0.05	29.93	FM-12		
18	0754	7	CLR:00	10.00		31	-0.6	28	-2.2	21	-6.1	67	9	250		29.90			29.93	FM-15	0.00	29.93
18	0854	7	CLR:00	10.00		33	0.6	29	-1.7	20	-6.7	58	15	260		29.91			29.94	FM-15	0.00	29.94
18	0954	7	CLR:00	10.00		36	2.2	30	-1.1	20	-6.7	52	16	250		29.91	0	-0.01	29.93	FM-15	0.00	29.94
18	1054	7	CLR:00	10.00		37	2.8	31	-0.6	19	-7.2	48	18	270		29.88			29.91	FM-15	0.00	29.91
18	1154	7	FEW:02 40	10.00		39	3.9	32	0.0	20	-6.7	46	18	280		29.86			29.89	FM-15	0.00	29.89

18	1254	7	BKN:07 42	10.00		37	2.8	30	-1.1	18	-7.8	46	18	270	28	29.85	6	+0.05	29.88	FM-15	0.00	29.88
18	1300	4	41	9.94		37	2.8	30	-1.1	18	-7.8	46	18	270		29.81	6	+0.05	29.88	FM-12		
18	1354	7	SCT:04 48 BKN:07 60	10.00		38	3.3	30	-1.1	15	-9.4	39	25	290	33	29.87			29.89	FM-15	0.00	29.90
18	1454	7	SCT:04 41 BKN:07 55	10.00		36	2.2	30	-1.1	18	-7.8	48	22	300	30	29.89			29.92	FM-15	0.00	29.92
18	1506	7	BKN:07 41 OVC:08 55	5.00	-SN:03 |SN |	34	1.1	29	-1.7	20	-6.7	56	21	290	37	29.90				FM-16	T	29.93
18	1515	7	SCT:04 41 BKN:07 60	10.00		34	1.1	29	-1.7	20	-6.7	56	16	280	29	29.90				FM-16	T	29.93
18	1554	7	SCT:04 40 BKN:07 60	10.00		35	1.7	30	-1.1	19	-7.2	52	16	270		29.92	3	-0.06	29.95	FM-15	T	29.95
18	1654	7	FEW:02 38 SCT:04 60	10.00		33	0.6	27	-2.8	16	-8.9	49	18	270	28	29.94			29.96	FM-15	0.00	29.97
18	1754	7	SCT:04 55 SCT:04 80	10.00		33	0.6	27	-2.8	13	-10.6	43	23	260	28	29.95			29.98	FM-15	0.00	29.98
18	1839	7	BKN:07 43 OVC:08 50	7.00	-SN:03 |SN |	33	0.6	28	-2.2	17	-8.3	52	22	270	37	29.98				FM-16	T	30.01
18	1854	7	SCT:04 33 BKN:07 43 OVC:08 50	7.00	-SN:03 |SN |	32	0.0	28	-2.2	19	-7.2	59	18	280		29.98	3	-0.06	30.01	FM-15	T	30.01
18	1900	4	26	6.84		32	0.0	28	-2.2	19	-7.2	59	18	280		29.94	3	-0.06	30.01	FM-12		
18	1901	7	SCT:04 30 BKN:07 43 BKN:07 55	10.00		31	-0.6	27	-2.8	19	-7.2	61	14	280		29.99				FM-16	T	30.02
18	1954	7	SCT:04 40	10.00		31	-0.6	26	-3.3	16	-8.9	54	18	290		30.01			30.03	FM-15	T	30.04
18	2024	7	SCT:04 40 SCT:04 48 BKN:07 60	2.50	-SN:03 |SN |	30	-1.1	25	-3.9	13	-10.6	49	25	320	34	30.03				FM-16	T	30.06
18	2029	7	SCT:04 37 BKN:07 48 BKN:07 60	7.00	-SN:03 |SN |	29	-1.7	25	-3.9	15	-9.4	56	25	300	36	30.03				FM-16	T	30.06
18	2035	7	SCT:04 38 SCT:04 45 BKN:07 60	10.00		29	-1.7	24	-4.4	14	-10.0	54	21	300	36	30.03				FM-16	T	30.06
18	2054	7	SCT:04 37 BKN:07 65	10.00		29	-1.7	23	-5.0	10	-12.2	45	23	300	32	30.05			30.08	FM-15	T	30.08
18	2154	7	SCT:04 60	10.00		27	-2.8	20	-6.7	0	-17.8	31	24	310	36	30.08	3	-0.10	30.11	FM-15	0.00	30.11
18	2254	7	SCT:04 42 BKN:07 60 OVC:08 75	10.00		26	-3.3	20	-6.7	2	-16.7	35	26	320	34	30.12			30.15	FM-15	0.00	30.15
18	2354	7	FEW:02 45 FEW:02 60	10.00		24	-4.4	19	-7.2	5	-15.0	44	20	300	33	30.15			30.17	FM-15	0.00	30.18
19	0054	7	SCT:04 32 SCT:04 44	10.00		23	-5.0	18	-7.8	1	-17.2	38	16	300		30.17	1	-0.08	30.19	FM-15	0.00	30.20
19	0100	4	26	9.94		23	-5.0	18	-7.8	1	-17.2	38	16	300		30.14	1	-0.08	30.19	FM-12		
19	0154	7	SCT:04 34 SCT:04 50	10.00		22	-5.6	18	-7.8	5	-15.0	48	20	310	29	30.21			30.24	FM-15	0.00	30.24
19	0254	7	FEW:02 36 SCT:04 50	10.00		21	-6.1	16	-8.9	0	-17.8	39	17	300	28	30.23			30.26	FM-15	0.00	30.26
19	0354	7	FEW:02 36 SCT:04 50	10.00		20	-6.7	16	-8.9	0	-17.8	41	16	300		30.26	1	-0.09	30.29	FM-15	0.00	30.29
19	0454	7	CLR:00	10.00		20	-6.7	16	-8.9	0	-17.8	41	14	310	29	30.28			30.31	FM-15	0.00	30.31
19	0554	7	CLR:00	10.00		20	-6.7	16	-8.9	0	-17.8	41	16	310	25	30.31			30.34	FM-15	0.00	30.34
19	0654	7	CLR:00	10.00		19	-7.2	15	-9.4	1	-17.2	45	11	300	21	30.34	3	-0.08	30.37	FM-15	0.00	30.37
19	0700	4		9.94		19	-7.2	15	-9.4	1	-17.2	45	11	300		30.30	3	-0.08	30.37	FM-12		
19	0754	7	CLR:00	10.00		19	-7.2	15	-9.4	1	-17.2	45	11	310		30.36			30.39	FM-15	0.00	30.39
19	0854	7	CLR:00	10.00		20	-6.7	16	-8.9	2	-16.7	45	16	290	22	30.40			30.43	FM-15	0.00	30.43
19	0954	7	CLR:00	10.00		22	-5.6	17	-8.3	3	-16.1	44	17	310	26	30.41	1	-0.07	30.44	FM-15	0.00	30.44
19	1054	7	CLR:00	10.00		23	-5.0	18	-7.8	3	-16.1	42	13	290		30.42			30.45	FM-15	0.00	30.45
19	1154	7	CLR:00	10.00		26	-3.3	20	-6.7	4	-15.6	38	13	300		30.39			30.42	FM-15	0.00	30.42
19	1254	7	FEW:02 50	10.00		27	-2.8	21	-6.1	5	-15.0	39	11	300		30.38	8	+0.03	30.41	FM-15	0.00	30.41

19	1300	4	57	9.94		27	-2.8	21	-6.1	5	-15.0	39	11	300		30.35	8	+0.03	30.41	FM-12		
19	1354	7	FEW:02 50	10.00		29	-1.7	23	-5.0	5	-15.0	36	14	270		30.37			30.40	FM-15	0.00	30.40
19	1454	7	CLR:00	10.00		28	-2.2	22	-5.6	6	-14.4	39	14	280	21	30.37			30.40	FM-15	0.00	30.40
19	1554	7	CLR:00	10.00		29	-1.7	23	-5.0	7	-13.9	39	14	300	21	30.38	5	+0.01	30.40	FM-15	0.00	30.41
19	1654	7	CLR:00	10.00		28	-2.2	22	-5.6	8	-13.3	43	9	300		30.39			30.42	FM-15	0.00	30.42
19	1754	7	CLR:00	10.00		28	-2.2	22	-5.6	8	-13.3	43	9	310		30.41			30.43	FM-15	0.00	30.44
19	1854	7	CLR:00	10.00		27	-2.8	22	-5.6	9	-12.8	46	10	280		30.43	3	-0.05	30.45	FM-15	0.00	30.46
19	1900	4		9.94		27	-2.8	22	-5.6	9	-12.8	46	10	280		30.40	3	-0.05	30.45	FM-12		
19	1954	7	CLR:00	10.00		27	-2.8	22	-5.6	9	-12.8	46	8	290		30.44			30.47	FM-15	0.00	30.47
19	2054	7	CLR:00	10.00		26	-3.3	21	-6.1	9	-12.8	48	9	290		30.44			30.47	FM-15	0.00	30.47
19	2154	7	CLR:00	10.00		25	-3.9	21	-6.1	9	-12.8	50	7	260		30.44	1	-0.01	30.47	FM-15	0.00	30.47
19	2254	7	CLR:00	10.00		24	-4.4	20	-6.7	9	-12.8	52	5	270		30.45			30.47	FM-15	0.00	30.48
19	2354	7	OVC:08 65	10.00		27	-2.8	22	-5.6	8	-13.3	45	7	280		30.45			30.48	FM-15	0.00	30.48
20	0054	7	FEW:02 60 FEW:02 95	10.00		25	-3.9	20	-6.7	7	-13.9	46	6	270		30.45	0	-0.01	30.48	FM-15	0.00	30.48
20	0100	4	57	9.94		25	-3.9	20	-6.7	7	-13.9	46	6	270		30.41	9	+0.01	30.48	FM-12		
20	0154	7	CLR:00	10.00		23	-5.0	19	-7.2	9	-12.8	55	6	250		30.47			30.50	FM-15	0.00	30.50
20	0254	7	CLR:00	10.00		22	-5.6	19	-7.2	9	-12.8	57	3	240		30.48			30.50	FM-15	0.00	30.51
20	0354	7	CLR:00	10.00		23	-5.0	19	-7.2	9	-12.8	55	0	000		30.47	0	-0.02	30.50	FM-15	0.00	30.50
20	0454	7	CLR:00	10.00		24	-4.4	20	-6.7	9	-12.8	52	0	000		30.49			30.52	FM-15	0.00	30.52
20	0554	7	SCT:04 65	10.00		24	-4.4	20	-6.7	10	-12.2	55	3	320		30.51			30.53	FM-15	0.00	30.54
20	0654	7	BKN:07 50	10.00		24	-4.4	20	-6.7	11	-11.7	57	5	320		30.52	1	-0.05	30.55	FM-15	0.00	30.55
20	0700	4	57	9.94		24	-4.4	20	-6.7	11	-11.7	57	5	320		30.48	1	-0.05	30.55	FM-12		
20	0754	7	FEW:02 50	10.00		24	-4.4	20	-6.7	11	-11.7	57	7	330		30.54			30.57	FM-15	0.00	30.57
20	0854	7	FEW:02 50	10.00		28	-2.2	23	-5.0	12	-11.1	51	14	360	21	30.56			30.59	FM-15	0.00	30.59
20	0954	7	CLR:00	10.00		30	-1.1	25	-3.9	12	-11.1	47	11	340		30.57	1	-0.05	30.60	FM-15	0.00	30.60
20	1054	7	CLR:00	10.00		32	0.0	26	-3.3	11	-11.7	41	13	360		30.57			30.59	FM-15	0.00	30.60
20	1154	7	CLR:00	10.00		33	0.6	26	-3.3	11	-11.7	40	10	330		30.55			30.58	FM-15	0.00	30.58
20	1254	7	CLR:00	10.00		35	1.7	28	-2.2	11	-11.7	37	10	350		30.54	8	+0.03	30.57	FM-15	0.00	30.57
20	1300	4		9.94		35	1.7	28	-2.2	11	-11.7	37	10	350		30.50	8	+0.03	30.57	FM-12		
20	1354	7	CLR:00	10.00		35	1.7	28	-2.2	11	-11.7	37	9	340	18	30.53			30.56	FM-15	0.00	30.56
20	1454	7	CLR:00	10.00		36	2.2	28	-2.2	12	-11.1	37	11	010	23	30.53			30.56	FM-15	0.00	30.56
20	1554	7	FEW:02 250	10.00		35	1.7	28	-2.2	12	-11.1	38	10	350	21	30.56	3	-0.02	30.58	FM-15	0.00	30.59
20	1654	7	FEW:02 250	10.00		33	0.6	27	-2.8	12	-11.1	42	6	340		30.58			30.61	FM-15	0.00	30.61
20	1754	7	FEW:02 250	10.00		32	0.0	26	-3.3	13	-10.6	45	6	340		30.60			30.62	FM-15	0.00	30.63
20	1854	7	FEW:02 250	10.00		32	0.0	26	-3.3	13	-10.6	45	7	320		30.62	1	-0.06	30.64	FM-15	0.00	30.65
20	1900	4		9.94		32	0.0	26	-3.3	13	-10.6	45	7	320		30.58	1	-0.06	30.64	FM-12		
20	1954	7	FEW:02 250	10.00		31	-0.6	26	-3.3	14	-10.0	49	5	VRB		30.61			30.64	FM-15	0.00	30.64
20	2054	7	CLR:00	10.00		29	-1.7	24	-4.4	14	-10.0	54	7	350		30.61			30.64	FM-15	0.00	30.64
20	2154	7	SCT:04 250	10.00		28	-2.2	24	-4.4	14	-10.0	56	6	010		30.61	7	+0.01	30.63	FM-15	0.00	30.64
20	2254	7	BKN:07 250	10.00		28	-2.2	24	-4.4	15	-9.4	58	8	020		30.61			30.63	FM-15	0.00	30.64
20	2354	7	BKN:07 250	10.00		28	-2.2	24	-4.4	15	-9.4	58	5	VRB		30.60			30.63	FM-15	0.00	30.63

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 10 ft. Lat: 39.8733° N Lon: -75.2268° W

Station: **PHILADELPHIA INTERNATIONAL AIRPORT, PA US WBAN: 72408013739 (KPHL)**

Local Climatological Data
Hourly Precipitation
December 2019

Generated on 09/27/2020

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Date	For Hour (LST) Ending at																							Date
	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	NOON	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	MID	
01									T	T	T	0.04	0.12	0.04	0.06	0.20	0.12	0.04	0.01	T	T	0.01s	0.01	T	01
02	0.01						T	T	0.01	T		T	T				T	T	0.01	T	T	0.01	T		02
03	T	T	T										M	M							M	M	M		03
04	M	M				T	T	T						M	M		T	0.03	0.04	0.01					04
05																									05
06																	0.01	T							06
07																									07
08																								T	08
09	0.01	0.02	T	0.02	0.02	0.13	0.07	0.01	0.01	0.01		T	0.01	0.05	0.12	0.24	0.19	0.24	0.07	0.03	0.02	0.01	0.02	0.01	09
10	T										T	0.03	0.06	T	0.01	0.01	T		T	0.01	0.01	0.01	0.02	0.01	10
11	0.01	0.01	0.01	0.02	0.02	0.01	T	T	T																11
12																				M	M				12
13															0.01	0.01	0.05	0.01	0.04	0.04	0.03	0.08	0.12	0.06	13
14	0.05	0.03	0.02	0.02	0.01	0.01	0.02	T	0.01	0.01		T	0.01	0.01	0.02	0.01								M	14
15	M		M					M	M		M		M	M											15
16						T		T	T		T	T	T	T	T		0.01	0.03	0.08	0.02	0.02	T	0.02	0.21	16
17	0.25	0.18	0.10	0.05	0.05	0.01	0.01	0.03	0.01	0.01	T	T	T	0.06	T	0.01	0.05	T	T						17
18																T			T	T	T				18
19																									19
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23																									23
24																									24
25																									25
26																									26
27											T	T													27
28																									28
29													T	0.01	0.01	T		0.02	0.05	0.09	0.08	0.04	0.02	0.04	29
30	0.03	0.07	0.01	0.08	0.11	0.04	0.02	0.01	T	T	0.01	0.03	0.05	0.05	0.11	0.01									30
31																									31

Maximum Short Duration Precipitation

Time Period (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (inches)	0.04	0.06	0.09	0.11	0.16	0.22	0.27	0.35	0.44	0.51	0.61	0.71
Ending Date Time (yyyy-mm-dd hh:mi)	2019-12-30 14:54	2019-12-30 14:54	2019-12-16 23:45	2019-12-16 23:45	2019-12-01 16:09	2019-12-17 00:08	2019-12-17 00:18	2019-12-17 00:50	2019-12-17 01:01	2019-12-17 01:30	2019-12-17 01:49	2019-12-09 17:49

Hourly, daily, and monthly totals on the Daily Summary page and the Hourly Precipitation Table are shown as reported by the instrumentation at the site. However, NWS does not edit hourly values for its ASOS sites, but may edit the daily and monthly totals for selected sites which will be reflected on the Daily Summary page.

T = Trace
s = Suspect
* = Erroneous
blank = No precipitation observed
M = Missing

I&E EXHIBIT
25b

AFFILIATED ENGINEERING LABORATORIES, INC.

Engineering Consultants

Physical Location:
777 New Durham Road
Edison, NJ 08817

P.O. Box 3300
Edison, NJ 08818-3300

Phone (732) 429-1200
Fax (732) 429-1201
www.affiliatedinc.net

October 14, 2020

Philadelphia Gas Works
800 West Montgomery Street
Philadelphia, Pennsylvania 19122-2806

Attention: Mr. Raymond Welte

Pennsylvania Public Utility Commission
400 North Street
Harrisburg, Pennsylvania 17120

Attention: Mr. Robert Horensky, Manager
Safety Division – Bureau of Investigation & Enforcement

Re: Philadelphia Gas Works
Our File No. W-2400

Dear Mr. Welte & Mr. Horensky:

Following the submittal of my report pertaining to the above referenced matter, I decided to review it once again now that some time has passed since its issuance. Upon my follow-up review, I observed slight errors in the Corrected Quant Laboratories report (REV1) regarding the tabulated averages of the Secant Modulus of Elasticity for the Ring Test and Talbot Strip Test. While the errors are negligible and are obviously clerical errors on their part, I took it upon myself to request a revised report from Quant whereby the errors were corrected in REV2 dated October 7, 2020 (see enclosed). Please note that while the cited averages in my report were slightly off from the actual average, the revisions do not change the performance of the material as per the required testing, and therefore have no effect on my findings or opinions contained in my report. Attachments 1 through 3 contain the tables for the referenced tests in each Quant report (Original, REV1 and REV2), with changes in each circled in red for clarity.

Kindly allow this letter to serve as an addendum to my report dated September 30, 2020. Should you require the issuance of a revised version of my report, where the tabulated averages would be changed to reflect the correct averages and the REV2 Quant Report be added as a corresponding attachment, let me know and I will gladly do so.

Very truly yours,

John P. Gashinski, P.E., CFEI
Engineering Consultant
Materials Scientist

JPG/np

ATTACHMENT 1
Original Quant Report – 7/16/20

Talbot Strip						Sample	Pipe
Modulus of Rupture		**W**	**t**	**d**	**R**	Material	Cast Iron
$R(psi) = \frac{10W}{td^2}$	#1	339	0.497	0.495	27,838	ID	6”
	#2	294	0.497	0.498	23,852		
	Avg	317	0.497	0.497	25,833		

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
Requirement: R > 30,000 lbs.

Secant Modulus of Elasticity		R	d	y	E_s
$E_s(psi) = \frac{213W}{td^3 y} = \frac{21.3R}{dy}$	#1	27,838	0.495	0.213	5.624E+06
	#2	23,852	0.498	0.190	5.369E+06
	Avg	25,833	0.497	0.202	5.500E+06

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.0e^7$

Ring						
Modulus of Rupture		**W**	**d**	**t**	**b**	**R**
$R(psi) = \frac{0.225W(d+t)}{bt^2}$	#1	4327	6.020	0.460	3.028	41,833
	#2	4894	6.020	0.487	3.055	41.927
	Avg	4611	6.020	0.473	3.042	41,923

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
Requirement: R > 31,000 lbs

Secant Modulus of Elasticity		R	d	t	y	E_s
$R(psi) = \frac{0.225W(d+t)^3}{bt^3 y} = \frac{0.236R(d+t)^2}{ty}$	#1	41,833	6.020	0.460	0.381	2.368E+06
	#2	41,927	6.020	0.487	0.394	2.183E+06
	Avg	41.923	6.020	0.473	0.388	2.275E+06

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.5e^7$

ATTACHMENT 2
Corrected Quant Report (REV1) – 9/30/20

Talbot Strip

Sample	Pipe
Material	Cast Iron
ID	6”

Modulus of Rupture

$$R(psi) = \frac{10W}{td^2}$$

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
Requirement: R > 30,000 lbs.

	W	t	d	R
#1	339	0.497	0.495	27,838
#2	294	0.497	0.498	23,852
Avg	317	0.497	0.497	25,845

Secant Modulus of Elasticity

$$E_s(psi) = \frac{213W}{td^3\,y} = \frac{21.3R}{dy}$$

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.0e^7$

	R	d	y	E_s
#1	27,838	0.495	0.213	5.624E+06
#2	23,852	0.498	0.190	5.369E+06
Avg	25,845	0.497	0.202	5.489E+06

Ring

Modulus of Rupture

$$R(psi) = \frac{0.225W(d+t)}{bt^2}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
Requirement: R > 31,000 lbs

	W	d	t	b	R
#1	4327	6.020	0.460	3.028	41,833
#2	4894	6.020	0.487	3.055	41.927
Avg	4611	6.020	0.473	3.042	41,880

Secant Modulus of Elasticity

$$R(psi) = \frac{0.225W(d+t)^3}{bt^3y} = \frac{0.236R(d+t)^2}{ty}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.5e^7$

	R	d	t	y	E_s
#1	41,833	6.020	0.460	0.381	2.368E+06
#2	41,927	6.020	0.487	0.394	2.183E+06
Avg	41,880	6.020	0.473	0.388	2.270E+06

ATTACHMENT -3
Corrected Quant Report (REV2) – 10/7/20

Talbot Strip

Sample	Pipe
Material	Cast Iron
ID	6”

Modulus of Rupture

$$R(psi) = \frac{10W}{td^2}$$

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
Requirement: R > 30,000 lbs.

	W	t	d	R
#1	339	0.497	0.495	27,838
#2	294	0.497	0.498	23,852
Avg	317	0.497	0.497	25,845

Secant Modulus of Elasticity

$$E_s(psi) = \frac{213W}{td^3\,y} = \frac{21.3R}{dy}$$

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.0e^7$

	R	d	y	E_s
#1	27,838	0.495	0.213	5.624E+06
#2	23,852	0.498	0.190	5.369E+06
Avg	25,845	0.497	0.202	5.496E+06

Ring

Modulus of Rupture

$$R(psi) = \frac{0.225W(d+t)}{bt^2}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
Requirement: R > 31,000 lbs

	W	d	t	b	R
#1	4327	6.020	0.460	3.028	41,833
#2	4894	6.020	0.487	3.055	41.927
Avg	4611	6.020	0.473	3.042	41,880

Secant Modulus of Elasticity

$$R(psi) = \frac{0.225W(d+t)^3}{bt^3y} = \frac{0.236R(d+t)^2}{ty}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.5e^7$

	R	d	t	y	E_s
#1	41,833	6.020	0.460	0.381	2.368E+06
#2	41,927	6.020	0.487	0.394	2.183E+06
Avg	41,880	6.020	0.473	0.388	2.276E+06

ENCLOSURE

Corrected Quant Report (REV2), dated 10/7/20

Q U A N T

Attn: Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
777 New Durham Road
Edison, NJ 08817

jgashinski@aelgroup.net
cyanik@aelgroup.net

TEST REPORT

QUANT Report No. 138210 (Corrected) Client Reference: W-2400
Report Date: 10-7-2020 Received on: 7-6-2020

Subject: Material Composition, Hardness, Talbot Strip, and Ring Testing of a Cast Iron Pipe Section (Samples D3 and D4), 6" I.D. x ½" Wall x 23" L. (Philadelphia Gas Works) for Conformance to ASA Specification A-21.3 ("Cast Iron Pit Case Pipe for Gas", 1952).

1. Material Composition (ASTM E351, ASA A-21.3, 3-3.2).

% of Element (wt.)

Element	6" I.D. Pipe Section	ASA A-21.3, 3-3.2
Carbon	3.44	--
Manganese	0.43	--
Silicon	1.52	--
Phosphorous	1.326	0.90 max.
Sulfur	0.101	0.12 max.
Chromium	0.03	--
Nickel	0.02	--
Molybdenum	<0.01	--
Copper	0.24	--
Titanium	0.068	--
Tin	0.029	--
Tungsten	0.009	--
Iron	Rem.	--
Grade:	**Gray Iron**	**--**

The carbon content was determined (ASTM E1019) on a solid section removed from the pipe wall (Sample D3).

The phosphorous content exceeds the 0.90% maximum limit for the ASA A-21.3, 3-3.2 requirement.

2. Hardness Tests (ASTM E10, E18, E140).

Five Brinell Impressions (10/3000 kg) were placed directly on a pipe wall section (Sample D3, milled on the O.D. and the I.D.) each resulting in the sample shattering. Hardness was then performed using the Rockwell B Scale and converting to Brinell Hardness, HBW.

Reading	Rockwell B, HRB	Brinell, HBW, 10/3000
1.	93	200
2.	94	205
3.	90	190
4.	88	176
5.	90	190
Average:	91	192

3. Talbot Strip Tests (ASA A-21.3, 3-18.4).

Talbot Strip

Modulus of Rupture		W	t	d	R
$R(psi) = \frac{10W}{td^2}$	#1	339	0.497	0.495	27,838
	#2	294	0.497	0.498	23,852
	Avg	317	0.497	0.497	25,845

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
Requirement: R > 30,000 lbs.

Sample	Pipe
Material	Cast Iron
ID	6”

Secant Modulus of Elasticity		R	d	y	E_s
$E_s(psi) = \frac{213W}{td^3 y} = \frac{21.3R}{dy}$	#1	27,838	0.495	0.213	5.624E+06
	#2	23,852	0.498	0.190	5.369E+06
	Avg	25,845	0.497	0.202	5.496E+06

W = breaking load (lbs)
t = width of strip (in)
d = depth of strip (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.0e^7$

The two tested gray iron strips did not meet the Talbot Modulus of Rupture Requirement of 30,000 PSI minimum. The Secant Modulus of Elasticity for the two strips did meet the $<1.0e^7$ Requirement.

Mr. John P. Gashinski, PE, CFEI
Affiliated Engineering Laboratories, Inc.
Quant Report 138210 (Corrected)

4. Ring Tests (ASA A-21.3, 3-18.5).

Ring

Modulus of Rupture

$$R(psi) = \frac{0.225W(d+t)}{bt^2}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
Requirement: R > 31,000 lbs

	W	d	t	b	R
#1	4327	6.020	0.460	3.028	41,833
#2	4894	6.020	0.487	3.055	41.927
Avg	4611	6.020	0.473	3.042	41,880

Secant Modulus of Elasticity

$$R(psi) = \frac{0.225W(d+t)^3}{bt^3y} = \frac{0.236R(d+t)^2}{ty}$$

W = breaking load (lbs)
d = average inside diameter of ring (in)
t = average thickness of metal along line of fracture (in)
b = length of ring (in)
y = deflection of strip at center @ W (in)
R = modulus of rupture (psi)
Requirement: $E_s < 1.5e^7$

	R	d	t	y	E_s
#1	41,833	6.020	0.460	0.381	2.368E+06
#2	41,927	6.020	0.487	0.394	2.183E+06
Avg	41,880	6.020	0.473	0.388	2.276E+06

Both 3” long sections of the 6” I.D. pipe met the requirements of both the Modulus of Rupture (R) and the Secant Modulus of Elasticity (E_s).

It is our policy to retain components and sample remnants for a minimum of thirty (30) days from the report date, after which time they may be discarded. The data herein represents only the item(s) tested. This report shall not be reproduced, except in full, without prior permission of QUANT Corporation.

David C. Marshall
Laboratory Director

I&E
Exhibit 26

Field Operations Training Program for Distribution Inspector School.pdf



FIELD OPERATIONS TRAINING PROGRAM
FOR
DISTRIBUTION INSPECTOR

Revised 1-2008 B.Bright/gf (5-2013 Durante)

Table of Contents

Week I

1. First Day

2. Second Day

3. Third Day

4. Fourth Day

5. Firth Day

Week II

1. First Day

2. Second Day

3. Third Day

4. Fourth Day

5. Firth Day

Field Operations Training Program

Distribution Inspector

PURPOSE: To present the entire scope of Distribution Inspector responsibilities. The five phases of inspecting are presented in classroom sessions and on-the-job training to candidates selected by the Manager of Personal Development.

Total training time is 440 hours. This time is allocated as follows:

Phase I (a)	-	40 hours
Phase I (b), II, III	-	40 hours
Phase IV, V	-	32 hours
On-the-Job	-	328 hours

GENERAL OUTLINE

PHASE I - PGW CONSTRUCTION INSPECTOR covers training regarding construction work performed by contractors working on "Cost Per Foot" and specific projects*.(80 Hours Field)*

PHASE II - FOREIGN CONSTRUCTION INSPECTION is concerned with the inspector's responsibilities in regard to the safety of PGW structures in the area of work being performed by plumbers, contractors, builders, etc*.(80 Hours Field)*

PHASE III - SURVEY INSPECTION teaches the methods and procedures used to detect gas leaks and underground troubles which might affect PGW structures.*(80 Hours Field and 8 Hours OMD)*

PHASE IV- OPERATOR QUALIFICATION: teaches the methods and procedures in accordance to all OPERATOR QUALIFICATION REQUIREMENTS according to DOT 49 CFR 192 SUBPARTS N: (*24 Hours Class/Field*)

PHASE V- POLYETHLENE FUSION REQUIREMENTS: Must meet all requirements of PGW's Operator Qualification Plan. (*8 Hours Class)*

PHASE VI - PAVING INSPECTOR: teaches the method to inspects repaving of PGW trenches by various contractors. *(80 Hours)*

PHASE VII -PIPE MECHANIC TRAINING SCHOOL (Optional)

This additional training will be given to candidates who have successfully completed Phases Ia, Ib, II, III, IV and V and have not previously had Pipe Mechanic Training. See Distribution Department Training Program fro Pipe Mechanic. Training Time – 40 hours.

Upon completion of the classroom presentations of Phases Ib, II, III,VI,V written examinations will be given. Test grades and the method of preparing and presenting the work will assist in determining successful candidates. A final period of on-the-job training will follow and successful candidates will be promoted first to a Variable Rate as Distribution Inspector and then as needed to Distribution Inspector.

All candidates who are promoted to Distribution Inspector will be given the Distribution Department Training Program for Crew Foreman if they so desire to attend.

MEMORANDUM OF UNDERSTANDING

Whereas, the Gas Works' Employees' Union Local 686 Group #3 Representatives and the Distribution Department Management desire to cooperatively address the training issues that are created when employees fail or drop out of a training class, hereby enter into the following Agreement as of **March 17, 2006**:

1. When a Union employee fails a formal promotional training school he/she shall be restricted from attending the same training for a period described below:

Fail Once

Compressor Operators	=	Four (4) months
Pipe Mechanics	=	Four (4) months
Sr. Pipe Mechanics	=	Six (6) months
Inspector / Foreman	=	Six (6) months
General Foreman	=	Six (6) months
Mobile Equipment Operator	=	Six (6) months

Fail two or more times

Compressor Operators	=	Twelve (12) months
Pipe Mechanics	=	Eighteen (18) months
Sr. Pipe Mechanics	=	Twenty four (24) months
Inspector / Foreman	=	Twenty four (24) months
General Foreman	=	Twenty four (24) months
Mobile Equipment Operator	=	Twenty four (24) months

2. An employee who drops out of a promotional training class will be restricted from attending the next training class regardless of length of time between classes.
3. The following circumstances are considered "dropping out of training".

    - Dropping out during the training at any time prior to being titled.

    - Requesting to be removed from training two (2) working days or less prior to the start date of the training.

4. Once an employee is trained and titled in a position he/she must have a documented reason to give up that title and will be restricted from attending the same type of training for a period of two (2) years.

5. All employees who successfully complete and pass a promotional training class will receive their promotional wage increase effective retroactive to the first day of training.

6. The Union and Company agree that this Memorandum of Understanding is without precedent or prejudice to either the Company or the Union and may not be introduced in any grievance or arbitration as evidence.

UNION **MANAGEMENT**

_____ _____

_____ _____

_____ _____

_____

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PGW
JOB EVALUATION ANALYSIS

DEPARTMENT: **Distribution/Operations**

JOB TITLE: **Distribution Inspector**

SUPERVISION RECEIVED: **10% Direct, 90% Indirect**

ADVERSE WORKING CONDITIONS: Must work in all sorts of inclement weather, winter and summer, when emergency work is necessary. Exposed to traffic and construction hazards on a daily basis. May be subjected to mandatory overtime.

NATURE OF DUTIES: Performs all inspection functions as required in the Distribution Construction Maintenance areas including operating functions as follows:

A) Contractors Performing PGW Construction Work

**Inspects work of contractors performing gas main and service installations,
Regardless of pipe size, for adherence to Company specifications and construction methods. Responsible for all work performance by contractors in accordance with the terms of the particular contract. Has authority to halt progress of work if needed to accomplish same. Within this work, specific duties included are:**

1) **Interprets and enforces contract specifications and construction methods of applicable gas main and service installations which requires knowledge of construction methods, drawings and sketches and repaving methods**
2) **Compiles records and reports of work in progress including measurement of any quantities completed using standard arithmetical formulas for measurement.**
3) **Observes contractors' work in progress for any effects on other underground structures and assures compliance with safe construction practices to avoid damage to such structures.**
4) **Orders and returns materials for contractors performing contract work.**
5) **Determines need for "contingency" work required by unforeseen conditions. Describes, records and submits required forms for such extra work.**
6) **Visually inspects welding, fusion and corrosion control methods for adherence to required specifications. Seeks technical assistance through supervision as needed.**
7) **Advises contractors of the importance of minimizing adverse effects of contractors' work on customer relations and the general public.**

B) Foreign Construction

**Upon notification by the Pa. One Call System or some other means of communication visits construction sites of work in progress by other utilities or contractors to insure that all PGW structures are protected and undisturbed by such work. Informs various utilities' and contractors' representatives of locations of gas structures and the necessary precautions to be taken. Must be familiar with construction methods and practices and must be able to read and interpret construction drawings including General Main Maps and Detail Main Maps.
Must have complete familiarity with PGW main and service records.
Must be able to recognize, evaluate and react according to Operator Qualification Requirements according to DOT Part 192.805 to prevent conditions which could result in hazards to natural gas structures.
Makes daily visits to jobsites that are assigned with a PGW Watchman to insure compliance with foreign construction responsibilities.**

Distribution Inspector

C) **Walking (Footways) and Mobile (Roadways) Surveys, Flame Ionization Survey, Optical Methane Detection Survey and Curb Box Inspections**

Conducts walking or mobile survey throughout the City using various detection devices such as: Optical Methane Detectors, Flame Ionization Instruments, Gas Detection Instruments (GDI's), or any other gas detection instruments to conduct leak detection surveys and general safety monitoring. This work may require the assistance of a helper.
Must follow the existing Street Leak Procedure when leaks are found on survey including taking necessary actions to protect people first and then property.
May be required to inspect exposed mains on bridges and report on conditions found and necessary maintenance.
Makes necessary adjustments to curb boxes as required or issues orders to rectify same.

D) **Repaving of PGW Trenches**

Inspects repaving of PGW trenches by various contractors.
Determines and elucidates, in writing, reasons for paving requirements in excess of reported quantities by PGW forces.
Must be capable of handling customer complaints related to trenches, repaving of trenches or repaving methods.

E) **Underground Metered Gas/House Piping Installations**

May be called upon to inspect underground gas lines being installed by plumber's or customer's contractors to insure compliance with PGW Underground House Piping Specifications.

F) **Plastic Fusion Requirements**

Capable of butt fusion, saddle fusion or electrofusion in accordance with manufacturers' procedures and in compliance with DOT Parts 192.283, 192.285 and 192.287.
Makes templates for fusing various special shapes.
Fits and fuses specials such as bends, crosses, tees and drip pots.
Fits and fuses service connection on mains
May be required to fit and fuse in a trench.
Fuses on pipe or uses electrofusion fittings where required on high, intermediate or low pressure gas mains.
Must have the ability to lay out angles, calculate runs, establish travel lengths involving angles, rolls and sets for plastic pipe.
Uses various types of Plastic Fusion Equipment and performs Plastic Fusion Procedures in accordance with manufacturer's specifications to join plastic mains and services.

G) **General Requirements**

Must maintain a valid driver's license.
Performs as ventilating crew or backfilling crew leader when required.
Must meet all requirements of PGW's Operator Qualification Plan.
Operates various types of equipment such as Pipe Line Locators, Box Locators, etc.
Must have thorough knowledge of and adhere to all requirements of the Pa. One Call System.
Must have thorough knowledge of safe excavation practices and trench protection systems such as, shoring, sloping or shielding.

Responsible for all tools, equipment and materials issued and utilized.
Immediately reports any unusual or unexpected condition encountered. Reacts appropriately to abnormal operating conditions.
Writes complete and accurate reports of work completed in connection with assigned work, underground street troubles injuries, accidents, incidents, etc.
Makes intelligent and accurate reports which may be written, entered on a computer or reported by radio or telephone.
Utilizes Computer technology to retrieve, enter and store data related to work assigned.
Responsible for a clean, safe and properly secured jobsite.
Responsible for enforcing and following established safety procedures.
Performs other related duties for which previously trained.

APPROVALS:

Company_____ Date_____ Union_____ Date_____
Company_____ Date_____ Union_____ Date_____

DD
Revised 11/20/07

Distribution Contract Inspector Refresher Training 12/1/2010

Agenda: ***B. Bright 12/2010***

1. Inspector Responsibilities:

A. *Contractor Equipment Inspection:*

- Generator
- Electro Fusion Processor
- Heater Plate Temperature
- Fusion Pressure
- #28 Machine
- #14 Machine
- Clamps
- Scrapers
- Temp Sticks
- Fusion Cooling Times
- Indentify Satisfactory Work

B. *Review Job Prints and Maps:*

- Interpretation
- Lay out
- Tie in – Line up existing pipe depth with new pipe. Make sure the new pipe is in parallel or perpendicular to the existing pipe.
- Purge Trench
- Trench for test gauge
- Main depth
- Tree locations

C. *Reports, Forms and Contingents*

- Need approval for any contingent work before it begins: (contingent work must be signed off by the supervisor prior to the contractor signing)
- Need approval for any changes on the job:
- Can holt the job if it is not getting done according to PGW standards:
- Turn in all paper work at the end of the job. All forms should be completed at the end of the job and turned in ASAP.

D. *Good Housekeeping:*

- Keep job neat
- Minimize open trenches
- Keep trenches safe and level
- Keep spoil, sand, cold patch, modify etc in neat piles:
- Completely clean up one job before moving to the next job, take everything with them:
- Recheck all trenches before leaving the job:

E. Utilize the contractor to make PGW work easier:

- Make sure Tie-ins and Services are lined up to make PGW installations easier
- Confirm there are no obstructions in pipe to be installed; such as, pipe caps, dirt, trash, paper, etc…
- Confirm electro-fusion couplings are installed appropriately
- Call the Supervisor if unsure of best practices

CURRENT "C" CONTRACT BOOKS

CLASS ROOM and FIELD MATERIAL

1. Red Manila Folder
2. Material Issue Forms (Stamped "Project")
   a. 1" – 1¼" Steel
   b. ¾'', 1" - 1¼" CTS Plastic
   c. 11/4" IPS Plastic
   c. 2" - Steel
   d. 2" - 6" Steel
   e. 11/4'', 2" – Plastic
   f. 3'' - 4'' – Plastic
   g. 6'' - 8''– Plastic
   h. 8" - 20" Steel
   i. 24" - 30" - 36" – Steel
   j. Distribution Miscellaneous
   k. Distribution Foreman Tool Order
3. Material Return Forms (Stamped Project)
   a. Steel
   b. Plastic
   c. Miscellaneous
4. Stock Transfer Forms
5. Inspector's Weekly Reports "C" Project (3 pages)
6. Contingent Authorization
7. Contingent Work Report
8. Service Cards
9. Timesheets
10. Occupational Injury Report
11. Accident Report
12. Paving Cards (Stamped "Project")
13. "537" Orders
14. Telephone Sheet
15. #2 Pencils
16. Pencil Carbon
17. Log Book
18. Paving Sketches

DISTRIBUTION DEPARTMENT TRAINING PROGRAM

DISTRIBUTION INSPECTOR – PHASE I

PGW Construction Inspection covers training regarding construction work performed by contractors working on Cost Per Foot ("C" series) and specific ("D" series) projects.

Purpose: To present the entire scope of construction inspecting in classroom and on-the-job training sessions to job candidates selected by the Field Operations Employee Relation Support Director or Manager:

This phase will acquaint the job candidates with the various PGW and governmental specifications, records, reports, tools and the calculations necessary to report units of work completed in accordance with the project specifications.

GENERAL OUTLINE – PHASE I

I (a)

1. Background of Project Work
2. Difference between Cost Per Foot ("C" series) and ("D'' series)
3. Records

GENERAL OUTLINE – PHASE I

4. Testing for basic skills to determine if candidate will continue with program (4 hours).

I (b)

1. Review of Project Documents
2. Field Check of Job Sites
3. General Outline of On-the-Job Duties
4. Review
5. Final Test (8 hours)

DISTRIBUTION INSPECTOR – PHASE I (a)

DETAILED OUTLINE

1. Background of Project Work
   (a) Reason for doing project work
   (b) Who does project work and how chosen
   (c) Administration of projects
   (d) Job planning responsibilities from time project is conceived until it is signed off completed
   (e) Tie-in or connection to gas system
2. Differences between the Two Types of Projects
   (a) Cost per Foot versus Specific

DISTRIBUTION INSPECTOR – PHASE I (a)

(b) Definition of terms: Engineer, contractor, company, construction inspector, etc.

3. Records

(a) Material Issue

(b) Material Return and Stock Transfer

(c) Paper transfer of material

(d) Calculations

1. Percentage

2. Square yards

3. Cubic yards

4. Fill dirt

5. Circumferential feet

(e) Engineering field draftsman

(f) Contractor

(g) Time sheets

(h) Paving

(i) Account numbers

DISTRIBUTION INSPECTOR – PHASE I (a)

4. Test

This test will be given to candidates to determine if they have mastered basic skills necessary in order to complete the remaining phases of training.

DISTRIBUTION INSPECTOR – PHASE I (b)

1. Review of Project Document

(a) General conditions of project

(b) General specifications of project

(c) Drawings

(d) Project job instructions and line sketch

(e) Bi-monthly reports?

(f) Contingent report

(g) Written report

1. White copy

2. Pink copy

3. Final copy

(h) Log book

(i) Service cards

DISTRIBUTION INSPECTOR – PHASE I (b)

(j) How to sign off job

(k) Accident reports

2. Field Check of Job Sites

(a) General location of structures to be installed

(b) Locate starting and stopping points, gaps and possible mains laid ahead of paving

(c) Method of setting up for tie-in with sketches

(d) What to look for in regard to doing the job:

(1) Site ready for contractor

(2) Service locations

(3) Order all materials

3. General Outline of On-Job Duties

(a) Check ditch layout

(b) Check ditch bottom

(c) Check pipe joining

(d) X-ray of welds

(e) Soap and water test

(f) Coating procedure

(g) Pipe on ditch bottom, alignment, drippage

3. General Outline of On-Job Duties

(h) Proper backfill

(i) Final test

(j) Clean-up of job site

(k) Safety

DISTRIBUTION INSPECTOR – PHASE II

Foreign Construction Inspection covers training regarding protection of PGW structures in excavations made by others.

Purpose: To present the entire scope of foreign construction inspection in a classroom session to job candidates.

This phase will acquaint the job candidates with the responsibilities regarding the safety of PGW structures in the area of work being performed by builders, contractors, plumbers, other utilities etc.

Upon completion of the lecture, the candidate will perform actual inspection work with an experienced foreign construction Distribution Inspector and under the supervision of the district supervisor.

DISTRIBUTION INSPECTOR – PHASE II

Detailed Outline

The main functions of the Foreign Construction Inspector are:

1. To inspect foreign construction for the main purpose to protect PGW underground structures.
2. To assist the contractors or builders by giving them proper and accurate information concerning PGW underground structures.
3. Keeping the PGW District Supervisor apprised of conditions found in the field concerning all know foreign construction.
4. Keeping his daily route sheet up to date, recording the progress of all running jobs covered daily in his district and recording the PGW watchman on the construction sites on the daily route sheets.
5. He or she must be completely familiar with the Distribution detail main maps and general main maps; at no time should these maps be given to anyone.
6. The Inspector must be completely familiar with and advocate the current PA One Call Act.

The Inspector should have available at all times such items as:

a. Prints of the construction

b. PGW DMM maps

c. Gas service pipe list

d. Flashlight

e. 6’ rule and measuring wheel

f. C.I. or gascope

g. Several cans of yellow pain and yellow keel crayon

h. Wax sealant, wrap and permagum

i. Roll of H.P. tape

j. Line locator (when needed)

PRIORITIZATION

The Inspector will cover a variety of foreign construction jobs such as:

A. Patrol the natural gas main route in his district daily.

B. Main sewer construction

C. Water main installation

D. Underground tunneling

E. Bell Telephone, Verizon, Cable & P.E. duct installations

F. Tree planting

G. Plumbing

H. Roadway and footway repaving

I. Resurfacing of roadways

The Inspector will cover a variety of foreign construction jobs such as:

J. Building construction & alterations

K. Blasting

L. Demolition of buildings

M. Augering for pole installations

N. Underground street troubles

O. Other utility installations

P. Reconstruction of bridges

GENERAL INSTRUCTIONS

Inspectors must be alert and ready to volunteer information concerning PGW structures to all contractors or jobbers that are excavating when discovered in his daily travels throughout his district.

The Inspector should acquainted with the correct and various methods of shoring and sheathing used by the contractors and whether the shoring is suitable for the protection of PGW underground structures; be aware of insufficient shoring which could caused PGW failure.

These are many danger signals the Inspector should look for on his tour of inspection, such as:

1. Parting of footway from the curb.
2. Parting of footway from the walls of buildings, front steps or other building appurtenances.
3. Splitting or cracked roadways.

These signals should not be ignored. The Inspector should, when he finds such conditions, check out the service pipes at the front foundation wall for any pipe movement or disturbance of plaster around the head of the service. If such conditions are encountered, notify the supervisor of the district at once.

Certain excavations should be carefully inspected after heavy rainfalls, looking for trench erosion and when found; it should be brought to the attention of the contractor and City Inspector and the PGW Distribution supervisor.

Shallow PGW structures should be carefully watched. Heavy equipment will not be permitted to traverse any shallow gas pipe.

Undermined gas mains will be reported immediately to the PGW Distribution supervisor.

Wherever H.P. gas mains and services are involved, a PGW watchman will be stationed until the job is completed and finagled.

Slope lines shall be carefully watched. Field changes by the contractor will be recorded and reported. See the attached copy about slope lines from the Federal Government.

Coating damages on gas mains when found should be measured accurately and 537 issued for immediate repairs.

Contractors working in deep and unshored excavations should be brought to the attention of the PGW Distribution supervisor.

When damages to PGW structures are encountered, notify the Distribution supervisor for possible OAR. Remember! The supervisor only! has the authority to issue an OAR.

When damages to PGW structures are encountered, a Foreign Construction accident report will be issued by the Inspector whether or not an OAR is issued giving the date, contractor, exact location of the damage and type of equipment used and the type of construction in progress.

Where a hydra hammer or steel ball is used for breaking paving, consideration will be given to the type of main (steel or cast iron) and depth of same.

DISTRIBUTION INSPECTOR – PHASE III

Survey Inspection covers training regarding the detection of gas leaks and underground street troubles.

Purpose: To present the methods and procedures used to detect gas leaks and underground troubles which might affect PGW structures.

This phase will acquaint the candidates with the instruments, tools and physical street conditions which are used to indicate the existence of underground troubles and leaks. Records, reports and priorities set down by the Work Initiation Schedule are also covered in detail.

GENERAL OUTLINE OF PHASE III

1. Background Information
2. History of Survey in PGW
3. Why do we survey?
4. Types of survey
5. Duties
6. Forms
7. Field training

The Inspector will cover a variety of foreign construction jobs such as:

DETAILED OUTLINE

1. Background Information
   - (a) Gas Company history
   - (b) City size
   - (c) Miles of main
   - (d) Number of active services
   - (e) Operating and maintenance expenditures
   - (f) Capital budget additions and replacements
2. History of Survey in PGW
   - (a) Planned survey program beginning
   - (b) History prior to 1954 when manpower was available

DISTRIBUTION INSPECTOR – PHASE III

(c) Present time – crews, etc.

3. Why do we survey?

   (a) OPS Regulations

   (b) Responsibility to the city and customers

   (c) Finding trouble before it is reported by customer

   (d) Keeping gas loss to a minimum

4. Types of Survey

   (a) General area

   (b) Business area

   (c) High pressure

   (d) Natural gas

   (e) Center City and residential

   (f) Others – ahead of paving, parades, increased pressure

5. Duties

   (a) Conduct street surveys

   (b) Vegetation checks

   (c) Check for street troubles

   (d) Demolitions and abandonments, street closings

   (e) Direct and lead an assistant

DISTRIBUTION INSPECTOR – PHASE III

(f) Issue survey forms

(g) To make a house check

(h) To determine what is safe

(I) How to use Sensit gas detection instrument

(j) Conduct Service Line Surveys

(k) Conduct ENN when necessary

6. Forms

(a) Work Initiation Schedule

(b) Survey Inspection forms

(c) Center City sheets

(d) General area sheets

(e) Street Leak Progress Report

(f) Valve Inspection Cards

(g) Street Work Maintenance Order, "537"

(h) Time sheets

DISTRIBUTION INSPECTOR – PHASE IV

Purpose: This optional phase will be given to candidates who have not previously had training as Pipe Mechanic. This training will

enable the Inspector to have a better background in the basic skills of pipe line construction.

See Distribution Training Program for Pipe Mechanic for details of the program.

PGW

Distribution Inspector

B. Foreign Construction

Visits construction jobs in progress by other utilities or contractors to insure that gas structures are protected and undisturbed by such work. Informs utilities and contractors of locations of gas structures, precautions to be taken and instructs PGW workmen assigned to watch such construction. The Inspector must be familiar with construction methods and be able to read construction and survey plans. He or she must be completely familiar with PGW main and service records. He or she must be able to recognize and evaluate conditions which could result in hazards to gas structures and to anticipate such possibilities in order that preventive precautions may be taken.

C. Survey and Curb Stop

Conducts leak survey and curb stop inspections throughout the City. This work may require a helper. Makes necessary adjustments to curb boxes and is capable of making necessary inspection of leaks found on survey. Examines exposed mains on bridges and recommends necessary maintenance.

D. Repaving of PGW Trenches

Inspects work of various contractors repaving trenches opened by PGW personnel or contractor.

Determines reasons for paving requirements in excess of that reported by PGW personnel and is able to report, in writing, reasons therefore. Is capable of handling customer complaints regarding trenches and repaving methods.

E. Underground Metered Gas Piping Installations

The Inspector may be called upon to inspect underground gas lines being installed by plumbers or customers' contractors to insure compliance with PGW Underground Piping Specifications. Must be licensed vehicle operator. Performs other related job duties as assigned.

FIRST DAY

PHASE 1A

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Welcoming address telling them of their obligation	Review homework	Review homework	Review timesheet	Review homework
	Describe Material orders and returns	Explain use of detail main maps and go over NSEW	Review paving cards	General review prior to setting up examination
	Discuss stock transfer	Discuss difference between “O” & “D” contractors	Review timesheet use	Test
Teach proper Use of timesheet	Explain paper transaction	Review calculations	Review account numbers	
Reason for Contracting work	Show how to make out a paving card	Review use of paving cards	Review material orders	
Administration of Project	Explain acct. no. system	Review timesheets use	Review paper transfer	
Job Planning	Review calculations	Review contract book, all the G.S. drawings	Review calculations	
Describe Street Main Instruction	Review timesheet use	Pass out homework	Review stock transfer	
Teach calculations	Describe use of telephone and ice expense sheet		Pass out homework	
Pass out homework	Pass out homework			
	Review G.S. Standards			

DISTRIBUTION INSPECTOR TRAINING SCHOOL
STANDARD ARITHMETIC COMPUTATIONS

I. Decimal Parts of a foot:

1" = 0.083'	7" = 0.583'
2" = 0.167'	8" = 0667'
3" = 0.250'	9" = 0.750'
4" = 0.333'	10" = 0.833'
5" = 0.417'	11" = 0.917'
6" = 0.500'	12" = 1.000'

II. Percentage (%) of any total Figure:

1. Simple Ratio

$$\frac{100\%}{\text{(whole proposed quantity)}} = \frac{(\ \%\ \text{completed})}{\text{(completed quantity)}}$$

$$(\ \%\ \text{completed}) = \frac{(\text{completed quantity}) \times (100\%)}{\text{(whole proposed quantity)}}$$

2. Or

$$\text{(whole proposed quantity)} \quad \frac{(\ \%\ \text{completed})}{(\text{completed quantity}) \times (100\%)}$$

3. Example

Job Length – 500'
Completed to date – 250'
Find % completed to date.

$$500' \quad \frac{50\%\ \text{completed to date}}{(250' \times (100\%)}$$

III. Square Yards

$$\frac{\text{Length (in feet)} \times \text{Width (in feet)}}{9} = \text{Square Yds.}$$

IV. Cubic Yards

$$\frac{\text{Length (in feet)} \times \text{Width (in feet)} \times \text{Depth (in feet)}}{} = \text{Cubic Yds.}$$

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FIRST DAY

h. Talk about the tie-in connection to gas system by PGW. Always make sure you have the contractor line it up properly and make it as easy as possible for the PGW crew.

9. Discuss the Standard Calculations used by Distribution Inspectors.

a. Decimal parts of a foot — .83”
Derive the formula — 12” — 1.00”

b. Percentage
Derive the formula and explain the usage on the first page of the report

$$\text{Whole quantity} \quad \frac{\%\ \text{Completed}}{\text{Completed quantity}}$$

c. Square Yards
Derive the formula and explain the usage in the “C” or “D” reports and the items involved (#60, 61, 63, 66, 67, 69, 70, 71, 74, 76, 77, 78, 79 and 80). Also explain the formula used when you have more then the normal thickness.

$$\frac{L' \times W'}{9} = \text{Square Yards}$$

d. Cubic Yards
Derive the formula and explain the usage in the “C” or “D” reports and items involved (#68, 75, 81, 82, 83 and 84). Also explain the formula used when you have more than the Normal thickness.

$$\frac{L' \times W' \times D'}{27} = \text{Cubic Yards}$$

e. Circumferential measurement for pipe diameter.
Derive the formula by using the table of constants and explain its usage and the item involved (#115).
Constant x Number of ends = Circ. Ft.

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FIRST DAY

DECIMAL PARTS TO A FOOT

1”	**0.083**
2”	**0.167**
3”	**0.25**
4”	**0.333**
5”	**0.417**
6”	**0.5**
7”	**0.583**
8”	**0.667**
9”	**0.75**
10”	**0.833**
11”	**0.917**
12”	**1.0**

CIRCUMFERENTIAL DIAMETER OF PIPE IN FEET

3”	**0.916**
4”	**1.178**
6”	**1.736**
8”	**2.259**
12”	**3.338**
16”	**4.186**
20”	**5.236**
24”	**6.283**
30”	**7.854**
36”	**9.425**
42”	**10.996**
48”	**12.566**

FILL DIRT (OR SAND) REQUIRED AROUND MAIN – CUBIC YARD PER FOOT OF DITCH

6” Top, 6” Base to Normal Ditch Width

¾” CTS		**.059**
1” CTS		**.060**
1 1/4” CTS		**.061**
1 1/4”	**STL or IPS**	**- 0.062**
2”	**“**	**- 0.065**
3”	**“**	**0.072**
4”	**“**	**0.074**
6”	**“**	**0.079**
8”	**“**	**0.081**
12”	**“**	**0.104**
16”	**“**	**0.136**
20”	**“**	**0.166**
24”	**“**	**0.21**
30”	**“**	**0.25**
36”	**“**	**0.33**

DISTRIBUTION DEPARTMENT TRAINING PROGRAM
DISTRIBUTION INSPECTOR

PURPOSE: To present the entire scope of Distribution Inspector responsibilities. The three phases of inspecting are presented in classroom sessions and on-the-job training to candidates selected by the supervisors.

Total training time is 440 hours. This time is allocated as follows:

Phase I (a)	-	40 hours
Phase I (b), II, III	-	40 hours
Phase IV, V	-	32 hours
On-the-Job	-	328 hours

GENERAL OUTLINE

PHASE I - PGW CONSTRUCTION INSPECTOR covers training regarding construction work performed by contractors working on "Cost Per Foot" and specific projects. 80 Hours:

PHASE II - FOREIGN CONSTRUCTION INSPECTION is concerned with the inspector's responsibilities in regard to the safety of PGW structures in the area of work being performed by plumbers, contractors, builders, etc. 80 Hours:

PHASE III - SURVEY INSPECTION teaches the methods and procedures used to detect gas leaks and underground troubles which might affect PGW structures. 80 Hours/8 Hours OMD:

PHASE IV- OPERATOR QUALIFICATION: teaches the methods and procedures in accordance to all OPERATOR QUALIFICATION REQUIREMENTS according to DOT 49 CFR 192 SUBPARTS N: (24 Hours Class/Field)

PHASE V- POLYETHLENE FUSION REQUIREMENTS: Must meet all requirements of PGW's Operator Qualification Plan. (8 Hours Class)

PHASE VI - PAVING INSPECTOR: teaches the method to inspects repaving of PGW trenches by various contractors. (72 Hours)

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FIRST DAY

1. Welcoming Address telling the candidates of their obligations and what is expected of them as participants in the class for Distribution Inspector. If they fail this phase, they must be

2. Read Mr. Forr's paper, "Training Program for Contract Construction Inspectors," which was presented to the AGA in May 1970.

3. Instruct the class in the proper use of the timesheets.

    a. The front side which has to do with the payroll and equipment information.
    b. The back side which has to do with the account and job code numbers, description of work and activity codes for the Work Measurement Program.
    c. Describe the use if you were a single Inspector using the timesheet or if you were a crew leader of two of three men.
    d. Define all the terms found on both sides of the timesheet in detail.

4. Discuss the reason for doing project work.

    a. Explain peak work load, winter emergency, "Maintenance is our Business."
    b. Set manpower as required for peaks.
    c. Building peak – spring, summer and fall
    d. Flexibility of work force – contract to meet all other requirements.

5. Who does project work and how chosen

    a. Three bids for (yearly) work

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FIRST DAY

b. Contractors on bidding:

Danella
General Asphalt Paving
Utilities Line Services
Others as invited

c. Name the current contractor

6. Administration of Project

a. Distribution Department – all administrative responsibility
b. Planning Section
   1. Design
   2. Draftsman
   3. Quality Control (Corrosion)
   4. Recordkeeping File
   5. Mileage of Mains (Check of block distances)
   6. Map-making

c. Accounting pays the contractor based on the reported completed items you, as an Inspector, give the contractor foreman.

d. Materials Management
   1. Delivery of material by 1:30 p.m. the next work day following the origination of the material order.
   2. Quality control of material used.
   3. Balance of material ordered against material returned.

7. Job planning responsibilities from time project is conceived until it is signed off "completed."

a. Marketing, Planning and Distribution Supervision Meetings with builders for size, location and the required gas date.
b. Distribution Planning for PGW or contractor work.

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FIRST DAY

c. Project issued on street main instruction.

8. Review project job instruction and single-line sketch ("J" Drawings)
   a. P.I. job prior to moving in, determining water, sewer, electric phone lines, cable lines and gas – locations free of other subcontractors doing work. Notify other customers involved prior to moving in.
   b. Order material with contractor foreman
   c. Checking material delivery with contractor foreman
   d. Doing work required
   e. Report-writing should be done daily while on the job so that you will have the correct addresses, information, etc.
   f. Maintain a log book
   g. Clean up job and material return. Make sure you charge the right material to the right account number. When you finish each job, send in the material. Do not wait until the end of the month or season.
   f. Fill dirt required around main or service or in lieu of rock or rubble removed from job site.

      Derive the formula by using the table of constants and explain its usage and the item involved (#84)

      Constant x Length of trench – Cubic Yards

      Explain the diagram which shows you have 6" of sand on the top of the pipe, 6" of sand on the bottom of the pipe and the normal ditch width. Tell about when you have excavated rubble, rock or trees and you have to replace with sand more then the normal trench width. We will accept invoices for payment rather than try and calculate the cubic yards.

10. Distribute the homework assignment and explain that it is not mandatory to do because it is outside working hours but that it is good preparation for the written test that is to take place on the fifth day of Phase I training. Also suggest that they carry out all calculations to two places and we will round off in class. Suggest no use of calculators because they will not be permitted during the test.

TRAINING PROGRAM FOR CONTRACT CONSTRUCTION INSPECTORS

by

Harry J. Forr

Supervisor, Distribution Department

Philadelphia Gas Works, Division of UGI Corp.

Philadelphia, Pennsylvania

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TRAINING PROGRAM FOR CONTRACT CONSTRUCTION INSPECTORS

Prior to 1959, the Philadelphia Gas Works did all main and service installation and replacement work with its own forces. Only a few specialized jobs, such as, bridge or river crossings were let to outside contractors.

Then, in 1959, our management decided to stabilize the size of the Distribution work force based on winter operating and maintenance needs and to contract that portion of work beyond the capability of this force. We have been contracting approximately 93% of our new main replacements. Considering the cost of such work, to be assured and to maintain our standards of safety and quality, at the outset management recognized the need for a comprehensive inspection program.

In reviewing the practices of other utilities ten years ago, we found that contract "Inspectors" ranged in background from physically disabled laborers to graduate engineers, assigned either full or part time to a given job. Our decision was to formally train as Inspectors a group of experienced Distribution Department employee, all Union-covered. We also decided to assign one Inspector full time to each contract crew.

First, a Training Guide was written by Line Supervisors who had first-hand knowledge of and experience on main and service construction work. This Guide has since been updated yearly to keep pace with new construction practices and changes in codes and specifications. Our objective in Inspector Training is to present the entire scope of responsibilities which are assigned to the "Distribution Inspector" job classification. Both classroom and on-the-job training is given to qualified candidates.

There are three phases of Inspection Training, i.e., Construction Inspection, Foreign Construction Inspection, and Survey Inspection. We will examine in more detail the Construction Inspection; however, since the other two phases of inspection are an integral part of the program, we will also take appropriate notice of them.

Let's first look briefly into the job evaluation analysis for a Distribution Inspector. This will tell us what we expect of a qualified person. A Distribution Inspector receives approximately 10% direct and 90% indirect supervision. He or she is exposed to traffic, weather and all construction hazards. While doing construction inspection, they interpret and enforce PGW contract specifications and visually inspect the construction methods used on main and service installations. This requires a

thorough working knowledge of construction drawings, sketches and specifications.

He or she must maintain records and prepare reports on work in progress. Standard arithmetical formulas are used to determine the quantities reported. He or she will observe the contractor's work in progress for its effect on other underground structures and check to see that safe construction practices are followed to avoid damage. The inspector issues orders for delivery and return of all material for the work in progress. They must determine the need for contingent (extra) work required by unforeseen conditions and describe and record such extra work. Also, they must visually inspect all welding and corrosion control work. Technical assistance in interpretation of radiograph films and on matters related to corrosion control is secured through his supervisor. Customer relations and the effects of the contractor's work on the general public are matters with which the inspector must also be concerned.

Finally, after the completion of construction, repaving work by the contractors is examined to determine the amounts completed and these amounts are recorded by the inspector in a written report.

In addition to Construction Inspection as mentioned before, the inspector will be assigned, as needed, to visit construction jobs in progress

by other utilities or contractors to insure that gas structures are protected and undisturbed by such work. They will inform the utilities and contractors of the locations of all gas structures and the precautions to be taken while excavating near them. Where PGW workman are assigned as full-time watchmen to such jobs, the inspector will instruct these individuals regarding their responsibilities. This requires a complete familiarity with main and service records. The inspector must be able to recognize and evaluate conditions which could result in hazards to gas structures and to anticipate such possibilities in order that preventive measures may be taken.

The inspector also is assigned to conduct leak surveys and curb stop inspections throughout the system. This work may require a helper and the inspector must be able to instruct and lead the helper. Together they make necessary adjustments to curb boxes and make required inspections of leaks found on survey. The inspector must be capable of examining exposed mains on bridges and making recommendations for necessary maintenance work.

From this impressive list of job duties, it is evident that our Distribution Inspector is a highly skilled person. For this reason we place his or her pay scale just above a first-class mechanic and under lead man or foreman.

Now back to the Training Program. Candidates are tested by our Industrial Relations Department with a series of selected tests to determine mechanical comprehension, general intelligence and general knowledge of shop arithmetic, space relations and mechanical knowledge. The candidates are expected to have a high school education or equivalent and two years or more of related construction experience. The candidates' qualifications are reviewed by Field Operations Distribution Department Personnel Manager before acceptance to the Training Program.

Formal training begins with a forty (40) hour program of classroom lecture and discussion on Phase I (a) of the program. This session covers fundamentals and is designed to give the candidate a background on which to build future training and to determine if he is capable of understanding more detailed work. The work covered in the session includes a background for contract work, such as, why PGW has contractors. To show what part the inspector plays, a detailed description is given of job planning responsibilities from the time the job is conceived until it is signed off as completed, including all of the necessary paper work. Tie-ins or live connections performed by PGW crews are discussed showing the planning and coordination of all personnel involved.

The standard calculations used in report writing are discussed. The candidates are given printed tables for use in calculating required quantities. Some examples of the calculations discussed are: Decimal parts of a foot, percentage, square yards, cubic yards, circumferential measurements for pipe diameters and fill dirt required around mains of varying diameters. In another session instructions are given on record keeping. This includes practice in using company forms to order material, return material and transfer material from job to job. Also discussed is the correct procedure to be followed when making out a paving card, the official record of paving removal and replacement.

Account numbers are discussed to show reasoning behind the system of numbering jobs to allow reports of quantities to correct job accounts.

This phase is then completed with a written examination (70%) to determine if the candidate can move into the next phase of their training.

A second forty (40) hour session of classroom lecture and discussion will differentiate between our two types of projects, i.e., specific job contracts for major jobs and (yearly cost/foot contracts under which we assign contract crews to small man in service installations). Instructions

include a detailed review of specifications for both types, report writing, and the necessary record keeping.

As a text book, we use our Specification Book for the current yearly "C" Series Project. This is our project document for installing 16" and smaller gas mains and services at unspecified locations. Outlined in the proposal are number (187) items describing measurable work for payment to the contractor. This is reviewed in detail as it will be used as a basis of the inspector's report and subsequent determination of payment on the contractor's invoice by our Accounting Department. The project document contains general and specific specifications and some *64* standard drawings, all of which will become the "Bible" for a construction job.

The second phase of training stresses report writing using standard company forms designed for this type of project work. This report consists of three sections: (a) Progress of job showing proposed pipe length by size and the percentage of the job completed, (b) A check list is provided for the inspector to follow when making his written report, this report includes such items as, nature and extent of contingent work claimed by contractor, radiography of welds, results of and percentage of, results of pressure tests, etc., (c) Inspector's report of work quantities completed. This

section is a printed page showing a listing and description of all items in the proposal.

Instructions are given on how to keep a field log book that can become very useful if, for reasons of sickness, vacation, etc., the inspector must be replaced before the job is completed. Instruction and practice is given on how to complete service records, time sheets, contingent reports for extra work completed and finally how to sign-off a completed job.

Also as a part of this second forty (40) hours of classroom training, the candidate is instructed in matters related to foreign construction and survey inspection.

This final session is completed with an open-book written examination in which the inspector must perform (70%) on paper all of the functions necessary to complete a given job, that is, from ordering material to writing the final report and signing off the job.

To help the trainee make a smooth transition from a classroom atmosphere to field conditions we place successful candidates in an on-the-job training program where, under very close supervision, he begins to fit the pieces of his newly acquired knowledge to his past experience.

Three phases: Construction Inspection, Foreign Construction Inspection, Paving Inspector and Survey Inspection.

At the completion of his on-the-job training, the successful trainee is Promote or given a variable rate for the job of Distribution Inspector. While working in any of the three phases, they will be paid the rate of Inspector and will be placed in a wage progression working toward the top rate. As the contracting season falls off and men are not needed for this type of work, they will reassume the duties of their base rate, which may include such skills as welder, compressor operator or pipe mechanic.

A worthwhile by-product of the hours invested in training these inspectors in later realized when candidates are considered for promotion to foreman. Experience has shown that they have the best qualifications and background required for this promotion. On first class for inspectors was completed on October 23, 1959. To date we have a group of thirty –two permanently-rated inspectors and have had many inspectors promoted to Foreman. One of the graduates of our first class of inspectors was ultimately promoted to a management position two years ago. At PGW we feel that our program for Inspector Training is a good investment; it assures us of getting from our contractors the same quality work we demand from our own forces.

REVIEW OF MATERIAL AND MATERIAL RETURN ORDER PROCEDURE AS ALLIED TO CONTRACT WORK

Material Orders

1. The Material Order From is issued by the Distribution Inspector. This form is signed by the Inspector immediately under the last entry on the form.

2. The "Engineer" or Distribution Department Supervisor responsible for the job under contract will review these orders on the job site with the Inspector and contractor making necessary corrections and additions to be certain that the correct amount and type of material is being ordered for the job.

3. The contractor will then be give copy #4 of the order to be held until the material is delivered.

4. The Inspector will then be given copy #3 of the order to be held until the material is delivered.

5. The Supervisor will send copies #1 and #2 to Stores Delivery Section for delivery of the material under the twenty-four hour provisions of our contract.

6. Copy #1 will stay with Stores Delivery Auditor until after the material has been delivered.

7. Copy #2 is sent to Distribution Stores for loading. If an item is to come from another station other than Tioga storeroom, a new issue order will be made up by Stores for each such item. If there is a shortage which is corrected the following day by any means, a new issue ticket will be made up by Stores for each such item. (No material will be delivered to a contract job site without an order describing such material being with the material for which the contractor must sign giving his company name and his own name.)

8. Copy #2 in the original order or issued by Stores for delivery from other stations, etc., rides with material for delivery to job site.

BID FORM INSTRUCTIONS – "D" CONTRACT

This Bid Form is divided into two sections:

1) Section 1 (items A – Z) requests prices for normal items required to complete the contract. Bidders are asked to submit a unit price for these items. Normal items shall include, but are not limited to: paving removal, excavation, test holes, sand padding, fabrication and installation of the pipe, installation of the corrosion protection, leak and pressure test, backfill, temporary and permanent paving, bond costs, and all other appurtenances necessary to produce a complete pipeline ready for activation and use by the Philadelphia Gas Works ("PGW").
   This section requires Bidders to enter both the unit price and total price for the Pipe Work Items and Paving Items. PGW has provided approximate quantities for the Pipe Work and Paving Items for most Items. Please note that Bidders are not required to enter a price for an item if the approximate quantity is blank, zero or "N/A" (Not Applicable).
   Bidders are reminded that PGW reserves the right to increase or decrease the "approximate quantities" depending on the changing conditions of the job. Therefore, the price per unit submitted for the Pipe Work and Paving Items will apply regardless of the actual quantity required to complete the project.
2) Section 2 requests fixed rates and prices for various contingent items, which will only be used as needed. The prices are for work arising from unforeseen conditions only. PGW reserves the right to determine the method of payment for all contingent work, be it by quoted item price, by the cost of labor and material, or by any other method applicable as determined by PGW.
   This section includes extra excavations by the Contractor to prepare services to be transferred or installed, on replacement or new gas main installations. In these instances, PGW crews will perform mechanical work. The Contractor shall backfill following the completion of work by PGW. Paving and excavation of excess dirt will be covered separately by the appropriate items.
   The daily rates for equipment are to include the cost of operators, drivers, oilers and helpers to do this work for which the equipment is required. All contingent rates for the labor and equipment shall include contractor's overhead and profit.

Bidders must fully complete both sections. However, only the prices submitted in the first section will be used to evaluate the bids. Bidders should give careful consideration to all of the documents in the bid package before submitting a bid. In addition, bidders shall examine the site of the work before preparing bids. Finally, Bidders should review the Special Instructions included in this book, as well as the construction drawings included for each item.

BIDDER'S CERTIFICATION

For work in connection with the replacement and/or installation of gas main and/or services and all appurtenances at the locations listed on the cover of this book.

From: _____ _____
(Bidder's Name) (Date)

To: Philadelphia Gas Works,

In care of Mr. Kenneth W. Williams, Director of Procurement,

The undersigned agrees and certifies that it has carefully read and examined the Specification Book and all other Bid documents described in the "Bidders' Information – PGW Quotation Request forms (collectively, the "Project Documents"). The undersigned submits the following bid to provide labor, equipment, and certain materials to perform the installation of gas main at the locations indicated on the cover of this book and as described in the Project Documents. The undersigned further agrees to fully comply with all terms and conditions in the Project Documents referred to above and deliver a complete job ready for use for the grand total of:

$

as shown in the Bid Form. The undersigned has also included contingent rates and prices in the Bid Form. The undersigned also agrees:

- To begin the work within ten (10) calendar days from the date of issuance of a Purchasing Order by PGW.
- To fully complete the work within ninety (90) days after commencement.
- To guarantee the work as provided required in the Project Documents.

ACCEPTED AND AGREED

If bid is by an INDIVIDUAL or a PARTNERSHIP, date and sign the bid here, with original signatures, in ink:

_____ _____
(Business Name) (Telephone Number)

_____
(Address)

_____ _____
(Signature: Owner, Partner) (Date)

_____ _____

(Name) (Title)

If this bid is submitted by a CORPORATION, date and sign the bid here with original signatures, in ink, by (a) President or Vice-President of the corporation AND (b) Secretary, Assistant Secretary, Treasurer or Assistant Treasurer of the corporation; and (c) affix the seal of the corporation. If the form is not signed by the President or a Vice-President and Secretary, Assistant Secretary, Treasurer or Assistant Treasurer, attach a duly certified corporate resolution authorizing the person signing in place of such officers to execute this bid for the corporation.

	(Corporate or Business Name)	(Telephone Number)
	(Address)	
a)	(Signature: President, Vice-President)	(Date)
	(Name)	(Title)
b)	(Signature: Secretary, Assistant Secretary, Treasurer, Assistant Treasurer)	(Date)
	(Name)	(Title)

c) (AFFIX CORPORATE SEAL)

Item A

PGW Drawing # 4X-3974

Fabrication, installation and testing of plastic main and all appurtenances at:

3400 Ridge (Cumberland - Huntingdon), 3300 Cumberland (33rd - 34th), 2400 N. 33rd (Hagert - Cumberland), 3300 Hagert (33rd - Ridge)

Item		Description of Pipe Work Items	Approximate Quantity	Units	Cost per Unit ($)	Total Price ($)
A.pipe	1	8" plastic gas main (including temporary repave)	811	feet		
A.pipe	2	4" plastic gas main (including temporary repave)	915	feet		
A.pipe	3	electrofusion tees	44	each		

Pipe Work Subtotal	

Item		*Description of Paving Items*	*Approximate Quantity*	*Units*	*Cost per Unit ($)*	*Total Price ($)*
A.pave	1	Replace 4” thick concrete footway paving	200	square yards		
A.pave	2	Replace 8” thick concrete roadway base	185	square yards		
A.pave	3	Replace 10” thick concrete roadway base	271	square yards		
A.pave	4	Replace asphalt binder & top	455	square yards		
A.pave	5	Replace 18”concrete curb	10	linear feet		
A.pave	6	Saw cut –Roadway	2732	linear feet		
A.pave	7	Saw cut – Footway	720	linear feet		
A.pave	8	Remove extra thick concrete & asphalt paving	20	cubic yards		
A.pave	9	Furnish and lay clean fill	25	tons		

Paving Subtotal	

Item A Total (Pipe Work + Paving)	

Contingent Prices and Rates

Item	*Description*	*Units*	*Unit Price ($)*	*Danella*	*JMS/ULS*
1.1	Furnish and lay 8” concrete paving base, including sub-grading and all appurtenances.	square yards		$ 90.00	$ 75.00
1.2	Furnish and lay 10”concrete paving base, including sub-grading and all appurtenances.	square yards		$ 98.00	$ 85.00
1.3	Furnish and lay 12” concrete paving base, including sub-grading and all appurtenances.	square yards		$ 115.00	$ 100.00
1.4	Furnish and lay stone base under paving, including sub-grading and all appurtenances.	square yards		$ 100.00	$ 50.00
2.1	Furnish and lay 8” concrete base, including sub-grading and all appurtenances.	square yards		$ 90.00	$ 75.00
2.2	Furnish and lay asphalt or macadam surface paving and binder course. (Maximum 3” thickness.)	square yards		$ 75.00	$ 50.00
2.3	Furnish and place 4” concrete footway paving, including removal to the nearest joints, placement of sub-grade and all appurtenances.	square yards		$ 90.00	$ 85.00
2.4	Furnish and place 6” concrete footway paving, including removal to the nearest joints, placement of sub-grade and all appurtenances.	square yards		$ 98.00	$ 95.00
2.5	Furnish and place 8” concrete footway paving, including removal to the nearest joints, placement of sub-grade and all appurtenances.	square yards		$ 118.00	$ 110.00
2.6	Replace curbing. (18” x 8”)	linear feet		$ 60.00	$ 50.00
3.1	Excavate rock	cubic yards		$ 500.00	$ 500.00
3.2	Furnish and maintain temporary paving.	cubic yards		$ 475.00	$ 400.00
3.3	Furnish and place additional asphalt binder course, as required	cubic yards		$ 325.00	$ 400.00
3.4	Excavate excess dirt (Greater than one-foot variance in cover from drawing)	cubic yards		$ 679.00	$ 800.00
3.5	Cost to install additional electro-fusion tapping tee	each		$ 150.00	$ 125.00
4.1	Excavate and backfill in roadway (typically 3' x 3' x 3' in paving)	each		$ 380.00	$ 400.00

4.2	Excavate and backfill in roadway (typically 3' x 3' x 3' in dirt)	each		$ 340.00	$ 350.00
4.3	Excavate and backfill in footway (typically 3' x 3' x 3' in paving)	each		$ 380.00	$ 400.00
4.4	Excavate and backfill in footway (typically 3' x 3' x 3' in dirt)	each		$ 340.00	$ 350.00

Hourly Rates for Contingent Work

	Job Position	Hourly Rate	***Danella***	***JMS/ULS***
	Foreman		$ 85.00	$ 85.00
	Sub-Foreman		$ 80.00	$ 75.00
	Operating Engineer		$ 95.00	$ 85.00
	Laborer		$ 70.00	$ 70.00
	Teamster		$ 70.00	$ 70.00
	Welder		$ 110.00	$ 95.00
	Stationary Operator		$ 80.00	$ 70.00
	Flagman		$ 65.00	$ 65.00
	Blaster		$ 151.00	$ 65.00
	Powderman (underpinning 8' or more below grade)		$ 136.00	$ 80.00
	Carpenter		$ 136.00	$ 90.00
	Fitter		$ 115.00	$ 95.00
	Plumber		$ 120.00	$ 95.00
	Cement Finisher		$ 110.00	$ 90.00
	Electrician		$ 120.00	$ 100.00
Others				

Overtime – (Specify overtime provisions for contingent work. Provide proper documentation. i.e. Union Contract)

	Danella	***JMS/ULS***

Markup Percentage for materials supplied by the Contractor		%	12%	25%

Daily Rates for Equipment

Equipment	Daily Rate	***Danella***	***JMS/ULS***
Compressor 125 C.F.		$ 275.00	$ 300.00
Compressor 300 C.F.		$ 935.00	$ 600.00
Crane		$ 2,500.00	$ 2,000.00
Hydro-Crane		$ 2,500.00	$ 2,000.00
Gradall		$ 2,500.00	$ 2,000.00
Low Boy Trailer		$ 2,000.00	$ 1,200.00
Side-Boom		$ 2,500.00	$ 1,800.00
Tractor (Bulldozer)		$ 2,500.00	$ 1,200.00
Sandblasting Machine (including sand and one laborer)		$ 1,408.00	$ 1,000.00
Plastic Fusion Equipment (with Generator)		$ 2,000.00	$ 800.00
Gasoline Tamper		$ 900.00	$ 600.00
Dump Truck - 20 cubic yd.		$ 803.00	$ 625.00
Dump Truck - 10.0 cubic yd.		$ 775.00	$ 600.00
Arc Welding Machine (excluding welder)		$ 500.00	$ 500.00
Water Pump		$ 662.00	$ 400.00
Backhoe Loader		$ 1,500.00	$ 1,000.00
Job Truck 1-½ Ton or Larger		$ 850.00	$ 400.00
¾ Pick-up Truck		$ 790.00	$ 400.00
Barricades		$ 10.00	$ 10.00
Steel Deck 4’ x 8’ each		$ 35.00	$ 30.00
Steel Deck Larger than 4’ x 8’		$ 50.00	$ 35.00
Portable Lighting Unit		$ 2,500.00	$ 2,500.00
High Ram		$ 2,500.00	$ 2,500.00

	Track Hoe		$ 3,000.00	$ 2,500.00
Others	Sweeper (JMS/ULS)			$ 2,000.00
	Mill (JMS/ULS)			$ 6,000.00

CALCULATION

Calculate the following to two decimal places: *Homework*

1. Sand pad needed in cubic yards for the following:
   a. 238'0" of 36" main = _____
   b. 260'0" of 1 ¼" service = _____
   c. 444'0" of 30" main = _____
   d. 306'0" of 2" main = _____
   e. 842'0" of 2" service = _____
   f. 232'0" of 16" main = _____
   g. 362'0" of 4" main = _____
   h. 660'0" of 6" main = _____
   i. 558'0" of 12" main = _____
   j. 444'0" of 3" main = _____

2. Footway or roadway paving in square yards
   a. 64'0" x 1'6" = _____ f. 514'0" x 2'2" = _____
   b. 106'0" x 1'10" = _____ g. 750'0" x 1'6" = _____
   c. 308'0" x 2'2" = _____ h. 250'0" x 1'10" = _____
   d. 274'0" x 1'6" = _____ i. 466'0" x 2'2" = _____
   e. 311'0" x 1'10" = _____ j. 161'0" x 1'6" = _____

3. Excavation of extra dirt or rock in cubic yards:
   a. 36'0" x 1'6" x 1'1" = _____
   b. 136'0" x 1'10" x 1'6" = _____
   c. 56'0" x 2'2" x 1'9" = _____
   d. 101'0" x 1'6" x 2'2" = _____
   e. 82'0" x 1'10" x 2'7" = _____
   f. 178'0" x 2'2" x 1'3" = _____
   g. 194'0" x 1'6" x 2'1" = _____
   h. 202'0" x 2'2" x 1'8" = _____
   i. 99'0" x 1'10" x 2'4" = _____
   j. 103'0" x 1'6" x 1'2" = _____

4. Calculate Percentage of work complete:
   a. Installed 378' of 2398' of 4" plastic = _____
   b. Installed 953 of 1459' of 6" plastic = _____
   c. Installed 1403' of 3728' of 20" steel = _____
   d. Installed 234' of 2873' of 16" steel = _____
   e. Installed 598' of 765' of 8" steel = _____

SECOND DAY

SECOND DAY

1. Review the homework assigned the day before.

    a. Have each candidate volunteer an answer.
    b. Do any problems that seem to bother anyone on the blackboard. Give hints about calculating shortcuts. Remind all that calculations should be carried out to two places on the second page of the report and we round off only on the third page of the report.

2. Review of Material and Material Return Order Procedure as allied to Contract Work (See Section V-7)

    a. Describe and explain the following procedures of ordering tools and or material.

        1. Material Orders (make sure they are stamped "Project")
        2. Number of copies (4)
        3. Contractor Foreman and Inspector's responsibility
        4. Specially-stamped copies
        5. Correct amount numbers and subaccount numbers.
        6. Review the Material Orders (1 ¼" – 20", etc.) and be very explicit about what you can order on each one. Make sure you don't order 3" steel pipe on 1" plastic material order blanks.
        7. Go through the Contract book and explain the types of material needed for the installation of mains and services. From G.S. 10.0 to G.S. 1X378-6.
        8. Make sure you, the Inspector, are present when the Storeroom truck delivers the material with the Contractor Foreman who makes a count of everything delivered and assumes responsibility.

SECOND DAY

3. Discuss material return and stock transfer orders.

    1. Types of material return tickets, tool or material, big or little pink orders.
    2. Advise them that if they have any 40' lengths of pipe left over that they must cut them in half because they won't send a pole trailer out to pick up the pipe.

    3. Send all material back to the shop and make sure you use the proper account number and their sub.
    4. Number of copies (4).
    5. Specify the time, type of truck and the proper location. Stress again the correct account number usage.

4. Explain the paper transaction method.

    1. Number of copies (4)
    2. Proper account numbers both on the pink and the white copies.
    3. The pink copy must agree with the white copy in quantities.

5. Show how to make out a paving card

    1. First, explain the use of a paving card for a roadway opening.
    2. Second, explain the use of a paving card for a footway opening.
    3. Number of copies (4)
        2 to the written report
        1 to the Contractor Foreman
        1 to the Contractor Inspector
    4. Fill in all the blank spaces
    5. Make comments if the paving widths exceed the trench widths outlined in the Contract book.

SECOND DAY

6. Describe the north, south, east and west directions on the blackboard using well-known Center City streets. Use examples of where you stand on how you have the Delaware River on your east and the Schuylkill on the west sides. Tell about the house numbers on the west and south sides of the

street are even and the house numbers on the east and north sides of the street are odd.

7. Elucidate terms use in the blank labeled "Opening at" such as:

   a. Across Broad Street, south of Chestnut, for a trench that goes from the east curb to the west curb of Broad.
   b. Northwest corner of Broad and Chestnut or the southeast corner of Broad and Chestnut will be for an opening on the general radius of the corner.
   c. South footway of Chestnut, east or west of Broad Street.
   d. North roadway of Chestnut, east or west of Broad Street.
   e. The reason for pinpointing and describing the location of our opening is that PGW is not the only one who makes excavations.

6. Explain our Account Number system

   1. Describe the history of Distribution Department account numbers for project work

      2008 - year issued
      089 - job number from Planning Section

SECOND DAY

2. Second, tell about the subaccounts

6-49 (job by job issue for each size of pipe and reissue if job is not completed)
50-74 (the tie-in accounts used by PGW)
75 (the Inspection account for all jobs)

7. Review the use of the timesheet

8. Describe the use of the ice, telephone and transportation sheet.

To: All Foremen March 30, 1977

PAVING RECORD

1. Where openings are made in conjunction with cave-in, plumber's trench, Water Department, utilities or any other reason where we extend an existing opening, state reason under "Remarks" on paving record. Otherwise, a visit must be made to the job site to determine reason for opening.

2. Fill in complete card including "Asphalt thickness" and depth of trench below concrete base.

3. Where openings are made in cement footway, include "Block Size" measurements. Very important.

4. Never assume the paving record has been completed when you relieve another crew unless he turns record over to you for submission.

5. State exact size of all openings. Where openings are larger than specified in Foreman's Handbook, state reason. All sizes of openings will be recorded again by Inspector when being paved.

   Reported 1'6" x 8'0" Actual 2'1" x 8'0"

6. When openings are odd sizes and shapes, make a sketch of opening on back of paving card.

7. Please observe surrounding area and bring to customer's attention any condition that exists prior to our work. (Cracked blocks, steps, walls, sod, etc.) Never remark to customer, "PGW will take care of it."

8. Do not commit us to restoration date. We are currently 10 weeks behind on paving.

9. If an opening is made where no paving exists, a paving record should be ininitated for "Record Only" so that future complaints will have reference to this record. Mark date of opening with an account number.

NORMAN R. DOWNEY

Revised 3-2008bb

PROBLEMS

HOMEWORK

1. Find the percentage completed if all the 6" main was installed in the east footway inside the curb line.

2. Calculate the roadway paving removal.

3. Calculate the footway paving removal.

4. Rock was found in the west footway where the 4" steel main was installed. It extended for 106'0" long and it averaged 1'9" deep. Calculate the cubic yards of rock.

5. The street crossing was in unsuitable fill and the supervisor requested sand padding. Calculate the cubic yards of sand pad.

6. If we are X-raying 25% of the job, how many joints would we have to X-ray if the complete job encompassed 48 joints.

THIRD DAY

THIRD DAY

1. Review the homework assigned the day before.

2. Explain use of Detail Main Maps

    a. Discuss the four points of the compass in relation to city streets.
    b. Describe the proper way to read a map attached to the Street Main Instruction.

3. Discuss the difference between “C” and “D” Contracts and the use of such.

4. Review the G.S. Standards in the Contract book and take a job and have the students orally order the pipe and material needed.
    a. Explain the difference between a low and high pressure service installation.
    b. Talk about different sizes of mains and service connections.
    c. Talk about how much pipe to order for a certain length of service. How many couplings.

5. Review all calculations used on the reports and paving cards.

    a. Make a diagram on the blackboard and have the class make out paving cards for footway and roadway and do the calculations in square yards.
    b. Give the students a hypothetical amount of rock to be calculated in cubic yards and then tell them to replace the rock with sand and calculate that in cubic yards using the constant.
    c. Go over the formulas used when you have more than normal thickness paving.

6. Review the use of the timesheet.

    a. Reiterate the correct usage of job codes and activities codes.
    b. Teach the necessity that careful consideration be given when using job account numbers and their subs.

7. Pass out the homework and field questions.

BB3-2008
PROBLEMS

HOMEWORK

1. By the end of the second day that the crew moved in, they had installed and backfilled 180’ of 4” steel pipe. What percentage of the 4” is installed?

2. Calculate roadway paving (Item #69) if the roadway was 18” thick and the length of the trench is 63’0” long and 18” wide.

3. Rock was found in half of the main trench. Calculate Item #96 if the average thickness was 18”.

4. Ground around all of the main inside the west curb line was found unsuitable and we had to install sand pad. Calculate Item #97 if the length of the trench was 137’0” long.

5. If we are x-raying 10% of the job, how many joints would it be necessary for us to X-ray. We are using 20’ lengths of 4” steel pipe.

Your crew number for _____ is _____.
_____ is _____.

The proper number should be used every time you fill out a timesheet. Enter crew number on both sides of the timesheet.

A. Activity Codes

01 - Shop Start Shift

Time in shop at start of shift for loading and unloading truck and gassing of vehicles and personal time. Includes time spent loading and unloading Stores trucks.

Travel Time (Codes 02 and 03)

All time spent moving to and from job site and shop, whether or not work is done at destination. (This does not include moving within a job site or within the area of an individual job.)

02 - Travel Time - Distribution Department Vehicle, etc.

Time spent traveling by Distribution Department vehicle, public transportation or walking to next job.

03 - Equipment Breakdown Delay

The time spent when the crew, Dump Truck Operator, Equipment Operator, Welder, Pressure Force Crew or Dripman has to wait for equipment repairs or equipment is not available. The delay can occur in the shop, enroute to a job or while at a job site.

04 - Shop - End Shift

Time in shop at end of shift for loading and unloading truck, time used for personal, vehicle clean-up and gassing of vehicles.

05 - Weather Delay

Time when work can not be performed because of inclement weather. This includes interruptions and delays of work on the street when the crew is ready to work and the time when "held" in the shop specifically because of weather conditions.

06 - Stand-by

The time when the crew is available and ready to carry an assignment, but can not do so because of conditions (other than weather). Such conditions include CGI, wrong address, awaiting job assignment, job location obstructed. Lack of materials etc. This delay can occur in the shop, enroute to a job or while at a jobsite.

07 - Job Time

Time spent in performance of activities chargeable to a productive time account - including inspections, investigations, training, instructional and Foreman's meetings, operating, maintenance and repairs, those actions which in themselves contribute to the accomplishment of the job.

08 - Other Non-Job Time

Time which can not be specifically charged to any of the above categories. Includes Union Business, etc., excludes meal period.

09 - Meal Period

Time spent in eating their meal.

10 - Weather Allowance

Time which workers are paid even though they have been sent home because of inclement weather.

11 - Travel Allowance

Time workers are allowed for traveling to job when they are required to report within a two (2) hour period after notification for work outside of their scheduled working hours.

Title - The employee's Job Classification using the initials or code from the following list:

GF	General Foreman	**SPR**	Senior Pressure Mechanic
DF	Distribution Foreman	**PRM**	Pressure Mechanic
SPM	Senior Pipe Mechanic	**PRC**	Pressure Controller
PM	Pipe Mechanic	**MH**	Mechanics Helper
CO	Compressor Operator	**DPS**	Distribution Pressure Specialist
SDW	Senior Distribution Worker	**DI**	Distribution Inspector
DW	Distribution Worker	**MEO**	Mobile Equipment Operator
W	Welders	**DTO**	Drip Truck Operator
SMO	Senior Mobile Equipment Operator	**MCM**	Manhole Construction Mechanic
PRF	Pressure Foreman	**SMCM**	Senior Manhole Construction Mechanic

Timesheet Data - Cont'd

C. Job Code Numbers

The following tables show the Job Categories to be included in the Work Measurement Program. Jobs which do not appear in these pages will be considered unmeasured for this program.

Other Work Categories

Work Category	Unit	Job Code #
Planned Surveys - Check with Combustible Indicator	Block	100
Street Leak Procedure Gas Leak		
Investigate and Pinpoint to Determine Cause	Investigation	102
Recheck when assigned as a job (recheck after repair is changed to the repair)	Recheck	103
Hole Dug - No Leakage Found	Hole	104
Ventilate Only	Occurrence	105
Foreign or No Odor	Job	106
Foreign Construction Visits	Job	107
Investigation of Structures (Underground Street Troubles)	Job Visit	110
Pumping Drips, All Drips (Drip Truck)	Job Visit	112
Test Holes	Hole	113
Repair Services - less than 3 feet of repair - temporary or permanent	Repair	117
Cut, Test and reconnect service. Also use for BPTO to remove stopper and enlarging tap holes.	Service	119
N.P.S.O.		
Excavation Required	Service	120
No Excavation Required	Service	121
Abandon Service	Service	122
Repair Front Foundation Wall Because of Water Leak	Each	123

Adjust, Replace or Clean Out Service Box	Box	124
Service Renewal - 1-1/4"	Service	129
Service Renewal - 2" and Larger	Service	130
Main Repairs - 8" and Smaller Permanent Repair - Sleeve	Job	137

Permanent Repair - Cutout	Job	138
Temporary Repair	Job	139
Adjust, Replace or Clean Out 201, Buffalo Box or Drip Box		
With Paving	Box	141
No Paving	Box	142
Replace or Repair Drip Rod (Includes Setting Box)		
High Pressure & Intermediate Pressure	Job	143
Low Pressure	Job	144

Repair Joints Externally

	Install or Replace Bell Joint Clamp Unit (Per Clamp)	Other Than Bell Joint Clamp Unit (Per Joint)
10" and Smaller	145	146
12"	147	
16"	149	
20"	151	
Larger than 20"	153	

Encapsulation

	Unit (Per Encapsulation)
10" and Smaller	148
12" and Larger	150

New 1-1/4" Service

Regulated	Service	155
Unregulated	Service	157

Main Additions 8" and Smaller
Job Length Over 20'

Steel Main	Per Foot Laid	164
Plastic Main	Per Foot Laid	165

Service Renewals for Plastic Inserts

Service Renewals 1" Plastic Inserts	Service	168
Service Renewals 1-1/4" and 2" Plastic Inserts	Service	169

Main Replacements 8" and Smaller
Job Length Over 20'

Steel Main	Per Foot Laid	172
Plastic Main	Per Foot Laid	180

Other Capital Work

Contract Tie-in and Gas Out - 8" and Smaller Main	Job	190
Excavation of 8" and Smaller (Less than 20 Feet)	Per Foot due	200
Welding Circumference Welds	Per Weld	300
Welding Threadolets and Weldolets	Per Weld	301

Revised 11/16/98

Timesheet Data - Cont'd

D. Crew Classifications

1. Day Station - All crews which start from a Company location between the hours of 6:00 a.m. and 11:59 a.m., Monday through Saturday (except holidays).

2. Job - Crews which start from a job location, regardless of the time. These crews may or may not be provided with mobile equipment.

3. Out-of-Hours - All crews (working from a Company location) which start work between 12 noon and 5:59 a.m., Monday through Saturday or at any time on Sunday or holidays.

4. Others - All groups not covered above regardless of starting time or location, i.e., Dripman, Dump Truck Operators, Mobile Equipment Operators, Scheduled Survey Crews, Watchman, Welders, etc.

E. Shift Codes

Key:

7-	7 AM	2-Man Wagon
7	7 AM	3-Man Wagon
e	8 AM	2-Man Wagon
K	8 AM	3-Man Wagon
A	8 AM	4-Man Wagon
Z	2 PM	4-Man Wagon
3	3 PM	4-Man Wagon
T	5 PM	4-Man Wagon
H	11 PM	4-Man Wagon
C	7 AM	Cart

Revised 10/16/98

FOURTH DAY

FOURTH DAY

1. Review the homework assigned the day before.

2. Review paving cards.

3. Review timesheet use.

4. Review account numbers.

5. Review material orders.

6. Review paper transaction procedure.

7. Review stock transfer order.

8. Review calculations.

9. Display imaginary jobs on blackboard and solicit individual answers. Correct when necessary or work out on the board when answer is questioned.

10. Pass out homework.

PROBLEMS
HOMEWORK

1. Order material for main and services of the attached job.

2. The job is completed and you have 21’ of 2” X-tru coated pipe, 1 sheet of rock shield, 10’ of 3” priter coated pipe and 1 roll of 3” Polyken tape left over. Make out necessary orders to have this material returned to the storeroom.

3. Make out a paving card for the footway assuming they are five x five blocks and that you have a two-foot grass plot at the curb.

4. Make out a timesheet for yourself for today’s date. You left the job at 2:30 p.m. to visit the Dispensary to be fitted for safety glasses.

5. We found rock in 83 feet of them 2” steel main trench. Average depth of the rock was 1’3”. Calculate the amount for Item #96.

Drawing

3X - 2235

FIFTH DAY

TESTING DAY PHASE 1A

FIFTH DAY

1. Review the homework assigned the day before.

2. General review.

3. On or about 2nd hour of day start test.

TESTING PHASE 1A

The test that takes place on the fifth day of the first week is a written test and should include the following:

1. A job issued on a Street Main Instruction form along with a single-line drawing showing the limits of the job.

2. Order material for delivery to the job site.

3. Order material returned from the job site.

4. Transfer material from one job to another.

5. Issue a paving card.

6. Make a timesheet.

7. Do calculations to report quantities involving:

    a. Percentage
    b. Square yards
    c. Cubic yards
    d. Circumferential measurement for pipe diameter
    e. Fill dirt required around main

FIRST DAY

PHASE 1B

DISTRIBUTION INSPECTOR TRAINING SCHOOL

PHASE 1B

FIRST DAY

1. Review of the Project Document

   a. Define the difference between the two types of projects, "C" and "D". The "C" contract book covers the installation of 16" and smaller gas mains and services at unspecified locations in the City of Philadelphia. This project is primarily designed for new business and RDM. The "D" contract is usually for 20" pipe and larger, regulator stations or a difficult or unusual type job which could not be installed under the "C" project.

   b. Definition of Terms

      1. Engineer (Inspector) is the company's representative or the supervisor in charge of the work. He will make, whenever possible, make all decisions as far as interpretation of the job or the "C" contract.

      2. Contractor is the party of parties proposing to perform or performing the work specified. He is required to perform exactly as both the general and special specifications are outlined in the book.

      3. Company is the Philadelphia Gas Works and is the owner and operator of this municipally-owned utility.

      4. Construction Inspector is the company's representative on the job eight hours a day on one individual job.

Distribution Inspector Training School 1B
First Day

c. Review the general conditions of the project covering items 3.1 to 3.15 in the "C" contract book.

d. Review the general specifications of the project covering items 4.1 to 4.16 in the "C" contract book.

e. Review the special specifications of the project covering items 5.1 to 5.7 in the "C" contract book.

f. Review of drawings and standards in Part 6 of the "C" contract book.

g. Review of Street Main Instruction, line sketches and W series drawings.

2. Instruct the proper usage of the bi-monthly report which includes the cover sheet, written report and work quantities completed. Introduce the use of the contingent work authorization and contingent work quantities completed. Explain where and how to submit the back-up figures. Every report should be accompanied by a chart, copies of material orders, paving cards (if necessary), a paving and tie-in sketch. Explain the use of the white, pink and final copy of the bi-monthly report.

    a. Explain the use of the log book.
    b. Instruct the correct use of the service card.
    c. Show how to sign off the job instruction.
    d. Describe the use of the accident reports; both personal and property for record only because of contractor inflicted.

Distribution Inspector Training School 1B
First Day

e. Review the repaving report. Explain the proper procedure to fill in blanks on written report and the use of paving sketches and the pink copy of the report.
f. Review the proper procedure to issue a final report.
g. Stress the conditions of the job when you leave it as far as tie-in is concerned. Make sure the pipe is properly aligned, the use of placing discs and the installation of linestoppers by the contractor on dead main for use by PGW at a future date.
h. Review the importance of agreement on pipe lengths with contractor foreman and the field draftsman.
i. Review the procedure used when the job is completed as far as items and quantities are concerned. PGW never gives them anything written, just verbal.

MATERIAL NEEDED FOR DISTRIBUTION INSPECTOR TRAINING SCHOOL

1.	Red Manila Folder	1	
2.	Current C Project Specification Book	1	
3.	Material Issue Forms (Stamped "Project")		10
	a. 1" – 1 ¼" Steel	10	
	b. 1" – 1 ¼" Plastic	10	
	c. 2" Steel	10	
	d. 3" – 6" Steel	10	
	e. 8" – 20" Steel	10	
	f. 4" – 8" Ductile Iron	10	
	g. Miscellaneous	10	
4.	Material Return Forms (Stamped "Project")		
	a. 1" – 2" Steel	10	
	b. 3" – 6" Steel	10	
	c. 4" – 6" Steel	10	
	d. Miscellaneous	10	
5.	Pencil Carbon	5	
6.	Stock Transfer Forms	10	
7.	Inspector's Weekly Reports "C" Project	3	
8.	Contingent Authorization	3	
9.	Contingent Work Report	3	
10.	Service Cards (Stamped "Project")	5	
11.	Timesheets	11	
12.	Accident Report (Property Damage)	2	
13.	Accident Report (Personal Injury)	2	
14.	Paving Cards (Stamped "Project")	12	
15.	"537" Orders	5	
16.	#2 Pencils	3	
17.	Copy "Standard Arithmetic Computations"	1	
18.	Copy "Fill Dirt Required"	1	
19.	Telephone Sheet	2	
20.	Paving Sketches	3	
21.	Log Book	1	

SECOND DAY

DISTRIBUTION INSPECTOR TRAINING SCHOOL
PHASE 1B
SECOND DAY

1. Review the use of the service card, stressing the following points:

   (a) Correct address (two, if necessary, when you have a house fronting on one street but the service entering the building from another street)

   (b) Make sure the account number in the lower left-hand corner is correct as well as the subaccount number.

   (c) Make a sketch on the back of the service card for any service not running straight from main to house.

   (d) Stress the section on corrosion protection and emphasize the importance of checking every block.

   (e) Talk about the totaling of service cards, lengths and number, and giving same to field draftsman for calculation and tape.

2. Review the use of the timesheet

3. Review the use of the paving cards for both footway and roadway.

4. Review the use of contingent reports

   (a) Issue field authorization form and the reason for same.

   (b) Issue work quantities report for contingent work completed.

   (c) Review list of contingent items, stressing the fact that in most cases the equipment costs include the operator.

Distribution Inspector Training School
Phase 1B

5. Discuss field check of job sites

   (a) General location of structures to be installed. Contractor foreman and Distribution Inspector are to visit the job prior to moving gang in and contact builder or his representative to determine location of service, check for completion of water and sewer installations, three-foot clearance to electric panels, etc.

   (b) Make sure that the ground is in an almost finished grade state and if you do not have any curbs or manholes, you have to have stakes supplied by the builder at least every fifty feet apart for line and grade.

   (c) Check with builder or his representative where he would like us to start so as to coincide our work with his building operations.

   (d) Dig test holes where necessary, expose existing structures in large enough space to determine proper line-up.

   (e) Test ahead of pavings before tying in.

   (f) Make sure it is a simple tie-in for PGW crew.

   (g) When issuing tie-in sketch, show foreign structures if present and any other pertinent facts.

   (h) Order all material (24-hr. delivery)

   (i) Examine for trees that will require feeding and/or pruning.

Distribution Inspector Training School
Phase 1B

6. Discuss a general outline of on-the-job duties

   (a) Check ditch layout to be sure you are not interfering with obvious foreign structures.

   (b) During excavation you, as the Inspector, are to check condition of soil for possible sand padding, depth and trench bottom.

   (c) Check pipe joints by any method, observe installation of Dresser, mechanical or Posi-hold joints by qualified fitters. When the joint is welded by a qualified welder, you order X-rays for the required percentage and more if necessary.

      1. Check welder's card to make sure he has been tested recently. Also, if the pipe is 12" or larger, there must be two welders and they must be passed to weld 12" or larger pipe within the past six months.

      2. How to order X-ray technician with a 537 and what information to put on it.

      3. Method of reporting X-rays on report, results of and percentage.

      4. Procedure for repairing welds and the re-X-raying of same.

   (d) Testing procedures. Outline the steps of each type of test and where necessary.

      1. Soap and water test

      2. Hydrostatic test where required. For risers and special jobs.

Distribution Inspector Training School
Phase 1B

3. Halogen test

4. 24-hour stand-up test including gauges and charts

You have to stress the fact that two tests are necessary for every job unless otherwise directed by supervision.

(e) Discuss coating procedures

1. Explain the need for jeeping all coating before installing pipe in the trench. The pritex coated pipe as well as the welded joints.

2. A visual inspection of the coating and the mold before backfilling.

3. Make sure that all valves that are coated with waxtape should be free after he coating has hardened.

(f) Discuss pipe laying procedures

1. On undisturbed ditch bottom (stress no blocks). Emphasize the visual inspection constantly by the Distribution Inspector to make sure the trench is not excavated too deep.

2. Proper alignment of pipe especially at the tie-in ends, but also where the contractor has to connect to ahead-of-pavings so there won't be any strain.

Distribution Inspector Training School
Phase 1B

3. Review drip procedure. All services must fall toward main and the main should fall toward the lowest tie-in.

4. Backfill material and compaction. Talk first about the type of sand or good fill recommended by the Quality Control Section and then the method of compaction described in the contract book. Stress the fact that any opening made in paved roadway must be compacted according to State and City regulations. Tell where you can use equipment to roll and compact trenches on new business jobs.

5. Clean-up of job site. Make sure all material has been credited against the job and sent back into the shop. If there is any dirt, rock or excess paving left over, it should be removed from the job site. Make sure PGW picks up all gauges and material before you leave the job site. Leave signs on all drip boxes and curb boxes and if needed, where the dead ends are if you don't have a box to denote its location. Make sure all trenches are cold patched. If you leave a job site as a completed job except for the test, you should remember to place signs on the head of every service that there is air pressure on the line and it should not be touched. Also remind the candidates that they must be present when the test is initiated and completed. Make sure all front foundation walls are repaired.

6. Review safety rules including the following:
   a. Smoking
   b. Trench protection, shoring, etc.
   c. Traffic

THIRD DAY

DISTRIBUTION INSPECTOR TRAINING SCHOOL
THIRD DAY

PHASE II

1. Following a general outline talk about the duties of foreign construction inspection. This talk will include the following:

   a. General duties

   b. Areas of assignment

   c. One Call System

   d. Review of detail and general main maps especially noting such things as

      segregation lines and cathodically protected systems.

   e. Review of materials and tools needed by an inspector.

   f. Special duties

   g. Slope lines and contractors' responsibilities to protect our structures.

   h. Forms

      1.) Foreign companies underground construction inspection.

      2.) Foreign construction accident report.

DISTRIBUTION INSPECTOR TRAINING SCHOOL
THIRD DAY

Phase 1b

1. Review time sheet
2. Review paving cards
3. Review service cards
4. Review calculations
5. Review the complete written report
6. Review the use **FOR GAS READINGS and** use of the log book.
7. Review the procedure for signing off the street main instruction.
8. Review the use of contingent reports (Authorization and written reports).
9. Review job examples and order material and give every candidate a section to be compared in class.

INSPECTION OF FOREIGN CONSTRUCTION

DISTRIBUTION INSPECTOR TRAINING SCHOOL
THIRD DAY

PHILADELPHIA GAS WORKS

DAMAGE PREVENTION PROGRAM

John Jolly
Revised 5/26/06
JJ/cc

DAMAGE PREVENTION PROGRAM (DPP)

TABLE OF CONTENTS

Mission Statement

Prevention of Damage to Pipeline Facilities

Damage Prevention Program Procedures

Pipeline Patrol Procedures
Pipeline Patrols

Procedure on Underground Street Troubles that
Affect PGW Company Structures

Special Instructions

Distribution Department Bulletin #198 – PGW Use of Directional Drilling to Lay Mains or Services

Distribution Department Bulletin #201 – Damage Prevention Policy Regarding Trenchless Technology Operations in the Vicinity of PGW Structures

G.S. Standard 40.7 – Clearance of Foreign Structures

G.S. Standard 53.0 – Damage Prevention Instructions

Distribution Department Damage Prevention Program Brochure

DAMAGE PREVENTION PROGRAM

Mission Statement

- To remain in full compliance with all federal and state requirements for damage prevention.
- To be a member of the Pennsylvania One Call System, Inc. and to participate actively in public and contractor awareness education programs, promoting safe digging practices and the use of the one call system.
- To assist contractors with timely and accurate mark-outs and to communicate effectively.
- When time permits, offer safety rechecks on on-going job sites.
- To observe contractor activities when necessary and to offer assistance to safeguard PGW facilities during construction.
- To communicate the need for a shared responsibility/partnership among the excavation community to dig responsibly, minimize costly delays, environmental damage, property damage and personal injury.

PREVENTION OF DAMAGE TO PIPELINE FACILITIES

Excavation, Demolition and Blasting

PGW is a member of the Pennsylvania One Call System. PGW actively participates in and sponsors contractor awareness events in the Philadelphia area. Upon receipt of notice of excavation, demolition or blasting, the location of pipeline facilities shall be determined and an inspector shall be dispatched to the work site as required, to mark the location of pipeline facilities. On major construction or where important pipeline facilities may be affected, a supervisor shall determine the need to assign a full time inspector during the period of construction.

In addition, in conjunction with inspections at all natural gas gate stations (normally made once each shift, seven days a week), the employee making such inspections shall, to the extent practicable, travel the route of natural gas supply lines.

Wherever pipeline facilities are or may be endangered, the appropriate supervisor shall be promptly informed. The supervisor shall institute necessary action such as patrolling, supporting, replacing, relocating or removing from service the affected facility.

Upon receipt of notice of blasting or implosion, the maintenance supervisor shall determine the need for a leak survey, both prior and after blasting, based on the vicinity of PGW facilities. The Philadelphia Fire Marshall's office notifies PGW of any permits extended to contractors for blasting.

Failure of Other than PGW Underground Facilities

Upon receipt of notice of water and sewer system failures, or surface conditions, such as cavities or cave-ins which may be caused by such failures, the location of pipeline facilities shall be determined. Where pipeline facilities may be affected, appropriate personnel shall be dispatched promptly to determine the effect of the failure on pipeline facilities. Inspection and necessary follow-up action shall be in accordance with the "Procedure on Underground Street Troubles that affect PGW Company Structures" as set forth in the Distribution Department Supervisor's Handbook and referenced at the end of this document.

DAMAGE PREVENTION PROGRAM PROCEDURES

OBJECTIVES

The main functions of the Foreign Construction Inspector are:

1. To inspect foreign construction activities for the main purpose of protecting PGW underground structures.

2. Communicate with contractors or builders and give them proper and accurate information concerning PGW underground structures. Properly mark all PGW structures in the vicinity of contractor's work.

3. Keeping the PGW area Supervisor apprised of conditions found in the field concerning all known foreign construction activities.

4. Keeping their daily route sheet (Form M-6299 - attached) up to date, recording the progress of all current jobs covered daily in his/her district and guide the PGW watchman on the construction sites.

5. They must be completely familiar with the Distribution Department detail main maps, general main maps, IBM service cards and UFD service lists.

6. They must be completely familiar with and advocate the current PA One Call "Act".

7. **Perform weekly patrols along the route of all transmission mains and other critical pipelines in the Distribution system. Records of activity will be noted on the Natural Gas Activity Report (Form 6300 – attached).**

EQUIPMENT

The Inspector should have available at all times such items as:

1. POCS tickets
2. PGW DMM maps
3. Service list(s)
4. Flashlight
5. 6' rule and measuring wheel

6. Several cans of yellow paint and yellow keel crayon
7. Wax sealant and wrap*
8. Line locator (when needed)

*Wax wrap should not be given to any contractor.

PRIORITIZATION

The inspector will cover a variety of foreign construction jobs and should prioritize the work. The following priority list should be used as a guide. The Inspector must use good judgment to plan the workday and accomplish company goals.

1. Visit all Pennsylvania One Call Notice locations on time.
    - Dig-up: Immediately
    - Emergency: within two (2) hours
    - Demolitions: Same day
    - Routine: Within two (2) working days of the POCS notification Insufficient notice: As soon as possible, maximum within two (2) working days of the POCS notification.

2. Re-visits to on-going jobs with watchman.

3. Re-visits to on-going jobs without watchman, particularly any jobs in which PGW facilities will be undermined, in order to report and/or recommend replacement or protection to his area supervisor.

4. Visit any contractor who you suspect has not called in. An Inspector must provide him/her with a copy of the current "Act" and advocate the use of the system.

5. Visit any underground street trouble encountered and report the same on form M-6299 and 6698 (attached).

6. Perform patrols once a week along the route of all transmission mains and other high pressure mains that have been identified as critical structures.
(See instructions for Natural Gas Patrols.)

GENERAL INSTRUCTIONS

Plan the work. Call contractors to schedule large quantities of mark outs or to seek clarification. **Do not assume.** Inspectors must be alert and ready to volunteer information concerning PGW structures to all contractors or jobbers that are excavating whether notice was received or not. The Inspector will advise all excavators of their responsibility under the One Call Act and inform them to call the Pennsylvania One Call System.

The Inspector should be acquainted with the correct and various methods of shoring and sheathing used by the contractors and whether the shoring is suitable for the protection of PGW underground structures. Be aware of insufficient shoring which could potentially cause failures to PGW facilities. There are many danger signals the Inspector should look for on his tour of inspection:

1. Parting of footway from the curb.
2. Parting of footway from the walls of buildings, front steps or other building appurtenances.
3. Splitting or cracked roadways.
4. Lack of support for company structures

These signals should not be ignored. The Inspector should, when he finds such conditions, observe the service pipes at the front foundation wall for any pipe movement or disturbance of wall surface around the head of the service. If such conditions are encountered, notify the district supervisor. Certain excavations should be carefully inspected after heavy rainfalls, looking for trench erosion and when found; it should be brought to the attention of the contractor, City Inspector and the PGW district supervisor.

Shallow PGW structures should be carefully watched. Heavy equipment will not be permitted to traverse over any shallow gas pipes.

Undermined gas mains will be reported immediately to the PGW district supervisor. Slope lines shall be carefully watched; 2'-horizontal for every 1'-vertical.

Wherever a transmission main or distribution pipeline operating in the 35# system or higher and district regulators are involved, an inspector must inform the district supervisor immediately who will take the appropriate action.

Machine excavation in the area of district regulators is prohibited. The district supervisor will be notified immediately of any activity in the area and outside control should be appraised by the pressure supervisor. All excavations within the slope line (1' vertical x 2' horizontal) of a transmission pipeline must be monitored.

Any trenchless technology operation which may be in proximity of PGW structures requires close attention by the inspector. This must be brought, verbally, to the attention of the district supervisor who will plan a course of action which should include a watchman or an Inspector's observation. Use of trenchless technology is prohibited near a transmission main without the approval of the Manager of Distribution.

When a hydra hammer or steel ball is used for breaking paving, consideration will be given to the type of main (steel or cast iron) and depth of same. Any contractor using a Vermeer trenching machine must be strictly enforced to comply with the 18" tolerance zone. Consider requesting a watchman.

Mains and services under cathodic protection will require special attention to avoid damage to wires as well as coating. Coating damages on gas mains when found should be measured accurately and a 537 order issued for immediate repairs.

Contractors working in deep and unshored excavations should be brought to the attention of the PGW district supervisor.

When damages to PGW structures are encountered, a PGW Facilities Damage Report will be issued by the Inspector whether or not an OAR is issued giving the date,
contractor, exact location of the damage, and type of equipment used and the type of construction in progress. Notify the district supervisor for possible OAR. Remember, the supervisor only, has the authority to issue or absolve an OAR. The inspector is primarily responsible for an accurate detailed report as to what happened.

PIPELINE PATROL PROCEDURES

When performing a pipeline patrol you should be looking for any activity of changes in the environment that could affect the safety of the pipeline. An activity or changes found **must** be reported to the area Supervisor immediately and documented on Form #6100, Transmission/Natural Gas Patrol Activity Report. The area Supervisor will immediately investigate and start remediation procedures if necessary and report his findings to the General Supervisor of Distribution Maintenance. The following is a sampling of items you should report or act upon.

- Any excavations (including backfilled openings that you may not have know about), grading, demolition, or other construction activity which could result in damage to a pipeline, loss of support due to settlement or shifting of soil around a pipeline, undermining or damage to a pipeline support, or loss of cover or excess fill.

- Atmospheric corrosion or physical deterioration of exposed pipe, pipeline, spans, and structural pipeline supports (such as bridges, pilings, headwalls, casing and foundations).

- Land subsidence, earth slippage, soil erosion, extensive tree root growth, flooding, climatic conditions, soil accumulation and other natural causes that can create additional external loading.

- Damage to pipeline markers, the need to replace them, or add additional pipeline markers. (Look to see that emergency contact information is clear and visible.)

- Changes in population density. Look for new buildings being built, day care centers or schools being opened, new housing complexes being built.

- Evidence of vandalism or tampering or damage to the pipe.

- Encroachment of buildings or other structures on pipeline right-of-ways.

- Any abnormal or unusual conditions.

- The Distribution Foreign Construction Inspector will perform pipeline patrols weekly. Attached is a list of patrol route maps and the area Inspector responsible for the patrol.

PROCEDURE ON UNDERGROUND STREET TROUBLES THAT AFFECT PGW COMPANY STRUCTURES

The kind of underground street troubles, about which the following statement deals, are those evident underground troubles usually brought to our attention due to a condition observed on the street surface; or, as a result of a condition we encounter in the performance of our work but not caused by our own work. These underground troubles are:

1. Water leaks from either water mains or water services.

2. Sewer system faults. These may be either visible sewer system failures or any of the following which may be the effect of a sewer system failure: cavity, cave-in, or a paving fault such as a surface crack, settlement, depression, etc.

3. Surface faults in paving caused by settlement in "area" fill or settlement caused by poor backfill over underground structures.

I. General Dispatching Procedure

A record of all such troubles whether the result of a telephone message or an observation on the street is to be issued in duplicate on Form 6698, "Underground Street Trouble Report", and given immediately to the Dispatcher. A report of a gas leak at the same location where there is an underground street trouble requires that the gas leak be recorded on Form 63360, "Street Leak

Order", which will be accompanied by reports on Form 61700, "Street Leak Progress Report". When combination gas leak and underground street trouble occurs simultaneously at the same location, the original of each order should be referred to the other.

It is important to emphasize that every complaint of underground street troubles must immediately be brought to the attention of the Dispatcher in the same way that gas leaks are.

The decision about whether to dispatch such troubles to either a gang or a supervisor or both depends on the judgment of the Dispatcher. From the description of the trouble, the general factors that affect his decision are:

1. **Origin of the Notice**

   a) POCS Notice – These notices can be handled by an Inspector during normal working hours. They will in turn initiate a Form 6698. They will also notify the Dispatcher if the Situation warrants an immediate visit of a Distribution crew and/or supervisor.
   If the Inspector can determine at the time PGW is not involved due to the distance of our structures from the UST and the containment of the UST problem, the job may be finaled at this point.

   b) Direct call from the City, Police, Fire, Water Department, Highway Department, etc.

   c) PGW employee observation.

   d) Other utility or customer.

2. The magnitude of the underground trouble. For example, the answers to any of the following questions may be important leads to help the Dispatcher formulate his decision.

a) In the case of water leaks:
- ❖ Is the volume of water described?
- ❖ Is the paving surface disturbed?
- ❖ Is earth being washed to the surface or through underground ducts in the form of mud?

b) In the case of cavity or cave-in:
- ❖ Is the depth or size described?
- ❖ Is the affected paving surface area described?

c) Have there been numerous complaints of either kind of case in a short period of time?

3. The distance of PGW company structures related to the underground trouble.

a) Is there an opening so that gas can escape?

b) If a cavity is suspected and there is no surface evidence of water,

is there an audible flow of water?

c) Are any foregoing descriptions accompanied by statements of poor water pressure?

4. Reports that a gas odor is also noticeable or that a gas main is visibly affected.

The above limited number of factors is not given to influence the Dispatcher's
decision about how quickly one should dispatch such an order as these troubles are to be treated with the same attention as gas leaks, but to illustrate what emphasis to dispatch the complaint.

The above statements cannot cover all the factors that can endanger PGW company structures. The purpose in stating the few conditions above is to set a minimum formal procedure, and to give those responsible for dispatching to follow. It will be our practice to continue to notify the appropriate City agency and/or other local utilities which may also be affected by the underground street troubles that come to which has been discovered.

II. Dispatching/Auditing Procedure

A. Order Initiation Procedure

1. POCS Notice

a) Normal Working Hours
POCS notices for UST activities will be dispatched to Foreign Construction Inspectors. They will in turn determine the need to initiate further investigation by a crew and/or Supervisor. They will issue a Form 6698 for the visit.

b) Out-of-Hours
Dispatch to a crew as soon as possible. If not, hand the notice to the POCS clerk the next day marked "incomplete".

2. All other initial orders are to be made in duplicated by the receiving Dispatcher.

3. Any orders which are not initiated by the City must be reported to the proper City agency. If another utility is also involved the Dispatcher must notify that other agency. This shall be logged in the appropriate notification book.

4. The original order shall be sent to the assigned crew for an initial visit report.

5. The duplicate will be placed in the open underground street troubles file.

II. Dispatching/Auditing Procedure (cont.)

A. Order Initiation Procedure

6. When the initial visit report is returned by the Foreman, the duplicate can be discarded. This initial visit report shall be audited using the same methods as street leak orders and placed in the open UST file.

7. When an initial visit report is received from a Foreign Construction Inspector the auditor shall proceed to perpetuate the next or final the job.

B. Order Perpetuation Procedure

1. When auditing the initial report, note the important information which has been recorded by the Foreman in order to determine the next step to take. Look for key indicators:

a) PGW involvement
b) Distance of the problem to PGW structures
c) Undermining
d) Status of the UST repair
e) Leak associated with the problem

The auditor should stamp and date the completed UST form and choose an appropriate re-inspection date based on the information given. The auditor will stamp the completed UST form as being rescheduled for _____(date). The auditor will then initiate a new recheck UST order transferring as much information as necessary. The completed UST will be filed in the open UST file.

Any report indicating PGW structures undermined must be referred to the Area Supervisor. This notification shall be recorded on the last completed UST report in the history pack.

The recheck UST will be mailed directly to the Area Supervisor for a report. If the Area supervisor receives a call to report to a UST, they must fill out a report with recommendations and submit the same to the auditors.

II. Dispatching/Auditing Procedure (cont.)

C. "3 Visit" Rule

Any UST history which indicated three (3) or more visits without resolve will be reviewed by the Chief Dispatcher. The Chief Dispatcher shall be responsible for the careful resolve of the job. This includes continual notifications to the appropriate City agencies and consultation with the Area Supervisors. The Chief Dispatcher will maintain and submit a weekly log of all UST jobs which are unresolved after three (3) visits (until the job is finaled). This report will be given to the Maintenance Supervisor of Distribution and the Superintendent, Maintenance and Operations, Distribution.

III. Final of UST History

A. Auditors' Finals

1. One Visit Final
   In some cases, one initial visit will be sufficient. If the report indicates **PGW not involved and UST repairs made,** the Auditor has the authority to final the job.

2. Two Visit Final
   If after two (2) visits both reports indicate no indication of any visible signs of a problem or activity and company structures are safe, the auditor has the authority to final the job.

3. Area Supervisor Final
Whenever structures were actually sited as being involved With some type of underground street problem or the auditor feels thereis a need to have a final visit by a Supervisor for final, the history will be sent to the Area Supervisor as an inspect to final. A duplicate cover will remain in file. The supervisor will review the area in question and final the history based on the information on
the history and his/her experience.

IV. UST Investigation Procedure

There can be no standard procedure that would include all the conditions that may be encountered, due to variations of conditions and other factors that in each case requires experience and good judgment. It will help to describe in a general way a few variations of conditions and list a few minimum requirements.

- Make a street check (Distribution crew only).
- In every case all manholes must be examined.

In sewer manholes, observe for such conditions as abnormal volumes of water,unusual clarity or water, or water clouded by mud or other earth content, bricks,or any unnatural debris. Unusual conditions observed in sewers, such as these specifically named above, or the existence of water, either still or running, in other manholes, indicates a suspicious condition that will require a thorough and complete investigation to determine the source of the water leak related to the point it enters the sewer system or the duct line. It is important that this point be related to the nearest PGW underground structure. The sound of running or leaking water in a drain vent, at a water stop, at a water service or a fire plug, is an almost infallible lead to important underground trouble. In the case of a cavity, the street can be sounded by simply walking the area in question and knocking a spoon bar onto the street surface.Whenever an underground street trouble is separated by a reasonable distance from our gas main or service, barholes are acceptable to determine the solidity of the foundation under our structures. The Foreman can at their discretion make an exploratory opening. To cut mains, to abandon mains, to provide bagholes and men to bag-off, and to prepare to use grease, are obvious precautionary steps to be taken when necessary. In any case of safety hazard to PGW structures, a supervisor must be notified and dispatched to the site On any kind of water leak that the shut off or reduction of water

leakage by cock or valve operation will reduce the danger to PGW company structures, we should request the Water Department to take such steps.

STEVEN A. GROEBER

APPROVED:_____
BRIAN C. SCHENK

DD/SAG/dls
Revised: 5/21/99

PGW Use of Directional Drilling to Lay Mains or Services

Directional drilling for mains and services can be a cost-effective method for laying gas mains and services, contractors are encouraged to utilize trenchless technologies. However, various issues must be reviewed prior to use of this methodology. As with all gas line installations, any construction method requires careful thought and planning. The following are factors to help determine that directional drilling is an appropriate alternative for the installation.

- ◊ Directional drilling requires sufficient clearance from structures parallel and perpendicular to the line. Any marked structure which falls within 2 feet from the drill path must be exposed prior and during installation.
- ◊ In many cases, directional drilling is used in locations requiring tracer wire. According to policy, tracer wire must be used in locations that are difficult to measure from curb lines. In these cases, PGW requires the tracer wire be placed in a ½" plastic sleeve and then taped to the main. This will protect the main and wire from damage and possible contact afterwards.
- ◊ Where tracer wire is not used, the directional drill must be equipped with a transponder indicating location and depth. The Field Drafter will capture this information for the DMM.
- ◊ Directional drilling can require unanticipated openings. In addition, the openings are left open for long periods. In many cases, in a city atmosphere, this is unacceptable.
- ◊ The possibility of damage to the pipe is a concern. The contractor and PGW Inspector must determine that the pipe does not incur any damage or stress during the operation. The proper, correct breakaway fitting must be used.
- ◊ In a notice published by the Office of Pipeline Safety, because a contractor had not exposed sewer laterals prior to crossing them with directional drilling, the plastic gas main was installed directly through household laterals. When the homeowner hired local plumbers to "clear" their clogged laterals, the main was severed and an ensuing gas leak caused an explosion at the premise.

PGW will maintain the final decision of accepting the use of directional drilling method for all contract work. All future contracts will include these requirements.

_____

STEVEN A. GROEBER
Director, Field Operations & Work Planning

APPROVED: _____

PAUL A. MONDIMORE
Vice President, Operations

SAG/dls
6/11/2003
cc: Ms. Janice Walsh
Supervisor's Handbook

DISTRIBUTION DEPARTMENT BULLETIN #201

Damage Prevention Policy Regarding Trenchless Technology Operations in the Vicinity of PGW Structures

In order to safeguard PGW structures from damage from Trenchless Technology operations, such as directional drilling, pneumatic piercing tools, pipe bursting or any similar activity, the Supervisor shall assess the particular job and provide recommendations which will ensure the safety of PGW structures.

Guidelines

1. If the trenchless technology operation comes within 18" or crosses a PGW structure, the contractor must be warned to make an excavation over the gas facility to assure its safety.

2. A watchman should be considered for such jobs to further protect PGW interests.

3. It may be anticipated that contractors will be reluctant to fully comply with PGW requirements. Upon this event, the following measures can be pursued:

   a) Notify your immediate supervisor up to an including the Manager of Distribution.

   b) Notify the Planning Section up to and including the Distribution Design Engineer to contact any city agencies or owners involved with the work.

   c) Notify the Fire Marshall's Office of PGW safety concerns. (After circumstances have been reviewed by the Superintendents or the Manager of the Department.)

STEVEN A. GROEBER

Director, Field Operations & Work Planning

APPROVED: _____

PAUL A. MONDIMORE
Vice President, Field Operations

DD/SAG/dls
12/8/2005

DISTRIBUTION INSPECTOR TRAINING SCHOOL
THIRD DAY

INSTRUCTIONS TO SURVEY CREWS

The following is a summary of what the survey crews are responsible for doing and what they are required to do when the conditions warrant:

1. Take combustible indicator, LEL scale readings from all manholes, traffic control boxes, curb boxes, vent boxes and cracks in the street.
2. Make visual observations for dead vegetation which may have resulted from a gas leak.
3. Make visual observations for water leaks, cavities, cave-ins, depressions in the roadway or footway which may affect our structures.
4. Make observations to determine if the main being surveyed is in use. Put circle around any questionable mains.
5. Visually inspect for accessability, all curb stops, where required.

When encountered, the following conditions must be telephoned to the survey clerk.

1. Combustible gas indicator readings in the following:
   a. sewer system, including vents at curb
   b. subways, tunnels and vents from such structures
   c. ductline, manholes with 76% LEL or higher
   d. buildings
   e. routes of natural gas mains
   f. PGW regulator manholes
   g. gas main valve manholes with 76% LEL or higher

Note: A house check is required when a reading is found in a water or gas stopbox or in a sewer vent.

2. All underground street troubles which could affect our distribution system.

These and all other conditions are to be recorded on your Survey Inspection Form M-6727 and turned in to your supervisor.

Telephone Number 215-684-6396 Survey Acct. No. 874430
Revised BB,1/2009 Job Code No. 100
DANIEL M. McHUGH

DISTRIBUTION INSPECTOR TRAINING SCHOOL
THIRD DAY

WINTER SURVEY PATROLS

TO: ALL DISPATCHERS AND DISTRIBUTION SUPERVISION

FROM: STEPHEN L LIPSKI, 12/2008

The General Winter Mobile Survey will begin on Monday, December 1st, 2008 at 0700 or as assigned (2200 during periods of frost). Two crews were assigned to this program and will utilize the Optical Methane Detection Equipment mounted on Van #209803 and #209903.The crews will work Monday through Friday (or as assigned) and the survey will be conducted from December 1st, 2008 through March 31, 2009. In addition the Prudent Winter Mobile Survey will be implemented during the same time period and will consist of one crew surveying the designated high-risk blocks in our system. This crew will work Monday through Friday from 12 noon to 8:30pm (or as assigned).

LEAK PROCEDURES FOR MOBILE SURVEY

- When the Survey crew finds a reading they must call in the initial reading (s) to the Dispatcher.
- The Dispatcher will respond accordingly based on the initial reported readings. As a minimum the information must be given to the On-Duty Distribution Supervisor and the survey crew will be instructed to continue with a make safe response, including an eventual block check.
- <u>If a Distribution leak crew is available</u>, they are to be dispatched to relieve the survey crew and conduct the block check, make a bar hole investigation and pinpoint the problem.
- <u>If a Distribution leak crew is not available</u> the survey crew must be instructed to conduct a make safe response, including a block check. The dispatcher and shift supervisor can make conditions safe to hold following new leak investigation procedures; however the dispatcher must initiate an “order issue “ for the next morning for a bar hole and pinpoint investigation.

- If a job is not safe-to-hold, FSD must be dispatched to assist the Distribution survey crew until a Distribution leak crew can relieve the survey crew. A shift supervisor should respond, if available.
- All reported jobs must be recorded on the DDWS beginning with the initial response times of the survey crew, relief crew, etc.
- Use symbols **WP = WINTER PATROL CREWS** AND **PWP = PRUDENT WINTER PATROL**
- If it is necessary to stop either of these surveys, for any reason, the on-duty dispatcher must submit a detailed written report to Stephen Lipski**.**
- The Survey clerk will enter all entries in the Auditors book for all initial Survey leaks.
- On all orders initiated by the Prudent Winter Patrol that require additional work or monitoring, an order to work shall be issued and given directly to Stephen Lipski for his review.
- After Supervision's determination the order will be worked or put on a recheck schedule based on Distribution Department Bulletin # 126 (Investigation and repair of Underground Gas Leaks). All recheck orders will be given to the Prudent Winter Patrol crew to update biweekly.

S.L.11/2008

WINTER SURVEY PATROL INVESTIGATION PROCEDURE

1) Follow Heath Omd Operating Procedures found in chapter Iii, Pg. 9-15 in The Omd Instruction Manual.
2) Make an area check to confirm readings with a Combustible Gas Indicator.
3) If reading is confirmed make a complete street check and notify the Dispatcher of your findings. If the readings that you pick up are hazardous notify the Dispatcher immediately so he/she can provide you with FSD, Supervision or a Crew as appropriate.
4) Follow Emergency Response Procedures as instructed in the Foreman's Handbook Section I. If readings or odors are intense, concentrate on Make Safe Procedures, protecting people first then property.
5) Fill out a Street Leak Progress Report recording your investigation.

RECORD KEEPING – WINTER PATROL

1) Use Survey Inspection Sheet (M-6727) - in the upper left hand corner mark "Winter Patrol Survey" (See sample).
2) Indicate mileage at beginning of shift and end of shift.
3) Prescribed speed of the patrol shall be 10-20 mph.
4) Record leaks based on combustible indicator readings only.
5) Use the Assigned General Main Map Book traversing North and South Streets and the East and West Streets. Color in the streets that are completed marking the date next to the color.
6) If you complete the assigned area prior to March 31st resurvey The area again using a new set of maps

   Blue = Sunday
   Yellow = Monday
   Pink = Tuesday
   Green = Wednesday
   Orange = Thursday
   Purple = Friday/Saturday

7) The timesheet and route sheet shall be signed by the Dispatcher on duty, at the start and at the end of the shift. The paperwork will then be forwarded to the General Supervisor in charge of survey for review.
8) Change of job codes shall be recorded properly so survey time can be isolated from investigative time.
9) Leave the Map Book in the General Supervisor's office each night.

RECORD KEEPING – PRUDENT WINTER PATROL

1) Use Survey Inspection Sheet (M-6727) - in the upper left hand corner mark "Prudent Winter Patrol Survey" (See sample).
2) Indicate mileage at beginning of shift and end of shift.
3) Prescribed speed of the patrol shall be 10-20 mph.
4) Record leaks based on combustible indicator readings only.
5) Refer to Plotted General Main Maps for routing of work.?
6) Use assigned list of high risk blocks indicating the date and your signature next to each block surveyed also indicate if readings were picked up.
7) When list is completed continue to resurvey list on a rotating basis.
8) The timesheet and route sheet shall be time stamped and signed by the Dispatcher on duty at the start and at the end of the shift.

9) The paperwork will then be forwarded to the General Supervisor in charge of survey for review.
10) Change of job codes shall be recorded properly so survey time can be isolated from investigative time.
11) Leave the assigned list, any street leak progress reports and your timesheet in the General Supervisor's office at the end of each night.

DD/SAG/vgm

Supplemental Safety Surveys for Winter Frost Conditions

From: Steven A. Groeber, PE
To: Paul Mondimore
Date: 10/20/2008

In anticipation of the PUC request for Supplemental Safety surveys due to cold weather conditions, Distribution Operations recommends the following.

PGW will again conduct two additional winter surveys. The General Winter Patrol Survey targets broad areas of the city, predominantly cast iron. The Prudent Winter Patrol Survey targets main segments identified for future main replacement.

Winter Patrols

General Winter Patrol Survey – December 1st 2008 to March 31st 2009 – OMD survey will be conducted in areas of cast iron concentration from 0700 to 1530. Starting times will change during all frost events and 7 days after all frost events to 2200 PM to 0630 AM.

Prudent Winter Patrol Survey – Initial top 300 blocks throughout the city will be OMD surveyed from 12 PM until 8:30 PM during all frost events and 7 days after all frost events.

Three vans will be equipped with Optical Methane Detection Equipment and set at a minimum alarm of 50 PPM. All readings encountered will be investigated by conducting a walking survey of the entire block. All normal leak investigation procedures (Foreman's handbook, Section 1, or the new leak procedures) shall be followed.
PGW walking surveys will continue throughout the winter period as conditions allow. This survey is also scheduled to occur in areas of high cast iron main concentration.

Procedures for conducting PGW Leak Survey

PGW conducts leak surveys according to schedules outlined in the Inspection and Maintenance Plan guidelines. Walking (Footways) and Mobile (Roadways) is the method of choice to conduct surveys. A GDI capable or reading 50 PPM or

Flame Ionization units are used in the Walking Survey. An Optical Methane Detector of Flame Ionization instrument is used for the Mobile Survey. All of these units operate in PPM. The following are minimum requirements to be carried out by the assigned inspector and helper. The inspector is ultimately responsible for the conduct of his/her crew and completion of the assignments.

GENERAL DUTIES

1. Check instruments daily to assure they are calibrated and operating properly, follow the manufactures requirements for checking and replacing the batteries and filters.
2. Before starting a block, read the map and the service information. This will offer valuable information such as the size, material, age, pressure and location of the structures that you are surveying. When completed the block, sign off the map and the service records.
3. While conducting a Walking Survey place the probe 0 to 2 inches above the surface and with a sweeping motion go over all structures in the footway such as curb boxes, water boxes, vent boxes, manholes, cracks, curbs, etc.
4. All gas structures such as PGW mains, services, valves, etc. that are within the curb line will be surveyed by walking directly over the structure in the same manner as above, to the outside foundation wall and up to the meter on outside sets. If the location of the service is unknown a zig zag pattern shall be used walking from curb to building, from building line to building line and along the outside foundation wall. In areas where the main is located in the roadway the walking survey will also be conducted along the outside and inside of the curb.
5. All roadways will be covered with the Mobile Survey using the OMD vehicle.
6. Make visual observations for dead vegetation, which may have resulted from a gas leak. Confirm these observations with a barhole and a GDI.
7. Make visual observations for water leaks, cavities, cave-ins, depressions in the roadway and footway, which may effect our

   structures. Report them immediately to the office and turn in a 537 to the survey supervisor.
8. Make observations to determine if the main being surveyed is in use. Put a circle around any questionable mains. Report these conditions to the survey supervisor.
9. Visually inspect for accessibility, all curb boxes.

10. All the above equipment used for either Walking or Mobile survey will operate at 50 PPM unless the survey supervisor approves a less sensitive setting due to field conditions. All F.I. readings are to be confirmed with a GDI (LEL) reading.
    Definition of "READING" (from Gas Piping Technology DEFINITION Committee GPTC): A reading is a **repeatable** deviation on a CGI or equivalent instrument, express in LEL. (see Field Operations Bulletin #4, attached)
11. **All readings 100% LEL or above MUST be recorded in % Gas.**

STREET LEAK PROCEDURE

A. The following are conditions, which must be **reported immediately** to the survey clerk or the Distribution Dispatcher and keep the survey supervisor apprised of these conditions.

1. Odor of gas outside, in the air.
2. Odor of gas, and/or an atmosphere reading inside a premise.

The GDI must be turned on prior to entry to any premise.

If odor is strong, or there is a 40% LEL, in the general atmosphere as you enter the customer's house as indicated by a CGI, evacuate immediately. The survey crew must begin "make safe procedures" immediately after calling in. Visit the adjoining houses as soon as possible.

When entering a property and the GMI indicates a **Carbon Monoxide** reading above 9 PPM notify the survey supervisor and the Field Services Dispatcher. Follow the safety procedures list in the PGW Carbon Monoxide Emergency Procedures (Sec. 2 pages 16 & 17).

ACTION MUST BE TAKEN TO PROTECT PEOPLE FIRST AND THEN PROPERTY

3. Combustible gas indicator readings in the following:
   a. sewer system, including vents at the curb.
   b. subways, tunnels and vents from such structures.
   c. ductline manholes with 76% LEL or higher**
   d. buildings
   e. routes of natural gas mains
   f. PGW regulator manholes
   g. gas main valve manholes with 76% or higher
   h. front foundation walls

**** All readings 100% LEL and higher will be recorded as % GAS**

B. Other readings in non-conduit structures or readings less than 75% LEL in conduit structures are to be reported on the survey inspection form M-6727 and a street leak progress report form 6170 and turned into the survey supervisor at the end of the shift.

Underground street trouble, depending on the severity and possible threat to PGW facility are to be reported immediately to the office and turned into the survey supervisor on form 6537 at the end of the shift.

Survey Clerk:	684-6395	Survey Account:	874430
Survey Supervisor :	267-249-7005 – 453 (Quick Call)	Job Code:	100

Distribution Department Bulletin #127
Leak Surveys

The following are the minimum requirements for leak detection surveys:

Description	Method	Frequency
• All Structures* in roadways	Mobile	-Annually – not to exceed 15 mo.
• All Structures in footway	Walking	-3- years – not to exceed 3.5 yr.
• Center City	Walking	-Semi-Annually – not to exceed 4 mo.
• Business Areas	Walking/Mobile	-Annually– not to exceed 15 mo.
• Transmission	Mobile/Mobile	-Quarterly
• Franklin Mills	Walking	Semi -Annually – not to exceed 4 mo.
• Plants and Gate Stations	Walking	-Annually– not to exceed 15 mo.
• Master Meter (by agreement)	Walking	-3 – years – not to exceed 3.5 yr.
• Major parades, bike race	Mobile	-2-4 weeks prior
• Buried Bridge Mains	Walking	-Annually– not to exceed 15 mo.
• Winter Frost Survey	Mobile	-Dec.1 – March 15

* Structures – PGW mains, services, valves, etc.

- All procedures will follow the GPTC guide for Surface Gas Detection Survey (G-192-11, 4.4 (a))

Mobile surveys will be conducted using either Optical Methane Detection or Flame Ionization Equipment, set to detect 50 PPM.

Walking surveys will be conducted using an instrument capable of detecting 50 PPM.

Structure surveys inside the footway shall be conducted by a walking survey and cover all gas structures within the curb, to the outside foundation wall and up to the meter on outside sets. These units shall be set for use at 50 PPM. In addition, we will continue to visually detect the possible effects of leaking gas on vegetation and to detect other conditions such as water, sewer and other underground or surface defects, which could affect gas distribution

facilities. If Optical Methane or Flame Ionization equipment is used, all PPM readings shall be confirmed with a gas detection instrument and reported in % LEL or, when appropriate, % gas scale.**

READING: **Reading is a repeatable deviation on a CGI or equivalent instrument, expressed in LEL.
Where the reading is in an unvented confined space, consideration should be given to the rate of dissipation when the space is ventilated, and the rate of accumulation when the space is resealed.

ATMOSPHERIC CORROSION:
Outside meter sets, and above ground pipelines shall be checked for atmospheric corrosion defects, reported and repaired as required by DOT 49 (192.481).

Franklin Mills - In addition to walking survey, the crew shall include the visual observation and report of safe and satisfactory conditions of the system.

Buried bridge mains surveys - In addition to walking PPM survey, the crew shall include a visual observation of the condition of the bridge to determine the existence of obvious structural defects of the bridge, and report any conditions which may appear hazardous to PGW structures.

Blasting and Implosion surveys shall be conducted a minimum of one week prior to and immediately following the activity. A General Supervisor shall determine the area affected, placing into consideration distance, age, size and material of PGW structures, and the scope of the work.

Investigation and repair of detected leaks shall be in accordance with the following requirements:

a) Distribution Department Bulletin #126 - "Investigation and Repair of Underground Gas Leaks" Street Leak Procedure - Section I of the Distribution Department Foreman's Handbook

DISTRIBUTION INSPECTOR TRAINING SCHOOL

FOURTH DAY

PHASE III

1. Survey Inspection covers training regarding the detection of gas leaks and underground street troubles. This phase will acquaint the candidates with the instruments, tools and physical street conditions which are used to indicate the existence of underground troubles and leaks. Records, reports and priorities set down by the Work Initiation Schedule are also covered in detail.

   a. Background Information

      1) Gas Company history

      2) City size

      3) Miles of main

      4) Number of active services

   b. History of Survey in P.G.W.

      1) Planned survey program beginning

      2) History prior to 1954 when manpower was available

      3) Present time – crews, etc.

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FOURTH DAY

c. Why Do We Survey

1) OPS and PUC regulations

2) Responsibility to the City and customers

3) Finding trouble before it is reported by customer.

4) Keeping gas loss to a minimum

d. Types of Survey

1) General area (Intersections done every year)

2) Business are (Indicated on separate sheet)

3) High pressure (Once a year)

4) Natural gas (Twice a year)

5) Center City and residential (Semi-Annually not to exceed 4 mo.)

6) Others – ahead of paving, parades or increased pressure

7) How to use ODM Machine

8) How to use C.I. and Gascope

9) Housing projects (done every three years)

10) Bridges are done once a year and the flame pack

DISTRIBUTION INSPECTOR TRAINING SCHOOL
FOURTH DAY

e. Duties

1) Conduct street surveys

2) Vegetation checks

3) Check for street troubles

4) Demolition and abandonments, street closings

5) Direct and lead assistant

6) Issue survey forms

7) To make a house check

8) To determine what is safe

9) 48 hour rechecks

10) Monthly rechecks

f. Forms

1) Work Initiation Schedule

2) Survey Inspection forms

3) Center City sheets

4) General area sheets

5) Street Leak Progress Report

6) Valve Inspection Cards

7) Street Work Maintenance Order, “537”

Phase 1b

1) Review time sheets

2) Review paving cards (using job locations in the New Business areas and also Center City)

3) Review service cards (give an example on the board of services at different locations than straight in

4) Review calculations

5) Discuss the Written report complete with chart, paving cards, tie-in and paving sketch, material orders, etc.

6) Discuss paper transfer only

7) Discuss stock transfer order

8) Review material orders and account numbers

Gas Detection Instrument Instructions

General

The % LEL scale on the gas detection instrument (GDI) indicates whether combustible gas is present in the sample of atmosphere being tested. If the meter indicates that combustible gas is present, it does not necessarily mean that PGW gas is present but may mean that gasoline vapor, sewer gas, etc., is present or a combination of combustible gases is present in the sample of air that is being tested.

When to Use the Gas Detection Instrument

Listed below are at least four (4) examples of when the GDI is used:

1. The GDI may be used on every leak or odor complaint or street leak examination.

2. When making a block check or investigation where an explosion or fire has occurred, regardless of the cause.

3. After disturbing the gas services, the front foundation wall and the curb box must be checked before FSD can light the appliances.

4. When making a turn-on from the curb box, the front foundation wall must be **checked before leaving the premises.**

Cases Referred to the Field Services Department

On gas leaks from an appliance, fuel lines, meter or service regulator, notify the Dispatcher via radio or telephone communications to record the locations visited, time and GDI readings. Also, record this information on a Street Leak Progress Report along with the number of your GDI.

BEFORE USE CHECKS:

The following checks should be carried out before using the instrument on site:

- ✓ The instrument is clean and in good condition.

- ✓ The batteries have sufficient power left in them for the intended use of the instrument.
- ✓ The filters are clean and in good condition.
- ✓ The sample line and any accessories are in good condition and leak free.
- ✓ All gas ranges are operational and zeroed correctly.
- ✓ The calibration is still valid.

OPERATION AND USE

SENSIT GOLD GDI

1. Push the POWER button to initiate operation. A beep will be heard during any button activation.

**** CAUTION: Always start any Sensit Gold GDI in a gas free environment to insure a proper zero.**

2. If the display fails to illuminate or "BAT LOW" is shown on the display, replace the batteries. There is room in the carrying case to keep an extra set of ALKALINE batteries.

3. Upon successful start-up, the pump will start and the display will illuminate. The instrument will then display:
   a) Product name and software version.
   b) System check for proper pump and battery operation.
   c) Date and time.
   d) Gas Type (NAT or PRO)
   e) Serial Number.
   f) Display "CAL PAST DUE" only when calibration is overdue.
      ** Do not use until the calibration is updated. **
   g) Warm-up countdown for 10 seconds.
   h) Display "AUTOZERO" indicating the zeroing of all sensors.
   i) Any sensor that is completely inoperable during start up will be indicated by "FAIL" on the display in the location where readings would normally be located. The GREEN READY LIGHT will not illuminate indicating the instrument requires service. * Return the unit for service do not use *
4. The display will indicate LEL readings by displaying a "L" next to the percent symbol (%). All LEL readings have a resolution of 0.1% LEL or 50 ppm methane. When the gas concentration exceeds the 100% LEL range the display will no longer show the "L" indicating the LEL readings.

5. The display will display the percent symbol (%) indicating percent Volume Gas and the type of gas the instrument is calibrated to by displaying an "N" for natural gas.

6. To turn the instrument off, push and hold the POWER BUTTON for 5-6 seconds until "POWER DOWN" appears on the display.

*** For further operational use and options refer to the manufactures instruction manual.**

CONVERSION CHART FOR GAS READINGS

%LEL	%GAS	PPM
0	0	0
0.1	0.005	50
0.2	0.010	100
0.3	0.015	150
0.4	0.020	200
0.5	0.025	250
1	0.050	500
2	0.10	1,000
3	0.15	1,500
4	0.20	2,000
5	0.25	2,500
10	0.50	5,000
15	0.75	7,500
20	1.00	10,000
25	1.25	12,500
30	1.50	15,000
40	2.00	20,000
50	2.50	25,000
60	3.00	30,000
70	3.50	35,000
75	3.75	37,500
80	4.00	40,000
90	4.50	45,000
100	5.00	50,000

% LEL/ 20 = %GAS
% LEL X 500 = PPM
% GAS X 10,000 = PPM

GMI GASURVEYOR 3-500 GDI

The instrument has two modes of operation which are accessed by switching the instrument ON with either Button One or Button Two

**** See Figure 3.1**

Mode 1. Switching ON with Button One provides two gas ranges:

a) LEL autoranging to Volume Gas.
b) Audible/visual alarms can operate in this mode.

Mode 2. Switching ON Button Two provides access to only 0-100% Vol Gas range for purge applications. No audible/visual Alarms are available in this mode.

Switching On

Press and hold Button One to turn the instrument on. This initiates the instruments warm up cycle and switches on the pump. **Figure 3.2** displays the warm up cycle for this instrument.

*** Always turn on your instrument in a gas free environment to insure a proper zero.**

Calibration

At the end of warm-up and before the Gasurveyor 3-500 instrument is ready for measuring, the instrument will indicate on the display when the next calibration is due. This will be displayed as month and year, as shown in **Figure 3.3**

*** DO NOT use until calibration is updated**.

Switching Off the Pump

A single press of Button One, when the pump is running, turns the pump off and stops sampling. Pressing button one again turns the pump back on.

Switching On in Purge Mode

To switch on in Purge mode, press and hold Button Two.
(**See Figure 3.4)

Switching Off

A double press of Button One turns the instrument off.

.

*** Figures 3.1 thru 3.4, other operational uses and options can be found in the manufactures users' handbook.**

GMI FIRST RESPONDER (LEAK SURVEY)

Connection of Probe

The First Responder instrument is equipped to accept two probe input types.

1. A Standard Probe and Handle assembly which is connected to the instrument via sample line inlet.
2. The EXT range Semiconductor Sensor Probe which provides fast gas detection and is connected to the instrument via an 8-pin Plug.

MEASURE OPERATION

The instrument is a very flexible combustible gas indicator, as well as a Carbon Monoxide monitor.

Switching On

Pressing and holding Switch One turns both the instrument and pump ON. This initiates the instrument's warm up cycle.

*** Always turn on your instrument in a gas free environment to insure a proper zero.**

a) All LCD segments are displayed
b) Instrument Type and Software version
c) Battery status
d) LEL alarm level and calibration gas(methane)
e) High CO alarm alternates between CO and HI
f) Current gas detection reading

Toggle Pump ON/Off

A single press of Switch One when the pump is running turns the pump off and stops sampling. (Does not shut off the machine) Pressing switch one again turns the pump back on.

Changing Range

Each single press of Switch Two changes the range. The display cycles through the available ranges in the order: LEL – PPM – CO – EXT – LEL etc.

Switching Off

A double press of Switch One turns the instrument off.
There is a five second shutdown sequence during which time, OFF is displayed in the top right hand corner of the display. Single press any one of the four instrument switches to abort shutdown.

**** Other operational uses and options can be found in the manufactures user hand book.**

OPTICAL METHANE DETECTORS (LEAK SURVEY)

Startup

1. Check all Connections
2. Clean Lenses on Light Bar
3. Turn on the SYSTEM POWER by pressing the SYSTEM POWER button.
4. Press the DISPLAY FUNCTION button twice to enter the normal operating
5. Warm up unit for approximately 15 minutes until TURN ON THE LIGHT SOURCE is displayed.

Operation

1. Turn on the LIGHT SOURCE by pressing the LIGHT SOURCE button.
   a. For a temporary shut down just press the LIGHT SOURCE button not the SYSTEM POWER button.
2. Press the CALIBRATION TEST button.
3. Set the audible ALARM SETPOINT by pressing either the ALARM SETPOINT UP or DOWN button.(Set at 2 PPM above base line zero)

4. Set the Speaker Volume of the alarm to the desired level by pressing either the SPEAKER VOLUME INCREMENT OR DECREMENT button to raise or lower the SPEAKER VOLUME.
5. Adjust the CONTRAST to the desired level by pressing either the CONTRAST UP or DOWN button.
6. Select the Sensitivity Scale by consecutively pressing the PPM RANGE button which allows the formatting of the display with full-scale settings of 10, 30, or 90 PPM. (Set at 10 PPM)

SHUT DOWN

At the end of the workday, press the SYSTEM POWER button to turn off all power.

**** Other operational uses and options can be found in the manufactures user hand book.**

MSA Gascope Model 53

Turn the GDI switch to the right to the "on" position. Make sure your selector switch is in the % LEL range. Purge the GDI with fresh air before entering any leak complaint or before taking a reading. Five (5) squeezes of the aspirator bulb will purge the instrument. This must be done in order to adjust the pointer to "zero".

MSA Gascope Model 62S

Flip switch to the on position. Make sure your selector switch is in the % LEL range. Purge the GDI with fresh air before entering any leak complaint or before taking a reading. Five (5) squeezes of the aspirator bulb will purge the instrument. This must be done in order to adjust the pointer to "zero".

Instrument Readings to be Reported When Using the GDI on the LEL Scale

The LEL Scale on the GDI meter ranges from zero to 100. The pointer on the scale indicates the amount of combustible gas present in terms of the lower explosive limit (LEL) of the sample being tested.

The readings obtained with a GDI fall into four (4) categories. These categories are defined as follows:

A. Zero

After the pointer is calibrated at zero using a fresh air sample and no further movement of the pointer occurs after the sample of gas is tested, the reading is zero. This zero
reading indicates that there is no combustible gas present in the sample of air being tested (0% gas - 100% air).

B. From Zero to 100

A reading of this portion of the scale indicates the percentage of combustible gas in terms of the lower explosive limit (LEL). Readings obtained in this range must be reported to the Dispatcher in the terms of percentage. For example, a reading of 60 indicates the sample of air being tested is 60% of the lower explosive limit. In terms of the amount of gas present, that 60% reading contains 3% gas - 97% air.

Percentage Gas and Air

GDI Readings "0/0 LEL Scale	% Gas	% Air
0	0	100
20	1	99
40	2	98
60	3	97
80	4	96
100	5	95

C. Over 100

If the pointer moves beyond 100 and remains in that region, it indicates that the sample tested is within the explosive range of the combustible mixture. This reading must be reported to the Dispatcher as a 100% reading. This reading is critical since the sample being tested contains the proper ratio of gas to air (between 5% gas - 95% air and 15% gas - 85% air), that is a source of ignition is introduced, an explosion could occur.

D. Pointer Moves to Extreme Right (Above 100) then Quickly Returns to Zero or Below

This reading should be reported to the Dispatcher as a 100+ reading. This reading indicates that the sample being tested is at or above the explosive limit. The upper explosive limit is defined as 15% gas - 85% air. This reading is critical, since the sample being tested is saturated with gas and contain 15% or more gas. If outside air is introduced to this sample, without all sources of ignition being eliminated, an explosion could occur since it would reduce the ratio of gas to air to be within the lower explosive limit.

NOTE: If 100+ readings are observed during your investigation, switch to the gas scale of your GDI to record the % of gas in the atmosphere by performing the steps in "E." below.

E. % Gas Scale

Make sure your GDI is switched on and that you have aspirated the bulb 8 to 10 times to flush fresh air through the GDI. Throw the selector switch to "% Gas." If necessary adjust meter pointer to zero by means of "ZA": control. (**GASCOPE MODEL 53 ONLY**). Gascope Model 62S does not require a "ZA" adjustment. Repeat switching from LEL to % Gas and adjusting "ZA" control until GDI pointer registers 0. Now switch to % LEL and aspirate bulb where the sample is to be taken. Aspirate the sample through the GDI approximately seven (7) to eight (8) squeezes for each ten (10) feet of line. Record readings as follows: if meter pointer comes to rest at 10 record "10 LEL" or if reading is 50 record "50 LEL". Continue aspirating. Throw selector switch to "% Gas". Record reading as follows: if meter pointer comes to rest at 20, record "20 Gas" or if reading is 80, record "80 Gas". Always takes readings on both scales.

GDI Readings "% Gas" Scale	Percentage of LEL	Zone
0	0	
1	20	Red
2 *	40	Red *
3 *	60	Red *
4 *	80	Red *
5 *	100	Red *
6 - 10 *	100 +	Red *
11 - 15 **	100 +	Red **
16 - 26 **	100 +	Red **
27 - 100 **	100 +	Blue **

* Gas Saturated Atmosphere
See Section I, Page 2 for Inside Leak Instructions, under A of the Street Leak Procedure.

** Warning
Atmosphere above this level (in a confined space) are oxygen deficient. No personnel are permitted to remain without external breathing apparatus.

Care of Your GDI

Use extreme care in handling the CGI. Care should be taken not to draw water or any other liquid into the GDI.

Identification

Each GDI is numbered and marked - PGW - Dist. This shall be recorded on all reports mentioning a GDI reading taken (including "0").

Field Operations Procedure 2003 – 4

Guidelines for Leak Investigation Using a PPM GDI

With the introduction of new Gas Detection Instruments capable of capturing 50 PPM of gas, PGW personnel assigned to investigation of leaks have been given a tool capable of detecting very minute traces of methane readings. PGW will follow these guidelines when reporting leaks. As a guideline, it is understood that deviations can be made through supervisory decision based on experience, responsible action and good judgement.

After a thorough investigation:

- INSIDE - Any reading qualifies as a reading. Any FFW reading requires outside investigation.
- OUTSIDE - A 2% LEL reading or higher is required to qualify as a recordable reading.

Definition of "Reading" (from GPTC):

> Reading is a **repeatable** deviation on a CGI or equivalent instrument, expressed in LEL. Where the reading is in an unvented confined space, **consideration should be given to the rate of dissipation when the space is ventilated, and the rate of accumulation when the space is resealed**.

PGW Operations Personnel will follow these guidelines.

STEVEN A. GROEBER
Director, Field Operations and
Work Planning

APPROVED: _____

PAUL A. MONDIMORE
Vice President, Operations

FO/SAG/dls
Initial Issue: 6/8/2004

Distribution Department Foreman's Handbook
Field Operations Dispatching Manual
FSD Operations Manual
Field Operations Supervisors Manual

Revised: 09/08/05
SLL/ai

CALIBRATION PROCEDURES

FOR THE SENSIT GOLD CGI

WITH THE SMART-CAL CALIBRATION STATION

PREPARATIONS FOR CALIBRATION:

1.) OPEN VALVE FOR 100%N GAS AT DEMAND REGULATOR.

2.) OPEN VALVE ON 50% L.E.L. METHANE AND 100 PPM CARBON MONOXIDE GAS BOTTLE.

3.) TURN ON "SMART-CAL" STATION WITH SWITCH AT BACK OF UNIT. STATION WILL GO THROUGH A SHORT WARM-UP, THEN DISPLAY WILL READ "SMART-CAL/READY . . ."

PREPARATION OF DETECTOR (CGI):

1.) TURN ON DETECTOR BY PRESSING LEFT (POWER) BUTTON. UNIT WILL GO THROUGH A SHORT WARM-UP, THEN DISPLAY WILL SHOW ZEROED GAS READINGS.

2.) CHECK THE INTEGRITY OF THE PUMP AND SEALS BY HOLDING A FINGER OVER THE INLET OF THE UNIT, A "FLOW BLOCKED" SIGNAL SHOULD APPEAR ON THE DISPLAY. IF FLOW BLOCKED DOES NOT APPEAR (POSSIBLE AIR LEAK, ETC), CORRECTIVE ACTIONS MUST BE TAKEN BEFORE CALIBRATION IS ATTEMPTED.

3.) PREPARE THE INSTRUMENT FOR CALIBRATION BY PRESSING THE LEFT (POWER) BUTTON FOR 1 – 2 SECONDS AND THEN RELEASING. UNIT WILL DISPLAY "SMART-CAL/COMMUNICATING".

4.) PLACE THE INSTRUMENT IN THE PROPER CRADLE AT THE CALIBRATION STATION.

5.) ATTACH INLET HOSE TUBING TO THE INSTRUMENT. NOTE THAT THE TRAK-IT III REQUIRES A MALE END TUBING ADAPTER FOR THIS TESTING.

6.) PRESS LEFT (CALIBRATE) BUTTON ON STATION TO BEGIN CALIBRATION.

7.) TESTING WILL TAKE PLACE AUTOMATICALLY. UPON COMPLETION OF TESTING, STATION AND INSTRUMENT WILL DISPLAY UNIT PASSED OR FAILED CALIBRATION.

TEST RESULTS:

IF UNIT PASSED CALIBRATION:

A,) TESTING IS COMPLETE. REMOVE UNIT FROM STATION.

B.) PRESS LEFT (POWER) BUTTON ON INSTRUMENT TO RETURN UNIT TO DISPLAY GAS READINGS.

C.)PRESS LEFT (CLEAR) BUTTON ON STATION TO RETURN STATION TO READY STATE.

D.) INSTRUMENT IS READY FOR FIELD USE AND CALIBRATION DUE DATES HAVE BEEN AUTOMATICALLY UPDATED TO REFLECT THE SUCCESSFUL CALIBRATION.

IF UNIT FAILED CALIBRATION:

A,) RETEST INSTRUMENT ONE MORE TIME.

B.) IF INSTRUMENT FAILS A SECOND TIME, TURN UNIT INTO AREA SUPERVISOR FOR REPAIRS.

IMPORTANT NOTE:

WHEN TESTING IS COMPLETED, SHUT OFF ALL VALVES AND TURN OFF POWER TO THE SMART-CAL STATION.

B.Bright 5/06

DISTRIBUTION DEPARTMENT BULLETIN #126

INVESTIGATION AND REPAIRS OF UNDERGROUND LEAKS
(Work Initiation Schedule)

The following minimum requirements shall be adhered to in scheduling investigations, repairs and rechecks of reported gas leaks from underground sources. These are minimum requirements and are not to restrict the foreman or supervisor from doing more extensive investigation or repair work which experience, safety and good judgment indicate.

1. Conditions Requiring Immediate Investigation or Work

When initially discovered, conditions listed below will require immediate investigation or work shall be continued until a supervisor considers the leak safe to hold.
A written order shall be originated specifying what future work is required and when such work shall be scheduled.

a. A customer leak complaint

b. Combustible gas indicator readings in a sewer system, including vents at curb

c. Combustible gas indicator readings in subways, tunnels, or in vents from structures

d. Combustible gas indicator readings of 76% LEL or higher in a ductline manhole

e. Combustible gas indicator readings in a building

f. Combustible gas indicator readings along routes of natural gas supply mains

g. Combustible gas indicator readings in PGW regulator manholes (investigation by Pressure Force personnel)

h. Combustible gas indicator readings of 76% LEL or higher in gas main valve manhole (investigation by Pressure Force personnel)

i. Combustible gas indication along a Transmission main.

NOTE: A house check is compulsory whenever a reading is found in a water or gas stopbox or in a sewer

2. Work or Recheck Schedule

Conditions that do not require immediate work will be rechecked within 72 hours. Based on the readings obtained on the 72 hour and subsequent rechecks, the condition shall be handled as follows:

LEL Reading	Non-Conduit Type Structure*	Conduit Type Structure	Gas or Water Service Box High Pressure Drip or Test Pipe Box
25 or less	Recheck next scheduled survey	Pinpoint, repair or recheck 3 months	Repair or recheck 30 days
26 to 50	Recheck next scheduled survey	Pinpoint, repair or recheck 3 months	Repair or recheck 30 days
51 to 75	Pinpoint, repair or recheck 1 year	Pinpoint, repair or recheck 1 month	Repair or recheck 30 days
76 to 95	Pinpoint, repair or recheck 3 months	See #1 above	Repair or recheck 15 days
96 or higher	Pinpoint, repair or recheck 3 months	See #1 above	Repair or recheck 15 days

*Water valve manholes, low pressure drip boxes and other non-conduit surface boxes such as those housing buried valves, electrolysis devices, etc.

NOTE: The above table refers to readings individual manholes or boxes. Where multiple readings are found in interconnected manholes and/or in non-connected manholes in close proximity to reach other, a supervisor shall issue a written order specifying what future action is required.

3. <u>Finaling Leak Orders</u>

Leaks will be finaled when readings are reduced to zero. On-site inspection by a supervisor will be required to "final" all leaks where readings were previously found in sewers, subways, tunnels and ductlines.

Exceptions to these minimum requirements may be made with the authorization of a General Supervisor.

STEVEN A. GROEBE

APPROVED: _____
PAUL A MONDIMORE
Vice President, Field OperationsJJJ:dls/c

cc: Ms. Janice Walsh
Distribution Department Supervisory Personnel

Original Issue: 9/22/76
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Underground Street Troubles that Affect PGW Company Structures

The kind of underground street troubles about which the following statement deals, are those evident underground troubles usually brought to our attention due to a condition observed on the street surface, or as a result of a condition we encounter in the performance of our work, but not caused by our own work. These underground troubles are:

1. Water leaks from either water mains or water services.

2. Sewer system faults. These may be either visible sewer system failures or any of the following which may be the effect of a sewer system failure:

    a) Cavity
    b) Cave-in
    c) Paving fault, such as surface crack, settlement, depression, etc.

3. Surface faults in paving caused by settlement in "area" fills; or settlement caused by poor backfill over underground structures.

General Street Trouble Procedure

There can be no standard procedure that would cover all of the conditions that may be encountered, due to variation of conditions and other factors that in each case require common sense and good judgment. It will help to describe in a general way a few variations of conditions and list a few minimum requirements.

In every case, all manholes must be examined as in Requirements C and D of the Street Leak Procedure.

Revised 8/15/2007

General Street Trouble Procedure - Cont'd

In sewer manholes, observe for such conditions as abnormal volume of water, unusual clarity of water, or water clouded by mud or other earth content, bricks or any unnatural debris. Unusual conditions observed in sewers such as these specifically named above, or the existence of water, either still or running, in other manholes, indicates a suspicious condition that will require a thorough and complete investigation to determine the source of the water leak related to the point it enters the sewer system or the duct line. It is important that this point be related to the nearest PGW underground structure. The sound of water running or leaking in a drain vent, at a water stop, at a water service or a fire plug, is an almost infallible lead to important underground trouble.

Whenever an underground street trouble is separated by reasonable distance from our gas main or service, barholes are acceptable to determine the solidity of the foundation under our structures. Make an exploratory opening wherever PGW structures are obviously endangered. Whether or not to backfill such an opening is dependent on judgment about whether the opening may endanger our main or create other hazards. To cut main, to abandon mains, to provide bagholes and men to bag off, and to prepare to use grease, are obvious precautionary steps to be taken when necessary. In cases of doubt about procedure, a Supervisor's decision must be obtained.

On any kind of water leak where the shut off or reduction of water leakage will reduce the danger to PGW structures, we should request the Water Department to take such steps.

On all visits, the Foreman or Inspector is responsible to record all pertinent information on the UST record. Key information will be:

1. Is PGW Involved?
2. Is there a visible problem?
3. Distance of the UST to PGW structure? What kind of PGW structures?
4. Undermining? Call for a supervisor.
5. Status of the UST repair?
6. Any gas leak associated with the UST?

Revised 8/5/2001

Procedure 212 Leak Investigation

I. Purpose

To provide clear direction to PGW employees when they are responding to and investigating an odor complaint. Odor complaints may originate from the police or fire departments, other utilities, contractors, customers or the general public. Odor complaints must be investigated promptly. Any delay in responding to a reported odor complaint must immediately be brought to the attention of the Dispatcher on duty.

If the investigation reveals a gas leak, the leak must be evaluated and action taken in accordance with the guidelines outlined in this procedure. All leak indications must be investigated to identify any potential hazardous conditions. Once a hazardous condition is identified, immediate action must be taken to make conditions safe. **Action must be taken toward protecting people first and then property.**

The employee assigned to the investigation must assume (for any odor complaint investigation) that a hazardous condition exists. Only after an odor complaint investigation is completed shall an operator determine an appropriate classification.

II. Definitions

- AREA CHECK – The appropriate area to investigate the original reported odor complaint. This is determined by the nature of the notification (phone call) and the investigation itself. **Minimum** coverage should be 50 feet in all directions (approximately three row houses each way) from the odor complaint or any reading.

- BAR HOLE – a 1" diameter or larger hole probed into the ground in a uniform manner with the use of a steel bar. The depth of each bar hole should be along side and near the bottom of the structure (gas main or service line) being checked. All bar holes should be made in a uniform manner.

    - ◊ PURPOSE OF BAR HOLES – used to sample gas/air mixtures underground in an attempt to pinpoint the largest concentration of natural gas and the source of the leak.

- BUILDING LINE – the extended house line from the side of a building.

- CGI – Can't Get In

- CURB LINE – The outside edge of the curb, where the curb meets the street. A directional identification must be noted on each curb line measurement. (Example: EWC = east of the west curb line)

- ENN – Entry Not Necessary; see section "III.B.1. What buildings must be checked?" (The use of the ENN rules does not apply to FSD technicians that are not qualified. The only

FSD technicians qualified are "A" men and above.)

- FFW – Generally means "Front Foundation Wall". However, for a leak investigation the term also means to check "ALL APPROPRIATE BASEMENT WALLS", all walls where a gas main (outside) may run adjacent to the building (not only the front wall).

- FIRST RESPONDER – term used to describe the first trained responder to arrive on scene of an emergency, accident, natural or human-made disaster, gas leak, fire or similar event. Such people may be PGW personnel, firefighters, police, other law enforcement or emergency medical services, or lay rescuers to deal with the situation and protect life and property.

- GABLE END – where the end (side) wall of a building does not connect to another building. On all reports that a gable end is indicated the direction of the gable end must also be recorded, example: a single dwelling on a north-south street shall have the address recorded and gabled end to the north and south. See example drawings.

- GDI – Gas Detection Instrument

- GENERAL ATMOSPHERE - is an open area within a room on any floor of a property. The general atmosphere is not behind a wall, in the corners of a room, between or against walls, floors, or in the area of the ceiling joist, or close to the FFW.

- INCIDENT COMMAND CENTER – a designated location used to coordinate activities and share information.

    ◊ INCIDENT COMMAND LOCATION - ON SCENE – The location of the highest ranking PGW employee responsible for all activities at the job site.

- LOWER EXPLOSIVE LIMIT (LEL) – Lowest concentration (percentage) of gas in air needed for the gas to ignite when given an ignition source. Concentrations lower than LEL are "too lean" to burn. 5% gas in air is the LEL of PGW gas.

- "M PACT" BAR HOLE – a ¼" to 1" diameter hole probed into the ground in a uniform manner with the use of an insulated "M Pact O" tool. The depth of each bar hole should be approximately 14" deep but not to exceed 18".

    ◊ PURPOSE OF "M PACT" BAR HOLE – used to sample gas/air mixtures underground to determine if a gas leak exists on a natural gas facility and to determine the gas migration pattern if a leak exists.

- MIGRATION – the area of natural gas movement from and around the source of the leak.
- MIGRATION LIMITS – the outer boundaries of natural gas movement in all directions. A circle of "zero readings" around a migration pattern is necessary to establish the migration limit.

- ODOR COMPLAINT – a report of a possible inside or outside gas odor, leak, explosion or other hazardous conditions which may involve gas pipelines, or other gas facilities, customer's house piping, or appliances. All odors must be confirmed using a GDI.

- OPERATOR – a PGW Operations' representative – technician, foreman, supervisor, etc.

- ONE HOUSE CHECK— a term used during a declared foreign odor allowing the technician or foreman to make a limited check for safety. Job must be within the area affected from the foreign odor. Permission must be obtained through the dispatcher or supervisor. See "Foreign odor" in "III.A. General Requirements" below.

- OUTSIDE SOURCE – (who calls in an odor) a PGW employee, other utility, police or fire personnel, contractors, customers and the general public.

- PPM GDI GAS READINGS – samples of the atmosphere taken with a parts per million (PPM) gas detection instrument. Any INSIDE reading qualifies as a reading and requires a physical action. An OUTSIDE reading of 2% LEL or higher is required in order to qualify as a recordable reading.

- PRESSURE OPERATION – A procedure to reduce distribution system pressure by controlling the flow of gas to a portion of the system.

- READING – a repeatable deviation on a GDI or equivalent expressed in % LEL & % Gas scales.

- SAFETY PERIMETER – The boundary of an area outside of the influence of the leaking gas. Also known as a Collapse Zone by the Philadelphia Fire Department.

- SUSTAINED READING – a gas reading found after a bar hole or structure has been opened and is allowed to stabilize or ventilate. NOTE: This reading should be recorded on the final report.

- UNIFORM MANNER – all bar holes shall be spaced evenly and have the same size and depth.

- UPPER EXPLOSIVE LIMIT (UEL) – At concentrations above the UEL the gas has displaced so much air that there is not enough oxygen for the gas to burn. When readings are above the UEL, be aware that the gas concentration will come down though the explosive limit of gas when the source of the gas leak is removed or through ventilation. 15% gas in air is the UEL of PGW gas.

- VENTILATE – This term, when used in reference to buildings, structures, manholes and confined spaces, means the introduction of fresh air into the affected structure. Ventilation can be accomplished by opening doors and windows, breaking windows, opening basement grates, and removing manhole covers or lids to prevent or reduce the level of natural gas in the affected structure. This term, when used in reference to gas readings underground, means to draw residual natural gas from below the surface with the use of pneumatic mechanical devices.

III. Procedure

A. General Requirements

- **ACTION MUST ALWAYS BE TAKEN TOWARD PROTECTING PEOPLE FIRST AND THEN PROPERTY.**
- **All requirements listed throughout this procedure represent minimum requirements and are not meant to limit the Operator in making decisions where experience, safety and common sense indicates otherwise.**
- **All employees responsible for conducting leak investigations must be qualified per PGW Operator Qualification Plan.**
- Employees must wear all required personal protection equipment per PGW Policies.
- Odor complaints are to be dispatched promptly regardless of their source.
- Any delay in arrival to the location of the complaint must be reported to the Dispatcher immediately.
- Conduct all odor complaint investigations as if a hazard exists until it is determined otherwise. Determine the extent of the hazard (leak) by making appropriate GDI checks, observations and tests.
- Review all information given on the order.
- If possible, enter all buildings through the main entrance.
- If available, interview the caller for relevant information.
- If during the initial leak investigation it is determined that a hazard exists, call the Dispatcher immediately providing details of the existing hazard.
- **Mobile phones must be turned off before entering properties for the leak investigation.** All communications must be conducted outside in a natural gas free atmosphere.
- If you suspect that the source of the leak involves any portion of PGW's system that would require a Pressure Operation, notify Dispatching immediately.
- Foreign Odors - on a wide spread foreign odor incident, when instructed by a Dispatcher or Supervisor, the leak investigation can be limited to one premise and a check of structures (boxes) directly outside that premise ("one house check", see

definitions). If gas readings are discovered follow the complete leak investigation procedure.

- Leak indications may come from sources other than natural gas (marsh gas, gasoline spills, etc.).
- If there are other "First Responders" agencies (PFD, PPD) on location, discuss with them as to their actions already completed and any findings of their investigation.
- Immediately establish a communications chain to share pertinent information with all PGW First Responders and any other First Responder agencies.

1. Forced Entry

   Upon the initial visit, if any house that requires a leak investigation per this procedure is apparently locked and secure and it is not possible to gain entrance, make an exterior examination. Examine at the basement windows, mailbox or any other place where an indication of the inside atmosphere may be sampled. If an odor or reading of gas is detected coming from a premise either from outside that premise or from an adjoining property, make forcible entry through a window or a door.

   - If a forcible entry is required, inform the Dispatcher. The Dispatchers will call 911. Give the Dispatcher the address of every house(s) requiring forced entry.
   - Do as little damage as possible.
   - During normal business hours notify the Risk Management Department with a final report, extension 6535. Out-of-hours leave a final report on extension 6532 (voice mail).
   - Sign and leave Form #6489 to inform the customer that it was necessary for PGW to enter the premise.
   - Complete a detailed Accident Report (Form 119) and submit it at the end of your shift.

2. Chain of Command – Incident Command Center

   When **both Distribution and Field Services *union-covered personnel*** are on location, the **Distribution Foreman is in charge and responsible** for following all procedures, directing make safe procedures and then continuing the investigation.

   A Field Service Department Supervisor or Distribution Department Supervisor has the authority to supersede the Distribution Foreman.

   When **both Distribution and Field Services *supervision*** are on location of a leak investigation, the highest ranking **Distribution Supervisor is in charge.**

All actions will be communicated and coordinated through the person in charge. If there is a change of the person in charge; relay all pertinent information to the person taking control on the job site, then announce the change to key personnel.

As additional PGW personnel arrive they should report to the person in charge who will provide instructions and a summary of current conditions and actions taken as well as any actions underway.

PGW Incident Command Center will be where the person in charge is located. If there are other agencies on location (PFD, PPD) that have the ultimate responsibility for the event (i.e., PFD at fire or explosion), the PGW person in charge will coordinate all actions and findings through that agency's Incident Command Center. Once PGW reports to the location of the controlling agency's command center, PGW must maintain continuous representation at that location.

3. Dispatching Resources Available:

- Distribution Crew(s)
- FSD Technician(s)
- Emergency Grease Equipment
- Cut-Cap Trailer
- Excavation Equipment including Vacuum Excavation truck
- FSD and/or Distribution Supervision
- Pressure Force Supervision and Crews
- Police or Fire Departments through 911 to assist (evacuations, safety perimeter, traffic control, public safety, etc)
- PECO
- PWD
- Notification or dispatching of Supervisory Chain of Command.

4. Odor

If during the course of an investigation a gas odor is detected, the source must be confirmed as soon as possible using a GDI instrument. The course of action may include further migration checks and eventual classifying of the leak. If required, request assistance immediately through the Dispatcher if the odor appears to be coming from inside a building.

B. Inside Leak Investigation (on any odor complaint, inside or outside)

1. What Buildings Must Be Checked (See attached illustrations of this procedure)

- Check the premise closest to the odor complaint. If the odor complaint was reported by a passerby, concentrate on the premise closest to the reported odor.

- If **a reading or odor is found inside** the first premise and the source is suspected from any Distribution facility (mains and services) or another building, the adjoining building(s) must be checked. (Note: in the case of a twin house (gable end) property, the unattached house must be attempted to be checked but can be considered for Entry Not Necessary (see section B.4., and see illustrations).
- Continue to investigate adjoining buildings until no gas reading is found.
- If **no reading or odor is found inside** the initial premise, attempt to enter and check properties on either side. These properties may be considered for "Entry Not Necessary" (See Section B.4.).

  A building must be checked when a reading is found within 5 feet of the building, including the side of the building (Distribution also required).
- A building must be checked when a reading is found inside the curb line in front of the premise and a bar hole cannot be made within 5 feet.
- A building must be checked when a vent box reading is found in front of the premise, (Distribution also required).
- A building must be checked when there is a reading over the service and the service is steel installed in 1975 or before (older).
- Considerations should be made to check additional properties when there is wall to wall paving or frost conditions.

2. Performing The Inside Leak Investigation

- Turn on and zero the GDI using fresh air before entering any premises. Follow the operating instructions for the GDI found in your handbook.
- Normally, the first premise to visit should be the house of the odor complaint. However, the first premise requiring entry may be dictated by the intensity and location of the hazard (leak).
- Knock on door – DO NOT USE THE DOOR BELL.
- Identify yourself. Verify the customer's name and address (if it is the order address).
- **The operator should not switch lights on or off. The customer must also be warned not to switch any electric devices on or off, or to smoke during the investigation.**
- Question the customer regarding the odor complaint regarding the location and intensity of the odor
- Go to the area of where the leak or odor is reported to exist and determine the source of the odor. Take additional GDI readings of the atmosphere as you proceed to this area.

- Enter the premise and take a GDI reading in the general atmosphere. If the reading detected is 40 % LEL (2% gas) or higher, **EVACUATE (INCLUDING YOURSELF) & VENTILATE THE PREMISE** and notify Dispatching.
- Evacuate a premise whenever the judgment is made that people or properties are in jeopardy.
- **See Evacuation Procedure described in Section III.B.3 (below).**
- If your investigation confirms a gas leak inside, eliminate or minimize all sources of ignition. If possible, shut off the supply of gas. **Ventilate** the premise. Attempt to shut off gas from the curb box to the property.
- If there is an LEL reading in the general atmosphere of a property, request Dispatching to notify PECO for assistance.
- If the leak is found inside on exposed piping, control the escaping gas- make conditions safe.
- Continue an inside investigation with the use of a GDI. Examine all appliances and piping, fuel line, meter and meter connections. Also, check the location of water service, gas service and sewer pipe where they enter the building. Check the foundation walls that are adjacent to streets.
- A foundation wall check shall include GDI sampling at any utility entrance through the wall such as gas, water, sewer, cable, drains, electric service and additionally any major cracks or holes that could provide an access for leaking gas. Check all foundation walls that are adjacent to streets.
- Continue to check affected and adjoining properties. Monitor and report any change in conditions to Dispatching.
- All leaks inside must be found and resolved before the employee investigating leaves the job site or is relieved from the job site by someone who will continue the investigation.
- Methods that can be used for an investigation to verify the source of an inside gas odor are:
  - ◊ odor check (smell)
  - ◊ sound check (listening for hissing or blowing)
  - ◊ GDI
  - ◊ soapy solution
- A meter and piping test *is required* to verify the source of an inside gas odor. (for exceptions such as master meters or commercial properties, call a Supervisor for assistance).
- Any inside investigation that has a reading coming into the building from an outside source requires a Distribution Crew. FSD will notify the Dispatcher to call for Distribution. Communication by cellular phone with the Dispatcher shall be made from outside the affected property. Report the initial readings found, as well as any subsequent changes to the initial leak investigation

findings. As soon as possible, transmit an electronic message via Mobile Mail confirming the voice contact and update the AIMS Leak Survey screen.

- When a leak is discovered on an appliance covered by PLP, the technician should complete the repair or refer to a qualified PGW Technician.
- (Distribution) In all cases where Distribution responds to an odor complaint and FSD is on location, it is the Foreman's responsibility to examine the FFW(s) and take atmospheric GDI readings. Distribution Foremen or FSD techs are not to enter evacuated buildings to examine the FFW(s) or take atmospheric readings until action has been taken to reduce gas levels below **LEL level**.
- After checking all inside premises, monitor inside readings and continue an outside leak investigation.
- If a leak is discovered inside the premise, follow the guidelines listed in the table below:

Leak discovered on:	**Repair procedure:**
If a leak is discovered on PGW piping (from the head of service up to the meter outlet)	Shut off gas supply by closing the curb valve and/or head of service valve (if available) or install the appropriate size service stopper. Make repair and restore gas service to the customer.
If a leak is discovered on customer piping (downstream of meter connections)	A repair will be permitted on 1 ¼" and smaller thread leaks only. The repair will be completed by using the established method of installing Perma-Gum on the leaking threads. After the leak has been repaired, the Technician will recheck the repaired joint with a GDI to verify there is no leakage. If there are no readings on the GDI, the Technician will issue a Class B hazard tag referring the customer to seek assistance from the appropriate Contractor to make the permanent repair. The Technician will list all information on MDT and refer order to the FSD Training Section. In cases involving multiple units, industrial or commercial applications; contact **a SUPERVISOR** to determine an alternate method of repair and recheck.
Leaks involving any type of shut off valve, union, cracked or defective fitting.	Leaks at shutoff valves and fittings can be permanently repaired by greasing in the valve or tightening the fitting. In cases where these actions do not repair the leak, the defective part of the fuel line must be disconnected and capped if possible. If the fuel line can not be disconnected, the gas must be shut off* with locking device and plug

	swivel at the meter. A Class A hazard tag must be issued referring customer to the appropriate Contractor to make the permanent repair. The Technician will also complete a temporary shut off work order. In cases involving multiple units, industrial or commercial applications; contact a SUPERVISOR to determine an alternate method of repair and recheck.
If a leak is discovered and isolated to an appliance	Shut gas off to the appliance. Issue the appropriate hazard tag.
General Notes concerning Inside Leaks and Repairs	If a residential premise has been shut off and relies on gas heat, also provide a "CO and Emergency assistance information card" to provide the customer information of City agencies which can help. FSD Training will track and maintain records of all repairs that were completed. All temporary repairs will have follow-up by a positive, documented phone call to the customer. Call will be documented on the BCCS customer contact screen and separate FSD list. **Note**: a temporary repair discovered *on any subsequent visit* is considered a Class A hazard and requires a temporary shut off as described above. All information pertaining to a piping or appliance hazardous condition must be recorded on the Hazard Screen of AIMS.

III.B.3 Evacuation Procedure (minimum requirements)

- Enter the premise and take a GDI reading in the general atmosphere. If the reading detected is 40 % LEL (2% gas) or higher, **EVACUATE (INCLUDING YOURSELF) & VENTILATE THE PREMISE** and notify Dispatching.
- Evacuate a premise whenever the judgment is made that people or properties are in jeopardy.
- Do not re-enter the property until the source of leak has been located, made safe or repaired and the LEL levels are reduced to a safe level.
- Eliminate or minimize all sources of ignition. If possible, shut off the supply of gas. Attempt to shut off gas from the curb box to the property.
- Request Dispatching to notify PECO for assistance
- Establish a Safety Perimeter. Restrict people from entering the Safety Perimeter. Restrict access into the Safety Perimeter to PGW employees required to perform their duties.

- Call for assistance from the Fire Department (call 911) through the Dispatcher. The PFD and PPD will assist you with evacuating and maintaining the Safety Perimeter.
- Evacuate the adjoining properties and move the occupants outside the safety perimeter. Consider the worst case scenario.
- If the source of the leak or strong odor of gas requires a Pressure Operation, consider moving outside the established Safety Perimeter.
- Continue to report any more evacuation(s) and call for more assistance.

3. Procedure for Entry Not Necessary (ENN) Investigation (see Section B.1. for buildings eligible for this procedure). This procedure will only be followed by qualified FSD technicians and Distribution Foremen. Qualified FSD technicians are A men and above.

Check mail slots, windows, basement entry doors, anything to obtain a sample of the inside atmosphere.

- Obtain a sample of the inside atmosphere by checking mail slots, windows, basement entry doors, etc. with your GDI.
- **If a potential hazard exists, make a forcible entry**. Follow procedures listed above.
- For all CGIs which appear non-hazardous, check the main and service information – age, material and location for the Distribution facilities in front of the property.
- Make "M-Pact" bar holes in front of the CGI building as close to the building as possible.
- Make "M-Pact" bar holes over the gas service of the CGI building.
- Check all outside readings for migration. If there is no migration within 5 feet of the building, the building can be considered for ENN.
- A building must be checked when there is a reading over the service and the service is steel installed in 1975 or before (older).
- If during the leak investigation it is determined that other buildings on the block have underground service conduits (electric or Bell), do not make the premise ENN.
- If conditions are questionable, use the Locksmith Procedure and gain entry.

4. Checklist To Allow ENN

√ Building does not meet the requirements in section titled "What Buildings Must Be Checked" (III-B-1)
√ No readings or anticipated migration to within 5 feet of the building.

√ No readings over a pre-1975, steel service (to the building in question).
√ No readings in vent box.
√ No evidence of underground conduit services (electric or bell).

5. Locksmith Procedure

a. A request for a Locksmith to gain entrance to a building should be made under the following conditions:

- ❖ Immediate forced entry is not necessary.
- ❖ Property is not eligible for ENN.
- ❖ You have exhausted all other options to gain entrance such as checking with neighbors, phone call to customer or self entry.
- ❖ Two PGW employees are required when entering an unoccupied property.

b. Field Operations Personnel Responsibilities

- ❖ Call Dispatcher or Clerk for Locksmith.
- ❖ If a police officer arrives on scene, report his badge number to the Dispatcher.
- ❖ Report back to Dispatcher or Clerk with the Locksmith's arrival time and a final report.
- ❖ Fill out a 119 property damage report.
- ❖ If lock is changed and keys cannot be given to customer, notify Dispatcher or Clerk of location of keys.
- ❖ During normal business hours, notify the Risk Management Department with a final report, extension 6535. Out-of-hours leave a final report on extension 6014 (voice mail).
- ❖ Sign and leave Form #6489 (door hanger) to inform the customer that it was necessary for PGW to enter the premise.
- ❖ Assure premise is secured.
- ❖ Sign voucher for Locksmith.

c. Dispatch or Clerk Responsibilities

- ❖ Dispatcher or Clerk contacts Locksmith and notifies police (911).
- ❖ Dispatcher or Clerk will log the Locksmith's arrival time and final report of all houses entered.
- ❖ If a police officer arrives on scene, the Dispatcher or clerk will log the police officer's badge number in the Locksmith Log.

C. Outside Leak Investigation

1. Outside Leak Investigation Procedure

- **Check buildings first, following all previous instructions for "Inside Leak Investigation" (Section III - B.).**
- Exchange information with PGW employee(s) or customers already on location.
- (Distribution and FSD relief) Verify all readings reported.
- Make an area check of all outside underground structures (CB, WB, VB, MH, etc.) in the vicinity of known readings or near the odor complaint. Determine the proper size of the area check. This can be expanded based on the investigation (Minimum 50' in all directions from the odor complaint or a confirmed reading).
- Bar hole as necessary to assure an effective investigation.
- (FSD) Check that there are no readings requiring an immediate Distribution Investigation, see list below (Criteria for a Distribution Crew to be called).
- Investigate all readings for migration. Confirm that migration does not approach within 5 feet of any building.
- (FSD) When snow or frost restricts investigation, call for Distribution. Continue to check for migration by making inside property checks while waiting for Distribution.
- All duct line or sewer readings must be investigated in all directions to confirm migration pattern.
- Follow Odor Complaint Investigation Reference Guide

REFERENCE CODE MINIMUM REQUIREMENTS GUIDE

ODOR COMPLAINT INVESTIGATION REFERENCE GUIDE

	Nature of complaint or readings found										
1	Conduit Type Manhole with reading - Footway and Roadway Location ex. Sewers, electric ducts, communication ducts etc.	A	B	C	D	E					
2	Foreign Odor - Odor from underground source and coming through foundation walls, drain, vent, stop box, manhole, etc. or odor from an above ground source such as gasoline, cleaning fluid, paint, chemicals, etc. ***If the foreign odor is a wide spread event the dispatcher may instruct a technician to replace "C" with "K" if the job is inside the affected area.**	A	B	***C**	D		F				***K**
3	Gas reading reported by FSD and the DD employee can not confirm the reading and feels a leak does not exist.	A	B	C	D			G			
4	An odor complaint received directly from a customer on the street	A	B	C	D					J	
5	Gas leak inside building coming from outside sources	A	B	C	D						
6	Non-Conduit Manhole - Footway Location - Examples: Water mains, survey boxes etc.	A	B	C	D						
7	Leak in Street – Gas blowing into air from underground source	A	B	C	D						
8	Investigating reports of gas odors in a subway or tunnel			C	D			G	H		
9	Electrical Burnouts			C	D		F	G	H		
10	No odor outside - "No Odor"			C	D						
11	Gas leak inside a building downstream of the head of service on exposed piping	A	B		D						K

A	Follow Inside Leak Investigation at building closest to the odor complaint
B	Follow Inside Leak Investigation at adjoining buildings if necessary or determine if the property can be considered for "ENN" Entry Not Necessary
C	Follow Outside Leak Investigation Instructions
D	Use a calibrated Gas Detection Instrument at every point that you investigate for a possible gas leak
E	All conduit and sewer type manhole investigations shall extend to cover and to find clear the most closely connected manhole in all directions along the route of the manhole in which the reading exist.
F	Dispatcher/supervisor will determine if notification of Air Management is required
G	A Field Operations Supervisor or above must review the investigation prior to determining a "Safe to Hold" status
H	A Field Operations Supervisor or above must be present during the Investigation
J	Notify the Dispatcher on duty as soon as reported by customer
K	Outside leak investigation limited to GDI check of structures (boxes) in front of the building. "(one house check)"

2. Checklist For A Distribution Crew To Be Called – Work Immediately
   All FSD technicians below B man (in rank) cannot make outside leaks safe to hold. They must call Distribution for any leaks found that require Distribution Crew attendance. This check list for not calling Distribution is only for FSD A men and above.

   a. (FSD) Readings and or conditions as noted below require an immediate notification for a Distribution response. FSD Dispatchers must be informed as soon as an initial outside reading is discovered in these structures. Maintain regular communications with the FSD Dispatcher on the status of the investigation. Make final report to FSD Dispatchers when released by Distribution or conditions will be left safe-to-hold.

   √ A leak that represents an existing hazard to persons or property, and requires immediate action
   √ Any reading in sewer manholes, storm inlets, vent boxes, light standards
   √ Any reading inside a building coming from an outside source
   √ Any reading within 5 feet of a building
   √ Any reading in subways
   √ Any reading in PGW manholes
   √ Reading of 76% LEL or greater in a conduit manhole
   √ Any reading in two (2) or more conduit manholes of the same type
   √ Indications of a broken main or third party damage
   √ Electrical Burnouts
   √ Readings on a block which contains a 150 PSI (or greater) main (Dispatcher to review)

   b. If readings do not meet the criteria listed above, the leak may be classified as safe to hold (see below - Checklist for Safe-To-Hold). Once an outside reading is discovered, all reports should be made to DISTRIBUTION DISPATCHERS.

3. Checklist For Safe To Hold

   √ There are no readings that require Distribution visit (see previous list).
   √ Area check does not indicate migration toward the building. All readings found outside were checked for migration – no migration was found within 5 feet of any buildings.
   √ Migration is not anticipated to move toward a building structure.
   √ There is no leak history associated with this leak causing repeated calls. Verification to be obtained from Dispatchers.
   √ Patches or trenches indicating recent construction work should be checked carefully – no migration was found within 5 ft of any buildings.
   √ No snow or frost to restrict investigation. (FSD) When snow or frost restricts investigation, call for Distribution. Continue to check for migration by making inside property checks while waiting for Distribution.
   √ Street block does not have a 150 PSI (or greater) main. (Reading must be pinpointed).

D. Final Reports

- Make oral report to Distribution and FSD Dispatchers via phone.
- Record your findings including reading found in the AIMS database.

IV. Associated Documentation

A. Relevant Code
1. 49 CFR Part 192.605 Procedural Manual for Operations, Maintenance, and Emergencies
2. 49 CFR Part 192.615 Written Emergency Procedures

B. Related Documents
1. Distribution Department Bulletin #63 - Notification Procedure of a Potential Emergency Involving a Pressure Operation
2. Distribution Department Bulletin #212 - Leak Response and Investigation Procedure
3. Distribution Department Bulletin #227 – Initiation of a Pressure Operation
4. Distribution Department Bulletin #228 - Pressure Control Operation Outline Procedure.
5. Distribution Department Bulletin #230 - Organization for Emergency Operations.

C. Attachments
Sample Leak Investigation Illustrations

V. Handbooks

FSD Operations Manual (Section I)
Distribution Foreman's Handbook (Section I)

VI. Transaction Listing

TR 2007-#03

Approved By:

John Jolly
Manager, Distribution Department

Steven Groeber
Director, Field Operations & Work Planning

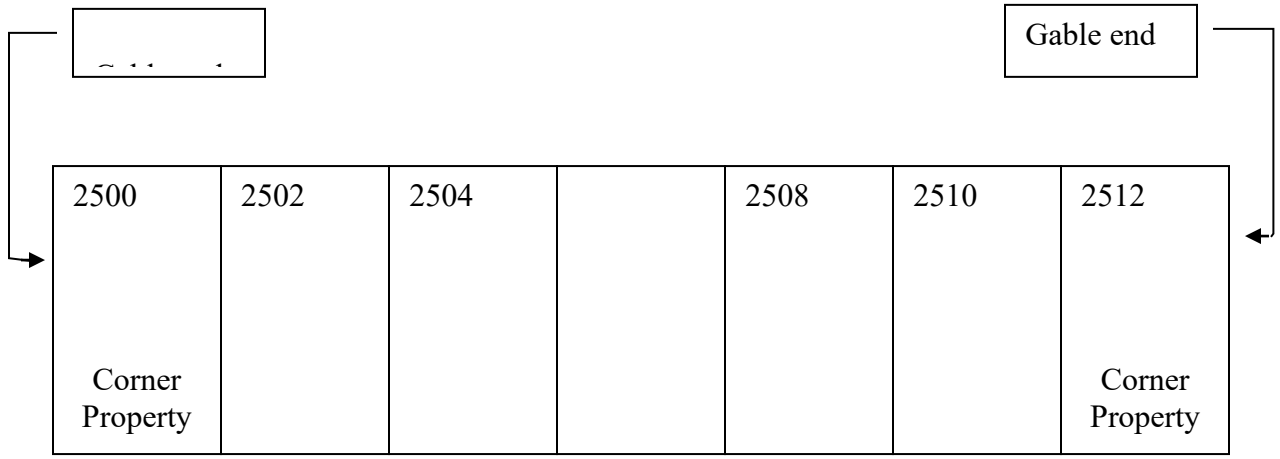
INDEX OF BUILDING CHECK EXAMPLES

Description	Sketch #
Gable End Examples	1
Complaint of an odor (inside or outside) at a specific address No reading or odor detected	2
Complaint of an odor (inside or outside) at a specific address Inside readings detected at FFW	3
Complaint of an odor (inside or outside) at multiple addresses Inside reading detected at FFW's	4
Complaint of an odor (inside or outside) at a specific corner address No reading or odor detected	5
Complaint of an odor (inside or outside) at a specific corner address Inside reading detected at FFW	6
Complaint of an odor (inside or outside) at a specific corner address Inside readings detected at side or rear walls	7
Complaint of an odor (inside or outside) at a specific corner twin address Inside reading detected at FFW	8
Complaint of an odor (inside or outside) at a specific twin address No reading or odor detected	9
Complaint of an odor (inside or outside) at a specific twin address Inside reading detected at FFW	10
Complaint of an odor (inside or outside) at a specific twin address No reading or odor detected	11
Complaint of an odor (inside or outside) at a specific twin address Gas services enter between properties. Inside readings detected at FFW	12
Complaint of odor at an intersection – no outside readings detected	13
Complaint of odor at an intersection – outside readings detected	14
Complaint of odor at an intersection – migration within five feet (5') Of a building line – (Distribution must work)	15
Complaint of an odor (inside or outside) –migration NOT within five feet (5') of a building line	16
Complaint of odor (inside or outside) – migration within five feet (5') Of a building line	17
Complaint of an odor (inside or outside) with readings over a pre-1975 steel service	18
Complaint of an odor (inside or outside) with readings over multiple pre-1975 steel services	19
Complaint of an odor (inside or outside) with a vent box reading	20
Complaint of an odor (inside or outside) with curb box reading	21
Complaint of an odor (inside or outside) with evidence of Underground conduit services	22

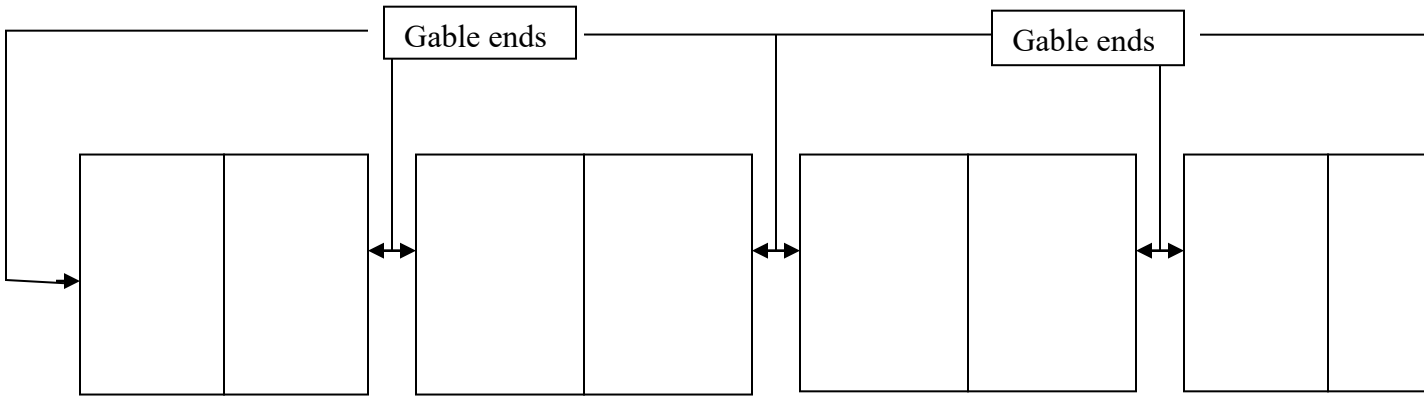
Gable end Examples

Sketch #1

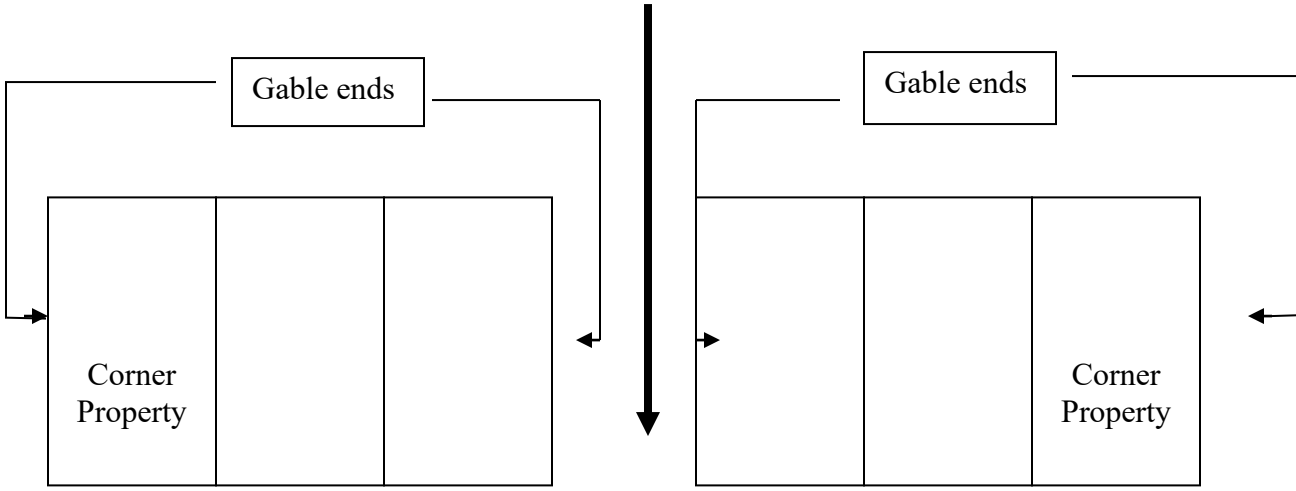
End of rows



Twins/alley way



Vacant lot/alley way

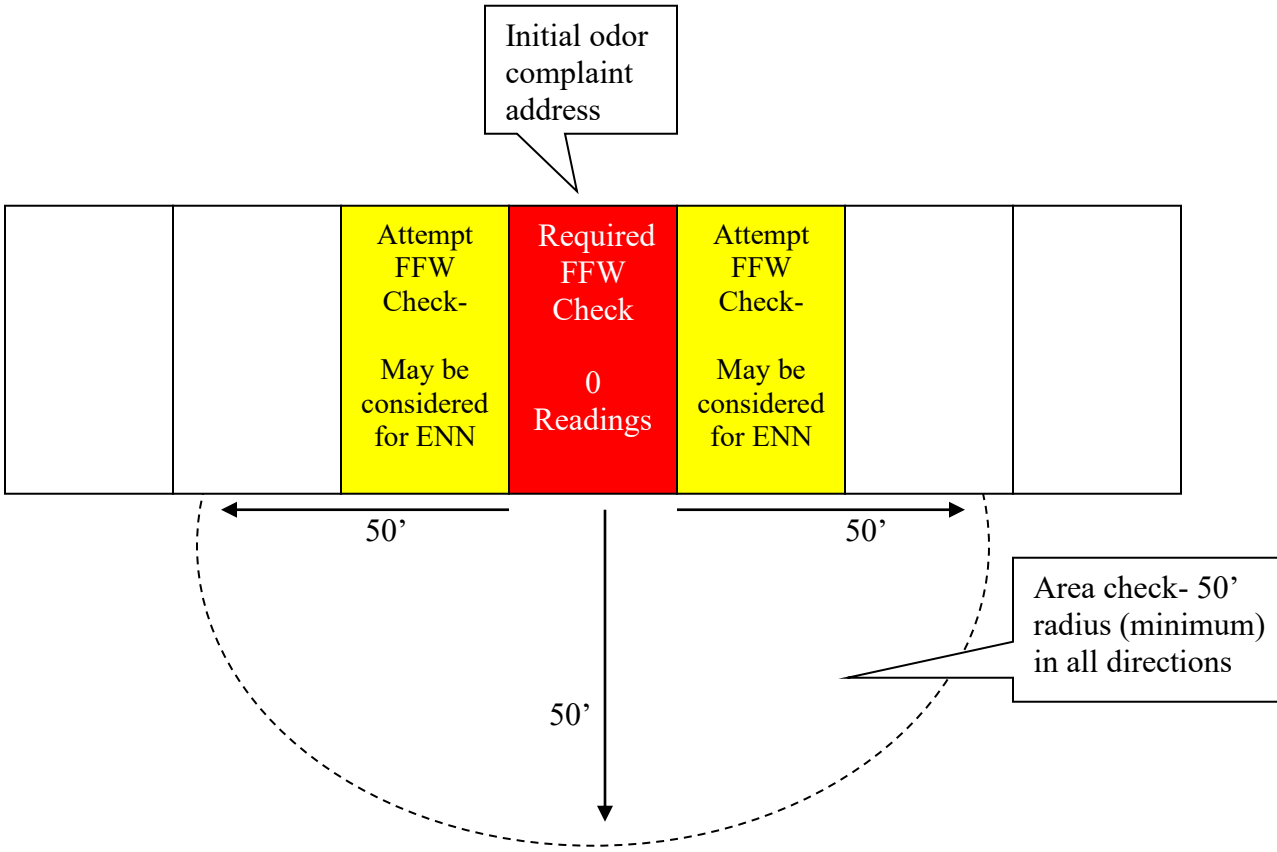


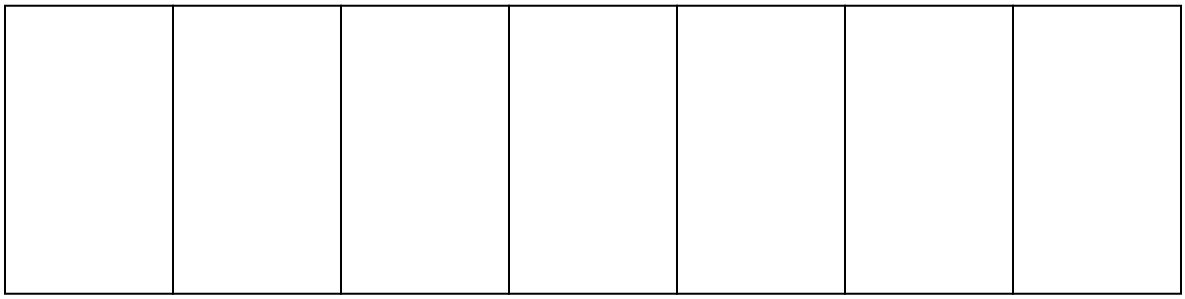
BUILDING CHECK GUIDELINES

Sketch #2 with minimum area check

Leak Investigation Order- **Complaint of an odor (inside or outside) at a specific address**
No readings or odor detected

Additional building checks may be required depending on the leak migration pattern.

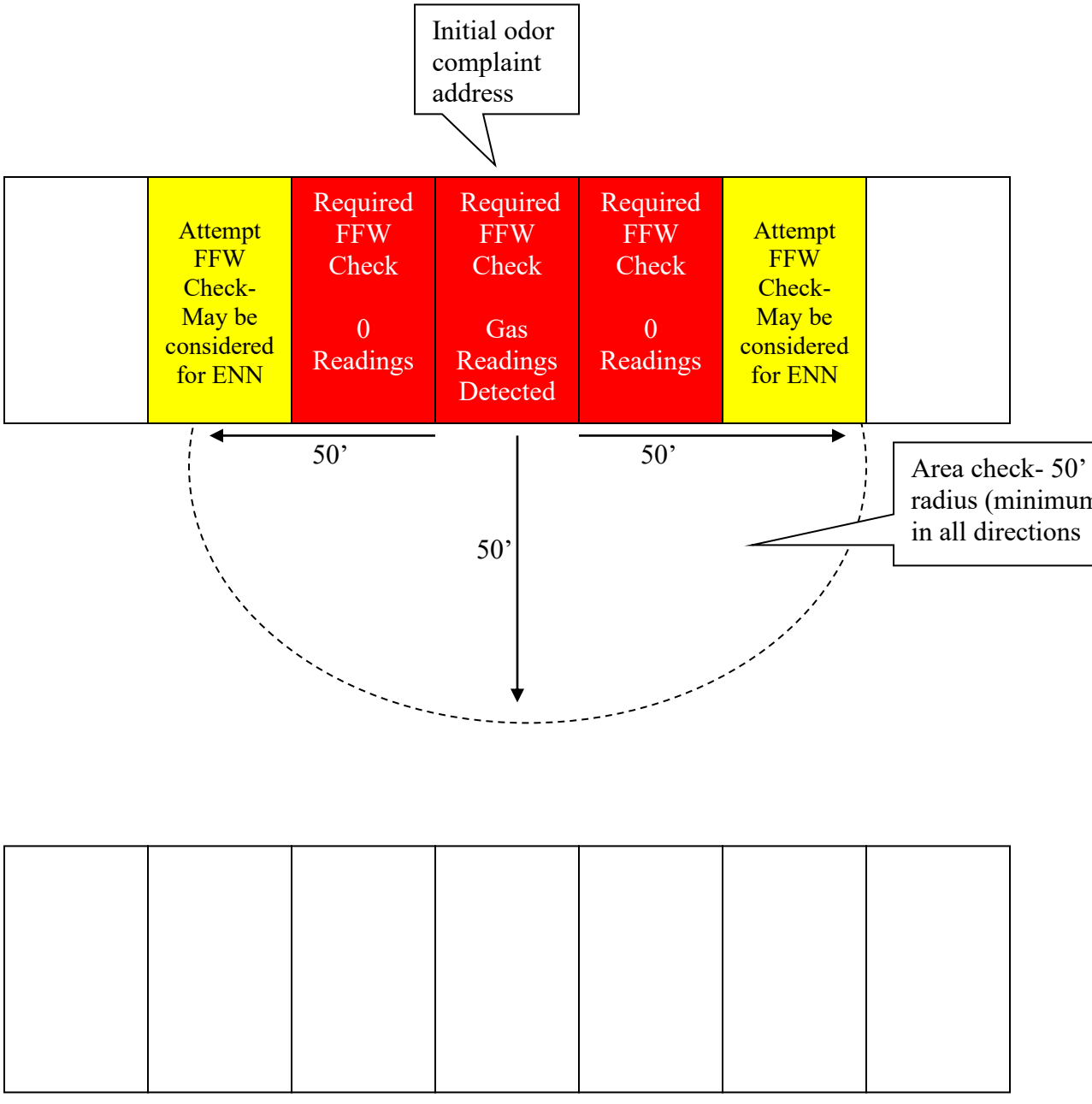




BUILDING CHECK GUIDELINES

Sketch #3 with minimum area check
Complaint of an odor (inside or outside) at a specific address
Inside reading detected at FFW

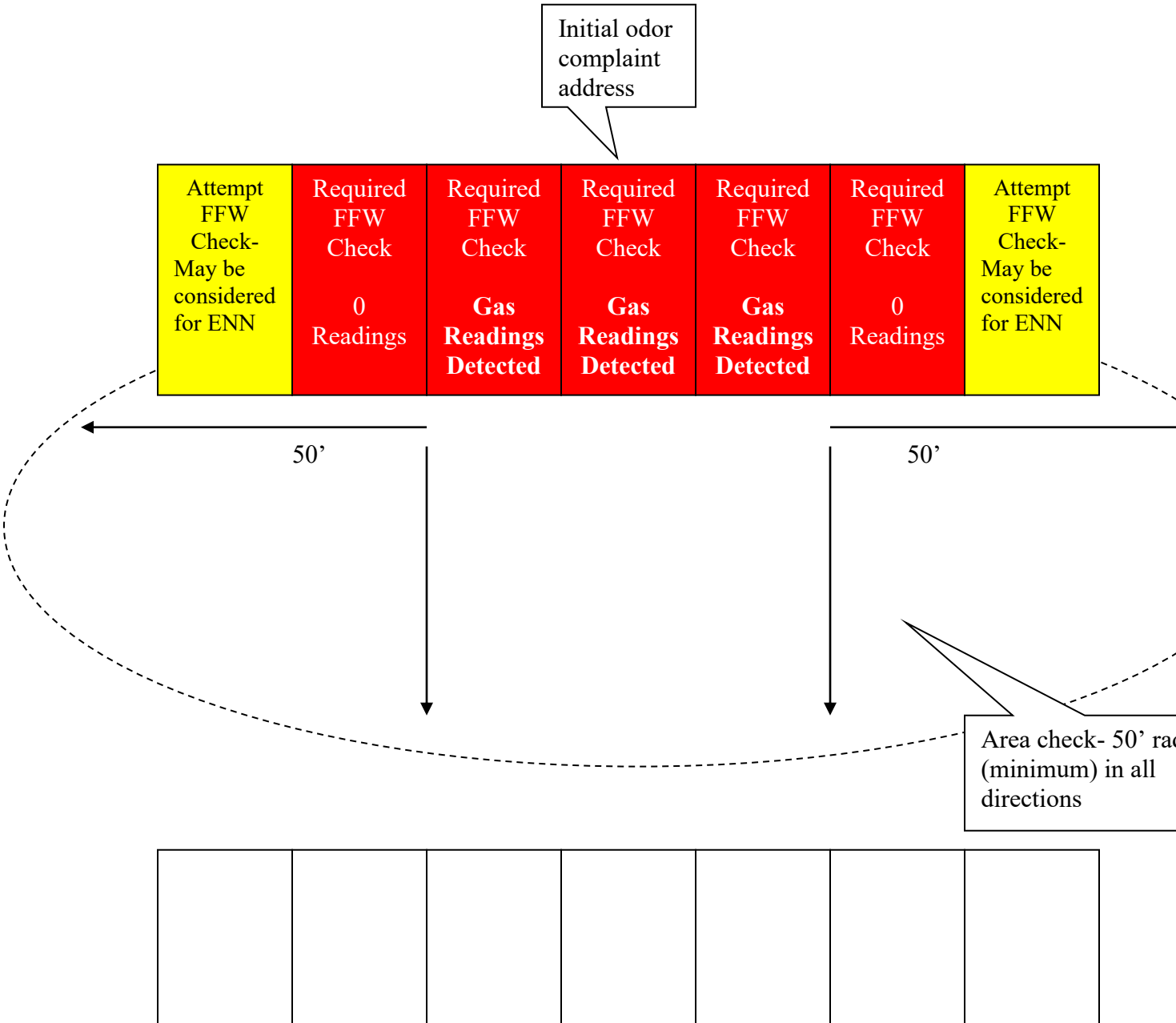
Additional building checks will be required if additional inside gas readings are detected (see next sketch).
When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.



BUILDING CHECK GUIDELINES

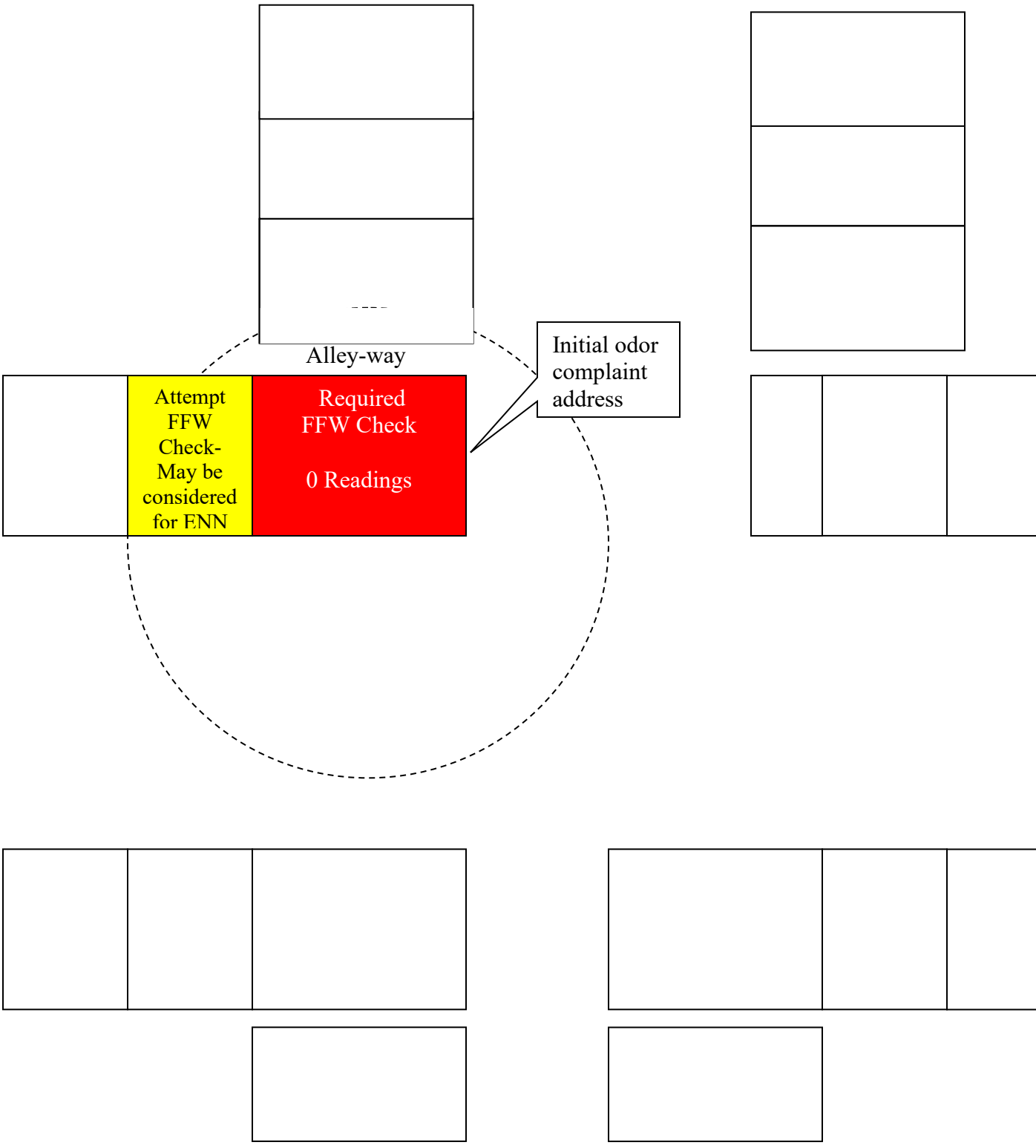
Sketch #4 with minimum area check
Complaint of an odor (inside or outside) –at multiple addresses
Inside readings detected at FFW's

When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.



BUILDING CHECK GUIDELINES

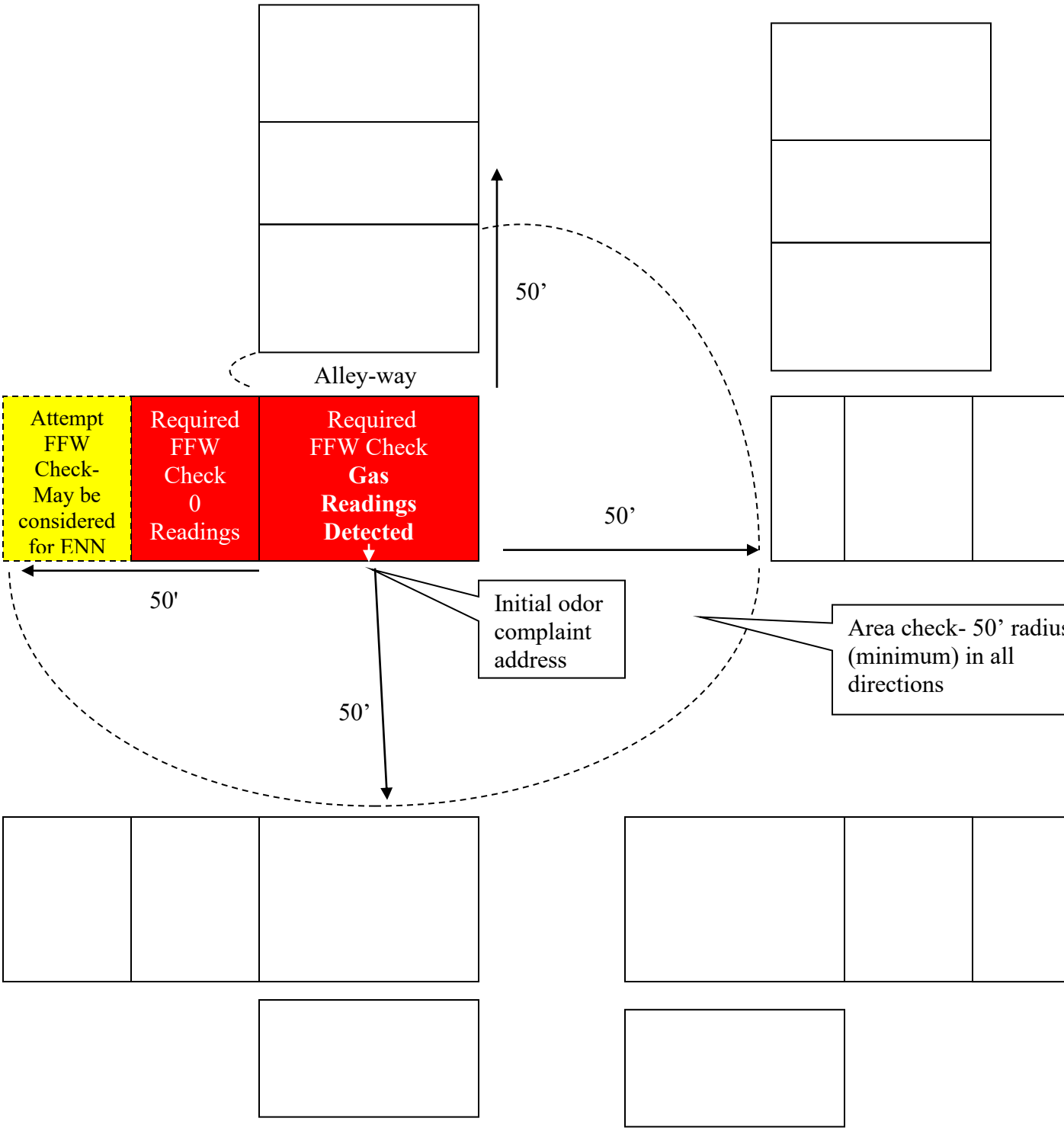
Sketch #5 with minimum area check
Complaint of an odor (inside or outside) at a specific corner address



BUILDING CHECK GUIDELINES

Sketch #6 with minimum area check
Complaint of an odor (inside or outside) at a specific corner address
Inside reading detected at FFW

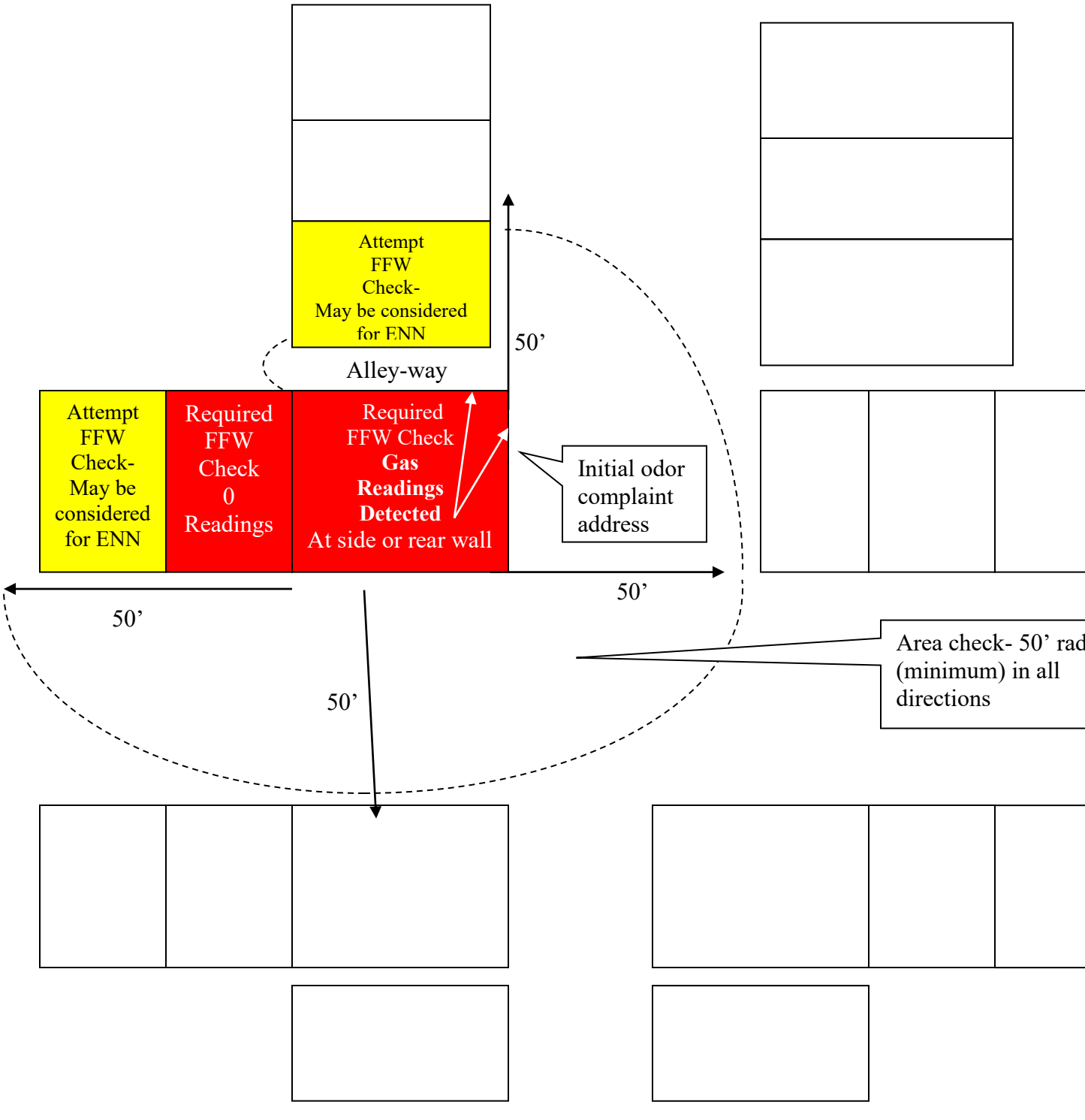
When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.



BUILDING CHECK GUIDELINES

Sketch #7 with minimum area check
Complaint of an odor (inside or outside) at a specific corner address
Inside readings or odor detected at side or rear walls

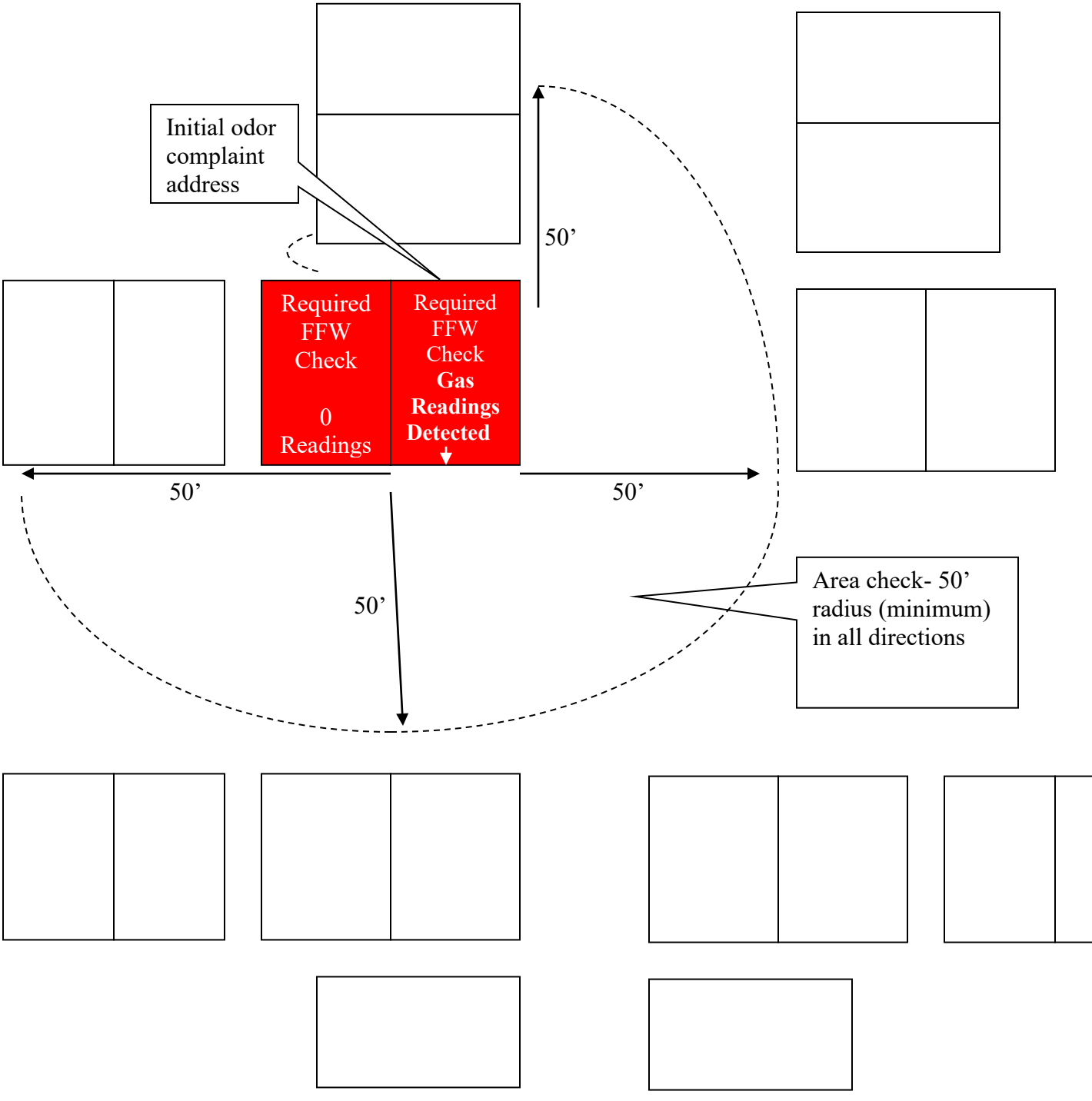
When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.



BUILDING CHECK GUIDELINES

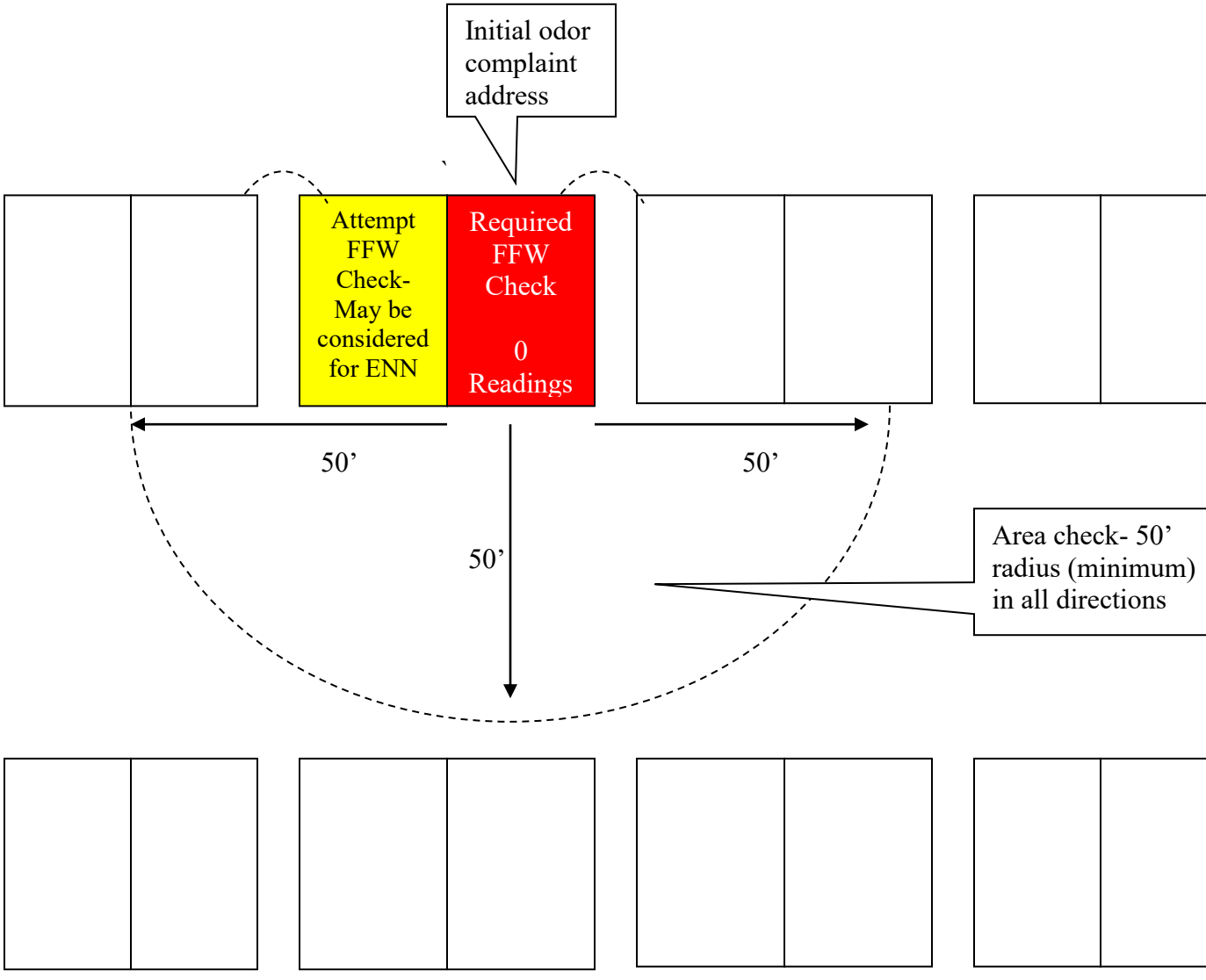
Sketch #8 with minimum area check
Complaint of an odor (inside or outside) at a specific corner Twin address
Inside readings detected at FFW

When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.



BUILDING CHECK GUIDELINES

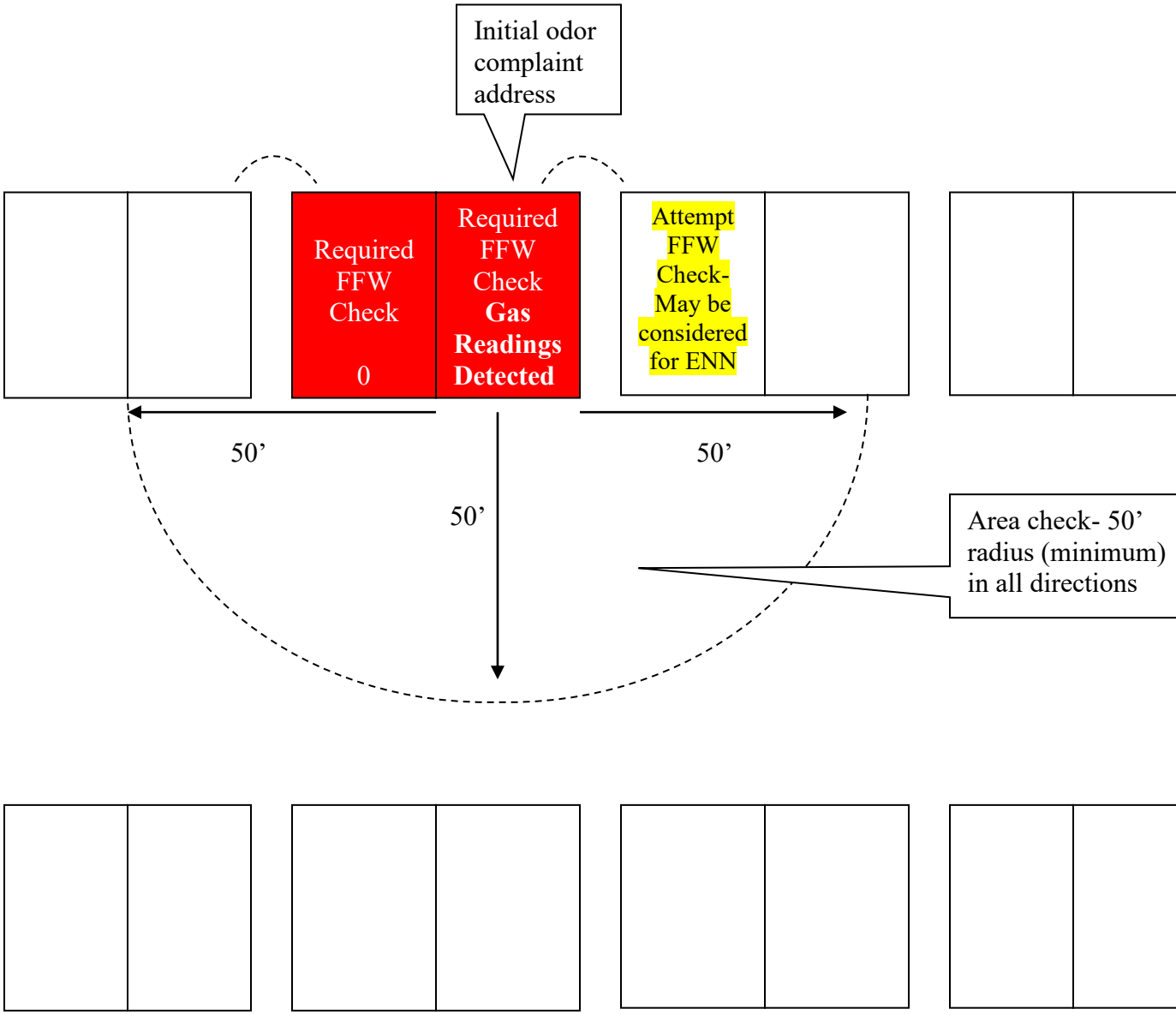
Sketch #9 with minimum area check
Complaint of an odor (inside or outside) at a specific Twin address
No readings or odor found



BUILDING CHECK GUIDELINES

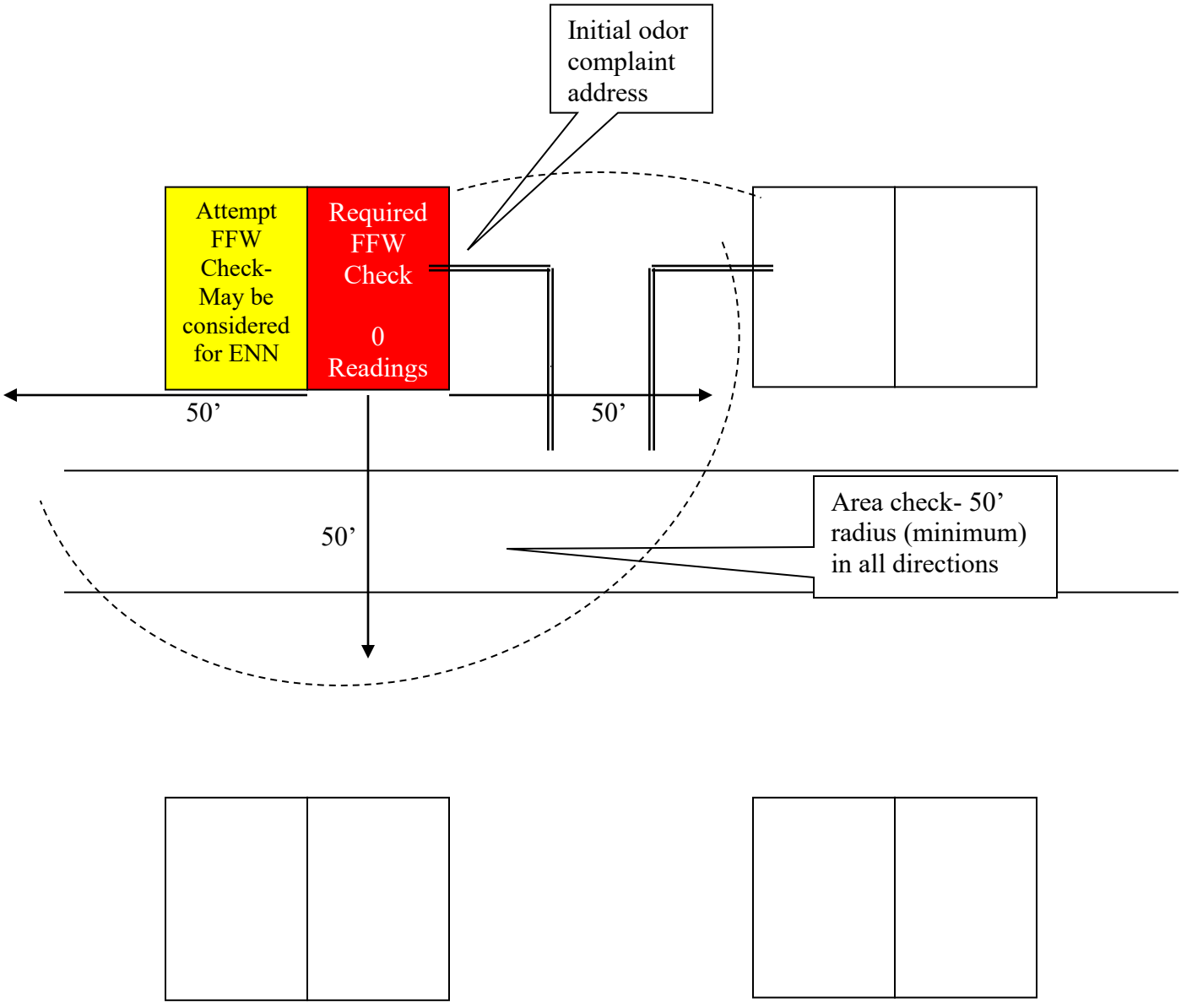
Sketch #10 with minimum area check
-Complaint of an odor (inside or outside) at a specific Twin address
Inside reading detected at FFW

When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.
Additional building checks will be required if gas services are located between properties (see next sketch).



BUILDING CHECK GUIDELINES

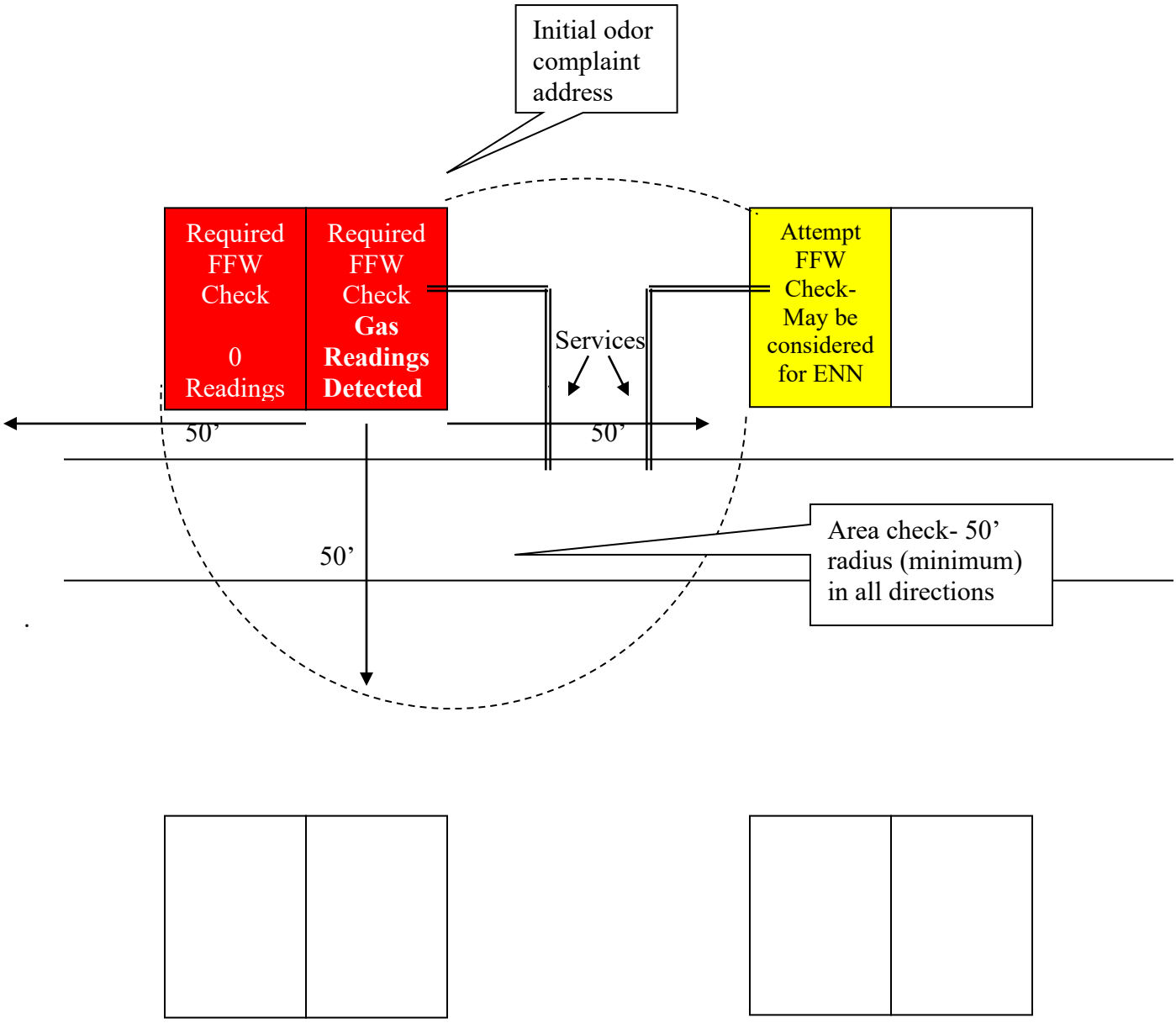
Sketch #11 with minimum area check
Complaint of an odor (inside or outside) at a specific Twin address
Gas services enter between properties
No readings or odor found



BUILDING CHECK GUIDELINES

Sketch #12 with minimum area check
Complaint of an odor (inside or outside) at a specific Twin address
Gas services enter between properties
Inside readings detected at FFW

When inside readings are detected, continue building checks until at least two adjoining properties on each side are clear of readings or odor inside. Consideration for ENN can be made as outlined below. A meter and piping test must be completed for any property with an inside odor.

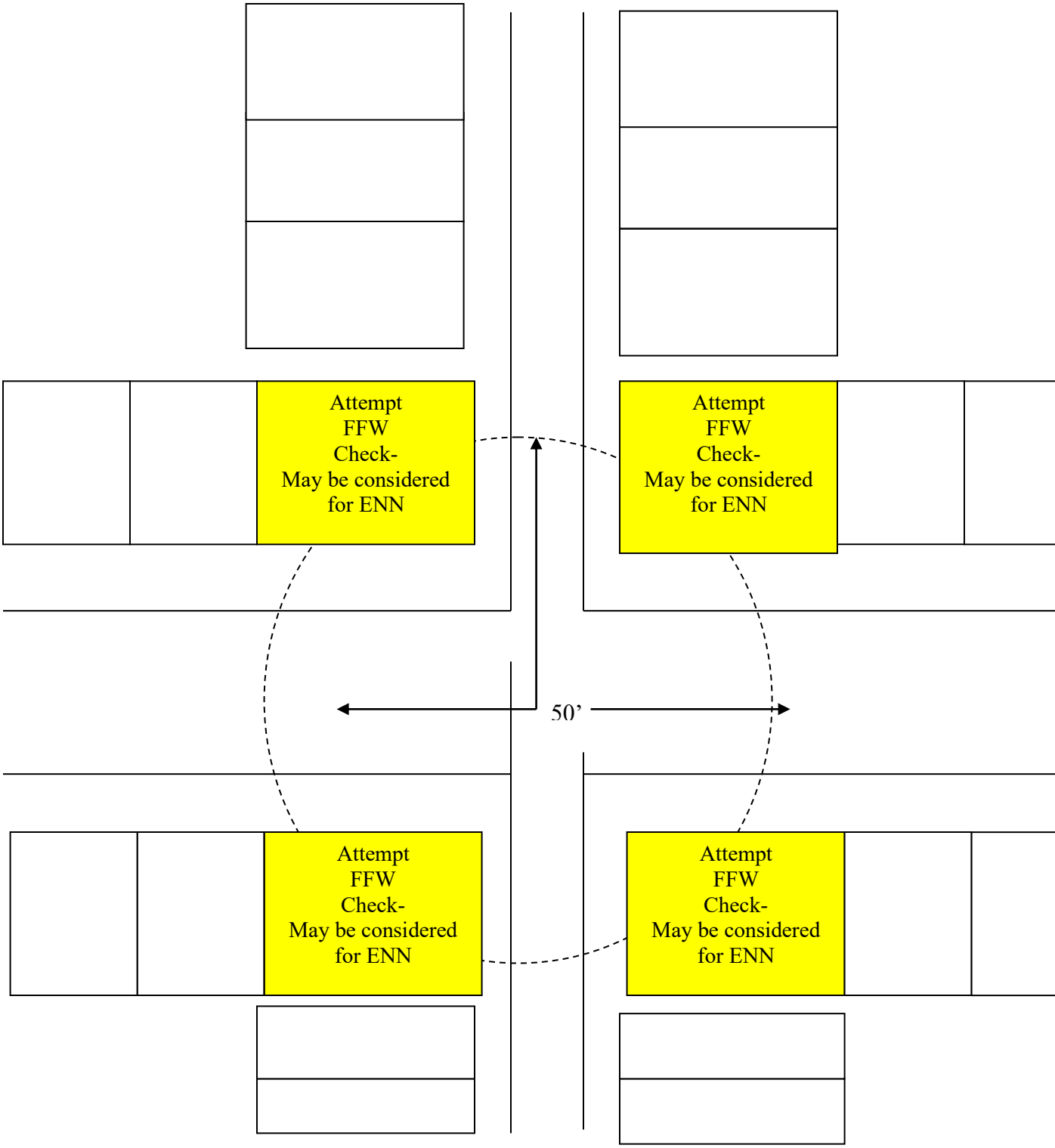


BUILDING CHECK GUIDELINES

Sketch #13

Complaint of an odor at intersection – no outside reading detected

Building checks may be required depending on the leak migration pattern.

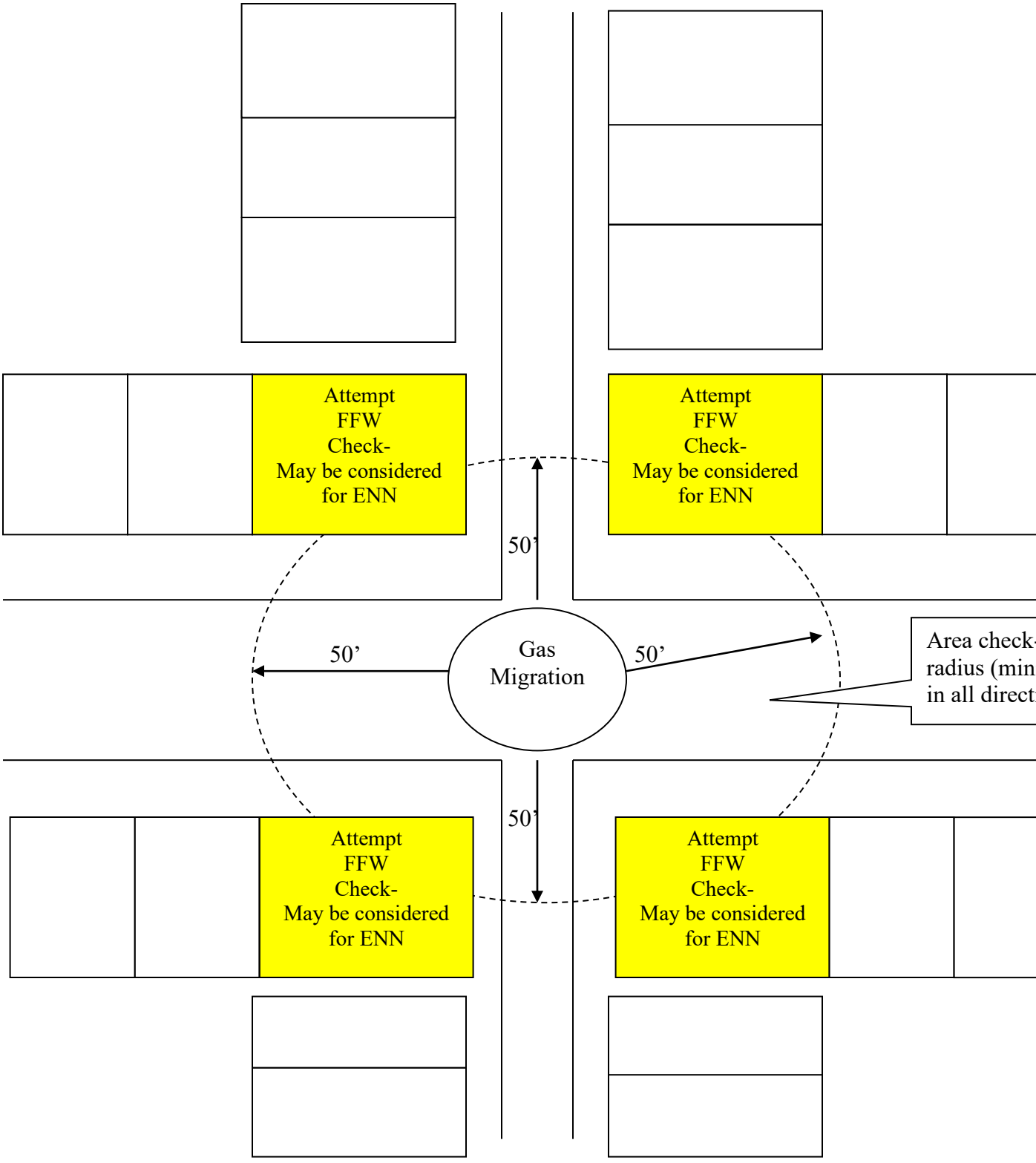


Outside Readings

Sketch #14 with minimum area check

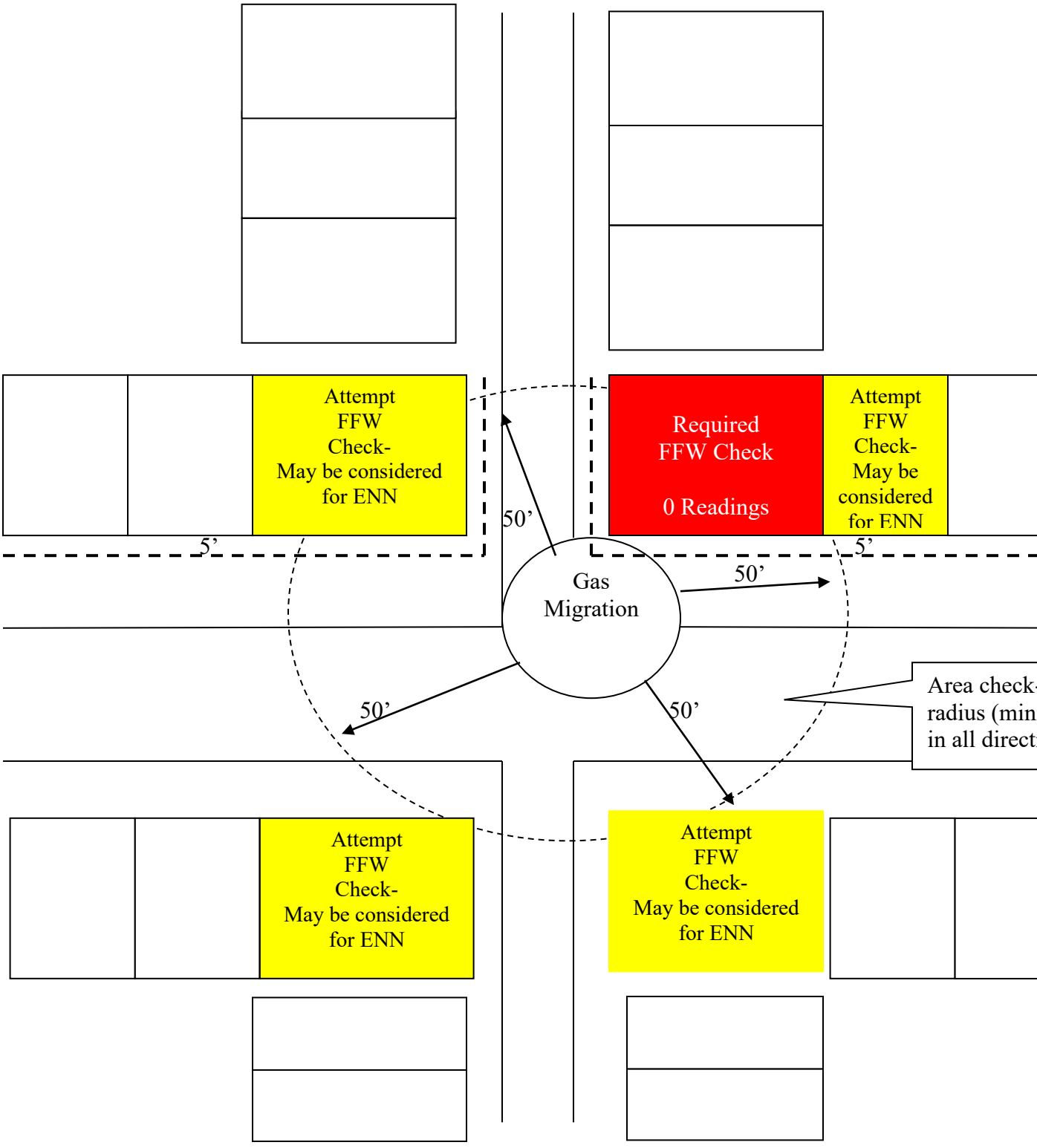
Complaint of an odor at intersection – Outside reading detected

Building checks may be required depending on the leak migration pattern.



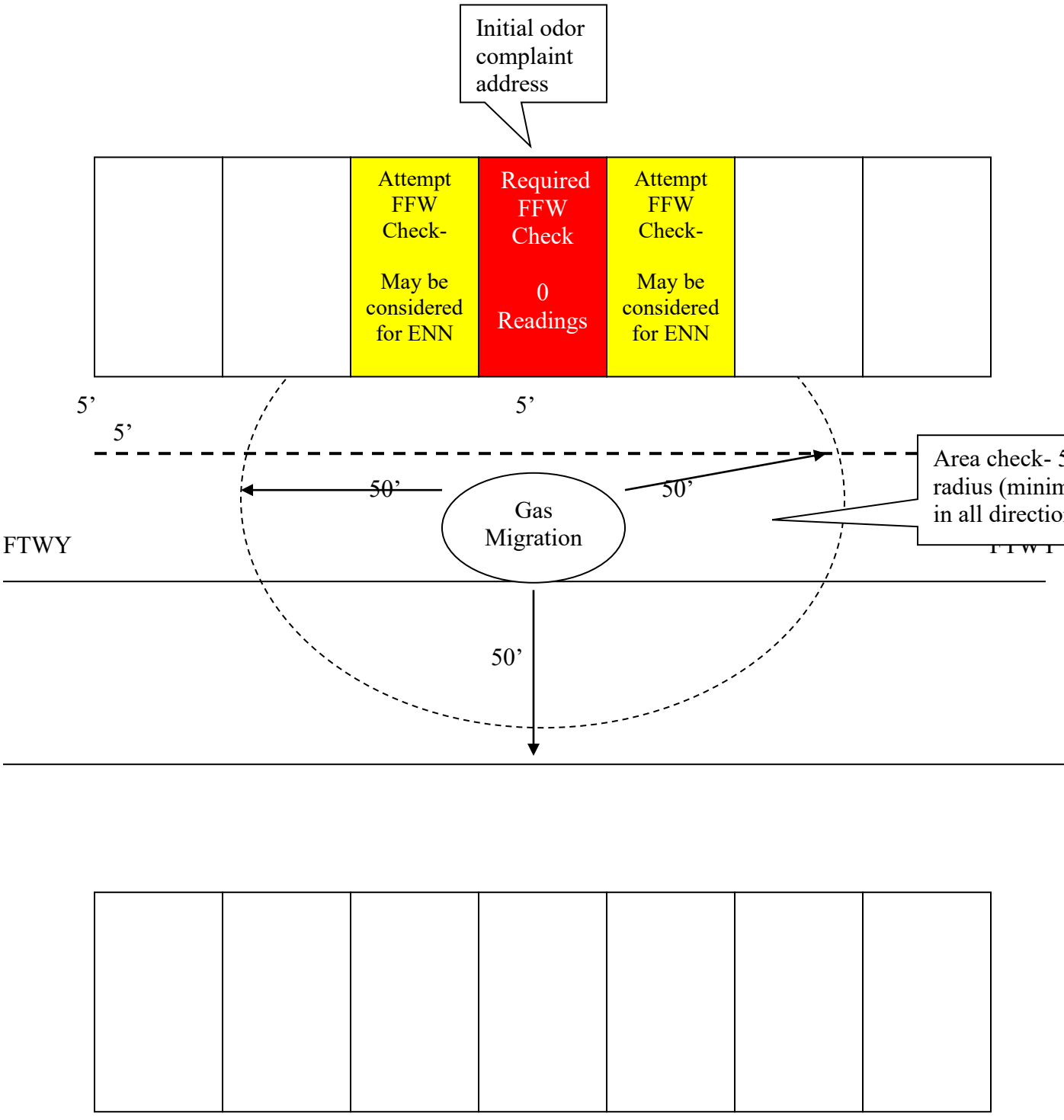
Outside Readings

Sketch #15 with minimum area check
Complaint of an odor at intersection
migration within five feet (5') of building line.
(Distribution must work)



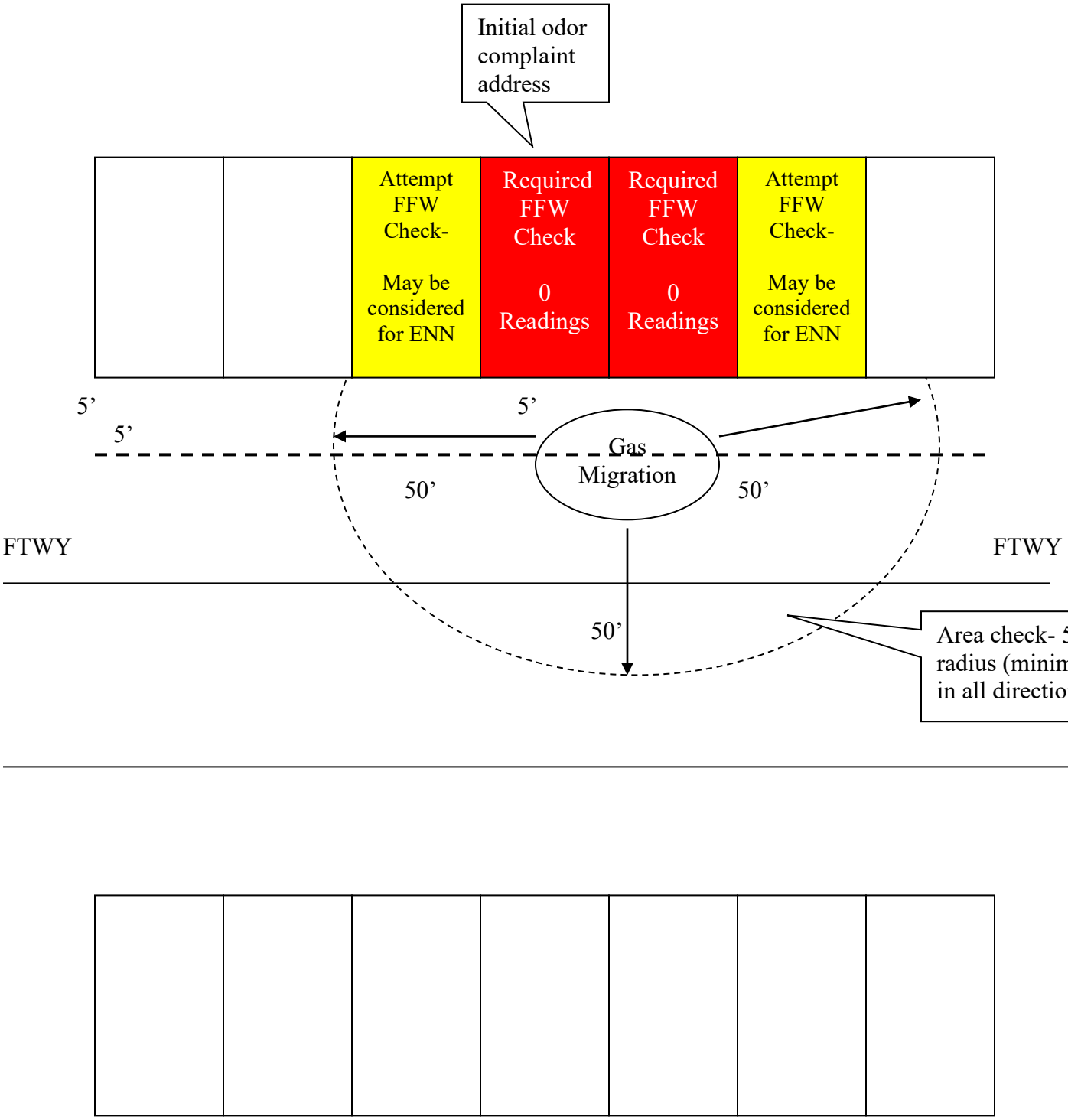
Outside Readings

Sketch #16 with minimum area check
Complaint of an odor (inside or outside) migration NOT within five feet (5') of building line.



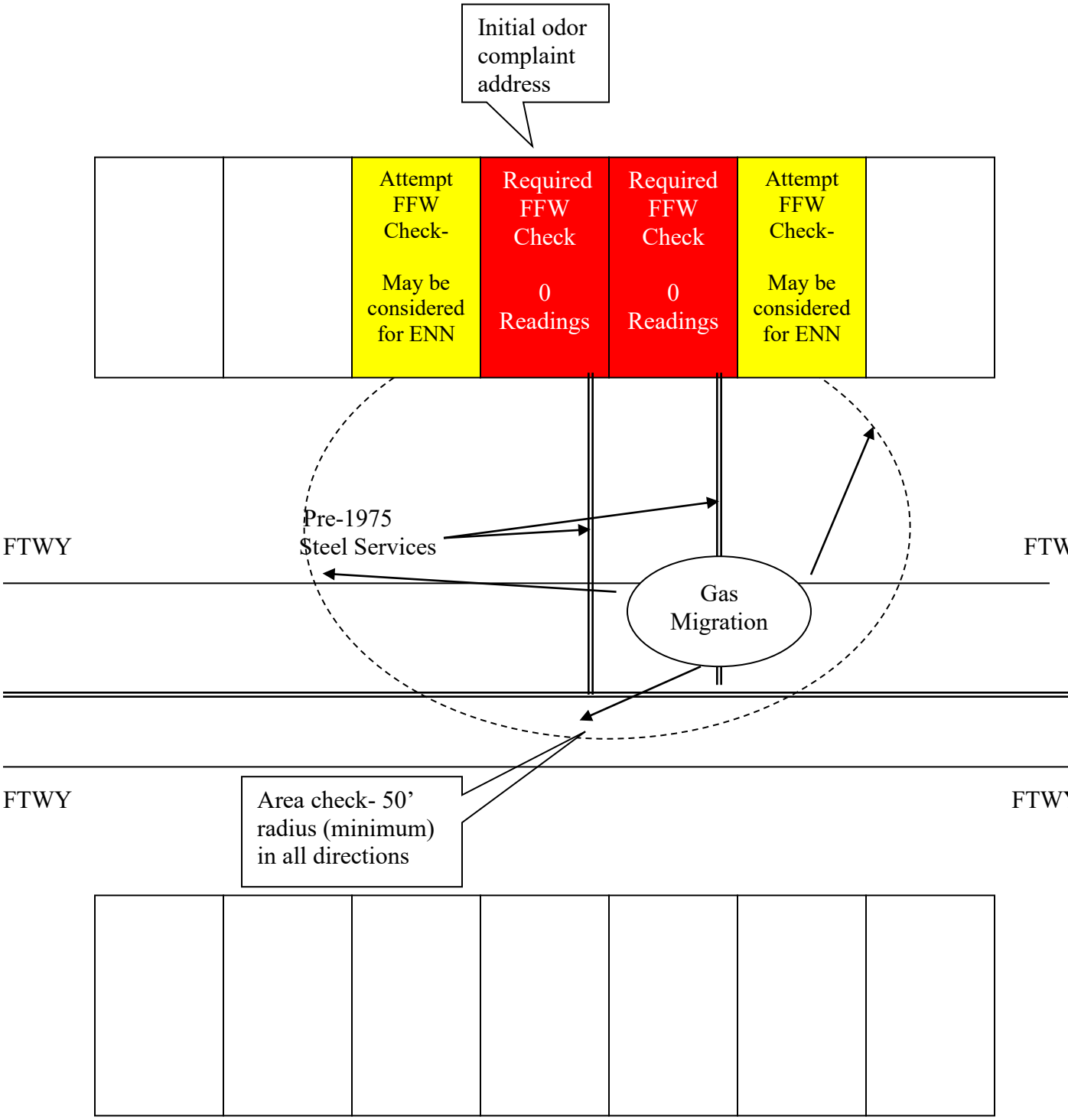
Outside Readings

Sketch #17 with minimum area check
Complaint of an odor (inside or outside) migration within five feet (5') of building line.



Outside Readings

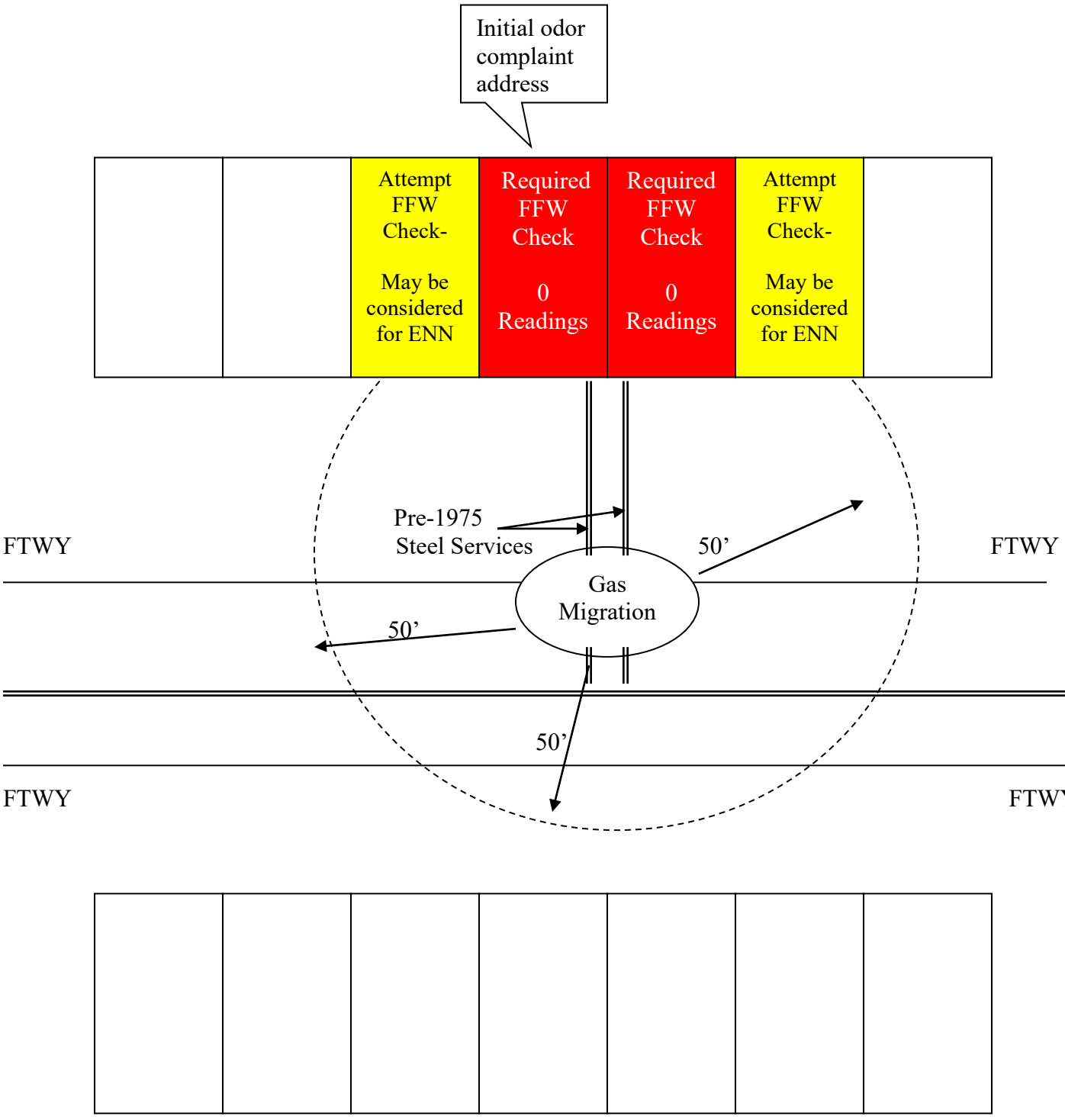
Sketch #18 with minimum area check
Complaint of an odor (inside or outside) readings over pre 1975 steel services.



Outside Readings

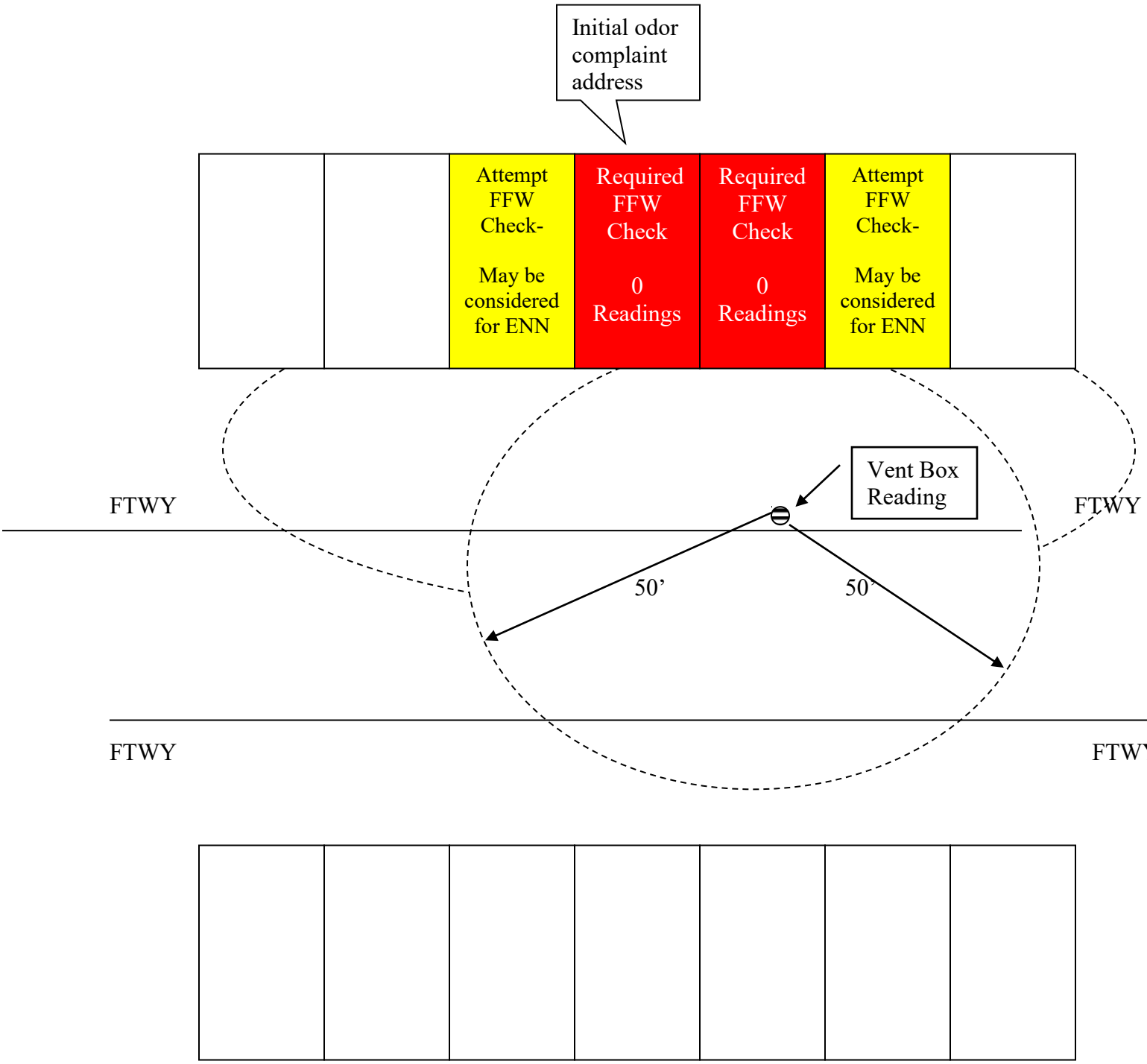
Sketch #19

Complaint of an odor (inside or outside) readings over pre 1975 steel services.



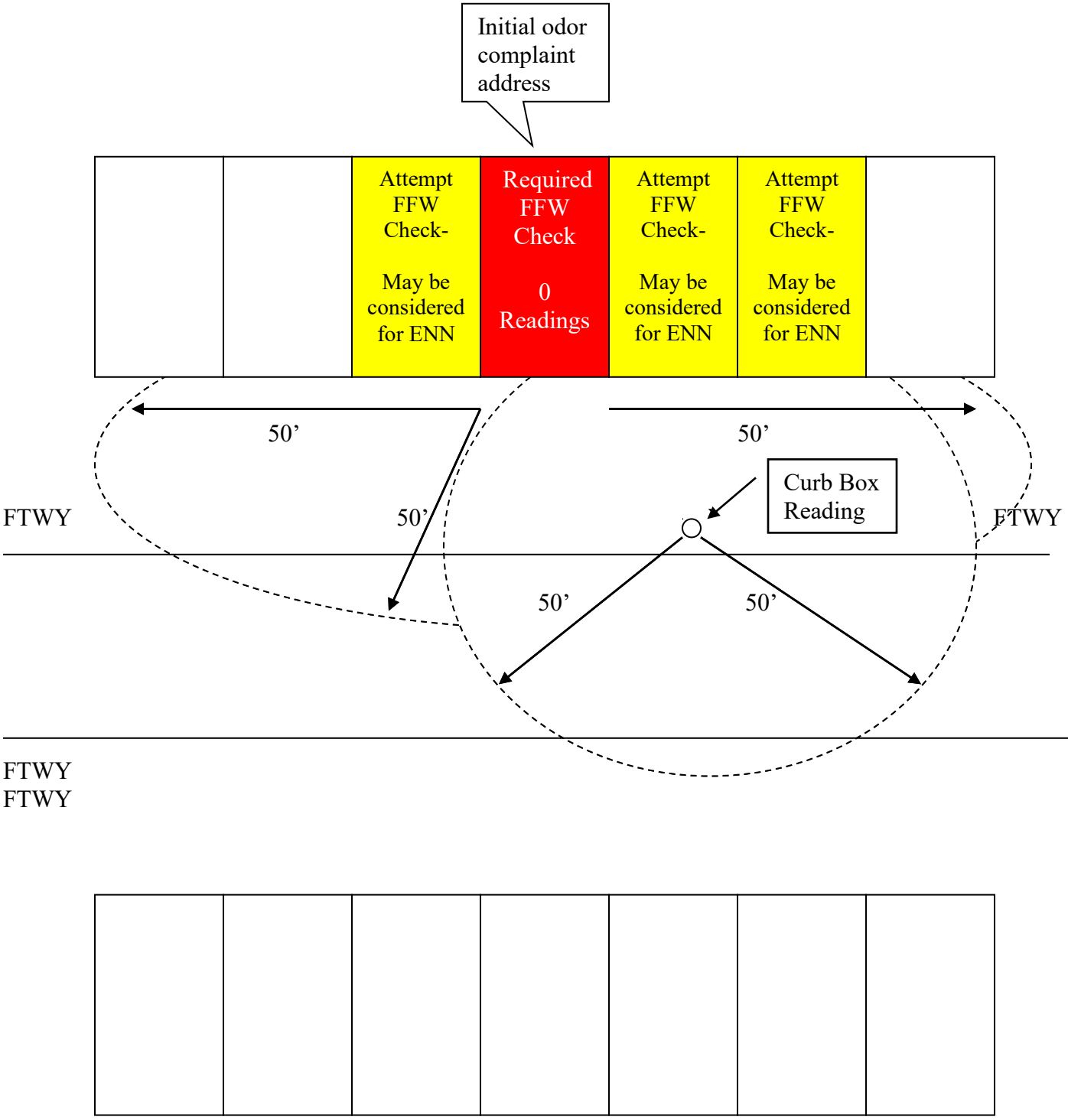
Outside Readings

Sketch #20 with minimum area check
Complaint of an odor (inside or outside) vent box reading.



Outside Readings

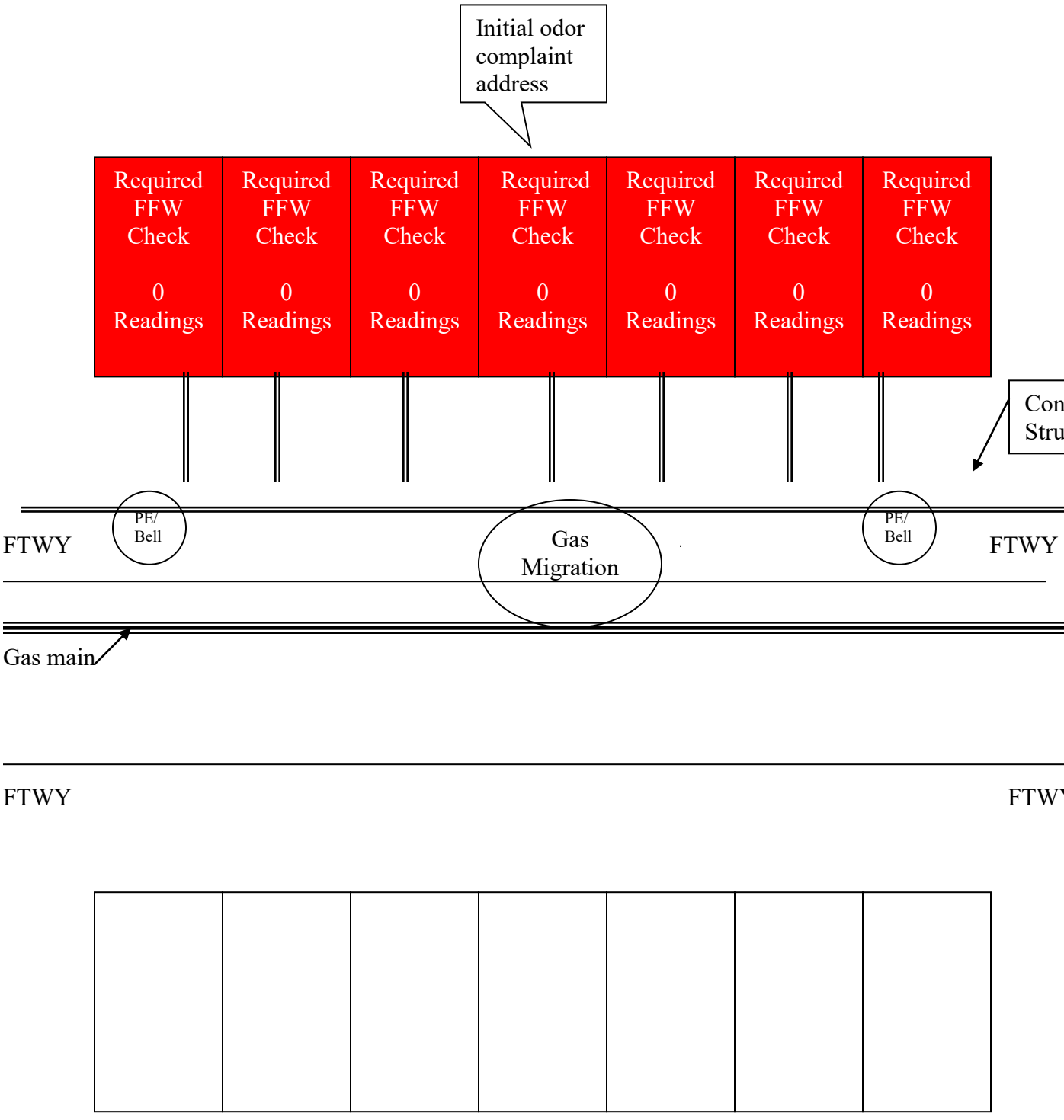
Sketch #21 with minimum area check
Complaint of an odor (inside or outside) curb box reading.



Outside Readings

Sketch #22- Complaint of an odor (inside or outside) evidence of underground conduit services.

Committee review



PFD AND PECO ASSISTANCE LEAK CALLS

BULLETIN 285

I. Purpose

To provide field operations personnel guidance when handling leak calls with LEL readings in the general atmosphere of a building. These procedures provide steps needed to contact the Philadelphia Fire Department and PECO to assist PGW in these situations.

II. Definitions

- FFW – Generally means "Front Foundation Wall". However, for a leak investigation the term also means to check "ALL APPROPRIATE BASEMENT WALLS", all walls where a gas main (outside) may run adjacent to the building (not only the front wall

- FIRST RESPONDER – term used to describe the first trained responder to arrive on scene of an emergency, accident, natural or human-made disaster, gas leak, fire or similar event. Such people may be PGW personnel, firefighters, police, other law enforcement or emergency medical services, or lay rescuers to deal with the situation and protect life and property.

- GDI – Gas Detection Instrument

- GENERAL ATMOSPHERE - is an open area within a room on any floor of a property. The general atmosphere is not behind a wall, in the corners of a room, between or against walls, floors, or in the area of the ceiling joist, or close to the FFW.

- INCIDENT COMMAND CENTER – a designated location used to coordinate activities and share information.

    - ◊ INCIDENT COMMAND LOCATION - ON SCENE – The location of the highest ranking PGW employee responsible for all activities at the job site.

- LOWER EXPLOSIVE LIMIT (LEL) – Lowest concentration (percentage) of gas in air needed for the gas to ignite when given an ignition source. Concentrations lower than LEL are "too lean" to burn. 5% gas in air is the LEL of PGW gas.

- READING – a repeatable deviation on a GDI or equivalent expressed in % LEL & % Gas scales.

- SAFETY PERIMETER – The boundary of an area outside of the influence of the leaking gas. Also known as an Exclusion Area by the Philadelphia Fire Department.

- VENTILATE – This term, when used in reference to buildings, structures, manholes and confined spaces, means the introduction of fresh air into the affected structure. Ventilation can be accomplished by opening doors and windows, breaking windows, opening basement

grates, and removing manhole covers or lids to prevent or reduce the level of natural gas in the affected structure. This term, when used in reference to gas readings underground, means to draw residual natural gas from below the surface with the use of pneumatic mechanical devices.

LEL reading in the General Atmosphere is any reading detected with a GDI in a building as you enter and proceed through a building to the FFW.

III. Procedure

PGW Dispatcher receives notification from any PGW First Responder stating there is a reading in the general atmosphere of a property or a report directly from the PFD of any reading or odor in the building, the dispatcher taking the call will request, record and communicate to PECO the following information:

- Leak heading address
- Number of properties with atmospheric readings,
- Address of premises with atmospheric readings (cross streets, or any special information to assist someone responding to this location)
- Atmospheric reading level
- Number of properties and people evacuated
- Address of evacuations
- PGW person in charge
- Is the Philadelphia Fire Department on Location?

The PGW Dispatcher will:

1. If the Philadelphia Fire Department is not on location, notify the PFD (911) requesting assistance.

2. Notify PECO requesting assistance at 215-841-3670; backup number is 215-841-4141.

3. Notify the Supervisor of the area or the on call supervisor. Follow the Emergency Notification Procedure. Out of hours you should also consider calling the closest supervisor living in the area of the event.

4. PECO will treat the call as a level 1 emergency. PECO refers to this as PF-1 meaning Police/Fire 1 and dispatch time is within fifteen minutes.

5. PECO also has PF-2 which has a dispatch time of one hour and PF-3 which has a dispatch time of four hours. These response levels should not be used for events with general atmospheric readings in a building.

6. PECO will assign a technician to respond with the instruction to report to the PGW person in charge on location (Incident Command Location- On Scene). If the person in charge for PGW changes PECO needs to be updated.

7. PECO will provide the PGW Dispatcher with an estimated time of arrival after the order has been assigned.

8. PECO will provide the PGW Dispatcher a contact number for the PECO responder after the order has been assigned.

9. Notify the PGW person in charge of PECO's estimated time of arrival (ETA) and the contact number for the PECO responder.

Whenever PFD arrives on location they are the authority in charge and the PGW person in charge will report to their Incident Commander.

PGW person in charge on location (Incident Command) will:

1. Ensure that Distribution Department Bulletin #212 - Leak Response and Investigation procedure is being followed.

2. Document PECO's arrival time.

3. Provide an update to the PECO technician of the gas leak situation; provide the address of the properties where electrical shutoff is necessary.

4. Confirm the electrical shut off requirements with the PECO technician.

5. Instruct the PECO technician to report back with the results of actions taken and the number of premises with electrical outages.

6. Document the approximate number of addresses where the electric was shut off.

7. Document the time electric was shut off.

8. Provide an update of the gas leak situation and, if possible give an estimated time when premise(s) will be clear of atmospheric gas readings

9. Coordinate electric restoration with PECO when it is determined to be safe.

10. Complete form 119 with addresses related to break-ins, evacuations, power outages with times related to disconnection and restoration of power. Notify Risk Management

IV. Associated Documentation

D. Relevant Code
   1. 49 CFR Part 192.605 Procedural Manual for Operations, Maintenance, and Emergencies
   2. 49 CFR Part 192.615 Written Emergency Procedures

E. Related Documents
   1. Distribution Department Bulletin #212 - Leak Response and Investigation Procedure.
   2. Actions to be Taken to Protect People & Property - Tip card

V. Attachments

N/A

V. Handbooks

A. Foreman's Handbook – Section I – Operations
B. Foreman's Handbook – Section VII – Safety
C. Dispatchers Handbook
D. FSD Operations Manual – Section I – Leak & Fire Duty

VI. Transaction Listing

Prepared by: John Jolly 3/24/11
JJ/ccm

Approved By:

SIGNATURE ON FILE
John Jolly
Manager, Distribution Department

SIGNATURE ON FILE
Raymond Welte
Manager, Field Services Department

SIGNATURE ON FILE
Steven Groeber
Director, Field Operations & Work Planning

NOTIFICATION PROCEDURE OF A POTENTIAL EMERGENCY INVOLVING A PRESSURE OPERATION
BULLETIN 63

I. Purpose

To ensure early, detailed and accurate notification of a potential emergency that would involve a pressure operation to the Pressure Force and Gas Control supervisory personnel.

II. Definition

Pressure Operation – A procedure to reduce distribution system pressure by controlling the flow of gas to a portion of the system.

Prospect Emergency – A Customer Service Representative generates an emergency order when a customer calls with a potential gas leak and one of the following conditions are met:

- Customer reports a Strong odor of Gas
- Gas leaks from Schools, Hotels, Hospitals or any other building where people congregate
- Gas leaks reported from Municipal Radio, Fire Department or Police Department
- Reports of an Explosion
- Calls from Contractors, Plumbers, Workmen, etc. indicating they have broken, ruptured or damaged a gas line while digging in the street, sidewalk or yard.
- A second call for a gas leak prior to PGW arriving on location.

III. Procedure

Upon receipt of a Prospect Emergency, the Distribution Department Dispatcher shall dispatch the appropriate manpower and equipment to the order location. In the event that the leak complaint is located in the block or involves the 10-35 psig or higher main or service **the Distribution Department Dispatcher shall:**

<u>During Normal Business Hours</u>

Dispatch a crew, supervisor and emergency grease unit to the location, informing the PGW First Responders that this leak complaint is along the route of a 10-35 psig or higher main. Notify the Pressure Force Supervisor, Superintendant of Maintenance, Distribution Department Manager and the Gas Control Dispatcher on duty of a potential leak that could require a Pressure Operation. Request information from the PGW First Responders on scene and determine which main is affected as soon as possible.

S. H. Section II **67**

Prepare detail main maps and service information for the location and have copies delivered to personnel at the scene, if necessary. Emergency Incident Report, recording all times and related information. Update information from the field to the Pressure Force Supervisor, Superintendant of Maintenance, Distribution Department Manager and the Gas Control Dispatcher.

Out of Hours

Dispatch a Distribution crew, the Pressure Force Detail crew, the Night Supervisor if he is on duty, (if he is not, dispatch the Detail Supervisor) and the emergency grease unit, informing the First Responders? that this leak complaint is along the route of a 10-35 psig or higher main. In all cases, notify the Detail, Reserve and Reserve Staff Supervision, Gas Control Dispatcher on duty and the Pressure Force Supervisor on Reserve. Request and gain information from the first on scene First Responders and determine the affected main as soon as possible. Request all First Responders to notify Dispatching for the potential need of a Pressure Operation as soon as possible. Initiate Emergency Incident Report, recording all times and related information. Update information from the Field to the Detail, Reserve and Reserve Staff Supervision.

Upon field determination that a high pressure leak exists, re-notify the Gas Control Dispatcher and the Pressure Force Supervisor of the approximate location of the leak. After the Pressure Force Supervisor determines any additional manpower needs, assist with the notification of required resources for the Pressure Force personnel. When the Pressure Force crews are called in, the Dispatcher may, when necessary, notify the Philadelphia Police Department (911) and request an escort for each Pressure Force crew from the 8th and Berks parking lot to the valve locations.

As soon as possible, the Distribution Dispatcher will confer with the Supervisor on location : it will be determined if there is any additional labor, mobile equipment, tools and/or material that is required at the scene.

Note: Whenever an order is received out of the normal working hours reporting an explosion or other severe or extreme emergency, the Distribution Dispatcher will immediately dispatch, by telephone, the supervisory employee who lives closest to the job site. Refer to "Dispatching Procedure for Severe or Extreme Emergencies" and "Emergency Notification Procedure" located in Section IV of the Supervisors Handbook.

S. H. Section II **68**

IV. Associated Documentation

A. Relevant Code

1. 49 CFR Part 192 Subpart L – Operations 192.605
   Emergency Plan – Handling Abnormal Operating Conditions

B. Associated Bulletin

- Distribution Bulletin #227 - "Out-of-Hours Pressure Operation."
- Distribution Bulletin #228 - "Pressure Control Operation Outline Procedure."
- Distribution Bulletin #230 - "Organization for Emergency Operations."

C. Attachments
N/A

V. Handbooks

A. Distribution Pressure Force Handbook
B. Field Operations Supervisor's Handbook
C. Emergency Plan

VI. Transaction Listing

TR-2006-06 – Revised 3/28/11

Approved by:

SIGNATURE ON FILE
John Jolly
Manager, Distribution Department

SIGNATURE ON FILE
Steven Groeber
Director, Field Operations & Work Planning

DEFINITIONS OF LEAK TYPES
BULLETIN 287

I. Purpose:

To standardize identifying and recording of leaks in accordance with Federal Regulation requirements.

II. Definitions of Leak "Types" (as defined by Pipeline Safety Regulations)

CORROSION: leak resulting from a hole in the pipe or other component that was caused by galvanic, bacterial, chemical, stray current, or other corrosive action. **(Rust outs)**

NATURAL FORCES: leak resulting from **earth movements**, earthquakes, landslides, subsidence, lightning, heavy rains/floods, washouts, flotation, mudslide, scouring, temperature, **frost heave**, frozen components, high winds, or similar natural causes.

EXCAVATION DAMAGE: leak resulting from damage caused by earth moving or other equipment, tools, or vehicles. Include leaks from damage by operator's personnel or contractor or people not associated with the operator. This includes damages to pipe and components such as cathodic protection systems and coatings.

First party is damage from a PGW employee
Second party is damage from a contractor working for PGW
Third Party is damage from someone other than a PGW employee or a contractor working for PGW

OTHER OUTSIDE FORCE DAMAGE: Include leaks caused by fire or explosion and deliberate or willful acts, such as vandalism.

MATERIAL OR WELDS: leak resulting from failure of original sound material from force applied **during construction** that caused a **dent, gouge, excessive stress**, or other defect that eventually resulted in a leak. This **includes leaks due** to faulty wrinkle bends, faulty field welds, and damage sustained in transportation to the construction or fabrication site. Also include leak resulting from a **defect in the pipe material**, component, or the longitudinal weld or seam due to faulty manufacturing procedures. Leaks from material deterioration, other than corrosion, after exceeding the reasonable service life, are reported under section below titled **"OTHER"**.

EQUIPMENT: leak resulting **from malfunction of control/relief equipment** including valves, regulators, or other instrumentation; stripped threads or broken pipe couplings on nipples, valves, **or mechanical couplings; or seal failures on gaskets, O-rings**, seal/pump packing, or similar leaks.
INCORRECT OPERATIONS: leaks resulting from **inadequate procedures** or safety practices, or failure to follow correct procedures, or other operator error.

OTHER: leak resulting from any other cause, such as exceeding the service life**, not attributable to the above causes.**

DISCUSSION – Classifying leaks from broken main or joint leaks.
Broken Mains (BM) can be classified among various leak type categories listed above. If you feel the cause of the broken main is caused by a "going in or "coming out" of a frost period, then "Natural Forces" should be chosen. If deterioration due to graphitization is a main factor of the broken main, then "Corrosion" can be used. If the broken main is caused by PGW barholing during a leak investigation, then "Excavation Damage" should be chosen. If a broken main was caused by an underground street trouble, use "Natural Forces" for the DOT leak definition.

Joint leaks (JL) are primarily classified under "Natural Forces" because of earth movement. But if the joint was previously clamped or epi-sealed and that repair fails due to reaching its useful life, then classify the leak as "Other". Likewise, if the joint was never repaired and the lead or cement joint was leaking, then "Natural Forces" due to ground movement should still be chosen. Repair clamps that are found leaking due to corrosion should be classified as "corrosion".

Mechanical fitting failures must be recorded separately. This is a code requirement; see "Mechanical Fittings Failures" Bulletin #289.

IV. Associated Documentation

Relevant Code
191.11 Annual Reporting to PHSMA

Associated Bulletin
Mechanical Fitting Failures – Bulletin #289
Attachments
N/A

V. Handbooks
Foreman's Handbook Section I

VI. Transaction Listing
TR-2011-02
Prepared by: John Jolly

Approved by:
Steven A. Groeber
Director, Field Operations & Work Plann
Michael H. Jones
Vice President – Technical Compliance

TEST REQUIREMENTS FOR SERVICE AND MAIN INSTALLATIONS
BULLETIN 251

Purpose

These are PGW testing requirements for all Distribution Department mains and services.

II. Procedure

SAFETY

All necessary precautions to protect workers and the general public, during pressure tests, are to be taken. This may include bracing, joint retention, barricading, etc. The methods employed will depend on the job parameters and should be discussed with all crew members prior to pressurizing the piping. All crew members should remain clear of the piping during the test period.

General Requirements for all Testing of Pipe

- For proper handling of plastic pipe See note 2 from DS 54.0
- ***If conditions suggest that the temperature of plastic pipe may be more than 100F, then a supervisor should be notified to check the pipe temperature prior to testing.***
- All pipe fittings and ends must be retained properly (see retention requirements below.
- When using mechanical couplings or there are mechanical couplings on the pipe line being tested, see tie-rod requirements below.
- Connections made for the tests must be minimized and made to withstand the test pressure and medium used.

Table 1.

Recommended Minimum Test Duration For Plastic & Steel Pipe									
Pipe Length (feet)	**Pipe Size**								
	2" & Smaller	**3" & 4"**	**6" & 8"**	**12"**	**16"**	**20"**	**24"**	**30"**	**36"**
50	10 min.	15 min.	30 min.	1.5 hrs.	2 hrs.	3 hrs.	4 hrs.	7 hrs.	10 hrs.
100	10 min.	15 min.	1 hr.	2.5 hrs.	4 hrs.	6 hrs.	8 hrs.	13 hrs.	19 hrs.
200	15 min.	30 min.	2 hrs.	4.5 hrs.	7 hrs.	11 hrs.	16 hrs.	24 hrs.	24 hrs.
500	30 min.	1.5 hrs.	5 hrs.	11 hrs.	18 hrs.	24 hrs.	24 hrs.	24 hrs.	24 hrs.
1,000	45 min.	2.5 hrs.	9.5 hrs.	22 hrs.	24 hrs.	24 hrs.	24 hrs.	24 hrs.	24 hrs.
When testing pipe of varying size, the total test duration may be calculated by adding the test durations given in the table above. Test durations beyond 24 hours are not required.									

When testing pipe of varying size, the total test duration may be calculated by adding the test durations given in the table above. Test durations beyond 24 hours are not required.

A. Test for Steel and Plastic SERVICES 60 psig or less

All existing services that have been fully disconnected from the main and all new services shall be tested with a minimum test pressure of 90 psig air pressure for a period of time determined from Table 1. During new main and service installations, the services can be tested in conjunction with the main pressure test.

- All exposed joints and fittings will be soap and water tested during the pipe test. The final tie-in will be tested with soap and water at operating pressure.
- Supervision may elect to test Plastic Pipe to at least 150 percent the Maximum Allowable Operating Pressure or 50 psig, whichever is greater. (per. 192.513 (c))
- Supervision may elect to test LP, IP, and HP service pipe (other than plastic) to at least 50 psig. (per. 192.511(b))

B. Test for Steel and Plastic MAINS 60 psig or less

All new plastic and steel mains shall be tested with a minimum test pressure of 90 psig air pressure for a period of time determined from Table 1.

For **STEEL** main:

- All exposed joints and fittings will be soap and water tested during the pipe test. The final tie-in will be tested with soap and water at operating pressure.
- See Attachment #1 for Pipe Connections Requiring Tie Rod Retention.
- See Attachment #2 for suggested reinforcement of End Caps.
- Short replacements such as cut-outs and tie-ins are tested at operating pressure.
- Supervision may elect to test Low pressure main (other than plastic pipe) to at least 10 psig. (per. 192.509 (b))

For **PLASTIC** main:

- All exposed joints and fittings will be soap and water tested during the pipe test. The final tie-in will be tested with soap and water at operating pressure.
- See Attachment #3 for PE Expansion test plug procedures.
- Short replacements such as cut-outs and tie-ins are tested at operating pressure.
- Supervision may elect to test Plastic Pipe to at least 150 percent the Maximum Allowable Operating Pressure or 50 psig, whichever is greater. (per. 192.513 (c))

C. Test and Reconnect Existing Mains

Any main that has been temporarily taken out of service can be tested at operating pressure with the approval of the manager of the Distribution Department or the Director of Field Operations. A leak survey is required after the pipe has been brought back into service.

- All exposed joints and fittings will be soap and water tested during the pipe test. The final tie-in will be tested with soap and water at operating pressure.
- Supervision may elect to test Low pressure main (other than plastic pipe) to at least 10 psig. (per. 192.509 (b))
- Supervision may elect to test Plastic Pipe to at least 150 percent the Maximum Allowable Operating Pressure or 50 psig, whichever is greater. (per. 192.513 (c))

D. Tests for higher pressure main and services greater than 60 to 150 psig

Refer to Project Construction Drawing for test type and test pressure or contact the Distribution Planning Department.

E. Allowable End Caps and bracing used for testing

1. Butt Fused End Caps or PE Expansion test plugs are to be used on all ***plastic*** main connections as approved by Distribution Department Supervision (See Attachment #3 for Expansion Plug procedure).

2. Weld Caps, restrained End Cap Couplings (suitable size and pressure rating) or Couplings with Tie Rods are used on all ***steel*** pipe tests. See Attachment #1 for Pipe Connections Requiring Tie Rod Retention. See Attachment #2 for suggested reinforcement of End Caps.

3. Welded Steel Cap can be used without restrain but still should be blocked in.

4. See section VII of the Foreman's Handbook for suggested timber bracing during pressure tests

F. Investigating for a Leak, Post Deactivation

If testing a main taken out of service for an incident consult a supervisor who will refer to Supervisor's handbook Section 2, Page 7-10.

Suggested method:
To test to confirm a leak on a main or service that was taken out of service.

1. Safely secure all sections of pipe and caps as described herein this procedure.
2. Test main and/or service at operating pressure.
3. Observe for any pressure drop.
4. If a leak is found, complete leak records.
5. Carry on with an abandonment, repair or replacement of the tested portion of pipe.

To determine a flow rate of the leak on a low pressure main or service from step 2 above, install a meter, residential regulator and air to the contained portion of piping and present a control flow on the system. Determine flow by timing the meter.

I. Record Keeping

(a) PGW shall make, and retain for the useful life of the pipeline, a record of each test performed on pipe operating on or above 100 PSI. The record must contain at least the following information:

(1) The operator's name, the name of the operator's employee responsible for making the test, and the name of any test company used.
(2) Test medium used.
(3) Test pressure.
(4) Test duration.
(5) Pressure recording charts, or other record of pressure readings.
(6) Elevation variations, whenever significant for the particular test.
(7) Leaks and failures noted and their disposition.

(b) PGW shall maintain a record of each test of all pipe operating (MAOP) under 100 psi for at least 5 years.

III. Associated Documentation

A. Relevant Code

49 CFR §§ 192.507, 509, 511, 513, and 725

Reference Material

B. Associated Bulletin

Suggested Bracing and Test Pressures (See Distribution Foreman's Handbook, Section VII-43)

DS 20.8 – Tie-Rod Specifications

DS 54.0 - 2" and smaller plastic services

Supervisor's handbook Section 2, Page 7-10.

C. Attachments

#1 Joint Retention Requirements

#2 Internal forces and tie-rod requirements (end caps)

#3 PE Expansion Test Plug Procedure

IV. Handbooks

Foreman's Handbook

V. Transaction Listing

TR 2008-38

3/7/11

Approved by:

SIGNATURE ON FILE
Steven A. Groeber
Director, Field Operations & Work Planning

SIGNATURE ON FILE
Michael H. Jones
Vice President – Technical Compliance

Attachment 1

PIPE CONNECTIONS REQUIRING TIE ROD RETENTION AT A TEST PRESSURE OF 90 psig (2'6" to 6'0" DEEP)

Joints and or mechanical couplings which fall within the length (measured distance from the bend or dead end) specified on this table must be retained before testing at 90 Psig. Depth of the buried pipe when tested is also a factor.

		22½° BEND	45° BEND	90° BEND	DEAD END
Size of Main	**Depth**	**Length (feet)**	**Length (feet)**	**Length (feet)**	**Length (feet)**
3"	2'-6"	4	6	11	18
	3'-0"	3	5	10	15
	4'-0"	3	5	7	10
	5'-0"	3	3	5	7
	6'-0"	2	2	4	6
4"	2'-6"	5	7	12	19
	3'-0"	4	6	11	16
	4'-0"	3	6	8	11
	5'-0"	3	3	6	8
	6'-0"	2	3	5	7
6"	2'-6"	8	12	23	31
	3'-0"	7	10	19	26
	4'-0"	5	8	14	20
	5'-0"	5	6	11	15
	6'-0"	4	5	9	13
8"	2'-6"	12	17	32	44
	3'-0"	10	14	26	37
	4'-0"	8	11	20	27
	5'-0"	6	9	16	22
	6'-0"	5	8	13	18
12"	2'-6"	19	29	52	74
	3'-0"	16	23	43	60
	4'-0"	11	17	32	44
	5'-0"	9	14	24	35
	6'-0"	8	11	20	29
16"	2'-6"	28	41	78	107
	3'-0"	23	34	62	86

	4’-0”	17	24	44	62
	5’-0”	13	18	34	48
	6’-0”	11	15	29	41

Attachment 1 (cont.)

		22½° BEND	45° BEND	90° BEND	DEAD END
Size of Main	**Depth**	**Length (feet)**	**Length (feet)**	**Length (feet)**	**Length (feet)**
20”	2’-6”	36	54	99	140
	3’-0”	29	44	80	113
	4’-0”	21	32	57	81
	5’-0”	16	24	44	62
	6’-0”	14	20	38	53
24”	2’-6”	45	68	125	176
	3’-0”	37	56	101	144
	4’-0”	26	40	74	104
	5’-0”	20	31	56	79
	6’-0”	17	26	47	68
30”	2’-6”	59	89	163	231
	3’-0”	49	73	134	190
	4’-0”	35	53	98	137
	5’-0”	27	41	74	105
	6’-0”	23	35	64	90
36”	2’-6”	72	108	200	287
	3’-0”	60	90	167	236
	4’-0”	44	66	122	172
	5’-0”	35	52	95	152
	6’-0”	29	44	81	115

Internal Forces Acting on Steel End Caps

		Force			Force		
		35 psig			90 psig		
Pipe Diameter (in)	Area (sq in)	Lbs	Tons	2x safety factor	Lbs	Tons	2x safety factor
4	12.56	440	0.3	879	1,130	0.6	2,261
6	28.26	989	0.5	1,978	2,543	1.3	5,087
8	50.24	1,758	1	3,517	4,522	3	9,043
12	113.04	3,956	2	7,913	10,174	6	20,347
16	200.96	7,034	4	14,067	18,086	10	36,173
20	314.00	10,990	6	21,980	28,260	15	56,520
24	452.16	15,826	8	31,651	40,694	21	81,389
30	706.50	24,728	13	49,455	63,585	32	127,170
36	1,017.36	35,608	18	71,215	91,562	46	183,125

Tie-Rod Requirements for Steel End Caps

When testing with 90 PSI air, use 90 Psig columns only.
When 3 or more tie-rods are required, consider weld end cap for the test

24000 Tensile Strength Rod			35 Psig		90 Psig	
Pipe Diameter (in)	Tie Rod size	Force	# of Rods	Total Force	# of Rods	Total Force
4	5/8	4,848	2	9,696	2	9,696
6	5/8	4,848	2	9,696	2	9,696
8	5/8	4,848	2	9,696	2	9,696
12	3/4	7,248	2	14,496	3	21,744
16	7/8	10,056	2	20,112	4	40,224
20	1 1/8	16,632	2	33,264	4	66,528
24	1 1/4	21,336	2	42,672	4	85,344
30	1 5/8	31,056	2	62,112	5	155,280

30	1 5/8	31,056	2	62,112	5	155,280
36	1 5/8	31,056	3	93,168	6	186,336

Attachment 3

Operating Procedure for PE Expansion Test Plugs

1. PRIOR TO USE, replace damaged or worn grippers and seal. Verify that the External O-ring on seal is seated correctly in the groove and that the O-ring is not damaged. The surface between the cone and grippers must be free of friction producing dirt or corrosion. Verify proper operation of the test plug by rotating the handles clockwise, tightening the nut so that the grippers move freely to the end of the tapered cone surface. Rotate the handles counter-clockwise and fully loosen the nut. Should the grippers not fully retract, apply a light lubricant to the tapered surface of the cone and wipe away any excess. The threads and both ends of spacer tube should be kept well lubricated with anti-seize. Inspect and apply anti-seize if necessary before testing. If the nut cannot be easily advanced to allow full gripper expansion, DO NOT USE THIS PLUG FOR TESTING and contact the Area Supervisor.

2. Position the test plug in a clean, lubricant free, deburred pipe end so that the seal is fully within the pipe. Center the plug within the pipe while rotating the handles, tightening the nut until the test plug has lightly engaged with the pipe ID. At this point the plug will not move relative to the pipe when pushed or pulled by hand.

3. Once the plug can not be moved within the pipe, the plug is to be tightened by rotating the handles a minimum number of turns specified in **TABLE 1**, for the pipe size being tested. The amount of turns should be counted by rotating the **RED** knob located on one of the handles.

4. A Safety Gag should be installed over the gripper area of the pipe. To properly locate the gripper position in the pipe, lay the plug on top of the pipe end to be tested. The back face of the aluminum seal cone should be approximately ¾" in from the end of the pipe end. Mark the pipe end where the middle of the gripper assembly is on the pipe. This is the location where the middle of the Safety Gag is to be placed on the pipe OD.

5. Install the pressure source to the plug leak tight. The plug is now ready for pressure testing.

6. Prior to pressure testing adequate measures need to be taken so that the safety of personnel and equipment is not compromised. **All Personnel MUST be clear of the test plug when pressure testing.**

Attachment 3 continued…

7. Slowly introduce the test pressure. The test pressure must never exceed the pressures listed for your application in **TABLE 1**.

   NOTE: The Normal Number of Turns to Engage Seal after the plug has engaged pipe listed in Table 1 is, under normal circumstances, sufficient to seal up the test pressure listed in Table 1 for the appropriate pipe size and material.

8. As pressure increases, the pipe will swell slightly and the seal will be further compressed. Due to this additional seal compression, the shaft will move approximately ¼" from its original installation depth. This is expected and will stop. Should movement of the shaft or plug exceed approximately ¼", release **ALL** pressure immediately, remove plug, examine, re-install and begin testing in accordance with this operating procedure. Should movement of the shaft or plug during the test still exceed approximately ¼", contact the Area Supervisor.

9. At the conclusion of the test, release **ALL** pressure. Insure pressure has been released **BEFORE** rotating the handles counter-clockwise to loosen the nut. Remove and inspect plug. Any plug component, which is worn or damaged, must be replaced before attempting further testing.

10. Prior to storing, dry all parts of the plug and lubricate the shaft threads.

Table 1 – Maximum Test Pressure & Minimum Turns Required							
Part Number	Pipe Size	SDR	PE 2406 Max Test Pressure (psig)	PE 3408 Max Test Pressure (psig)	Pipe Internal Diameter Range		Minimum Number of Turns to Engage Seal After Plug has Engaged Pipe
					MIN (in)	MAX (in)	
GT-2SDR-11115	2"	11-11.5	90	90	1.84	2.02	13
GT-3SDR-11115	3"	11-11.5	90	90	2.72	2.96	13
GT-4SDR-11115	4"	11-11.5	90	90	3.51	3.79	5
GT-6SDR-11115	6"	11-11.5	90	90	5.14	5.61	7
GT-8SDR-135	8"	13.5	90	90	7.03	7067	9

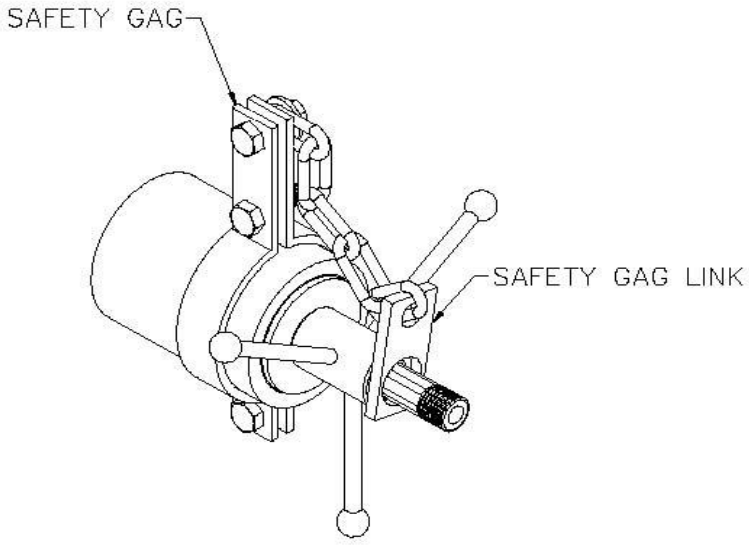
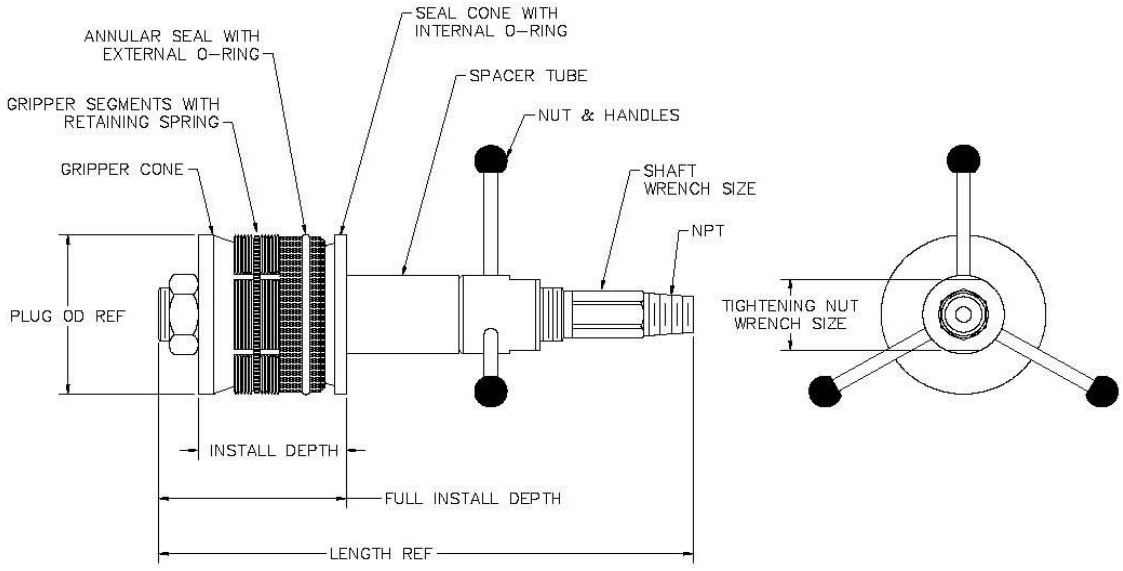


Table 2 – Plug Dimensions

Part Number	Pipe Size	SDR	Plug O.D.	Length (in)	Install Depth (in)	Full Install Depth (in)	Shaft Diameter (in)	NPT	Shaft Hex Flat Wrench Size	Tightening Nut Hex Flat Wrench Size
GT-2SDR-11115	2"	11-11.5	1.82	9	4 3/8	4 5/8	3/8	1/8	9/16	7/8
GT-3SDR-11115	3"	11-11.5	2.7	10 5/8	4 7/8	5 3/8	5/8	1/4	1/2	1 1/8
GT-4SDR-11115	4"	11-11.5	3.47	16 1/8	5 9/16	6 1/2	1 1/4	1/2	1	1 5/8
GT-6SDR-11115	6"	11-11.5	5.1	16 1/8	7 1/4	8 3/16	1 1/4	1/2	1	1 5/8
GT-8SDR-135	8"	13.5	6.99	16 1/8	7 3/4	8 11/16	1 1/4	1/2	1	1 5/8



FIFTH DAY

DISTRIBUTION DEPARTMENT TRAINING PROGRAM

Bbright 2/22/2012

1. General Review, lesson taught during the past two weeks:

2. Final Test, begins on or about the first hour of the day:

3. Test and all associate paper work/forms must be turned in to the instructor at 3:30 pm.

TESTING PHASE 1B

The test that takes place on the fifth day of the second week is a written test and should include the following:

1. A typical job issued on a Street Main Instruction form along

with a drawing showing the limits of the job.

2. Order material for delivery to the job site.

3. Order material returned from the job site.

4. Transfer material from one job to another.

5. Issue paving card.

6. Make out a timesheet.

7. Do calculations to report quantities involving:
   a. Percentage
   b. Square yards

   c. Cubic yards

   d. Circumferential measurement for pipe diameter

   e. Fill dirt required around main

8. Make a complete Inspector's report including
   a. Contingent reports

   b. Accident reports

   c. Tie-in and paving sketches
9. Example page of log book.

10. Issue service cards
11. Sign off Street Main Instruction
12. Make out necessary order for X-ray man.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Elena Bozhko, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: January 13, 2023

Elena Bozhko
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

I&E Statement No. 2
Witness: Christopher Whiteash, P.E.

PENNSYLVANIA PUBLIC UTILITY COMMISSION,
BUREAU OF INVESTIGATION AND ENFORCEMENT

v.

PHILADELPHIA GAS WORKS

Docket No. C-2022-3033834

Direct Testimony

of

Christopher Whiteash, P.E.

on behalf of the

Bureau of Investigation and Enforcement

Q: Please state your name.

A: Christopher Whiteash.

Q: Are you currently employed?

A: Yes.

Q: By whom are you employed and in what capacity?

A: I am employed by the Pennsylvania Public Utility Commission ("PUC" or "Commission"), Bureau of Investigation and Enforcement ("I&E") as a Fixed Utility Valuation Engineer- 2 ("FUVE") in the Pipeline Safety Section. My business address is Pennsylvania Public Utility Commission, 400 North Street, Harrisburg, PA 17120.

Q: What is your educational and employment experience?

A: I graduated from Penn State University in 1993 with a Bachelor of Science degree in Engineering. Since graduating, I have been employed as an engineer for approximately 29 years and my experience includes: ten (10) years as an Environmental Engineer at the Pennsylvania Department of Environmental Protection ("PA DEP"); eleven (11) years as a Project Engineer at various companies/corporations that operate in the commercial and industrial construction sector; and eight (8) years as a FUVE with the Commission.

Q: Do you hold any professional license(s)?

A: Yes, I have held a valid professional engineering license in the Commonwealth of Pennsylvania since June 2013.

Q: What are your current job responsibilities as a Fixed Utility Valuation Engineer for the Bureau of Investigation and Enforcement?

A: My current job responsibilities include a comprehensive investigation of pipeline incidents and explosions, involving serious service failures, property damages, death, and injuries resulting within jurisdictional natural gas systems. FUVEs analyze data and natural gas systems prior to incident/explosions and interpret the conclusions of engineering lab test results to develop recommendations for future gas operations and citation according to obtained evidence. FUVEs are also required to develop, prepare, and present testimony on specific issues and/or factual matters during proceedings before Administrative Law Judges and civil court cases.

Q: Have you received formal training on your current job responsibilities?

A: Yes, I completed all the required Pipeline and Hazardous Materials Safety Administration ("PHMSA") Training & Qualifications pre-requisite and core courses, attended formal training, and successfully completed the required testing conducted by PHMSA Training and Qualifications staff at the Oklahoma City, Oklahoma training facility.

Q: In your capacity as a Fixed Utility Valuation Engineer, are you familiar with the Public Utility Code, Pennsylvania Code, and Code of Federal Regulations as they relate to the regulation of natural gas distribution companies?

A: Yes, I am familiar with the regulations which are applicable to the regulation of natural gas distribution companies in Pennsylvania. Specifically, I am familiar

with Title 66 (Public Utility Code), Title 52 of the Pennsylvania Code (Chapter 59 - Gas Service) as well as the pertinent portions of the Code of Federal Regulations, that are subject to the federal pipeline safety regulations at 49 CFR § 190, 191 & 192, as adopted by the Commission through annual certification with PHMSA via 49 U.S.C. § 60105.

Q: In your capacity as a Fixed Utility Valuation Engineer, are you familiar with Philadelphia Gas Works ("PGW")?

A: Yes, I am.

Q: What is PGW?

A: PGW is a municipally owned natural gas distribution company ("NGDC"), as defined by 66 Pa.C.S. § 102 and 66 Pa.C.S. § 2202, that provides natural gas service to retail gas customers within the city of Philadelphia, PA through PGW-owned distribution facilities.

Q: Is PGW subject to the Commission's jurisdiction?

A: Yes, PGW became subject to the Commission's jurisdiction on July 1, 2000 pursuant to the Natural Gas Choice and Competition Act. Section 2212(b), which subjects city natural gas distribution operations furnishing or rendering public utility service within municipal limits to regulation and control by the Commission with the same force as if the service were rendered by a public utility. 66 Pa.C.S. § 2212(b).

Q: Are you familiar with the fatal gas explosion which occurred on December 19, 2019 at 1435 South 8th Street in Philadelphia, PA and that is the subject of this proceeding?

A: Yes, I am.

Q: How or why are you familiar with the December 19, 2019 incident at 1435 South 8th Street in Philadelphia, PA?

A: I received a phone call from my Supervisor on Thursday, December 19, 2019 requesting that I assist with the Commission's investigation starting the following day (Friday, December 20, 2019). I arrived at the explosion site at approximately 11:00 AM on December 20, 2019 and assisted with the investigation.

Q: While assisting with the investigation, what relevant information and facts were you able to obtain?

A: Through interviews with members of the local public, PGW personnel, and plumbing contractors who performed emergency sewer lateral repairs along the 1400-block of South 8th Street, I was able to create a timeline of events and details with regards to the activities within the street in the days, weeks, and months prior to the explosion at 1435 South 8th Street. For instance, several members of the local public informed me that weeks prior to the explosion SEPTA rerouted bus traffic off the 1400-block of 8th Street due to the instability of the roadway/travel lane.

Q: What were the primary causes of instability within the roadway/travel-lane along the 1400-block of South 8th Street near the explosion site?

A: The roadway near the explosion site had a unique set of circumstances where abandoned trolly tracks, cross ties along the trolley tracks, and a cobblestone/concrete subbase acted to bridge and artificially support the loads along the roadway, including SEPTA bus traffic. However, water main leaks beneath the roadway started to erode other areas of the subbase, which created voids beneath the road surface. Due to the unique artificial support system along the roadway, the creation of voids beneath the road surface did not result in the roadway collapsing and instead acted to disguise problematic utility issues beneath the road surface. Specifically, the presence of the trolley tracks acted like a support for the road, and thus the presence of the voids was not obvious from mere visual inspection of the roadway surface. See I&E Exhibits 17-20 for an example of the voids existing underneath the roadway surface.

Q: Prior to the December 19, 2019 explosion, are you aware of whether any excavation activity occurred on the 1400-block of South 8th Street?

A: Yes, several relevant excavation activities occurred prior to the explosion. PA One Call Ticket (20192752094) for an emergency repair of a water leak near 1427-1431 South 8th Street was performed by the Philadelphia Water Department ("PWD") around October 2, 2019. PA One Call Ticket (20192803422) for an emergency sewer repair at 1433 South 8th Street was performed by Lepore Plumbing & Excavating, LLC around October 8, 2019. PA One Call Ticket

(20192960460) for an emergency sewer repair at 1431 South 8th Street was performed by Bart Emanuel Plumbing around October 25, 2019. See I&E Exhibit 4 for the One Call tickets described above.

Q: Were the One Call tickets attached as I&E Exhibit 4 provided to PGW?

A: Yes, PGW is a member of the One Call System and the tickets are automatically sent to PGW via the One Call System.

Q: Did PGW respond to the One Call tickets?

A: Yes, PGW responded to the associated One Call Tickets by field marking its facilities prior to the excavation activities described in the aforementioned One Call tickets.

Q: Do the PA One Call tickets provide information on the purpose or need for the excavation activity?

A: Yes, the PA One Call Tickets provide the purpose of the excavation activity. For example, PA One Call Ticket (20192752094) indicated the need for an emergency repair of a water leak near 1427-1431 South 8th Street on October 2, 2019.

Q: Should such emergency repair have raised a cause for concern by PGW?

A: Yes, the nature of a water leak near PGW's cast iron main is cause for concern. A pressurized water leak near any pressurized gas main has the ability to scour or undermine support for the pipe underneath the street surface in a short period of time.

Q: So, is it safe to assume that PGW knew that the excavation activity, which occurred in October of 2019 on the 1400-block of South 8th Street, included emergency repairs to sewer and water laterals as well as the water main?

A: Yes, it is safe to assume, that by receipt of these One Call tickets, that PGW had knowledge of these utility repairs.

Q: What is the importance or significance, if any, of emergency excavation activity related to sewer and/or water laterals/mains as it relates to natural gas pipeline facilities?

A: Any emergency sewer/water utility repair concentrated within close proximity to PGW's cast iron mains should be of immediate concern due to the potential scour of the earthen support underneath PGW's cast iron in the event of a water main leak.

Q: As part of your investigation, did you speak with any of the companies or individuals who completed excavation activity along the 1400-block of South 8th Street prior to December 19, 2019?

A: Yes, I conducted numerous telephone and in-person interviews in the months following the explosion on December 19, 2019.

Q: Please identify who you spoke with and provide a brief summary of the conversation.

A: In the days immediately following the explosion, I spoke with Rich Lepore from Rich Lepore Plumbing and Joseph Emanuel from Emanuel Plumbing & Heating. Rich Lepore from Rich Lepore Plumbing reported completing an emergency

sewer lateral repair at 1433 South 8th Street around October 8, 2019. Mr. Lepore reported no water in the trench but discovered multiple underground voids at a depth of two to three feet along the excavated trench closest to the sewer main. He also reported seeing a collapsed and separated sewer lateral (1433's sewer lateral) five to six feet below the asphalt surface where the lateral connects at the sewer main. Mr. Lepore noted that he reported the voids to the PWD and repaired the voids with backfill material.

Joseph Emanuel from Emanuel Plumbing & Heating reported performing an emergency repair at 1431 South 8th Street on November 1, 2019. Mr. Emanuel reported seeing water in the trench (which needed to be removed via pumping) and hearing the distinct sound of water draining into the sewer main from another location. He also reported seeing underground voids for a distance of at least ten feet (underneath the road surface and perpendicular to his excavated trench) between the water main and sewer main. Mr. Emanuel noted that he reported the water leak and voids to PWD and repaired the voids with backfill material.

Q: What impact, if any, would underground voids have on natural gas pipeline facilities?

A: The presence of underground voids can be a preliminary indication of underground street trouble, which can be a threat to PGW's cast iron natural gas facilities. The loss of any subsurface material and the subsequent creation of an underground void should be of immediate concern due to the potential scour or loss of the earthen support underneath PGW's cast iron natural gas mains.

Q: What is scour and how can it impact cast iron pipe?

A: Scour is the eroding or rough abrasion of material via pressurized water. The presence of scour can erode the earthen support material of underground cast iron pipe or it can create a localized hole directly into a cast iron pipe.

Q: How can the loss of earthen support undermine cast iron pipe?

A: The loss of earthen support material as a result of scour is a displacement or removal of support material located underneath the cast iron piping, which in this case consisted of a mixture of compacted dirt/stone. The dirt/stone mixture can scour in a short period of time as compared to the scouring of a substance such as concrete or cobblestone. As the support material is scoured from underneath the cast iron piping, the weight of the cast iron pipe and the weight of material located above the cast iron piping (including the static and dynamic loads of vehicles located on the street above the piping) is no longer supported by the earthen material. Some or all of the loading that was supported by the earthen material is now transitioned onto the cast iron pipe. The cast iron pipe eventually fails (breaks or cracks) due to the excessive loading imposed upon the pipe as a result of loss of the earthen support material.

Q: Are you personally aware whether Mr. Lepore and Mr. Emanual reported the voids found during the October 2019 excavation to PGW?

A: I personally do not know whether Mr. Lepore and Mr. Emanual reported the voids to PGW. I also am not aware of any One Call or PGW procedure which requires

third-party contractors who complete excavation activities near PGW facilities to report voids to PGW.

Q: Was a PGW employee present during the excavation activities?

A: No. All PGW field activities are documented through their AIMS ("Advanced Intelligent Mobile System") software application. During a post-explosion investigation meeting with PGW personnel on January 28, 2020, it was reported by PGW that no AIMS field activities were recorded on the 1400-block of South 8th Street since the year 2015.

Q: Did a PGW employee visit the excavation site after the work was completed?

A: No. All PGW field activities are documented through their AIMS system. During a post-explosion investigation meeting with PGW personnel on January 28, 2020, it was reported by PGW that no AIMS field activities were recorded on the 1400-block of South 8th Street since the year 2015.

Q: As a result of your post-explosion investigation meeting with PGW personnel on January 28, 2020, did any additional field activities occur?

A: Yes, at the January 28, 2020 meeting, it was noted that PGW incorrectly mapped the emergency sewer repair at 1433 South 8th Street which was performed by Lepore Plumbing & Excavating, LLC around October 8, 2019. PGW's position at the meeting was that Rich Lepore undermined PGW's cast iron and that the excavation activity may have caused or contributed to the failure of the cast iron main. Accordingly, I scheduled a field visit on February 5, 2020 for any interested parties to view the extent of the excavation activity.

On February 5, 2020, Rich Lepore performed an open excavation which showed that his repair of the sewer lateral did not undermine PGW's cast iron main as Mr. Lepore's excavation appeared no closer than twenty-seven (27) inches from PGW's cast iron main. A number of insurance investigators were present for this activity. PGW was invited to the field visit but declined to send any representatives.

Q: What was the goal of scheduling this field investigation with PGW?

A: Since it was noted during the January 28, 2020 meeting that PGW incorrectly mapped Rich Lepore's excavation, the goal of scheduling the field investigation and visit was to ascertain the facts and extent of the excavation so PGW could correct its map and reissue an accurate map to I&E.

Q: Did PGW reissue a corrected map?

A: No. PGW's presence at the field visit was requested by I&E in order to obtain the most accurate facts and information related to the investigation. However, PGW did not attend the field investigation and did not follow-up with a corrected map.

Q: As part of your investigation, did you review any of PGW's policies, procedures, and/or training programs?

A: Yes, I reviewed the following materials:

Bulletin #54 Protection of PGW facilities from underground street troubles, effective date 4/15/11;

Bulletin #312 Summary of distribution department damage prevention program, effective date 9/1/13;

Bulletin #313 Instructions for distribution department damage prevention inspectors, effective date 8/2/16; and
Field Operations Training Program for Distribution Inspector School.
The documents and materials are labeled as I&E Exhibit 3, I&E Exhibit 1, I&E Exhibit 2, and I&E Exhibit 26, respectively.

Q: In reference to the excavation activity which occurred prior to December 19, 2019, in your professional opinion, based upon your engineering expertise, did PGW adequately monitor its cast iron pipeline facilities on the 1400-block of South 8th Street?

A: No, PGW did not adequately monitor its cast iron pipeline facilities on the 1400-block of South 8th Street prior to December 19, 2019. PGW could not provide any documented records of any monitoring which may have taken place and could not provide any documentation that the One Call mark out person checked for underground street trouble pursuant to PGW Bulletin 54: Protection of PGW Facilities from Underground Street Troubles, I&E Exhibit 3.

Q: In your professional opinion, based upon your engineering expertise, did PGW adequately protect the 6-inch cast iron main on the 1400-block of South 8th Street after the excavation activity occurred?

A: No, PGW did not adequately protect the 6-inch cast iron main on the 1400-block of South 8th Street after the excavation activity occurred. Local residents reported observing the Philadelphia Street Department placing metal plates on the roadway (due to sink holes forming) and placing fill in the roadway on a continuous basis

up to the day of the explosion. Additionally, there were reports of SEPTA rerouting bus traffic off of South 8th Street due to the instability of the roadway. PGW did not have a system of checks and balances in place to protect the 6-inch cast iron main after the excavation activity.

Q: Have all your answers and responses today been based upon your personal knowledge or professional engineering expertise?

A: Yes.

Q: Does this conclude your direct testimony?

A: Yes. However, I reserve the right to supplement my testimony as additional issues and facts arise during the course of the proceeding.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Christopher Whiteash, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: January 13, 2023



Christopher Whiteash, P.E.
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

I&E Statement No. 3
Witness: Robert Horensky

PENNSYLVANIA PUBLIC UTILITY COMMISSION,
BUREAU OF INVESTIGATION AND ENFORCEMENT

v.

PHILADELPHIA GAS WORKS

Docket No. C-2022-3033834

Direct Testimony

of

Robert Horensky, Safety Manager

on behalf of the

Bureau of Investigation and Enforcement

Q: Please state your name.

A: Robert Horensky.

Q: Are you currently employed?

A: Yes.

Q: By whom are you employed and in what capacity?

A: I am employed by the Pennsylvania Public Utility Commission ("PUC" or "Commission"), Bureau of Investigation and Enforcement ("I&E") as the Safety Manager. My business address is Pennsylvania Public Utility Commission, 400 North Street, Harrisburg, PA 17120.

Q: How long have you been employed with the Commonwealth and what are your credentials?

A: I have worked for the Pennsylvania Public Utility Commission for nearly 16 years. I have worked in the Pipeline Safety Section of I&E for approximately 10 years. I began my current role as Safety Manager in December 2019 and served as acting manager from August 2019 through December of 2019.

I obtained a B.S. in Environmental Engineering from Wilkes University in 1997.

Q: What are your current job responsibilities as the Safety Manager for the Bureau of Investigation and Enforcement?

A: The duties and responsibilities of the I&E Safety Manager are broad and far reaching. I will attempt to give a high-level overview of the duties assigned to the Safety Manager. The Safety Manager provides management and direction to safety staff and serves as the Program Manager of the Pipeline Safety Section of

the Safety Division. The Pipeline Safety Section oversees and enforces state and federal safety regulations on over 170 registered pipeline operators within the Commonwealth. These operators include, but are not limited to distribution, transmission, gathering, master-meter, propane, liquified natural gas, underground natural gas storage, and hazardous liquid pipeline operators. The Safety Manager also oversees and provides direction to the Electric Safety Section and the Damage Prevention Section of I&E's Safety Division, and coordinates steam, water, and other utility inspections and investigations, as assigned.

The Pipeline Safety Section currently has 4 supervisors and 24 engineers on staff. The Safety Manager is responsible for inspections, investigations, complaints, reports, violation letters, expert witness testimony, rate case analysis, data collection and review, day-to-day operations, and technical and professional training for staff.

The Safety Manager also coordinates and oversees investigations of reportable and non-reportable incidents and events within the Commonwealth. These events can include reported explosions, ruptures, leaks, outages, line hits, product releases, fires, failures, overpressures, and other high profile or significant events.

The Safety Manager provides staff with training, direction, and guidance to review and analyze causes, gather data, conduct interviews, perform field observations, require laboratory testing, determine contributing factors and possible violations, and formulate remedial measures to deter actions and prevent reoccurrence of these events and incidents. These investigations often involve communications,

coordination and cooperation with local emergency responders, fire chiefs, fire marshals, the Bureau of Alcohol Tobacco and Firearms ("ATF"), Occupational Safety and Health Administration ("OSHA"), National Transportation Safety Board ("NTSB"), Pipeline and Hazardous Materials Safety Administration ("PHMSA") management and PHMSA's Accident Investigation Division, Pennsylvania Department of Environmental Protection, and other federal, state, and local entities.

The Safety Manager, pipeline supervisors, and pipeline engineers are required to complete training and certification of PHMSA-mandated training for approximately thirty (30) in-person and web-based safety related classes. The Safety Manager also plans and hosts an annual Safety Seminar, and attends and participates in national meetings and discussions hosted by PHMSA and The National Association of Pipeline Safety Representatives ("NAPSR").

The Safety Manager also coordinates collection and submission of supporting technical and financial documentation and data for four (4) federal grants associated with the Pipeline and Damage Prevention programs. Each of the four programs are evaluated annually by PHMSA.

Q: In your capacity as Safety Manager, are you familiar with the Public Utility Code, Pennsylvania Code, and Code of Federal Regulations as it relates to the regulation of natural gas distribution companies?

A: Yes, I am.

Q: In your capacity as the Safety Manager, are you familiar with Philadelphia Gas Works ("PGW")?

A: Yes, I am.

Q: Are you familiar with the fatal gas explosion which occurred on December 19, 2019 at 1435 South 8th Street in Philadelphia, PA and that is the subject of this proceeding?

A: Yes, I am.

Q: Please explain how or why you are familiar with the December 19, 2019 explosion.

A: On December 19, 2019, in my role as Safety Manger, I was notified of the tragic explosion on 8th Street in Philadelphia, PA. The supervisors and I coordinated staff to report to the scene and begin the investigation. Communications between I&E Safety, PGW management, and PGW onsite personnel began immediately. I also communicated with responding federal, state, and local entities. I&E Safety's onsite inspections, meetings, and communications filled the next few weeks. I had direct communications with PHMSA's Accident Investigation Division through the early stages of the investigation, and PHMSA representatives were onsite. Our team of Pipeline Safety engineers continued with observations, interviews, data requests, analyses, and research that culminated with an incident report that served as the basis for this Complaint.

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to provide some background and explanation for the following remedial measure requested in the Formal Complaint:

a) That PGW shall, within ninety (90) days of entry of a Final Order, work with I&E Pipeline Safety to create and implement a methane detection program(s) to ensure the safety of PGW customers during PGW's replacement of its cast iron facilities.

Q: What is a methane detector and what is its purpose?

A: The methane detectors referenced in I&E's Formal Complaint are devices used to measure and initiate an alarm when methane level thresholds are reached within a structure or enclosed area. I&E is proposing two (2) types of methane, or natural gas, detectors to be installed and utilized by PGW.

The first is an Audible Alarm Residential Type Methane Detector ("ARMD") that works similar to a smoke alarm, meaning that once a methane level threshold is reached in the atmosphere, the detector would emit an audible alarm. The purpose of the alarm is to alert and warn residents or occupants of a potential danger where natural gas is present in the atmosphere where the device is installed.

The second type of methane detector is compatible with smart technology that not only provides the audible alarm as described above, but also directly notifies emergency officials, or gas dispatch personnel, that natural gas in the atmosphere where the device is installed. These Smart Remote Methane Detectors ("SRMD")

may be compatible with existing smart communications technology in place or may require a rollout of a separate wireless communication technology.

Q: Would this entail the installation of such a device in each residence?

A: Yes.

Q: How would PGW and its customers benefit from the installation of methane detectors?

A: With implementation of these devices, PGW will provide their customers a safety tool that provides early warning alarms signaling a gas leak and potentially hazardous situation. Implementing an early warning audible alarm will afford additional time to safely evacuate and notify the emergency response officials. Adding the SRMD devices will simultaneously notify the customer and the emergency gas response officials, not only allowing additional time for safe egress by those hearing the alarm, but also provide advanced notice to reduce response time of the emergency responders who can potentially assist with further evacuations or mitigate the issues triggering the alarm.

The make-up of PGW's pipeline facilities has some unique and concerning characteristics, including miles of cast iron in-service, the timeframe to replace cast iron, and the ability to finance an accelerated replacement program. As stated in Elena Bozhko's testimony, PGW's distribution system contains a significant amount, approximately 1,200 miles, of cast iron mains in service. PGW's cast iron main replacement plan spans over 30 years at the current replacement rate of about 34 miles per year. Only three (3) other operators in the entire United States have

more cast iron main in-service than PGW, but these operators have more aggressive removal plans that span approximately half the time, or less, than PGW.[1] Within Pennsylvania, PGW has more cast iron in place than all other operators combined.

The existence of cast iron, some of which is over a century old, in-service in Philadelphia over the next three decades requires integrity management efforts. The risks associated with cast iron have been stated and restated in previous incidents in Pennsylvania and across the nation. Both operators and regulators are all too familiar with these risks, including piping graphitization and brittleness over time, and the propensity of full circumferential breaks. It is important to accelerate the replacement rate of this cast iron, with the ultimate goal of eliminating cast iron altogether, while also acknowledging that replacement will take years, even decades, regardless of any accelerated replacement programs. In the meantime, the installation of methane detectors can make Philadelphia and its residents safer by providing an earlier mode of detection for cast iron breaks and other pipeline failures when gas migrates into the building or where the leak initiates within the building.

Risk is defined as the probability of occurrence multiplied by the consequence of the event. The implementation of methane detectors can drive down the

[1] *See generally* Gas Distribution, Gas Gathering, Gas Transmission, Hazardous Liquids, Liquefied Natural Gas (LNG), and Underground Natural Gas Storage (UNGS) Annual Report Data, https://www.phmsa.dot.gov/data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids ; Cast and Wrought Iron Inventory, https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory ; and Federal Register, Vol. 77, No. 57 (March 23, 2012), https://www.govinfo.gov/content/pkg/FR-2012-03-23/pdf/2012-7080.pdf.

consequence of a cast iron main break by providing early warning that gas is migrating and detected at the meter detector location, thus potentially saving lives and avoiding injury. Cast iron was historically installed in urban environments and remains in service in some of Pennsylvania's underserved areas. Methane detector deployment is currently an underused tool to protect these underserved areas and all PGW customers and residents.

Q: Briefly describe the perimeters that I&E seeks PGW to create and establish with the implementation of a methane detector program.

A: I&E has prepared an outline describing the implementation of the methane detector program which is attached as I&E Exhibit 27. Specifically, I&E is proposing PGW coordination with GTI Energy, a research entity that has experience with the technology and implementation of ARMD and SRMDs with natural gas distribution suppliers. GTI Energy has worked with entities across the country and across the world to test and implement methane detector technology. I&E proposes two (2) simultaneous pilot programs focused in the neighborhood surrounding South 8th Street, followed by an initial ARMD rollout. The more complex SRMD technology rollout will follow.

Q: Are you aware of whether any other jurisdiction or natural gas facility has implemented a methane detector program?

A: Yes. The State of New York Public Service Commission, in collaboration with GTI Energy, has successfully instituted methane detector installations in New York City and other areas across the State.

Q: Please provide a brief explanation of the methane detector program implemented in New York.

A: In one example, GTI Energy worked with the State of New York Public Service Commission and Con Edison Company of New York, Inc. to establish pilot programs and to develop a rollout for installations of the smart meter compatible detectors. GTI Energy performed research into both the Audible Residential Methane Detector units and the smart meter technology. New York City's distribution systems have many of the same issues and concerns as Philadelphia. Specifically, the infrastructure in both cities is old, the climate is comparable, and the densely populated urban environment are just some of the similarities of the underground pipeline facilities of both cities.

Q: Was the methane detector program in New York successful or provide positive impacts for the residents of New York City?

A: Yes. Con Edison's smart devices have alerted personnel and residents of potential hazards on several occasions. In my opinion, the implementation of these detectors may be the biggest tool for accelerated actions to reduce impacts of infrastructure integrity concerns going forward.

Q: Have federal agencies provided support for the installations of indoor methane detectors?

A: Yes. Both PHMSA and the NTSB have provided written support for the installation of indoor methane detectors or alarms. PHMSA provided a statement in Advisory Bulletin 2012-05, largely regarding Pennsylvania incidents stemming

from cast iron main failures, asking owners and operators of cast iron distribution pipelines and state pipeline safety representatives to consider, among other items, the installation of interior/home methane gas alarms. [2] The NTSB has repeatedly encouraged the installation of these indoor methane detector devices and listed the devices as a line item on their 2021-2023 NTSB's Most Wanted List.[3]

Q: Can this technology be used by other operators to improve safety?

A: Yes. These detectors and technology can be instituted and provide the same early detection and safety enhancements for any operator. These detectors can alert of any leak by any cause, including excavation damage, corrosion, ruptures, material failures, or any other cause where gas escapes from a pipeline or appurtenance. The detectors will also detect gas from leaks on non-jurisdictional piping within proximity of the meter within the structure.

Q: Have all your answers and responses today been based upon your personal knowledge or professional expertise?

A: Yes.

Q: Does this conclude your direct testimony?

A: Yes. However, I reserve the right to supplement my testimony as additional issues and facts arise during the course of the proceeding.

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[2] *See* Federal Register, Vol. 77, No. 57 (March 23, 2012), https://www.govinfo.gov/content/pkg/FR-2012-03-23/pdf/2012-7080.pdf.

[3] Improve Pipeline Leak Detection and Mitigation, https://www.ntsb.gov/Advocacy/mwl/Pages/mwl-21-22/mwl-rph-01.aspx.

I&E
EXHIBIT 27

Appendix C

I&E's Proposed Methane Detector Program

Docket No. C-2022-3033834

Pilot 1. That, within 45 days of an entry of a Final Order, PGW shall implement an audible style alarm residential methane detector ("ARMD") pilot program.

a. The pilot program should be accomplished through consultation with GTI Energy ("GTI") and be implemented within 45 days of an entry of a Final Order and run for a six (6) month period of time.
b. PGW's selected model(s) of the ARMD used in the pilot program should rely on testing and guidance performed by GTI and have an alarm level of 10% of the Lower Explosive Limit ("LEL").
c. The pilot program shall focus on the service area immediately surrounding 8th Street, Philadelphia, PA, at the nearest approximately 7,000 gas services where cast iron pipe remains in-service and will include both residential and commercial properties.
d. PGW shall install the ARMD device for the 7,000 gas services in the pilot program.
e. Following the 6-month pilot program, PGW should make available, through a phased roll-out, for each service line entering a building, an audible indoor ARMD. PGW should use GTI research and the 6-month pilot program results to make an informed decision on what locations/service areas the ARMD(s) will be provided and the phased roll-out approach. The ARMD rollout shall begin within 30 days after completion of the pilot program and be completed within 6-months of completion of the pilot program. Frequently Asked Questions ("FAQs") about the ARMD should be provided to the customers.

Pilot 2. In parallel with the Pilot 1 program, PGW shall, through consultations with GTI Energy, within 45 days of an entry of a Final Order, implement a 9-month pilot program for commercial, or smart, remote methane detectors ("SRMD") that can identify leaks and directly notify the gas operator and/or emergency official(s).

a. This pilot program shall include approximately 750 of the 7,000 service addresses included in the Pilot 1 program.
b. The selection of the devices and technology for this pilot should be selected in consultation with GTI Energy and will depend on available technology either compatible with or separate from PGW's current technology.

c. PGW shall be responsible for the installation of the SRMDs.
d. PGW shall use the results and resources in the roll-out of the SRMD pilot to prioritize implementation to PGW's areas where cast iron remains in service. PGW should consider a rollout that provides increasing safety measures for those underserved areas within the city.
e. PGW shall use the results of the Pilot 2 program, and with the consultation with GTI, to begin a rollout of SRMD technology throughout the City of Philadelphia. Full implementation of the SRMD technology shall be completed within 24 months after the Pilot 2 program is complete. The goal of the rollout is for each service line in PGW's service territory to be equipped with a SRMD within three (3) years of the date of entry of a Final Order.

Miscellaneous.

a. PGW shall develop and create a replacement program for those methane detectors that are either found to be damaged, defective, or nearing the end of their useful life.
b. PGW shall, with the consultation with GTI, develop and distribute educational materials and FAQs to its customers and first responders regarding the methane detectors. The educational materials should include, but not be limited to:
    i. The purpose and benefits of the program and the detectors, and what the methane detector device does;
    ii. The difference between the SRMD and ARMD detectors;
    iii. Descriptions detailing how the methane detector device alerts the customer and/or first responder to a natural gas leak;
    iv. Direction of what the customer and/or first responder should do after the methane detector device alerts of a natural gas leak;
    v. General maintenance, *i.e.*, device placement locations, replacement of batteries, access, etc.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Robert Horensky, Safety Manager, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: January 13, 2023

Robert Horensky
Safety Manager
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

I&E Statement No. 1
Witness: Elena Bozhko

PENNSYLVANIA PUBLIC UTILITY COMMISSION,
BUREAU OF INVESTIGATION AND ENFORCEMENT

v.

PHILADELPHIA GAS WORKS

Docket No. C-2022-3033834

Direct Testimony

of

Elena Bozhko, Fixed Utility Valuation Engineer 3

on behalf of the

Bureau of Investigation and Enforcement

Q: Please state your name.

A: Elena Bozhko.

Q: Are you currently employed?

A: Yes.

Q: By whom are you employed and in what capacity?

A: I am employed by the Pennsylvania Public Utility Commission ("PUC" or "Commission"), Bureau of Investigation and Enforcement ("I&E") as a Fixed Utility Valuation Engineer 3 in the Pipeline Safety Section. My business address is Pennsylvania Public Utility Commission, 400 North Street, Harrisburg, PA 17120.

Q: How long have you been employed with the Commonwealth and what are your credentials?

A: I have worked with the Pennsylvania Public Utility Commission's Pipeline Safety Division since November of 2016. Previously, I was a Design Engineer at Gilmore and Associates and was a Quality Engineer at Pergamon Corporation. I have a Master of Science Degree in Engineering from the Yaroslavl State Technical University and a Master of Science Degree in Environmental Engineering from Temple University.

Q: What are your current job responsibilities as a Fixed Utility Valuation Engineer 3 for the Bureau of Investigation and Enforcement?

A: A Fixed Utility Valuation Engineer 3 is responsible for performing operational compliance inspections and completing reportable and non-reportable incident investigations. This position is responsible for the enforcement of federal and

Commission regulations related to gas pipeline systems that are under the jurisdiction of the Public Utility Commission.

Q: In your capacity as a Fixed Utility Valuation Engineer 3, are you familiar with the Public Utility Code, Pennsylvania Code, and Code of Federal Regulations as they relate to the regulation of natural gas distribution companies?

A: Yes, I am. A Fixed Utility Valuation Engineer 3 conducts standard and complex inspections and assessments of both interstate and intrastate gas or hazardous liquid pipeline facilities and operations in order to determine compliance with state and federal regulations.

Q: In your capacity as a Fixed Utility Valuation Engineer 3, are you familiar with Philadelphia Gas Works ("PGW")?

A: Yes, I am.

Q: What is PGW?

A: PGW is a municipally owned natural gas distribution company ("NGDC"), as defined by 66 Pa.C.S. § 102 and 66 Pa.C.S. § 2202 that provides natural gas service to approximately 524,000 customers in the city of Philadelphia.

Q: Is PGW subject to the Commission's jurisdiction?

A: Yes, PGW became subject to the Commission's jurisdiction on July 1, 2000, pursuant to the Natural Gas Choice and Competition Act. Section 2212(b) subjects city natural gas distribution operations furnishing or rendering public utility service within municipal limits to regulation and control by the Commission with

the same force as if the service were rendered by a public utility. 66 Pa.C.S. § 2212(b).

Q: Since becoming subject to the Commission's jurisdiction, how many reportable incidents has PGW had on its facilities?

A: Since becoming subject to the Commission's jurisdiction on July 1, 2000, PGW has had twelve (12) reportable incidents on its facilities. Six (6) of the incidents were caused by cast iron breaks, three (3) of which occurred on 6-inch cast iron pipes. In the past twenty (20) years, PGW incidents caused by cast iron breaks have been responsible for four (4) deaths, eight (8) injuries, and almost $4 million in damages. Between 2016 and 2020, PGW experienced an average of 282 cast iron main breaks annually and an average of 2,018 hazardous leaks per year in its distribution system.[1]

Q: What is a reportable incident?

A: An incident that qualifies as reportable as defined by the federal Pipeline and Hazardous Materials Safety Administration ("PHMSA") includes any of the following events:

(1) An event that involves a release of gas from a pipeline, or of liquefied natural gas ("LNG"), liquefied petroleum gas, refrigerant gas, or gas from an LNG facility, and that results in one or more of the following consequences:

[1] https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data.

(i) A death, or personal injury necessitating in-patient hospitalization;

(ii) Estimated property damage of $129,300[2] or more, including loss to the operator and others, or both, but excluding cost of gas lost;

(iii) Unintentional estimated gas loss of three million cubic feet or more;

(2) An event that results in an emergency shutdown of an LNG facility. Activation of an emergency shutdown system for reasons other than an actual emergency does not constitute an incident.

(3) An event that is significant in the judgment of the operator, even though it did not meet the criteria of paragraphs (1) or (2) of this definition.[3]

Q: Is the reportable incident information publicly available? If so, please explain where it can be found.

A: Yes, the reportable incident data is published on PHMSA's website page titled "Distribution, Transmission & Gathering, LNG, and Liquid Accident and Incident Data" and can be accessed using the following link: https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data.

Q: Why are cast iron mains a specific concern?

A: Even though the quantity of active cast iron pipe is declining, there have been a number of recent incidents caused by cast iron gas distribution main failures which in turn has resurged attention to the risks associated with them. Countrywide, only

[2] The amount of property damage was $50,000 on December 19, 2019.
[3] 49 CFR § 191.3.

2 percent (2%) of distribution mains are cast iron, [4] but yet gas distribution incident reports for 2005 through 2020 show that 9 percent (9%) of the incidents occurring on gas distribution mains involved cast iron mains.

Q: Does PGW have a significant amount of cast iron mains remaining in its distribution system?

A: Yes, in 2021 PGW had more cast iron mains remaining on its distribution system than all other Pennsylvania operators combined. [5]

Q: Approximately how many miles of cast iron mains remain on PGW's distribution system?

A: As of December 31, 2021, over 40% of mains in PGW's distribution system were made out of cast iron.

Year	2019	2020	2021
Miles of cast iron mains	1,306.02	1,271.56	1,239.35
Miles of reconditioned cast iron mains	5.32	7.27	7.11

Reconditioned cast iron is defined as cast iron gas distribution pipe that has been lined internally by use of suitable materials that ensure safe operation at a maximum allowable operating pressure ("MAOP") not to exceed the previously

[4] https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory

[5] https://portal.phmsa.dot.gov/PDMPublicReport/?url=https://portal.phmsa.dot.gov/analytics/saw.dll?PortalPages&PortalPath=%2Fshared%2FPDM%20Public%20Website%2FCI%20Miles%2FGD_Cast_Iron, 916.4 (all) vs 1,239.40 (PGW)

established MAOP. [6]

Q: What are the known dangers to cast iron pipelines?

A: One of the biggest threats to cast iron pipe is earth movement. If these pipelines are disturbed by digging, seasonal frost heave, or changes in ground water levels, leakage may occur.[7]

Q: What characteristic of cast iron pipe causes it to have a high risk of degradation?

A: A serious threat to cast iron pipe is graphitization, which is a natural process in which iron degrades to softer elements, making cast iron pipelines more susceptible to cracking. The extent of graphitization depends on many factors, but gas may leak from the joints or through cracks in the pipe if graphitization has occurred and the surrounding soil has been undermined.[8]

Q: Can leakage of cast iron pipelines due to undermining be prevented?

A: Yes, leakage due to undermining could be prevented if timely remedial measures are taken such as supporting or reinforcing the cast iron pipe.

Q: What can an operator of cast iron pipeline do to prevent undermining and potential leakage?

A: In 1976, new requirements on protection of buried cast-iron pipelines were added

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6 *See* Instructions (rev 5-2021) for Completing Form PHMSA F 7100.1-1, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2022-03/Current_GD_Annual_Instructions_PHMSA%20F%207100.1-1_CY%202021%20and%20Beyond%20Editorial.pdf

7 https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory

8 https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory

to the Code of Federal Regulations to include Section 192.755.[9] The Code requires any disturbed segment of buried cast-iron pipelines to be protected against damage.[10]

Q: What are some ways an operator can protect a cast iron pipe from damage?

A: While it is incumbent upon the operator to decide what actions are best to protect its cast iron pipe from damage, some options to protect the pipe include, but are not limited to, bridging, bracing, or suitable backfill.

Q: Are you familiar with the fatal gas explosion which occurred on December 19, 2019 at 1435 South 8th Street in Philadelphia, PA and that is the subject of this proceeding?

A: Yes, I am.

Q: Please explain how or why you are familiar with the December 19, 2019 explosion.

A: I received a call notifying me of the explosion from my supervisor (at the time). I was at the explosion site for many days gathering the details of the explosion, interviewing persons, reviewing PGW's records and procedures, and completing various other investigative tasks.

Q: When did the explosion occur?

A: The explosion occurred at approximately 11:36 a.m. on December 19, 2019, at 1435 South 8th Street, Philadelphia, PA. Passersby called 911 immediately after

[9] https://archives.federalregister.gov/issue_slice/1976/3/31/13586-13592.pdf#page=3

[10] 49 CFR § 192.755, Protecting cast-iron pipelines.

the explosion. Units from the Philadelphia Fire Department ("PFD"), Philadelphia Police Department, and other emergency personnel were dispatched to the area. First responders from the PFD arrived at the location within minutes after the explosion and notified PGW of the incident at 11:45 a.m.

Q: What was the human impact of the fatal explosion at South 8th Street?

A: The explosion resulted in the death of two (2) persons. Both victims were in their respective homes when the explosion occurred. Pipeline Safety was conducting its investigation at the explosion site when recovery efforts of the victims were underway.

Q: In addition to the tragic loss of life, what was the economic impact from the South 8th Street explosion?

A: The explosion resulted in a structural fire and approximately $1,416,920.00 in property damage. The explosion and subsequent fire destroyed the residences located at 1433 South 8th Street, 1435 South 8th Street, and 1437 South 8th Street, and caused structural damage to the residences located at 1431 South 8th Street and 1439 South 8th Street. The residences at 1431 South 8th Street and 1439 South 8th Street were later condemned and demolished. Approximately sixty (60) residents were evacuated from the scene.

Q: Did Pipeline Safety conduct its own investigation into the December 19, 2019 gas explosion?

A: Yes, the responsibilities of Pipeline Safety include investigations of gas explosions on jurisdictional facilities.

Q: Please provide a brief overview of the distribution system on the 1400-block of South 8th Street in Philadelphia, PA.

A: The distribution system on the 1400-block of South 8th Street consisted of two (2) parallel mains running along the entire length of the block between Dickson Street and Reed Street.

The 6-inch cast iron main that experienced the break was installed in 1928 and was located on the east side of South 8th Street, approximately 3.5 feet west of the curb line. A 6-inch ductile iron main, which was installed in 1964, is located under the sidewalk on the west side of South 8th Street opposite from the location of the gas main break. Both mains were part of the same pressure system and operated at 7.5 inches water column, approximately 0.25 pounds per square inch gauge ("psig").

Q: After arriving at the scene of the explosion, what did you see?

A: When I arrived at the site the firefighting efforts were still underway as the firefighters were pumping water onto the collapsed buildings. I observed significant damage to the surrounding structures from the pressure wave and debris which had been hurled across the street. The ground was covered with debris, remnants of the exploded structures and broken glass. The area surrounding the incident side was full of emergency personnel who were rushing around to make the scene safe. I took some pictures on site on December 19, 2019 which are attached as I&E Exhibit 5 and I&E Exhibit 6.

Q: Are you aware of or familiar with PGW's response to the explosion?

A: Yes, I am.

Q: What actions did PGW personnel complete upon arriving at the scene?

A: PGW personnel arrived at the explosion site approximately thirteen (13) minutes after the explosion occurred. PGW personnel were completing various tasks, including, but not limited to, shutting the gas off, completing leak checks, locating gas lines, and completing other tasks in response to the gas explosion.

Q: At some point after the explosion occurred, did PGW start conducting an investigation into the cause of the explosion?

A: Yes.

Q: Please explain when PGW personnel began investigating the explosion and what actions they took.

A: On December 19, 2019 at approximately 11:00 p.m., PGW deployed an inspection camera into the cast iron main south of the explosion site. While pushing the camera north toward the explosion area, the camera was stopped to observe the main full of water and captured water rushing into the main. PFD pumped an abundance of water at the explosion site for several hours to contain the fire, causing water to infiltrate into the main with no gas pressure at that time. The inspection was stopped.

A second attempt to examine the cast iron main was performed on December 21, 2019 at 2:30 p.m. The inline inspection camera was deployed in the 6-inch cast iron main north of the explosion site. While pushing the camera south toward the

explosion area, the camera was stopped to observe a clear break in the main and what appeared to be a drop in the main. Consequently, the examination was stopped. The main failure appeared to be located near where previous water/sewer repairs were completed to 1433 South 8th Street.

Q: Did you talk to residents of the 1400-block of South 8th Street?

A: Yes, I interviewed several residents living in the vicinity of the explosion.

Q: Did they report anything out of ordinary that caught your attention?

A: Yes, several residents mentioned excavation work happening on the block in the months leading up to the explosion. One neighbor reported seeing settling of the road surface and consequent repair attempts by the construction crews.

Q: What did you do with this information?

A: I requested excavation notices from Pennsylvania One Call System to review the excavation activities in the area in the months leading to the explosion.

Q: Did the response from One Call show information about excavation activity occurring on the 1400-block of South 8th Street prior to the December 19, 2019 incident?

A: Yes, it did. The 1400-block of South 8th Street was the subject of frequent excavation activity. Seven (7) locate requests related to water and/or sewer repair work were submitted to the Pennsylvania One Call System, Inc. ("Pennsylvania One Call") in the twelve (12) months prior to the incident. Five (5) of these locate requests occurred in the two and a half (2.5) months prior to the incident and were

classified as emergency requests in the vicinity of the incident site. The One Call Tickets are labeled as I&E Exhibit 4.

Q: Did PGW mark out the One Call tickets?

A: Yes, PGW marked out each of the One Call requests.

Q: Were all of the tickets marked by the same employee?

A: No, three (3) different PGW employees marked out the tickets. See I&E Exhibit 4.

Q: Does the nature of the One Call tickets, i.e., emergency requests related to water and/or sewer, have any impact on PGW's pipeline facilities?

A: Yes, the nature of the One Call tickets poses an elevated risk of impacting PGW's pipeline facilities. The fact that the tickets involved water and/or sewer work, coupled with the emergency nature of the request, suggests the leakage of water, which in turn can cause undermining or disturbance of nearby pipeline facilities. However, Pipeline Safety notes that this elevated risk is not limited to emergency water/sewer tickets.

Q: Did you observe excavation of the cast iron main which caused the explosion?

A: Yes, I did. On December 22, 2019, PGW excavated the area over the cast iron main which caused the explosion. I observed fresh patches of pavement on the surface close to the proximity of the suspected main crack and hollow areas under the pavement during the excavation. Some of the soil underneath the roadway was missing so the road surface lacked the support and was caving in. When the roadway was opened to start the excavation, it buckled downwards. There were several layers of pavement, including asphalt, cement, and cobblestone. Some of

the layers appeared to be recent repairs. Once exposed, a circumferential crack on the cast iron pipe became visible. PGW carefully extracted and secured a 65-inch-long section of the main for evidence and prepared it for transport.

Q: Did you take photographs of the excavation conducted on December 22, 2019?

A: Yes, I took photographs of the excavation activity.

Q: Please identify the photographs taken and provide a brief description of each photograph.

A: The photographs taken during the December 22, 2019 excavation are labeled as I&E Exhibits 7-15.

I&E Exhibit 7 and I&E Exhibit 8 show the demolished building and the beginning stages of the cleanup of debris after the explosion.

I&E Exhibit 9 shows the intersection of 8th Street and Wilder Street where the road surface is covered with metal plates and depressions on the road can be seen.

I&E Exhibit 10 shows the clean-up efforts at the explosion site as well as PGW and PFD personnel inspecting the site.

I&E Exhibit 11 shows the depression on the road in front of 1435 South 8th Street and the metal plates which were placed on the road to prevent potential collapse.

I&E Exhibit 12 shows the start of the excavation in front of 1435 South 8th Street and how the road surface collapsed upon impact. This photograph showcases the lack of support of the roadway surface in front of 1435 South 8th Street.

I&E Exhibit 13 shows a gap behind the curb on the front of 1435 South 8th Street. This cavity was later buried during service line excavation and was never unearthed. The existence of cavities is further shown in the left side of the photograph near the edge of the metal plate.

I&E Exhibit 14 shows a depression in the road left by an excavation due to the pavement slightly collapsing from the weight of the vehicle. This further evidences the lack of support underneath the roadway surface and existence of cavities or voids.

I&E Exhibit 15 shows the cracked 6-inch main which was unearthed by PGW personnel. The crack can be seen near where the employee placed his hammer/hand tool.

Q: In addition to the mains, did you complete any research or observations on any residential service lines?

A: Yes.

Q: What are the installation dates for the service lines at 1433 South 8th Street, 1435 South 8th Street, and 1437 South 8th Street?

A: The installation dates for the service lines at the affected residences were as follows:

a. 1433 South 8th Street- service line installed in 1988,

b. 1435 South 8th Street- service line installed in 1900,[11]

[11] PGW's records state that the service line at 1435 South 8th Street was installed in 1900 even though the main was installed in 1928.

c. 1437 South 8th Street- service line installed in 2003.

Q: Did PGW excavate the services lines at 1433 South 8th Street, 1435 South 8th Street, and 1437 South 8th Street?

A: Yes, PGW excavated the services lines to the properties on January 2, 2020. I was on-site during the excavations.

Q: Please describe what you saw during the excavations.

A: While looking at the sidewalk and surrounding surfaces, I noticed an opening under the sidewalk in front of the residence at 1435 South 8th Street. There was a gap or cavity directly behind the curb. That cavity was later buried during service line excavation and was never unearthed.

Q: Did you take photographs of the excavation conducted on January 2, 2020?

A: Yes, I took photographs of the excavation activity.

Q: Please identify the photographs taken and provide a brief description of each photograph.

A: The photographs taken during the January 2, 2020 excavation are labeled as I&E Exhibits 16-24.

I&E Exhibit 16 was taken in front of 1421 South 8th Street during excavation of the middle of the road. During the excavation, PWD broke the pavement and underneath the layers of asphalt and concrete there was no soil present.

I&E Exhibits 17-20 clearly show the voids and cavities discovered through excavation. Since the voids and cavities can be seen underneath the roadway

beyond the site of excavation, it is clear that they were not caused by the excavation activity completed on January 2, 2020, but rather were preexisting. I&E Exhibit 21 shows the removal of the roadway surface and the existence of voids/cavities underneath the road.

I&E Exhibit 22 shows the layering of pavement and cobblestone as well as the existence of voids/cavities underneath the roadway at the excavation site.

I&E Exhibit 23 shows the layering of pavement and cobblestone as well as the existence of voids/cavities underneath the roadway directly behind the curb at 1435 South 8th Street. The cavity was later buried during service line excavation and never unearthed.

I&E Exhibit 24 shows the piece of 6-inch cast iron main which was extracted during the January 2, 2020 excavation.

Q: Was there anything notable about the underground street layout on the 1400-block of South 8th Street?

A: There were abandoned trolley tracks buried in the layers of pavement running along the road centerline in the middle of the street.

Q: Why is the presence of trolley tracks notable?

A: The pavement at the roadway on South 8th Street consisted of asphalt over two layers of cobblestone. In the middle of the street, there were abandoned trolley tracks going along the road centerline, not visible from the surface, buried in the pavement. PGW's excavation showed that there were cavities present underneath

the surface of the road. These tracks may have supported the pavement by preventing its collapse when the soil underneath was washed away.

Q: Was there anything that made you notice the buried trolley tracks providing support to the pavement?

A: Yes, there was. While PGW was working at the site excavating service lines, Philadelphia Water Department ("PWD") employees were completing work in front of 1421 South 8th Street. When excavating in the middle of the roadway, PWD broke the pavement, and underneath the layers of asphalt and concrete, there was no soil. The pavement layers were supported by the trolley tracks as the layers of pavement collapsed downwards immediately after they were cut free. Several feet of soil underneath the pavement was completely washed away. If the gas facilities had been located there (usually buried about 3 feet deep), the facilities would have lost all support.

Q: Was the 65-inch section of the cast iron main sent for testing?

A: Yes, the 65-inch section of cast iron main was sent to Affiliated Engineering Laboratories, Inc. for an independent metallurgical evaluation. A copy of the September 30, 2020 Lab Report and October 14, 2020 Addendum is labeled as I&E Exhibit 25(a) and I&E Exhibit 25(b), respectively.

Q: What was the result of the metallurgical evaluation?

A: The metallurgical evaluation revealed that the effective wall thickness of the pipe was reduced to 27% as a result of graphitization. The fracture of the pipe initiated near the bottom and propagated along the circumference of the pipe. The cast iron

pipe exhibited graphic corrosion around its circumference whereby the strength of the wall was compromised. There was no evidence of a pre-existing breach or leak location observed on the fracture surface.

Q: Can you please explain what graphitization means?

A: Cast iron is a combination of iron and graphite (carbon). Graphitization occurs when iron is selectively leached from cast iron, leaving graphite behind. The result is a weakened and brittle pipe.

Q: What caused the circumferential crack which started at the bottom of the pipe?

A: Undermining of pipelines is well known to be detrimental to the integrity of aged pipes such as gas, sewer, or water. Water leaks can cause softening and/or erosion of support, which is extremely detrimental to brittle pipe such as terracotta or graphitized cast iron. The lab report concluded that external stresses applied to a graphitized gas main induced a circumferential crack whereby gas could escape.

Q: In the aftermath of the explosion, what steps did PGW take to safeguard the public in the vicinity of the explosion?

A: On January 28, 2020, PGW completed leak surveys of the area in the vicinity of the explosion. The following blocks were included in the survey: 1300, 1400 and 1500 blocks of South 8th Street; 1400 block of South Franklin Street; 700 and 800 blocks of Dickinson Street; 700 and 800 blocks of Reed Street; and 800 block of Wilder Street. The leak surveys occurred from January 28, 2020 to March 21, 2020. Three (3) leaks were found, however none of the leaks were in the

immediate vicinity of the explosion site and no leaks were on the remainder of the cast iron on 8th Street.

Q: What did PGW do to remediate the potential risks on the reminder of the cast iron main?

A: PGW started the installation of a new plastic main in the vicinity of the explosion on February 17, 2020. PGW abandoned the existing 6-inch cast iron main and completed the construction and installation of the new plastic main and service lines by April 21, 2020.

Q: As part of your investigation, did you review PGW's policies, procedures, and/or training materials?

A: Yes, I did.

Q: What policies, procedures, and/or training materials did you review?

A: I reviewed the following materials:

Bulletin #54 Protection of PGW facilities from underground street troubles, effective date 4/15/11;

Bulletin #312 Summary of distribution department damage prevention program, effective date 9/1/13;

Bulletin #313 Instructions for distribution department damage prevention inspectors, effective date 8/2/16; and

Field Operations Training Program for Distribution Inspector School, attached hereto as I&E Exhibit 26.

Q: Can you please identify I&E Exhibit 1, I&E Exhibit 2, and I&E Exhibit 3?

A: I&E Exhibit 1 is PGW's Bulletin #312 procedure, I&E Exhibit 2 is PGW's Bulletin #313 procedure, and I&E Exhibit 3 is PGW's Bulletin #54 procedure.

Q: Please provide a brief description of I&E Exhibit 1: Bulletin #312.

A: PGW Bulletin #312 is the Company's procedure related to Pennsylvania One Call requests. The procedure outlines a damage prevention mission statement, prevention of damage to pipeline facilities and structures, and failure of other facilities which are not PGW's. PGW Bulletin #312 states: "[W]herever pipeline facilities are or may be endangered, the appropriate supervisor shall be promptly informed. The supervisor shall, after consulting with his/her superiors, institute necessary actions such as patrolling, supporting, replacing, relocating or removing from service the affected gas facilities."

Bulletin #312 also states the determination of the location of PGW facilities shall be made whenever there is notification of water or sewer system failures or repairs. It also provides that, if these conditions affect PGW facilities, that appropriate personnel shall be dispatched promptly to determine the effect of the failure on pipeline facilities. Inspection and necessary follow-up action shall be in accordance PGW Bulletin #54.

Q: Please provide a brief description of I&E Exhibit 2: Bulletin #313.

A: PGW Bulletin #313 provides instructions for distribution department damage prevention inspectors. Among the various duties included in the Bulletin, the inspector is specifically required to re-visit on-going jobs in which PGW facilities

will be undermined in order to report and/or recommend replacement or protection and visit any underground street trouble encountered and report the same to the distribution dispatching and supervisor.

Q: Please provide a brief description of I&E Exhibit 3: Bulletin #54.

A: PGW Bulletin #54 addresses dispatcher duties and field personnel investigations of failures of underground structures which could affect PGW facilities.

Q: In reference to the training materials you reviewed, did you identify any training related to underground street trouble?

A: Yes, in the response to interrogatories, PGW provided an overview of the training that contained review of outdated underground street trouble procedure. For example, the training is dated May 21, 1999 while the "current at the time of incident" procedure's effective date is April 15, 2011.

Q: Is PGW required to have training for their employees on continuing surveillance procedure, patrolling procedure, operator qualification abnormal operating conditions, or training which addresses recognition of street trouble?

A: Yes, any individual who performs covered tasks on a pipeline facility is required to be operator qualified pursuant to Section 192.801. 49 CFR § 192.801. Pursuant to Section 192.801, a covered task is an activity, identified by the operator, that (1) is performed on a pipeline facility; (2) is an operations or maintenance task; (3) is performed as a requirement of this part; and (4) affects the operation or integrity of the pipeline. 49 CFR § 192.801(b).

Q: In your professional pipeline safety expertise, did PGW have procedures related to continuing surveillance consistent with 49 CFR §192.613?

A: No, PGW does not have a continuing surveillance procedure in place for identifying threatening integrity issues to the pipeline system.

Q: Did Pipeline Safety completes its investigation of the December 19, 2019 explosion?

A: Yes.

Q: After completing your investigation and reviewing all the information gathered, in your professional opinion, based upon your pipeline safety expertise, did PGW follow its procedures relating to the protection of cast iron from disturbance due to excavation activity prior to the December 19, 2019 explosion?

A: No, PGW did not follows its procedures. Specifically, PGW did not follow its procedures relating to the protection of cast iron from disturbance because they did not safeguard their facilities, did not perform inspection and necessary follow-up actions upon receipt of notice of water and/or sewer system failures, and did not act on the concentrated number of One Call notices.

Q: Was PGW aware of the conditions effecting the 6-inch cast iron main?

A: Yes, prior to the explosion PGW received various notifications/One Call requests for the 1400-block of South 8th Street. The notifications mentioned water and/or sewer repairs, therefore PGW had been aware of the construction/repair work in the area.

Q: Did PGW take adequate steps to safeguard its facilities during the aforementioned excavations?

A: No, PGW did not safeguard its facilities during those excavation activities.

Q: Why do you believe that PGW had sufficient information to anticipate the potential for undermining of the cast iron facilities?

A: Water leaks scour and weaken the surrounding soil which is the foundation for pavement and underground utilities such as water, gas, or sewer facilities. Sewers and sewer laterals are located well below gas facilities, making the probability of gas mains losing support high. The repair process to excavate sewer facilities can also loosen and weaken soil due to the size of the excavation during the sewer repair process. The likelihood of further weakening of the soil surrounding the pipeline facilities is increased if there are multiple excavations in close proximity.

Q: Did PGW employees perform the necessary steps to inspect the location?

A: PGW employees before/while/after visiting the location did not perform inspection and necessary follow-up actions in accordance with the "Protection of PGW Facilities from Underground Street Troubles," Bulletin #54, procedure upon receipt of notice of water or sewer system failures. Subsurface conditions, such as cavities or cave-ins may have been caused by such failures, which in turn affected the integrity of the cast-iron facilities. PGW did not inspect any underground street trouble encountered and did not report the same to the Distribution Dispatching and supervisor. PGW did not inspect third party construction activities for the purpose of protecting PGW underground structures and facilities. Further, because

PGW employees did not perform the required steps above, they did not report undermined gas mains immediately to the PGW supervisor.

Q: What was the result of PGW's inaction?

A: Since PGW failed to act on a known concentrated number of One Call notices on the 1400-block and the ensuing construction activity, the integrity of the 6-inch cast iron main was compromised by the weakening of the soil and/or undermining of the pipeline. Thus, PGW failed to reinforce and protect the integrity of the main. PGW did not recognize, react, nor investigate and take the proper steps to mitigate the danger caused by the compromised soil conditions.

Q: Did you review training that the PGW inspectors received?

A: Yes, PGW provided Field Operations Training Program for Distribution Inspector School in support of the PGW's averment that PGW personnel "were and are properly trained." See I&E Exhibit 26.

Q: In your pipeline safety opinion, is PGW's training sufficient?

A: No, in my opinion PGW's training is not sufficient. Evidently, no reports of underground street troubles were initiated by PGW personnel and no actions were taken to investigate despite receipt of several One Call tickets placed for water and sewer repair work.

Q: What are some of the deficiencies of the training that you observed?

A: PGW's training does not provide a link or reference to the current procedures PGW personnel are supposed to follow/utilize. The training refers to outdated procedural steps such as using forms that are no longer in use or are inactive in

PGW's reporting system. Also, the outdated version of Bulletin 313, which is reviewed during training, is missing Subsection III-D5 which requires the PGW inspector to notify the supervisor and the contractor if the inspector comes across an excavation that is in direct conflict with PGW structure. Overall, Section D of Bulletin 313 which is provided in the training document is missing 5 (Subsections 5, 12, 13, 14, and 18) out of 18 subsections when compared to the current version of Bulletin 313 which was in effect at the time of the explosion.

Q: Does the provided training also review outdated versions of Bulletin 54?

A: After reviewing the training, the Bulletin 54 reviewed during training is dated May 21, 1999, while the current version of the Bulletin, in effect at the time of the explosion, was effective as of April 15, 2011. There were significant changes made to the Bulletin in the consequent revisions- for example, "Inspector Notice"[12] was added as one of the origins of the underground street trouble reports. Also, Subsection 2 was expanded to include "key indicators" for the investigation of underground street trouble that were not present in previous versions of the Bulletin.

[12] Excerpt from Bulletin 54, page 2: Section 1. Origin of the Notice:
b) Inspector Notice:
Normal Working Hours - When an inspector is conducting a routine mark out on a designated location (address) and a UST is detected the inspector will generate a UST request order through AIMS and back that request up with a phone call to the Pa One Call clerk. The clerk will issue a UST form #6698 and forward it to the Dispatcher, and also call the proper city agency regarding the UST. The Dispatcher will issue an UST order in AIMS.
Out of Hours – The inspector will request a UST order through AIMS and back that request up with a phone call to the Dispatcher. The Dispatcher will generate an UST order in AIMS and call the proper city agency regarding the UST.

Q: Did you review PGW's procedures?

A: Yes, I did.

Q: Where the procedures detailed enough to outline what needed to happen?

A: No, the procedures for locators do not provide instructions to the locator on when to initiate an investigation for underground street trouble report. In addition, PGW procedures do not list criteria, such as the number of emergency tickets and type of indication of street issues (broken sewer laterals, water leaks etc.) placed in the same general location within relative short time frame, to trigger an investigation.

Q: After completing your investigation and reviewing all the information gathered, in your professional opinion, based upon your pipeline safety expertise, what was the primary cause of the natural gas explosion which occurred on December 19, 2019 at 1435 South 8th Street in Philadelphia, PA?

A: In my professional opinion, the primary cause of the explosion was the release of natural gas from a circumferential crack on the cast iron main in front of 1435 South 8th Street. The cast iron main cracked due to the instability of the soil due to water leaks and excavations to repair water and sewer laterals in the vicinity of the main. Undermining in the area caused sufficient softening or removal of material supporting the cast iron main which led to the material failure. Graphitization of the cast iron main coupled with lack of support and downward bending movements caused the crack and subsequent release of gas.

Q: After completing your investigation and reviewing all the information gathered, in your professional opinion, based upon your pipeline safety expertise, what corrective actions would you recommend PGW complete?

A: Pipeline Safety seeks the following remedial measures:[13]

a) That PGW review its existing street troubles process, amend the process and procedures as appropriate, and effectively train its employees to follow and enforce the requirements in those procedures. The street trouble recognition and identification indicators need to be well defined with trigger points for actions. PGW personnel with authority to identify street troubles, including supervisors, locators, and dispatchers, should receive this training. PGW shall provide to I&E a copy of its amended street troubles processes and procedures;

b) That PGW implement revised street trouble related procedures to create a comprehensive and effective practice to prevent line breaks and reduce distribution system risks. PGW shall incorporate all aspects of PGW's operations procedures, including applicable sections of PGW's Operator Qualifications and Training, additional in-house or third-party training, Bulletin #312, Bulletin #313, Bulletin #54, PGW's Dispatching Criteria, procedures concerning communications with outside entities such as PWD, and procedures concerning Line Locators and other applicable staff. PGW's

[13] Pursuant to Section 192.1001, an Integrity Management Program requires operators to create an overall approach to ensure the integrity of its gas distribution system. 49 CFR § 192.1001.

procedures shall be revised to clearly define the roles of dispatchers, locators, supervisors, and other personnel as these roles relate to the street trouble process;

c) That PGW implement a management structure, with field street supervision, to ensure compliance with underground street trouble procedures and to oversee the process;

d) That PGW provide periodic training to emphasize the risk and consequence associated with cast iron pipelines when PGW crews or other crews are excavating. This training should be provided to PGW employees and open to others that conduct excavation and utility work in the City of Philadelphia;

e) That PGW make every effort to ensure all work, done by PGW or by others, completed in or around its facilities restores the subsurface to a condition that ensures long-term stability and safe operation of its natural gas distribution facilities;

f) That PGW reexamine how it incorporates and documents the data and communications provided by the PWD into its street troubles procedures and process;

g) That PGW create an OQ task to evaluate and perform continuing surveillance pursuant to 49 CFR § 192.613(a), given that the undermining of cast iron natural gas mains and/or unstable soil in proximity to such mains creates unusual operating and maintenance conditions;

h) That PGW create an initiative to identify the locations of abandoned trolly tracks relative to the location of cast iron mains and integrate the necessary data into the damage prevention program, Pennsylvania One Call mark outs, and leak survey program. The information shall be made available to PGW front line field personnel, and supervisors and management trained with the knowledge to identify and further investigate these hazards;

i) That PGW incorporate the identified risks into PGW's distribution integrity management program ("DIMP"), such as identifying other locations where the same vintage water main is located along PGW's existing cast iron mains, identifying the location of buried trolley tracks and determining if their existence is affecting the integrity of PGW's facilities, and proactively identifying excavation activities in the area of PGW's facilities;

j) That PGW create and implement a process which uses specific criteria based on information gathered from Pennsylvania One Call tickets and other information, such as active communication with the PWD and plumbing contractors, to perform mandatory street trouble investigations involving water leaks. This process must track Pennsylvania One Call requests within a specific timeframe and specific location, such as blocks or within a defined area, close to cast iron mains;

k) That PGW, within thirty (30) days of entry of a Final Order, offer and provide initial training to PWD's management and staff regarding potential and actual integrity issues of natural gas pipelines caused by work

performed by PWD in proximity to gas mains. Restoration expectations and practices of the subsurface must be included in the training. PGW should emphasize the need for communications and notifications when work is being performed around gas facilities or if gas lines were, or could be, compromised. This training program between PGW and PWD is expected to be ongoing;

l) That PGW present a plan to accelerate the removal rate of its riskiest cast iron assets within ninety (90) days of the date of entry of a Final Order. Such plan may include submitting an application to PHMSA's Natural Gas Distribution Infrastructure Safety and Modernization Grant Program[14] to seek funding to replace any high risk, leak prone cast iron assets; and

m) That PGW, within ninety (90) days of entry of a Final Order, work with I&E Pipeline Safety to create and implement a methane detection program(s) to further the safety of PGW customers during PGW's replacement of its cast iron facilities.

Q: Have all your answers and responses today been based upon your personal knowledge or professional expertise?

A: Yes.

[14] Information about the Program can be found in the following PHMSA Press Release: USDOT Begins Accepting Applications for President Biden's Bipartisan Infrastructure Law Program Designed to Improve Pipeline Safety, Reduce Gas Distribution Leaks in Communities Across the Country | PHMSA

Q: Does this conclude your direct testimony?

A: Yes. However, I reserve the right to supplement my testimony as additional issues and facts arise during the course of the proceeding.

I&E
EXHIBIT 1

FIELD OPERATIONS

DISTRIBUTION DEPARTMENT

Effective Date: 9/1/13

SUMMARY OF DISTRIBUTION DEPARTMENT DAMAGE PREVENTION PROGRAM

Bulletin Number 312
Supersedes: Document dated 2/2012

I. **To:** Distribution Department personnel and other relevant entities.

II Damage Prevention Mission Statement

- To remain in full compliance with all federal and state requirements with regard to underground pipeline facilities damage prevention.
- To be a member of the Pennsylvania One Call System, Inc. and to participate actively in public and contractor awareness education programs, promoting safe excavating practices and the use of the one call system (811).
- To assist contractors and other excavators with timely and accurate mark-outs, and to communicate effectively with them
- To offer safety rechecks on on-going job sites, when time and conditions permit.
- To observe contractor activities when necessary and to offer assistance to safeguard PGW facilities during construction.
- To communicate the need for a shared responsibility/partnership among the excavation community to dig responsibly, minimize costly delays, environmental damage, property damage, and personal injury.

III Prevention of Damage to Pipeline Facilities and Structures

A. Excavation, Demolition and Blasting

- PGW is a member of the Pennsylvania One Call System. PGW actively participates in and sponsors contractor awareness events in the Philadelphia area. Upon receipt of notice of excavation, demolition or blasting, the location of pipeline facilities shall be determined and an inspector shall be dispatched to the work site as required, in order to mark the location of pipeline facilities. On major construction projects or where important pipeline facilities may be affected, a supervisor shall determine the need to assign a full time inspector or watchman during the period of construction.
- In conjunction with inspections at all City gate stations (normally made once each shift, seven days a week by Gas Processing personnel), the employee making such

inspections shall, to the extent practicable, travel the route of natural gas supply lines.

- Wherever pipeline facilities are or may be endangered, the appropriate supervisor shall be promptly informed. The supervisor shall, after consulting with his/her superiors, institute necessary actions such as patrolling, supporting, replacing, relocating or removing from service the affected gas facilities.

- Upon receipt of notice of blasting or implosion, the supervisor shall contact the Superintendent of Maintenance and Operations or above who will determine the need for a leak survey, both prior and after blasting, based on the type and location of PGW facilities. The Philadelphia Fire Marshall's office usually notifies PGW of any permits extended to contractors for blasting.

B. Failure of Other than PGW Underground Facilities

Upon receipt of notice of water or sewer system failures, or surface conditions, such as cavities or cave-ins which may be caused by such failures, the location of gas pipeline facilities shall be determined. Where pipeline facilities may be affected, appropriate personnel shall be dispatched promptly to determine the effect of the failure on pipeline facilities. Inspection and necessary follow-up action shall be in accordance with the "Protection of PGW Facilities from Underground Street Troubles" procedure.

IV. Associated Procedure(s)

DD Bulletin#54: Procedure on Underground Street Troubles
DD Bulletin#24: Prevention of Damage to Underground Control Line
DD Bulletin#198: PGW Use of Directional Drilling To Lay Mains or Services
DD Bulletin#201: Damage Prevention Policy Regarding Trenchless Technology
DD Bulletin#211: Excavation Interference with All Other Utility Lines Procedure
PGW Damage Prevention Program Brochure

V. Handbooks

Foreman’s Handbook

VI. Attachments

N/A

FIELD OPERATIONS

DISTRIBUTION DEPARTMENT

SUMMARY OF DISTRIBUTION DEPARTMENT DAMAGE PREVENTION PROGRAM

Effective Date: 9/1/13

Bulletin Number 312
Supersedes: Document dated 2/2012

VII. Transaction Listing

TR-2013-12

Prepared by A. Awad

Approved by:

Signature on File

Raymond J. Welte
Director, Field Operations & Planning

Signature on File

Michael H. Jones
Vice President, Technical Compliance

I&E
EXHIBIT 2

FIELD OPERATIONS

DISTRIBUTION DEPARTMENT

INSTRUCTIONS FOR DISTRIBUTION DEPARTMENT DAMAGE PREVENTION INSPECTORS

Effective Date: 8/2/16

Bulletin #313
Supersedes: Document dated 9/1/13

I. Purpose

To provide clear instructions for Distribution Department damage prevention inspectors regarding the various duties of their job.

II. Definitions

AIMS – Advanced Intelligent Mobile Solution: An automated LAN (Local Area Network) to mobile field application designed to generate, dispatch, and document work orders for FSD and Distribution workforce.

Foreign Construction – all construction activities other than PGW

III. Procedure

A. Objectives

The following are the main functions of PGW Damage Prevention Inspectors:

1. To inspect foreign construction activities for the main purpose of protecting PGW underground structures and facilities.

2. To communicate with contractors and builders, and give them proper and accurate information concerning the location of PGW underground structures by properly marking all PGW structures in the vicinity of contractor's work.

3. To respond to all Pennsylvania One Call System (POCS) tickets in their areas through the AIMS application in a timely manner.

4. Keeping PGW supervisors informed of conditions found in the field concerning all known foreign construction activities.

5. To assist and guide PGW watchman on the construction sites.

6. To respond to all reports of third party damages to PGW facilities during business hours, and complete the “Damage Prevention Report” form in AIMS.

7. To perform patrols along the routes of all transmission mains and other critical pipelines in the distribution system. These pipeline patrols must be done on a weekly basis, but not to exceed two weeks. Records of all patrol activities will be noted and recorded in AIMS system.

8. Inspectors must be completely familiar with the Distribution Department detail main maps (DMM), general main maps (GMM), service cards & UFD/AIMS service lists, and AIMS Damage Prevention application and orders.

9. Inspectors must be completely familiar with and advocate the current PA One Call Law "Underground Utility Line Protection Act 287".

B. Equipment

Each Damage Prevention Inspector should have available, at all times, such items as the following:

1. POCS tickets orders (in AIMS)
2. PGW DMM maps (on field laptop)
3. Service lists (through field laptop)
4. Distribution Standards & Foreman's Handbook (on field laptop)
5. Several cans of yellow paint and yellow keel crayon
6. Yellow wire staff marking flags
7. POCS paraphernalia such as flyers, brochures, and the "Pa Act 287"
8. Flashlight
9. 6' rule and measuring wheel
10. Wax sealant and wrap*
11. Line locator (when needed)

*Wax wrap should not be given to any contractor.

C. Prioritization

The inspector will cover a variety of foreign construction jobs and should prioritize the work in his/her area. The following priority list should be used as a guide. The Inspector must use good judgment to plan the workday and accomplish company goals.

1. Visit all Pennsylvania One Call Notice locations on time.

- Dig-up: Immediately
- Emergency: within two (2) hours
- Demolitions: Same day
- Routine: Within two (2) working days of the POCS notification
- Insufficient notice: As soon as possible, maximum within two (2) working days of the POCS notification.

2. Re-visits to on-going jobs with watchman.

3. Re-visits to on-going jobs without watchman, particularly any jobs in which PGW facilities will be undermined, in order to report and/or recommend replacement or protection to the supervisor.

4. Visit any contractor who is suspected not to have called Pennsylvania One Call. The Inspector must provide the contractor with a copy of the current "Pa Act 287" and advocate the use of the 811 system.

5. Visit any underground street trouble encountered and report the same to Distribution Dispatching and supervisor.

6. Perform pipeline patrols along the route of all transmission mains and other high pressure mains that have been identified as critical structures. (See instructions for Natural Gas Patrols for details)

D. General Instructions

1. Plan the work. Call contractors to schedule large quantities of mark outs or to seek clarification. **Do not assume.** Inspectors must be alert and ready to volunteer information concerning PGW structures to all contractors who are excavating whether notice was received or not. The Inspector will educate and advise all excavators of their responsibility under the Pa One Call Act and inform them to call the Pennsylvania One Call System (811).

2. The Inspector should be acquainted with the correct and various methods of shoring and sheathing used by the contractors and whether the shoring is suitable for the protection of PGW underground structures. Be aware of insufficient shoring which could potentially cause damage to PGW

facilities. There are many alarm signals the Inspector should look for on his/her tour of inspection, such as:

- Parting of footway from the curb.
- Parting of footway from the walls of buildings, front steps, or other building appurtenances.
- Splitting or cracked roadways.
- Lack of support for PGW structures

3. These signals should not be ignored. The Inspector should, when such conditions are found, observe the service pipes at the front foundation wall for any pipe movement or disturbance of wall surface around the head of the service. If such conditions are encountered, notify the supervisor immediately. Certain excavations should be carefully inspected after heavy rainfalls, looking for trench erosion and when found should be brought to the attention of the contractor, City Inspector and the PGW supervisor.

4. Shallow PGW structures should be carefully watched. Heavy equipment will not be permitted to traverse over any shallow gas pipes. Special attention should be given to protruding structures such as drip rods and high-head extensions for main and service valves.

5. When the inspector comes across an excavation that is in direct conflict with PGW structure, he/she must notify the contractor as well as the PGW supervisor.

6. Undermined gas mains will be reported immediately to the PGW supervisor. Slope lines shall be carefully watched; 2feet-horizontal for every 1 foot- vertical.

7. Wherever a transmission pipeline or distribution pipeline operating in the 35 psig system or higher and district regulators are involved, an inspector must inform the supervisor immediately, who will then take the appropriate actions.

8. Machine excavation in the area of district regulators is prohibited. The supervisor will be notified immediately of any activity in the area, and outside control should be considered by the pressure supervisor.

FIELD OPERATIONS

DISTRIBUTION DEPARTMENT

INSTRUCTIONS FOR DISTRIBUTION DEPARTMENT DAMAGE PREVENTION INSPECTORS

Effective Date: 8/2/16

Bulletin #313
Supersedes: Document dated 9/1/13

9. **All excavations within the slope line (1foot vertical x 2 feet horizontal) of a transmission pipeline must be monitored by a PGW watchman.**

10. Any trenchless technology operation which may be in proximity to PGW structures requires close attention by the inspector. This must be brought, verbally, to the attention of the supervisor who will then plan a course of action, which should include a watchman or an Inspector's observation. **The use of trenchless technology is prohibited near a transmission pipeline without the approval of the Manager of Distribution or above.**

11. When a hydra-hammer or steel ball is used for breaking paving, consideration will be given to the type of main (steel or cast iron) and depth of same. Any contractor using a Vermeer trenching machine must be strictly enforced to comply with the 18 inch tolerance zone from any PGW structures. Consider requesting a watchman in such situations.

12. When a demolition POCS ticket is covered by the inspector, he/she must issue an order to abandon the gas service(s) when the service to the building is still active. Notification of a distribution supervisor is also recommended. The demolition contractor will be notified and informed to cease the demolition until the service is abandoned.

13. Special attention should be given by the inspector to any encroachment of new buildings and other structures on gas main and service lines. All such encroachments must be immediately reported to the supervisor.

14. When marking gas services, special attention should be given to any offsets (such as 45s and 90s) within the service line. All offsets should be clearly identified and marked by the inspector.

15. Steel mains and services under cathodic protection will require special attention to avoid damage to wires as well as coating. Coating damages on gas mains when found should be measured accurately and a work order issued for immediate repairs.

16. Contractors working in deep yet un-shored excavations should be brought to the attention of the PGW supervisor.

17. When damages to PGW structures are encountered, a PGW Facilities Damage Report will be issued by the Inspector in AIMS, whether or not an OAR is issued. The report will list the date, contractor information, exact location of the damage, type and size of damaged facility, type of equipment used, reason for the damage, and the type of construction in progress. Notify the supervisor for possible OAR. Remember that the supervisor only has the authority to issue or absolve an OAR. The inspector is primarily responsible for an accurate detailed report as to what happened.

18. **Notify the excavator every time there is a note on the Detail Main Map stating that a location of a mapped structure near the scope of the excavation site is unknown. For example: Location of Dead End or location of a main with respect to the curb. Once located, contact planning to have the Detail Main Map revised.**

E. Pipeline Patrol Procedures

When performing a pipeline patrol, the inspector should be looking for any activity or changes in the environment that could affect the safety of the pipeline. An activity or changes found **must** be reported to the Supervisor immediately and documented in the corresponding AIMS order. The Supervisor will then immediately investigate and start remediation procedures if necessary and report his/her findings to the Superintendent of Operations & Maintenance. The following is a sampling of items the inspector should always report or act upon:

- Any excavations (including backfilled openings that are not familiar to the inspectors), grading, demolition, or other construction activity which could result in damage to a pipeline, loss of support due to settlement or shifting of soil around a pipeline, undermining or damage to a pipeline support, or loss of cover or excess fill.

- Atmospheric corrosion or physical deterioration of exposed pipe, pipeline, spans, and structural pipeline supports (such as bridges, pilings, headwalls, casing and foundations).

- Land subsidence, earth slippage, soil erosion, extensive tree root growth, flooding, climatic conditions, soil accumulation and other natural causes that can create additional external loading.

- Damage to pipeline markers, the need to replace them, or add additional pipeline markers. (Look to see that emergency contact information is clear and visible on all markers).

- Changes in population density around pipeline path. Look in particular for new buildings being constructed, daycare centers or schools being opened, and new housing complexes being built.

- Evidence of vandalism or tampering, or damage to the pipelines.

- Encroachment of buildings or other structures on pipeline right-of-ways.

- Any other abnormal or unusual conditions.

IV. Associated Documentation

Relevant Code

Pennsylvania Underground Utility Line Protection Act - ACT287

Associated Documents

Foreman's Handbook Section XII

- DD #312 - Summary of Distribution Department Damage Prevention Program
- Foreign Construction Areas - Natural Gas Main/Route Maps
- Foreign Construction Area Map by Ward Numbers (Ward Map)
- PGW Damage Prevention Program Brochure

Attachments

N/A

V. Handbooks

Foreman's Handbook

VI. Transaction Listing

TR-2013-13

	FIELD OPERATIONS **DISTRIBUTION DEPARTMENT** Effective Date: 8/2/16	INSTRUCTIONS FOR DISTRIBUTION DEPARTMENT DAMAGE PREVENTION INSPECTORS Bulletin #313 Supersedes: Document dated 9/1/13

Prepared by A. Awad

Approved by:

Signature on File
Michael H. Jones
Vice President, Technical Compliance

Signature on File
Raymond J. Welte
Vice President, Field Operations

I&E
EXHIBIT 3

	FIELD OPERATIONS **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

I. Purpose

Dispatching and investigating failures of underground structures such as water and sewer mains that could reduce or eliminate support of PGW pipelines.

II. Definitions

POCS – Pennsylvania One Call System

Underground Street Trouble (UST) – A problem with another utility infrastructure (other than PGW), such as water leaks, bridge abutment washouts and cavities, which could or does affect the support of PGW infrastructure (piping, valves, regulators, telemetry, etc.)

311 – City contact agency

III. General Information

Underground troubles are usually brought to PGW's attention due to a condition observed on the street surface; or as a result of a pre-existing condition encountered in the performance of PGW work but not caused by PGW activity. Some underground troubles are:

- Water Leaks
- Washouts
- Sewer System Failure – Signs of a sewer system failure are as follows: cavity, cave-in, or paving faults such as a surface crack, settlement, or depression in the street or curb area.
- Paving depressions – These may be caused by settlement in "area" fill or settlement caused by poor backfill.

IV. Procedure

A. General Dispatching Procedure

A record of all such troubles whether the result of a telephone message or an observation on the street will be generated in AIMS by the Dispatcher as a Trouble Order for the Underground Street Trouble (UST).

If there is a report of a gas leak at the same location where there is an underground street trouble, the crew or inspector on site will be required to request a Leak Order. The Dispatcher will generate a Leak Order in AIMS. When a combination gas leak and

PGW	**FIELD OPERATIONS** **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

underground street trouble occurs at the same time and location, a comment should be made in the comments tab of the Underground Street order that refer to a leak order being generated.

It is important to emphasize that every complaint of underground street troubles must immediately be brought to the attention of the Dispatcher in the same manner as gas leaks.

The decision to dispatch such trouble orders to an inspector, a crew and/or a supervisor relies on the judgment of the Dispatcher. From the description of the trouble, the general factors that affect his/her decision are:

1. Origin of the Notice

   a) POCS Notice – These notices can be handled by an Inspector during normal working hours. The Dispatcher will generate an Underground Street Trouble order in AIMS. The Inspector will also notify the Dispatcher if the situation warrants an immediate visit of a Distribution crew and/or supervisor. If the Inspector can determine at the time that PGW is not involved due to the distance of our structures from the UST and the containment of the UST problem, the job may be finaled at this point.

   b) Inspector Notice:
   Normal Working Hours - When an inspector is conducting a routine mark out on a designated location (address) and a UST is detected the inspector will generate a UST request order through AIMS and back that request up with a phone call to the Pa One Call clerk. The clerk will issue a UST form #6698 and forward it to the Dispatcher, and also call the proper city agency regarding the UST. The Dispatcher will issue an UST order in AIMS.

   Out of Hours – The inspector will request a UST order through AIMS and back that request up with a phone call to the Dispatcher. The Dispatcher will generate an UST order in AIMS and call the proper city agency regarding the UST.

   c) Direct call from the City, Police, Fire, Water Department, Highway Department, etc.

PGW	**FIELD OPERATIONS** **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

d) PGW employee observation during the course of their work. For example, during a leak survey, leak investigation, main replacement or new business work.

e) Other utility or customer.

2. Investigation of a UST - The magnitude and proximity (to PGW structures) of the underground trouble is important to observe and report.

Look for key indicators:

a) PGW involvement
b) Distance of the problem to PGW structures
c) Undermining
d) Status of the UST repair
e) Leak associated with the problem

Answers to any of the following questions may be important criteria to help the Dispatcher formulate his/her decision to issue further recheck or final of the order.

- In the case of water leaks:
  - Is the volume of water described?
  - Is the paving surface disturbed?
  - Is earth being washed to the surface or through underground ducts in the form of mud?
- In the case of cavity or cave in:
  - Is the depth or size described?
  - Is the affected paving surface area described?
- Have there been numerous complaints of either kind of case in a short period of time?
- What is the distance of PGW company structures related to the underground trouble?
  - Is there an opening so that gas can escape?
  - If a cavity is suspected and there is no surface evidence of water, is there an audible low of water?
  - Are any foregoing descriptions accompanied by statements of poor water pressure?
  - Are there reports that a gas odor is also noticeable or that a gas main or service is visibly affected?

PGW	**FIELD OPERATIONS** **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

In addition to calling 311, it will be our practice to continue to notify other local utilities which may also be affected by the underground street trouble which has been discovered.

B. Dispatching/Auditing Procedure

1. Order Initiation Procedure - POCS Notice

a) Normal Working Hours – POCS notices for UST activities will be dispatched to Foreign Construction Inspectors. The Dispatcher will generate an Underground Street Trouble order in AIMS. They will in turn determine the need to initiate further investigation by a crew and/or Supervisor. In the absence of AIMS the order will be documented on a Form #6698 for the visit. All reports not entered in the field must be entered in the system from the office. Paper documents will be retained in the file system.

b) Out of Hours – Dispatch a crew as soon as possible. If not, hand the notice to the POCS clerk the next day marked "incomplete."

c) All initial UST orders will be generated in AIMS.

d) Any orders which are not initiated by the City must be reported to the proper City agency through 311. If any other utility is also involved the Dispatcher must notify that other agency through POCS. This shall be logged in the appropriate notification log book.

e) The original order shall be sent to the assigned crew for an initial visit report.

f) When the initial visit report is completed by the Foreman in AIMS, the initial visit report shall be audited using the same methods as street leak orders.

g) When an initial visit report is received from a Foreign Construction Inspector the auditor shall proceed to perpetuate the next visit or final the job.

2. Order Perpetuation Procedure

When auditing the initial visit report, note the important information which has been recorded by the Foreman in order to determine the next step to take. Look for key indicators:

PGW	**FIELD OPERATIONS** **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

a) PGW involvement
b) Distance of the problem to PGW structures
c) Undermining
d) Status of the UST repair
e) Leak associated with the problem

The Auditor will choose an appropriate re-inspection date based on the information given. The Auditor will then initiate a follow up UST order in AIMS transferring as much information as necessary.

Any report indicating PGW structures undermined must be referred to the Area Supervisor, as a follow up order. The recheck UST will be viewed and acted on by the Area Supervisor. If the Area Supervisor receives a call to report a UST, they must fill out a report with recommendations and submit the same to the Auditors.

3. "3 Visit" Rule

Any UST history which indicates 3 or more visits without resolution will be reviewed by the Chief Dispatcher. The Chief Dispatcher shall be responsible for the careful resolution of the job. This includes continual notifications to the appropriate City agencies and consultation with the Area Supervisors. The Chief Dispatcher will maintain and submit a weekly log of all UST jobs which are unresolved after 3 visits (until the job is finaled). This report will be given to the Maintenance Supervisor of Distribution and the Superintendent, Maintenance and Operations, Distribution.

C. Final of UST History

Auditor's Finals

1. One Visit Final – In some cases, one initial visit will be sufficient. If the report indicates **PGW not involved** and **UST repairs made**, the Auditor has the authority to final the job.

2. Two Visit Final – If after 2 visits both reports indicate no indication of any visible signs of a problem or activity and company structures are safe, the Auditor has the authority to final the job.

3. Area Supervisor Final – Whenever structures were actually sited as being involved with some type of underground street problem or the auditor feels there is a need to have a

PGW	**FIELD OPERATIONS** **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

final visit by a Supervisor, the auditor will notify the area supervisor. The Supervisor will review the area in question and final the history based on the information on the history and his/her experience.

D. Additional <u>UST Investigation points</u>

There can be no standard procedure that would include all the conditions that may be encountered due to variations of conditions and other factors that in each case require experience and good judgment. It will help to describe in a general way a few variations of conditions and list a few minimum requirements.

- Make a street check (Distribution crew only).
- In every case <u>all</u> manholes must be examined.

In sewer manholes, observe for such conditions as abnormal volumes of water, unusual clarity of water, or water clouded by mud or other earth content, bricks or any unnatural debris.

- Unusual conditions observed in sewers, such as these specifically named above, or the existence of water, either still or running, in other manholes, indicates a suspicious condition that will require a thorough and complete investigation to determine the source of the water leak related to the point it enters the sewer system or the duct line.

- It is important that this point be related to the nearest PGW underground structure. The sound of running or leaking water in a drain vent, at a water stop, at a water service or a fire plug, is an almost infallible lead to important underground trouble.

In the case of a cavity, the street can be sounded by walking the area in question and knocking a spoon bar onto the street surface.

Whenever an underground street trouble is separated by a reasonable distance from gas mains or services, barholes are acceptable to determine the solidity of the foundation under PGW structures.

The Foreman, at his/her discretion, may make an exploratory opening. If a safety hazard exists, a supervisor must be dispatched to the site. Blocking up or securing mains with wooden or steel beams may be necessary. Additional precautionary steps may be taken such as cutting or abandoning mains or stopping the flow of gas through the use of grease or bags and stoppers.

PGW	**FIELD OPERATIONS** **DISTRIBUTION DEPARTMENT** Effective Date: 4/15/11	**PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES** Bulletin #54 Supersedes: Bulletin #54 dated November, 1991

Any water leak where the shut off or reduction of water leakage, by cock or valve operation, will reduce the danger to PGW company structures, PGW should request the Water Department to take such steps.

IV. Associated Documentation

Relevant Code

Protecting Cast Iron Pipelines 192.755
Damage Prevention Program 192.614

Associated Bulletin

Bulletin #276 - Procedure for PA One Call Activities (TR 2010-09)

Attachments

N/A

V. Handbooks

Foreman's Handbook
Dispatcher's Manual
Supervisor's Handbook

VI. Transaction Listing

TR-2010-#03

Prepared by: Steven Lipski 11/30/10

Approved by:

Steven A. Groeber	**Michael Jones**
Director, Field Operations & Work Planning	**Vice President, Technical Compliance**

I&E
EXHIBIT 4

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CDC    00000 POCS MM/DD/YY TT:TT:TT 20193531211-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST=============
Serial Number--[20193531211]-[000] Channel#--[1233AWEB][0080][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[S 8TH ST]
     Nearest Intersection--[REED ST]
     Second Intersection--[DICKINSON ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.931563/-75.157852,39.930528/-75.158103,39.931539/-75.157820]
     Attachments--[http://www.pa811.org/attachments/20193531211]
Type of Work--[REPAIR GAS LEAK]                                  Depth--[]
Extent of Excavation--[]              Method of Excavation--[DIGGING]
Equip Type--[]
Street--[X] Sidewalk--[X] Pub Prop--[ ] Pvt Prop--[ ] Other--[]
Private Front--[ ] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[19-Dec-19]
      Scheduled Excavation Date--[19-Dec-19] Dig Time--[1245] Duration--[]

Caller--[PAT BRAHL]
Caller Phone--[215-684-6395]
Excavator--[PHILADELPHIA GAS WORKS]
Address--[1800 N 9TH ST]
City--[PHILADELPHIA]                              State--[PA] Zip--[19122]
FAX--[]                          Caller Type--[B]
Email--[PATRICIA.BRAHL@PGWORKS.COM]
Work For--[PHILADELPHIA GAS WORKS]
Onsite Contact--[JIM PAUL]
Onsite Contact Phone--[267-249-7268]
Best Time to Call--[0700-1530]
Onsite Contact Email--[PATRICIA.BRAHL@PGWORKS.COM]

Prepared--[19-Dec-19] at [1234] by [PATBRAHL]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20193531211]-[000]
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```

RESPONSES for S/N 20193531211:

Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	12/19/2019 12:56:27	UQ-WEBSVC
0	KA	PECO ENERGY	5-NOT MARKED. NO	12/19/2019 13:42:40	CLS-WEBSVC
0	PD	PHILADELPHIA CITY WATER D	6-SCHEDULED MARK	12/19/2019 13:12:04	RK-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	12/19/2019 12:50:57	AW-WEB
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	12/19/2019 12:42:46	SYS-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	12/20/2019 08:17:50	AAA-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	9-NO RESPONSE**	12/19/2019 14:41:04	-KARL

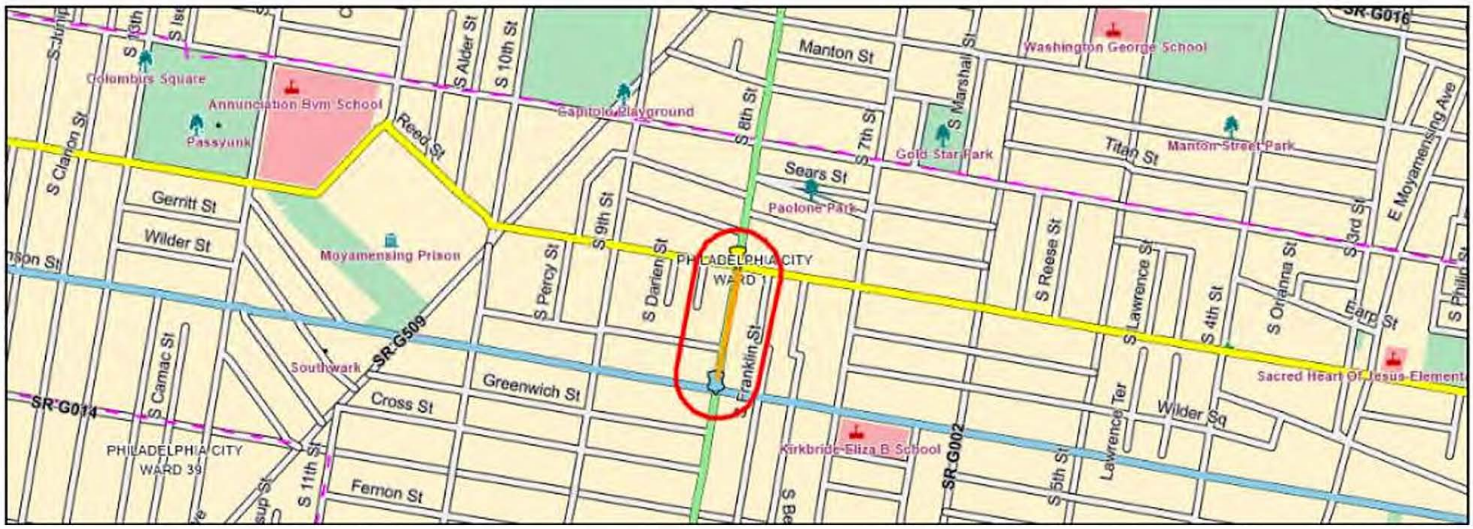
DELIVERIES for S/N 20193531211:

Ver	CDC	Name	To	Time	Seq	Type
0	CQ	COMCAST CABLE	CQ	12/19/2019 12:35:02	74	MAIL
0	KA	PECO ENERGY	KA	12/19/2019 12:35:04	71	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	12/19/2019 12:35:06	154	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	12/19/2019 12:35:08	168	MAIL
0	YA	VERIZON PENNSYLVANIA LLC	YA	12/19/2019 12:35:09	178	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	12/19/2019 12:36:16	160	FM1

NOTIFICATIONS for S/N 20193531211:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0

Map Graphic for S/N 20193531211:



```
CDC    00000 POCS MM/DD/YY TT:TT:TT 20192960460-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192960460]-[000] Channel#--[0815A021][0260][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1431 S 8TH ST]
     Nearest Intersection--[DICKINSON ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.931532/-75.157482,39.930378/-75.157740,39.930454/-75.158477,
      39.931655/-75.158148]
     Attachments--[http://www.pa811.org/attachments/20192960460]
Type of Work--[REPL 5IN SWR LATERAL]                          Depth--[7FT]
Extent of Excavation--[3FT X 4FT]       Method of Excavation--[DIGGING]
Equip Type--[BH]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[24-Oct-19]
    Scheduled Excavation Date--[25-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[BART EMANUEL]
Caller Phone--[215-467-5282]
Excavator--[BART EMANUEL PLUMBING]
Address--[2819 S SMEDLEY ST]
City--[PHILADELPHIA]                              State--[PA] Zip--[19145]
FAX--[]                          Caller Type--[B]
Work For--[BART EMANUEL PLUMBING]
Onsite Contact--[BART EMANUEL]
Onsite Contact Phone--[215-783-2780]
Best Time to Call--[ANYTIME]

Prepared--[23-Oct-19] at [0820] by [VALERIE HENZE]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192960460]-[000]
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```

RESPONSES for S/N 20192960460:

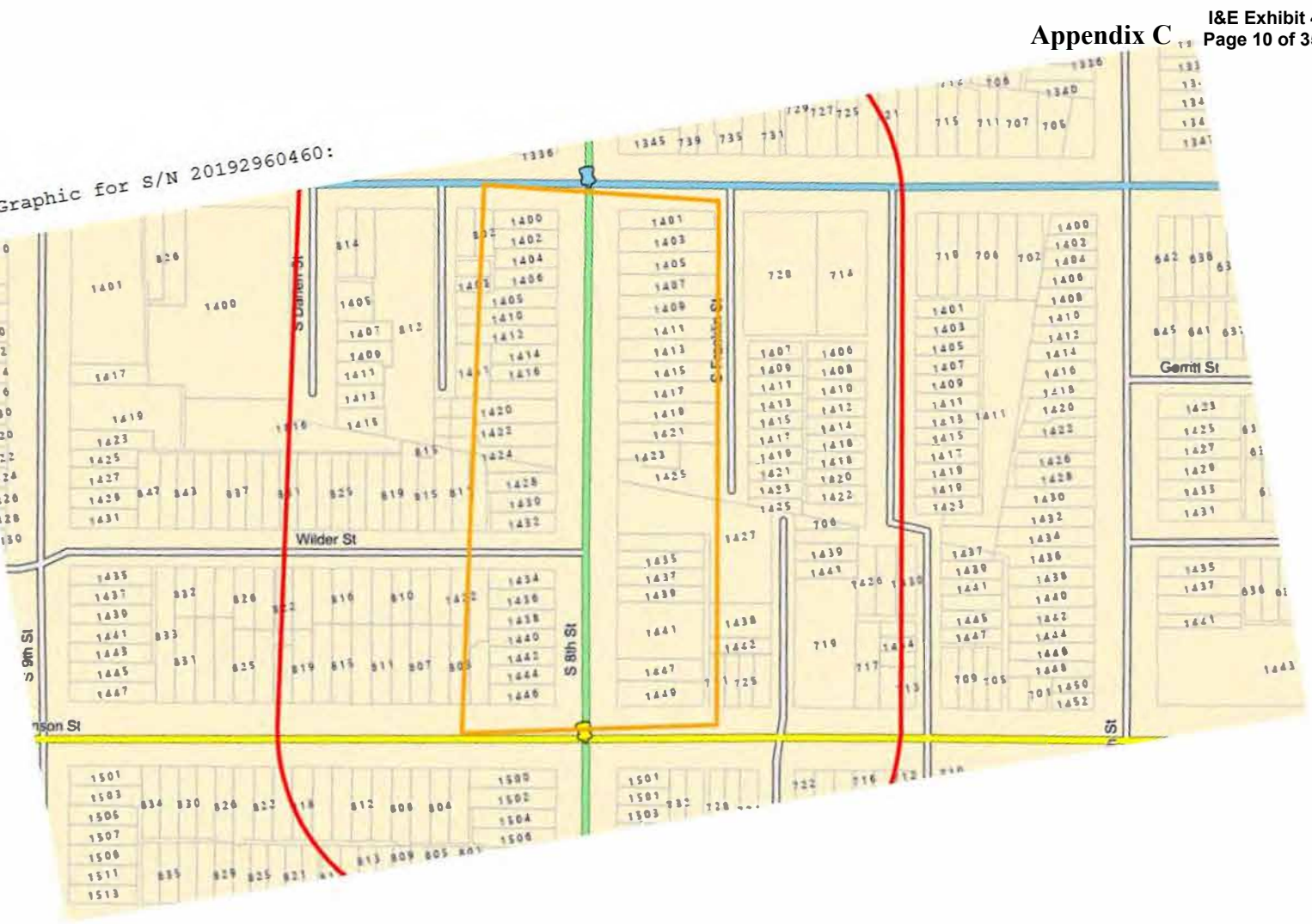
Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	10/23/2019 08:40:34	UQ-WEBSVC
0	KA	PECO ENERGY	1-CLEAR NO FACIL	10/23/2019 10:26:48	CLS-WEBSVC
0	PD	PHILADELPHIA CITY WATER D	6-SCHEDULED MARK	10/23/2019 10:23:54	RK-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	10/23/2019 08:28:24	KR-WEB
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	10/24/2019 11:49:38	RGr-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	10/23/2019 09:59:42	AAA-WEBSVC

DELIVERIES for S/N 20192960460:

Ver	CDC	Name	To	Time	Seq	Type
0	YA	VERIZON PENNSYLVANIA LLC	YA	10/23/2019 08:20:21	59	MAIL
0	CQ	COMCAST CABLE	CQ	10/23/2019 08:20:22	21	MAIL
0	KA	PECO ENERGY	KA	10/23/2019 08:20:22	21	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	10/23/2019 08:20:25	44	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	10/23/2019 08:20:36	51	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	10/23/2019 08:21:41	45	FM1

NOTIFICATIONS for S/N 20192960460:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0


Graphic for S/N 20192960460:
Wilder St
S 8th St
S Eaglet St
S Daniel St
Gerritt St
S 9th St

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CDC    00000 POCS MM/DD/YY TT:TT:TT 20192940516-000 NEW  XCAV EMER

==========PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST===========
Serial Number--[20192940516]-[000] Channel#--[0816A025][0217][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     [WORKING AT 1428 AND 1430 S 8TH ST.]
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930984/-75.157990,39.931022/-75.158283,39.930931/-75.158301,
      39.930894/-75.158011]
     Attachments--[http://www.pa811.org/attachments/20192940516]
Type of Work--[REPLACING A 5IN LATERAL]                        Depth--[7FT]
Extent of Excavation--[3FT X 4FT]       Method of Excavation--[DIGGING]
Equip Type--[BH]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[21-Oct-19]
    Scheduled Excavation Date--[22-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[BART EMANUEL]
Caller Phone--[215-467-5282]
Excavator--[BART EMANUEL PLUMBING]
Address--[2819 S SMEDLEY ST]
City--[PHILADELPHIA]                              State--[PA] Zip--[19145]
FAX--[]                          Caller Type--[B]
Work For--[BART EMANUEL PLUMBING]
Onsite Contact--[BART EMANUEL]
Onsite Contact Phone--[215-783-2780]
Best Time to Call--[ANYTIME]

Prepared--[21-Oct-19] at [0820] by [MYRA BOOK]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192940516]-[000]
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RESPONSES for S/N 20192940516:

Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	10/21/2019 08:55:46	UQ-WEBSVC
0	KA	PECO ENERGY	3-FIELD MARKED	10/21/2019 11:12:29	CLS-WEBSVC
0	PD	PHILADELPHIA CITY WATER D	6-SCHEDULED MARK	10/21/2019 11:52:10	RK-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	10/21/2019 08:37:09	TC-WEB
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	10/21/2019 11:43:17	MKi-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	10/21/2019 08:23:21	PRA-WEBSVC

DELIVERIES for S/N 20192940516:

Ver	CDC	Name	To	Time	Seq	Type
0	CQ	COMCAST CABLE	CQ	10/21/2019 08:20:08	27	MAIL
0	KA	PECO ENERGY	KA	10/21/2019 08:20:09	28	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	10/21/2019 08:20:10	54	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	10/21/2019 08:20:10	56	MAIL
0	YA	VERIZON PENNSYLVANIA LLC	YA	10/21/2019 08:20:11	64	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	10/21/2019 08:20:54	53	FM1

NOTIFICATIONS for S/N 20192940516:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0


Graphic for S/N 20192940516:
1417
1419
1420
1422
1420
1421
813
815
1424
1423
1426
1423
1425
1428
815
813
811
809
PHILADELPHIA CITY
WARD 1
1430
1427
1432
1433
Wilder St
S 6th St
1435
1437
1434
808
802
1436
806
1422

```
CDC    00000 POCS MM/DD/YY TT:TT:TT 20192901689-000 NEW  XCAV RTN

==========PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST===========
Serial Number--[20192901689]-[000] Channel#--[1108A013][0178][2019-08]
Message Type--[NEW][EXCAVATION][ROUTINE]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1430 S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930903/-75.158090,39.930927/-75.158288,39.930975/-75.158277,
      39.930952/-75.158088]
     Attachments--[http://www.pa811.org/attachments/20192901689]
Type of Work--[REPLACE CURB TRAP LATERAL]                    Depth--[]
Extent of Excavation--[]              Method of Excavation--[DIGGING]
Equip Type--[BH AND JACKHAMMER]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[22-Oct-19] thru [31-Oct-19] Response Due Date--[21-Oct-19]
    Scheduled Excavation Date--[22-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[CHRISTINE LONG]
Caller Phone--[215-742-3813]
Excavator--[MISTER DS PLUMBING]
Address--[6001 RISING SUN AVE]
City--[PHILADELPHIA]                          State--[PA] Zip--[19111]
FAX--[215-725-7218]             Caller Type--[B]
Work For--[THE HELP PROGRAM]
Onsite Contact--[DIANE DIXON]
Onsite Contact Phone--[215-742-3813]
Best Time to Call--[0800-1600]

Prepared--[17-Oct-19] at [1111] by [STACY BOOKER]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192901689]-[000]
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RESPONSES for S/N 20192901689:

Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	10/17/2019 14:00:45	UQ-WEBSVC
0	KA	PECO ENERGY	3-FIELD MARKED	10/21/2019 16:19:01	CLS-WEBSVC
0	PD	PHILADELPHIA CITY WATER D	6-SCHEDULED MARK	10/18/2019 11:28:02	RK-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	10/17/2019 14:23:16	TC-WEB
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	10/22/2019 11:40:21	MKi-WEBSVC
0	PZ	PHILADELPHIA GAS WORKS	9-NO RESPONSE**	10/22/2019 00:18:21	-KARL
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	10/17/2019 11:18:22	PRA-WEBSVC

DELIVERIES for S/N 20192901689:

Ver	CDC	Name	To	Time	Seq	Type
0	CQ	COMCAST CABLE	CQ	10/17/2019 11:12:00	104	MAIL
0	KA	PECO ENERGY	KA	10/17/2019 11:12:01	103	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	10/17/2019 11:12:04	192	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	10/17/2019 11:12:05	203	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	10/17/2019 11:13:45	199	FM1
0	YA	VERIZON PENNSYLVANIA LLC	YA	10/17/2019 11:14:12	223	MAIL

NOTIFICATIONS for S/N 20192901689:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0


Graphic for S/N 20192901689:
S Mildred
Wilder St
S 8th St
PHILADELPHIA CITY
WARD 1
S Franklin St
S Beulah St

```
CDC    00000 POCS MM/DD/YY TT:TT:TT 20192803422-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192803422]-[000] Channel#--[1536A013][0208][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1433 S 8TH ST]
     Nearest Intersection--[DICKINSON ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[Y]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930842/-75.157928,39.930798/-75.157935,39.930801/-75.158012,
      39.930849/-75.158003]
     Attachments--[http://www.pa811.org/attachments/20192803422]
Type of Work--[REPAIR SEWER LINE]                              Depth--[6FT]
Extent of Excavation--[2 AT 3FT X 6FT]  Method of Excavation--[DIGGING]
Equip Type--[BH AND HAND TOOLS]
Street--[X] Sidewalk--[X] Pub Prop--[ ] Pvt Prop--[ ] Other--[]
Private Front--[ ] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[07-Oct-19]
    Scheduled Excavation Date--[08-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[RICH LEPORE]
Caller Phone--[215-778-6909]
Excavator--[LEPORE PLUMBING]
Address--[44 STRATTON LN]
City--[SEWELL]                                  State--[NJ] Zip--[08080]
FAX--[856-232-0827]              Caller Type--[B]
Email--[leporeplumbing@gmail.com]
Work For--[JOE SMARK]
Onsite Contact--[RICH LEPORE]
Onsite Contact Phone--[215-778-6909]
Best Time to Call--[ANYTIME]
Onsite Contact Email--[leporeplumbing@gmail.com]

Prepared--[07-Oct-19] at [1540] by [STACY BOOKER]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192803422]-[000]
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```

RESPONSES for S/N 20192803422:

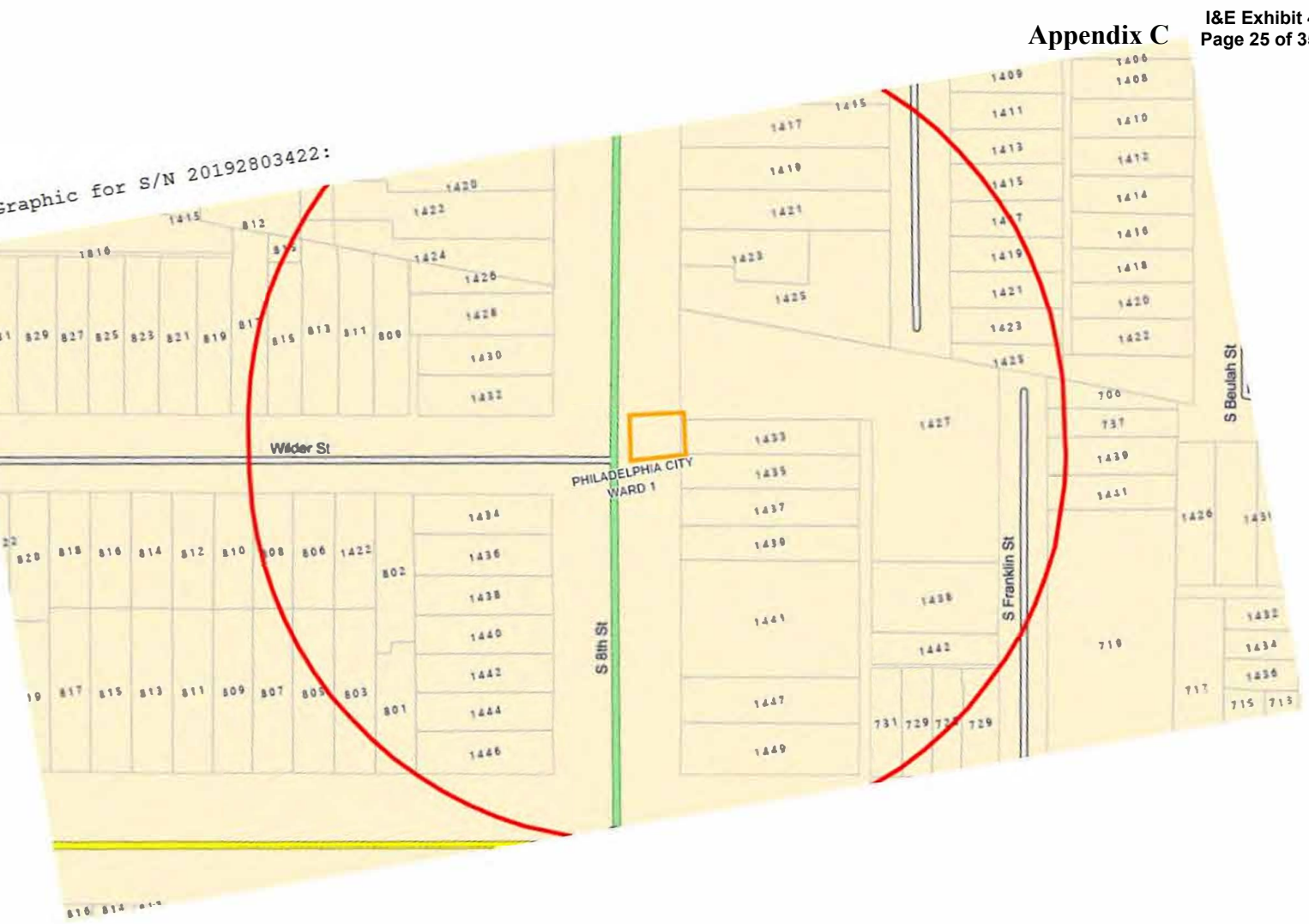
Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	10/07/2019 16:40:58	UQ-WEBSVC
0	KA	PECO ENERGY	1-CLEAR NO FACIL	10/07/2019 18:24:57	CLS-WEBSVC
0	PD	PHILADELPHIA CITY WATER D	6-SCHEDULED MARK	10/07/2019 17:04:40	RK-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	10/08/2019 08:13:52	KR-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	9-NO RESPONSE**	10/08/2019 00:38:17	-KARL
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	10/07/2019 21:46:46	SPe-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	10/08/2019 08:09:14	AAA-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	9-NO RESPONSE**	10/08/2019 00:38:17	-KARL

DELIVERIES for S/N 20192803422:

Ver	CDC	Name	To	Time	Seq	Type
0	CQ	COMCAST CABLE	CQ	10/07/2019 15:40:16	142	MAIL
0	KA	PECO ENERGY	KA	10/07/2019 15:40:17	110	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	10/07/2019 15:40:19	280	MAIL
0	YA	VERIZON PENNSYLVANIA LLC	YA	10/07/2019 15:40:19	323	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	10/07/2019 15:40:20	300	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	10/07/2019 15:41:14	287	FM1

NOTIFICATIONS for S/N 20192803422:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0


Graphic for S/N 20192803422:
Wilder St
PHILADELPHIA CITY
WARD 1
S 8th St
S Franklin St
S Beulah St

```
CDC    00000 POCS MM/DD/YY TT:TT:TT 20192752094-000 NEW  XCAV EMER

==========PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST===========
Serial Number--[20192752094]-[000] Channel#--[1202A022][0209][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1427-1431 S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930975/-75.157999,39.930829/-75.158030,39.930828/-75.158011,
      39.930973/-75.157976]
     Attachments--[http://www.pa811.org/attachments/20192752094]
Type of Work--[LOCATE AND REPAIR WATER LEAK]                 Depth--[]
Extent of Excavation--[]              Method of Excavation--[DIGGING]
Equip Type--[]
Street--[X] Sidewalk--[X] Pub Prop--[ ] Pvt Prop--[ ] Other--[]
Private Front--[ ] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[02-Oct-19]
      Scheduled Excavation Date--[02-Oct-19] Dig Time--[1215] Duration--[]

Caller--[ADRIENNE HARRIS]
Caller Phone--[215-685-9638]
Excavator--[PHILADELPHIA CITY WATER]
Address--[N 28TH ST AND W CAMBRIA ST]
City--[PHILADELPHIA]                              State--[PA] Zip--[19132]
FAX--[215-226-2409]              Caller Type--[B]
Work For--[PHILADELPHIA CITY WATER]
Onsite Contact--[EMERGENCY]
Onsite Contact Phone--[215-685-9638]
Best Time to Call--[ANYTIME]
Job Number--[2391952]

Prepared--[02-Oct-19] at [1205] by [DARLENE SPANO]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192752094]-[000]
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```

RESPONSES for S/N 20192752094:

Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	10/02/2019 12:45:57	UQ-WEBSVC
0	KA	PECO ENERGY	1-CLEAR NO FACIL	10/02/2019 16:27:03	CLS-WEBSVC
0	KA	PECO ENERGY	9-NO RESPONSE**	10/02/2019 14:11:21	-KARL
0	PD	PHILADELPHIA CITY WATER D	2-CONFLICT. DCTF	10/02/2019 17:25:50	JS-WEB
0	PD	PHILADELPHIA CITY WATER D	9-NO RESPONSE**	10/02/2019 14:11:21	-KARL
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	10/02/2019 14:50:41	TC-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	9-NO RESPONSE**	10/02/2019 14:11:21	-KARL
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	10/02/2019 19:50:24	SPe-WEBSVC
0	PZ	PHILADELPHIA GAS WORKS	9-NO RESPONSE**	10/02/2019 14:11:21	-KARL
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	10/02/2019 12:10:55	PRA-WEBSVC

DELIVERIES for S/N 20192752094:

Ver	CDC	Name	To	Time	Seq	Type
0	CQ	COMCAST CABLE	CQ	10/02/2019 12:05:42	79	MAIL
0	KA	PECO ENERGY	KA	10/02/2019 12:05:43	71	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	10/02/2019 12:05:45	152	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	10/02/2019 12:05:47	169	MAIL
0	YA	VERIZON PENNSYLVANIA LLC	YA	10/02/2019 12:06:08	218	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	10/02/2019 12:06:34	155	FM1

NOTIFICATIONS for S/N 20192752094:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0

Graphic for S/N 20192752094:



```
CDC    00000 POCS MM/DD/YY TT:TT:TT 20192562899-000 NEW  XCAV RTN

=========PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192562899]-[000] Channel#--[1512A022][0113][2019-08]
Message Type--[NEW][EXCAVATION][ROUTINE]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1421 S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     [WORKING BY THE FRESH AIR INLET]
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.931080/-75.157871,39.931041/-75.157876,39.931000/-75.157605,
      39.931033/-75.157605]
     Attachments--[http://www.pa811.org/attachments/20192562899]
Type of Work--[REPL STREET SIDE WTR SVC]                    Depth--[10FT]
Extent of Excavation--[]              Method of Excavation--[DIGGING]
Equip Type--[BH AND SHOVEL]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[23-Sep-19] thru [27-Sep-19] Response Due Date--[22-Sep-19]
    Scheduled Excavation Date--[23-Sep-19] Dig Time--[0700] Duration--[1 DAY]

Caller--[KELLY MINNICH]
Caller Phone--[215-728-1482]
Excavator--[BILL FRUSCO PLUMBING AND HEATING]
Address--[8675 TORRESDALE AVE]
City--[PHILADELPHIA]                          State--[PA] Zip--[19136]
FAX--[215-742-7098]            Caller Type--[B]
Email--[fruscoplumbing@comcast.net]
Work For--[SABASTIAN PUPILLO]
Onsite Contact--[BILL FRUSCO]
Onsite Contact Phone--[215-728-1482]
Best Time to Call--[ANYTIME]
Onsite Contact Email--[fruscoplumbing@comcast.net]

Prepared--[13-Sep-19] at [1513] by [DARLENE SPANO]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192562899]-[000]
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```

RESPONSES for S/N 20192562899:

Ver	CDC	Name	Response	Time	Respondent
0	CQ	COMCAST CABLE	1-CLEAR NO FACIL	09/14/2019 11:40:27	UQ-WEBSVC
0	KA	PECO ENERGY	1-CLEAR NO FACIL	09/20/2019 11:43:17	CLS-WEBSVC
0	PD	PHILADELPHIA CITY WATER D	6-SCHEDULED MARK	09/18/2019 12:20:31	RK-WEB
0	PSD	PHILADELPHIA CITY DEPARTM	1-CLEAR NO FACIL	09/16/2019 07:20:13	TC-WEB
0	PZ	PHILADELPHIA GAS WORKS	3-FIELD MARKED	09/20/2019 13:10:06	FMc-WEBSVC
0	YA	VERIZON PENNSYLVANIA LLC	1-CLEAR NO FACIL	09/20/2019 13:47:10	AAA-WEBSVC

DELIVERIES for S/N 20192562899:

Ver	CDC	Name	To	Time	Seq	Type
0	YA	VERIZON PENNSYLVANIA LLC	YA	09/13/2019 15:14:02	295	MAIL
0	CQ	COMCAST CABLE	CQ	09/13/2019 15:14:03	155	MAIL
0	KA	PECO ENERGY	KA	09/13/2019 15:14:04	168	MAIL
0	PSD	PHILADELPHIA CITY DEPARTMENT	PSD	09/13/2019 15:14:05	261	MAIL
0	PZ	PHILADELPHIA GAS WORKS	PZ	09/13/2019 15:14:06	266	MAIL
0	PD	PHILADELPHIA CITY WATER DEPAR	PD	09/13/2019 15:18:10	267	FM1

NOTIFICATIONS for S/N 20192562899:

Ver	CDC	To	Dlvr	Show	Place+	Rule+	Renot+	InAct-	Map-	Rule-	OOG-	Renot-	Forced+
0	ATM		0	0	1	0	0	0	1	0	0	0	0
0	CQ	CQ	1	1	1	0	0	0	0	0	0	0	0
0	ITM		0	0	1	0	0	0	1	0	0	0	0
0	KA	KA	1	1	1	0	0	0	0	0	0	0	0
0	PD	PD	1	1	1	0	0	0	0	0	0	0	0
0	PLL		0	0	1	0	0	0	1	0	0	0	0
0	PSD	PSD	1	1	1	0	0	0	0	0	0	0	0
0	PZ	PZ	1	1	1	0	0	0	0	0	0	0	0
0	RU		0	0	1	0	0	0	1	0	0	0	0
0	SEP		0	0	1	0	0	0	1	0	0	0	0
0	YA	YA	1	1	1	0	0	0	0	0	0	0	0

Graphic for S/N 20192562899:



I&E
EXHIBIT 5


WILDER STREET
ONE WAY
NO PARKING
ANY TIME
AHEAD
Cuernavaca
PRODUCTOS MEXICANOS
HZN-2808

I&E
EXHIBIT 6



I&E
EXHIBIT 7


PC 400 LC
452
KOMATSU
TRI
(215) 2

I&E
EXHIBIT 8


ONE WAY
JPC GROUP, INC.
KOMATSU

I&E
EXHIBIT 9


WILDER ST
ONE WAY
8TH ST
ONE WAY
AHEAD
Cuernavaca
Grocery
PRODUCTOS MEXICANOS
WE ACCEPT FOOD STAMP
TARJETAS TELEFONICAS
ENVIOS DE DINERO
CARNES FRESCAS
LACTEOS,QUESOS Y MAS...
STOP
GEHL

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

REBUTTAL TESTIMONY OF

JOSEPH HAWKINSON

ON BEHALF OF
PHILADELPHIA GAS WORKS

Docket No. C-2022-3033834

Formal Complaint of Bureau of
Investigation and Enforcement

TOPICS:

Responding to the Direct Testimony of
BI&E Witnesses Bozhko and Whiteash

March 10, 2023

TABLE OF CONTENTS

I. INTRODUCTION 1
II. PGW BACKGROUND AND DISCUSSION OF CAST IRON MAIN REPLACEMENT PROGRAMS. 3
III. PUBLIC OUTREACH 11
IV. STREET TROUBLE IDENTIFICATION AND REMEDIATION 12
V. INCIDENT OF DECEMBER 19, 2019 13
VI. SPECIFIC REBUTTAL TO BI&E TESTIMONY 16
VII. CONCLUSION 39

TABLE OF EXHIBITS

Exhibit JH-1	BI&E's responses to PGW Interrogatories Sets I - V
Exhibit JH-2	Chronology of Events, 1400 S 8th Street
[redacted]	[redacted]
Exhibit JH-4	City of Philadelphia, Streets Department 1400 S. 8th St. Service Requests
Exhibit JH-5	FCNA Partners Report, dated February 4, 2021

[redacted]

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND POSITION WITH THE COMPANY.

A. My name is Joseph Hawkinson. I am the Vice President, Field Operations for Philadelphia Gas Works ("PGW").

Q. HOW LONG HAVE YOU HELD THIS POSITION?

A. Five years since January of 2018.

Q. AS IT PERTAINS TO GAS SAFETY, WHAT ARE YOUR JOB RESPONSIBILITIES?

A. In my present position, I am responsible for the Distribution and Field Service Departments.

Q. PLEASE SUMMARIZE YOUR BACKGROUND AND EXPERIENCE.

A. I have been employed with PGW for 19 years since February 17th, 2004. I have been Vice President of Field Operations since 2018. Prior to that I was Director of Engineering Design, Construction, & Planning from 2017 to 2018. I held the position of Director of Field Services & Maintenance from 2014 to 2017. I held the position of Superintendent of Construction from 2011 to 2014. Prior to 2011 I held various positions as an Engineer in the Field Operations department. I received my Bachelor of Science degree in Mechanical Engineering from Pennsylvania State University in 2002.

Q. HAVE YOU PREVIOUSLY PROVIDED TESTIMONY BEFORE THIS COMMISSION?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY IN THIS PROCEEDING?

A. My testimony will discuss the numerous efforts PGW makes to provide safe and reliable service and the timeline of events that happened on 1400 S. 8th St. I will also respond to the testimony of the Bureau of Investigation and Enforcement ("BI&E") witnesses.

Q. PLEASE IDENTIFY THE EXHIBITS THAT ACCOMPANY YOUR REBUTTAL TESTIMONY.

A. The exhibits that accompany my rebuttal testimony are:

Exhibit JH-1	BI&E's responses to PGW Interrogatories Sets I - V
Exhibit JH-2	Chronology of Events, 1400 S 8th Street
[redacted]	[redacted]
Exhibit JH-4	City of Philadelphia, Streets Department 1400 S. 8th St. Service Requests
Exhibit JH-5	FCNA Partners Report, dated February 4, 2021

Q. WERE THOSE EXHIBITS PREPARED BY YOU OR UNDER YOUR DIRECTION AND SUPERVISION?

A. Yes.

Q. PLEASE DESCRIBE EXHIBIT JH-1?

A. **Exhibit JH-1** is a copy of all BI&E's Responses to PGW's Interrogatories Sets I through V that are referred to in the various PGW witnesses' testimony. I have included these

[redacted]

documents as a single exhibit for ease of reference since the responses are used throughout PGW's various rebuttal testimony statements.

II. PGW BACKGROUND AND DISCUSSION OF CAST IRON MAIN REPLACEMENT PROGRAMS.

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF PGW'S GAS DISTRIBUTION SYSTEM.

A. PGW's gas distribution system serves approximately 518,000 customers in the County and City of Philadelphia, employing approximately 3,046 miles of natural gas mains ("Mains") and some 476,600 service lines ("Services").[3] At the end of calendar year 2021, PGW's mains were comprised of approximately 41% cast iron, 40% plastic and protected coated steel, and 19% unprotected coated steel and ductile iron. The Company's Services are made up of 82% plastic and protected coated steel, 14% bare steel and 4% unprotected coated steel.

Q. CAN YOU DESCRIBE PGW'S EFFORTS TO REDUCE THE AMOUNT OF CAST IRON MAINS IN ITS DISTRIBUTION SYSTEM?

A. In the last ten plus years, PGW has made tremendous strides in reducing the amount of cast iron main in its system and replacing these mains with modern materials such as protected steel and plastic. In 2010, PGW was annually replacing only approximately 18 miles of "at risk" pipe, mostly cast iron main. Currently, PGW is replacing cast iron mains at a rate of over 30 miles per year. In each long-term infrastructure improvement plan ("LTIIP") filing with the Commission, PGW has consistently reduced the projected date of complete cast iron main replacement. The current projected completion of replacing all cast iron main inventory is 37.8 years.

[3] PGW owns and operates all of the service lines from the mains to the inlet side of the meters. There are no customer-owned service lines in the PGW service territory.

Q. WHAT ARE THE IMPEDIMENTS TO MORE RAPID REPLACEMENT OF CAST IRON MAINS?

A. Financial limitations are the primary impediment to more rapid replacement of cast iron mains. PGW finances replacement in three ways: 1) Funds made available from its current base rates as internally generated funds; 2) Debt financing; and 3) PGW's distribution system improvement charges ("DSIC"), currently set at 7.5% of PGW's distribution revenues.

This funding combination has allowed PGW to successfully complete its first Long Term Infrastructure Improvement Plan ("LTIIP") in FY 2017, removing approximately 3% more cast iron main than originally planned. PGW's second LTIIP, ending with FY 2022, also had strong results. While PGW's replacements were impacted during FY 2020 as a direct result of the COVID-19 Pandemic, PGW made up the FY 2020 shortfall in FY 2021 and exceeded its second LTIIP replacement goals from FY 2018 - 2022, replacing 164.7 miles, or 4% more cast iron main replaced than planned. PGW's third LTIIP was approved by the Commission in 2022 and will account for another 155.04 miles of cast iron main replacement. PGW's third LTIIP continues the acceleration of its cast iron main replacement program and reflects the current DSIC cap of 7.5%, is currently $38.6 million annually.

Q. WHY IS PGW FOCUSED ON CAST IRON MAIN REPLACEMENT?

A. Cast iron becomes brittle (a process known as graphitization) over time and is susceptible to breaking. PGW concentrates on cast iron main replacement because the amount of cast iron main replacement is positively correlated with the following:

1. The reduction of leaks and the associated risk of serious incidents from those leaks;
2. The reduction of breakage repairs and future breakage repair costs;

3. A reduction in leak maintenance and repair on the facilities being removed from service; and

4. An improvement in pressure, and lower levels of unaccounted-for gas, which should produce greater rate stability for PGW's customers and result in more adequate, efficient, safe, reliable and reasonable natural gas distribution service.

PGW has a large amount of installed cast iron main compared to other natural gas distribution companies, and much of it is of relatively older vintage.

Q. IS THE PRESENCE OF CAST IRON SOMETHING NEW THAT THE COMMISSION AND BI&E WERE NOT PREVIOUSLY AWARE OF?

A. No, of course not. The presence of cast iron in PGW's distribution system is well known to the Commission and BI&E. The Commission and BI&E have worked intensely with PGW to reduce the amount of cast iron in our distribution system.

The Commission and PGW have a long history of shared concern with the aging status of PGW's pipeline and has worked with the Company to create workable solutions. PGW's first DSIC filing to accelerate investment was made in 2013, which the Commission approved in 2014.

Then, in 2015, a multi-Bureau Commission Staff task force, which included BI&E, was formed that produced in an extensive report discussing ways to accelerate PGW's "at-risk" pipeline replacement, explaining that: "Despite the fact that PGW accelerated its replacement efforts in 2014, Staff believes this replacement rate is not aggressive enough, given the risk this pipe poses to PGW's system and its customers."[4] The Staff Report noted that PGW's then-current cast iron main replacement program would not be completed for eighty years.

[4] Pennsylvania Public Utility Commission Staff Report: Inquiry into Philadelphia Gas Works' Pipeline Replacement Program, April 21, 2015 at 4 ("2015 Staff Report"). https://www.puc.pa.gov/press-release/2015/puc-publishes-staff-report-on-pgw-pipeline-replacement-program.

The 2015 Staff Report identified the same risks of cast iron pipe that I have explained above:

> Although pre-1971 unprotected steel pipe mains and services are at risk, cast iron is more risky. Cast iron has low beam strength and is subject to graphitization, which makes it more brittle and susceptible to complete and partial main breaks with large volumes of gas exiting the main, with little to no warning.[5]

Responding, PGW filed to further accelerate its pipeline replacement program timeline from eighty-six years to forty-eight years.[6] Upon PGW's petition, the PUC agreed to increase the DSIC to 7.5% resulting in an additional $11 million annually for main replacement at the time.[7] Accordingly, it is fair to say that PGW's present cast iron main replacement effort have been fully endorsed by and is in partnership with the Commission.

Q. HOW DOES PGW DETERMINE WHICH CAST IRON MAINS TO REPLACE?

A. PGW has developed a prioritization process that incorporates a risk ranking strategy in its Distribution Integrity Management Program ("DIMP"), consistent with the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration's ("PHMSA") standards. The DIMP establishes relative risk rankings and an updated benchmarking / prioritization study to identify the poorest performing main segments, so that these mains can be targeted to be replaced at the earliest feasible times. BI&E has reviewed PGW's DIMP every year since 2018.

---

5 2015 Staff Report at 15.

6 *Petition of Philadelphia Gas Works for Waiver of Provisions of Act 11 to Increase the Distribution System Improvement Charge CAP and to Permit Levelization of DSIC Charges*, P-2015-2501500, Opinion and Order entered January 28, 2016.

7 *Petition of Philadelphia Gas Works for Waiver of Provisions of Act 11 to Increase the Distribution System Improvement Charge CAP and to Permit Levelization of DSIC Charges; Office of Consumer Advocate v. Philadelphia Gas Works*, Docket Nos. P-2015-2501500 and C-2015-2504092 (Order entered January 28, 2016).

PGW's sophisticated predictive model, the Main Replacement Prioritization Model, is used to identity which "at risk" mains to replace to maximize safety. The process is consistent with federal regulations and has been reviewed by BI&E.

Q. IS THERE ANY EVIDENCE THAT THE ACCELERATED PIPELINE REPLACEMENT PROGRAM HAS IMPROVED SAFETY?

A. Yes, PGW continues to make significant strides towards reducing the number of hazardous leaks encountered on the distribution system both in its distribution mains and service lines (connecting from the street to the customer's home/business). The graph below depicts hazardous leaks repaired on distribution mains from FY 2014 through FY 2022, showing a downward trend.

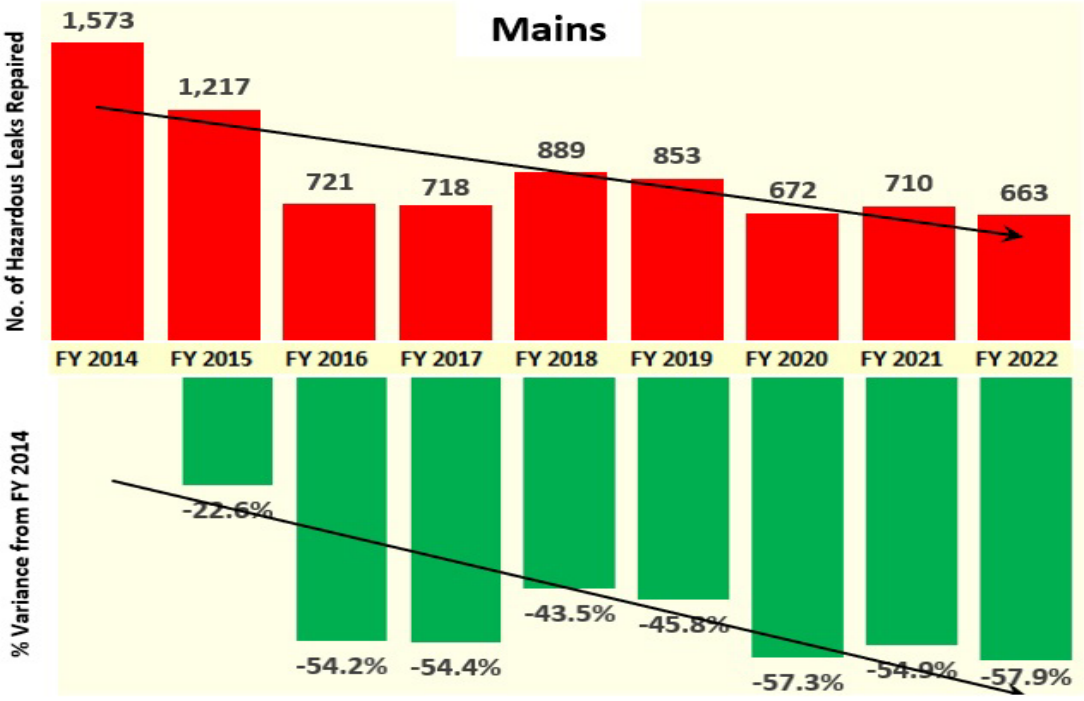


Figure 1 – Hazardous Leaks Repaired on Mains Fiscal Years 2014 – 2022

This continued downward trend is attributed to the prioritized main selection and the accelerated pace of PGW's main replacement program, and recent warmer than average winter seasons.

PGW has also made substantial gains in the reduction of hazardous leaks repaired on Services. The number of hazardous leaks on service lines has continually declined since FY 2014 by greater than 55%.

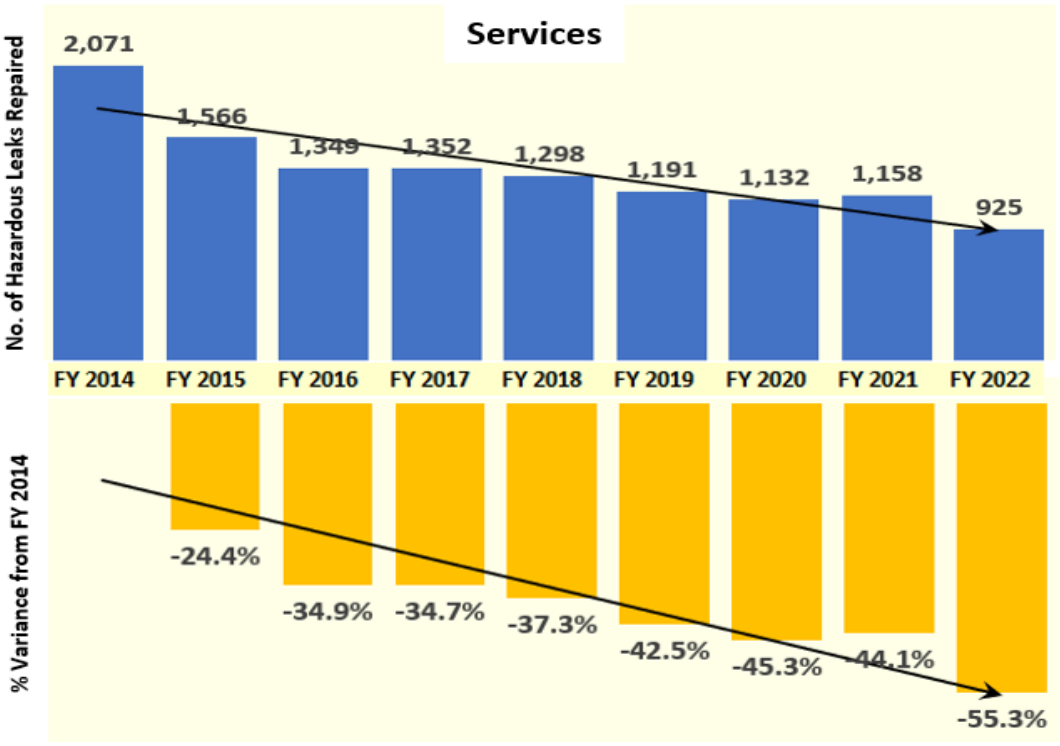


Figure 2 – Hazardous Leaks Repaired on Services Fiscal Years 2014 - 2022

It is PGW's practice to replace all bare steel service lines encountered on main replacement projects regardless of condition. This proactive replacement of aging steel service lines has aided PGW in continuously reducing the number of hazardous leaks caused by corrosion on service lines.

Q. PLEASE DESCRIBE THE EFFORTS PGW HAS MADE IN RECENT YEARS TO MODERNIZE ITS NATURAL GAS DISTRIBUTION SYSTEM.

A. PGW has continued to make tremendous strides in reducing the amount of cast iron main in its system and replacing it with modern materials, such as cathodically protected, coated steel and plastic. In the past ten (10) fiscal years, PGW has successfully removed 309.71 miles of this "at-risk" pipe from inventory. The following graphic shows this.

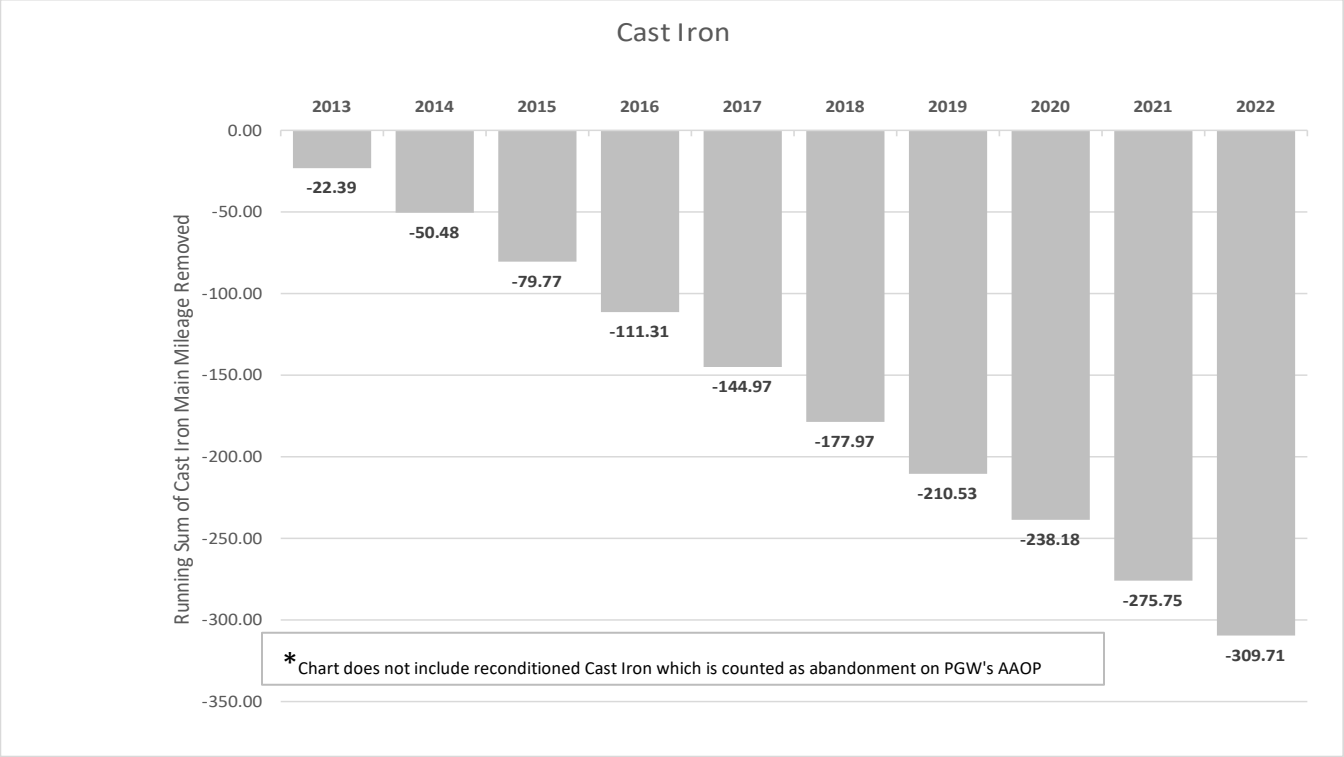


Figure 3 – Cumulative Cast Iron Main Removed from Inventory Fiscal Years 2013 – 2022

Additionally, during both the first and second LTIIP periods, PGW replaced more cast iron main than what was originally planned, which shows PGW's focus on meeting and exceeding its cast iron replacement program goals as shown in the graphic below:

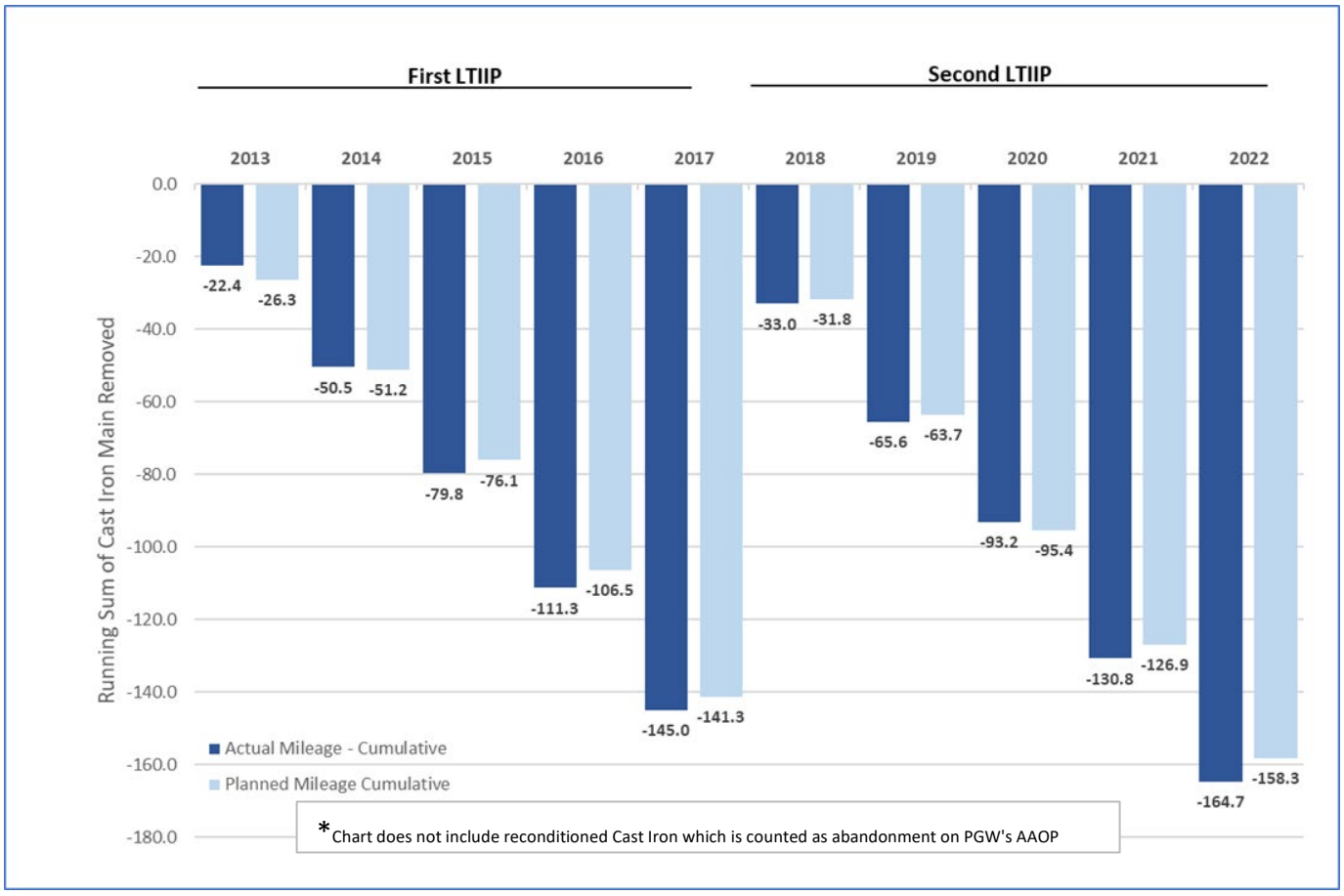


Figure 4 – LTIIP Cast Iron Main Removal Cumulative Results Fiscal Years 2013 - 2022

Q. PLEASE DESCRIBE PGW'S PROPOSED FUTURE EFFORTS TO MODERNIZE ITS NATURAL GAS DISTRIBUTION SYSTEM.

A. In PGW's third LTIIP, which covers FY 2023 - 2027, the Company propose to eliminate approximately 65 miles of cast iron main over the life of the program. This will be done concurrently with PGW's baseline main replacement program which removes 18 miles of cast iron main per year and is funded by current base rates. These combined efforts are currently projected to remove approximately 155 miles of cast iron main from PGW's service territory from FY 2023 - 2027.

Q. HAS PGW APPLIED TO THE PHMSA GRANT PROGRAM AND, IF SO, WHAT IS THE STATUS OF PGW'S APPLICATION?

A. Yes, on July 22, 2022, PGW applied for a $45 Million Grant through PHMSA's Natural Gas Distribution Infrastructure Safety and Modernization Grant Program authorized by the Infrastructure Investment and Jobs Act. This is the maximum amount allowed in the 2022 grant year. This grant is available to municipally or community owned utilities to repair, rehabilitate, or replace natural gas distribution pipelines. The grant program will span over five years, and each entity may receive up to $125 million over the entire 5-year period. PGW expects to hear about the grant shortly.

Q. WHAT WOULD BE THE EFFECT ON PGW'S CAST IRON REMOVAL PROGRAM IF PHMSA DOES AWARD THE REQUESTED GRANT?

A. The PHMSA grant would permit PGW to remove an additional 24 miles of cast iron main over the next 5 years.

III. PUBLIC OUTREACH

Q. WHAT INTERNAL STEPS DOES PGW TAKE TO MAXIMIZE SAFETY?

A. PGW has a multi-pronged set of programs that include formal statements of procedure and employee training on these topics. For example:

1. PGW utilizes in-house trained employees to perform Pennsylvania One Call ("One Call") mark outs. Their title is Damage Prevention Inspectors, as explained by Mr. Leva.
2. PGW staffs dedicated in-house trained crews/technicians for maintenance and emergency response on a 24/7 basis.
3. PGW's leak survey goes beyond code requirements by performing an annual city wide mobile survey.

IV. STREET TROUBLE IDENTIFICATION AND REMEDIATION

Q. WHAT ARE UNDERGROUND STREET TROUBLES AND HOW ARE THEY IDENTIFIED BY PGW?

A. Underground street troubles ("UST") are failures of underground structures that could reduce or eliminate support of PGW pipelines or otherwise compromise them. Underground street troubles are usually brought to PGW's attention due to a condition observed on the street surface either by us or a third party.

PGW Damage Prevention Inspectors and Foreman are trained to look for paving depressions, cavities, cave-ins, paving faults such as surface cracks, or settlement that are in proximity to PGW facilities and which could reduce or eliminate support of PGW pipe. When these circumstances are identified, an Underground Street Trouble investigation is triggered.

Q. DOES PGW HAVE AN OBLIGATION TO INVESTIGATE UNDERGROUND STREET TROUBLES?

A. Yes, of course. When an UST is identified by a PGW trained employee or by an outside source such as another utility, a City department, an excavator, member of the public or other, a UST order is created in PGW's work management system (AIMS) and assigned to a crew to investigate. If the location of the UST is not in proximity to PGW structures, bar holes will be drilled through the pavement to determine the solidity of the foundation under PGW structures. If the UST is in proximity to PGW structures, then the Foreman may make an exploratory opening. If needed, the mains may be blocked up or beamed temporarily if PGW facilities require support. If the UST is extensive, the main may need to be cutout or temporarily abandoned until the underlying issues are repaired.

Q. WHAT STATED PROCEDURES DOES PGW HAVE IN PLACE THAT ADDRESS UNDERGROUND STREET TROUBLES?

A. Mr. Leva's testimony addresses our protocols in more detail.

Q. IS PGW OBLIGATED TO BE ON SITE DURING THIRD PARTY EXCAVATION WHERE IT HAS NO NOTICE OF AN UNDERGROUND STREET TROUBLE THAT WOULD AFFECT PGW FACILITIES?

A. No. PGW cannot possibly be present at all third party street construction sites in the City to supervise and observe third party excavators. PGW responds to over 70,000 PA One Calls each year. Once we have knowledge of an UST, however, PGW promptly dispatches the appropriate personnel. PGW and all utilities rely on the experience and expertise of excavators and other utilities (facilities owners) and the requirements of PA One Call Act 50 "to protect the public health and safety by preventing excavation or demolition work from damaging underground lines."

V. INCIDENT OF DECEMBER 19, 2019

Q. WAS THERE A NATURAL GAS EXPLOSION ON DECEMBER 19, 2019 IN PGW'S SERVICE TERRITORY?

A. Yes. The natural gas explosion that occurred at 1435 South 8th Street, Philadelphia, PA on December 19, 2019 was a tragedy. Property damage and loss of life occurred.

Q. WHAT WAS THE PROXIMATE CAUSE OF THE EXPLOSION?

A. Based upon our investigation, we have concluded that the explosion occurred after natural gas was released from a circumferential crack on PGW's 6-inch cast iron main located in front of 1435 South 8th Street, Philadelphia, PA.

Q. WERE YOU ON THE SCENE ON THAT DAY?

A. Yes. I was on scene December 19, 20, 21, and 22. On December 19, I was on location for the initial camera inspection of the abandoned 6" cast iron main which showed water

flowing into the cast iron main from the abundance of water being pumped on the effected properties by the Philadelphia Fire Department ("PFD").

Q. HAVE YOU REVIEWED THE COMPANY'S RESPONSE TO THE INCIDENT?

A. Yes. The actions taken in response to the emergency by all first responders, including PGW personnel, was heroic and protected the public by taking control of the incident area and limiting the potential damages to the community. It showed how public safety is a first priority in all that we do. See the attached document for the 1400 block S. 8th Street Chronology. **Exhibit JH-2**.

Q. WHAT PGW FACILITIES SERVED 1435 SOUTH 8TH STREET?

A. A 6" low pressure cast iron main located three feet and six inches west of the east curb line installed in 1928 served the 1¼" steel service line to 1435 S. 8th Street.

Q. WHAT OTHER UNDERGROUND UTILITY FACILITIES ARE IN THE AREA?

A. I have prepared a map showing the location of gas and water/sewer facilities and PGW's distribution system on the 1400-block of South 8th Street. See [redacted]

[redacted]

The curb and centerline are also shown on the map, as well as the buried trolley tracks, since BI&E's testimony raises the presence of these facilities.

Q. PLEASE DESCRIBE THE COMPANY'S INVESTIGATION OF THE INCIDENT.

A. On December 22, 2019, I was on location when PGW excavated the broken section of 6" cast iron main in front of 1435 South 8th Street. When the roadway paving was removed, a cavity *above* the cast iron main was observed. It is not clear whether this cavity formed prior to the incident on December 19 or if it was the result of the immense amount of water pumped onto the scene by the PFD in order to extinguish the fire. PGW proceeded to sleeve and brace the cast iron main so a section could be removed as evidence. A 65-

inch long section of 6" cast iron was removed and transported to PGW's evidence locker for future analysis.

PGW contracted with Affiliated Engineering Laboratories, Inc. to perform a metallurgical evaluation of the aforementioned pipe. The evaluation concluded that a combination of the graphitic corrosion, the brittle nature of gray cast iron pipe, and an external bending force caused the circumferential cracking of the cast iron piping. I will discuss this report in more detail later in my testimony.

Q. WHAT WAS THE CONDITION OF THE SOIL SURROUNDING THE CRACKED MAIN WHEN IT WAS EXCAVATED?

A. There was a cavity/void *above* the cast iron main and below the roadway paving. It is not clear when that cavity developed. The cast iron main *had soil underneath it and around it and a cavity above it*. Ms. Bozhko agrees that "the voids shown [under the main in various BI&E photo Exhibit 15] were the results of excavation." See **Exhibit JH-1** at 060 (Set-IV-10).

However, it is impossible to know what the surrounding condition was prior to the main breaking due to the immense amount of water utilized for the firefighting efforts.

Q. PLEASE DESCRIBE PGW'S FOLLOW UP IN THE AREA POST-INCIDENT.

A. Following the incident on December 19, 2019, PGW performed regular leak surveys in the area to help verify safety conditions and assuage concerns from local residents. PGW continued performing regular leak surveys until all cast iron main in the area was replaced. The cast iron main pipe replacement for the entire 1400 block was completed in March of 2020.

VI. SPECIFIC REBUTTAL TO BI&E TESTIMONY

Q. WERE YOU INVOLVED IN BI&E'S INVESTIGATION? AND, IF SO, CAN YOU DESCRIBE YOUR INVOLVEMENT?

A. Yes. I was a full participant, responding to BI&E's written questions of PGW. PGW responded to numerous data requests, performed the necessary field work, and arranged the lab and root cause analyses. To my knowledge, BI&E investigators did not interview any PGW Damage Prevention Inspectors undertaking the One Call line marking. There was a single face to face meeting with PGW on January 28, 2020 where PGW's policies and procedures were discussed.

Afterwards, there was no follow-up discussion of the conclusions reached by the BI&E investigators and they sought no input from PGW on how they came to their conclusions. The BI&E conclusions were reached without the benefit of PGW's subject matter expertise. At the very least, PGW would have liked to have been involved in their analysis to help BI&E understand day to day field activities and discuss remedial actions that BI&E may have believed appropriate.

PGW was not aware of BI&E's conclusions concerning this incident until the complaint was received over 2 ½ years after the incident. The investigators have referred to notes they made on the scene and a formal report that they prepared. We attempted to obtain copies of these documents, notes and internal reports, but BI&E objected to their disclosure.

Q. MR WHITEASH STATES THAT PGW WAS INVITED TO BUT DECLINED TO ATTEND A MEETING ON FEBRUARY 5, 2020 THAT WAS PART OF BI&E INVESTIGATION. BI&E ST. 2 AT 11. CAN YOU RESPOND?

A. PGW has no record or recollection of being invited to this meeting. If PGW was aware of it, PGW would have attended.

Q. HAVE YOU REVIEWED THE TESTIMONY OF BI&E WITNESSES BOZHKO AND WHITEASH?

A. Yes. Overall, I believe that their conclusions are based on a misunderstanding and misinterpretation of the facts and do not support a timeline relevant to causation. The witnesses have misapplied the PGW Bulletins that BI&E has previously reviewed and approved.

Most importantly, PGW is not empowered as a general "street sheriff" in the City of Philadelphia. BI&E's position would require PGW to change its protocols retroactively to require monitoring of third-party excavations involving third party facilities. In effect, PGW would be penalized for not adopting unprecedented third-party oversight procedures prior to December 19, 2019.

Q. CAN YOU BRIEFLY SUMMARIZE BI&E'S TESTIMONY?

A. Yes. The basic assertion is that excavation work on water and sewer service lines in the area prior to the incident disturbed PGW's gas main in front of 1435 South 18th Street, creating the crack in the gas main and causing the explosion. Further, while the BI&E witnesses concede that PGW was not aware of any safety concerns and that nothing was brought to PGW's attention regarding that gas main, they claim that PGW should have been aware of the potential of underground subsidence based upon the number and type of One Call tickets associated with the prior water/sewer excavations. Continuing, the witnesses assert that, because PGW should have been aware of the underground conditions of which they had no notice, PGW had an obligation to post employees to monitor the third party excavation of third party water/sewer facilities at each marked One Call location.

PGW's safety bulletins and federal rules regarding "safeguarding" against another party's excavation near our gas mains is triggered by actual notice of unsafe conditions affecting PGW's facilities. However, BI&E asserts that actual knowledge is not required, rather that PGW should have known. PGW disagrees with BI&E's version of the facts and interpretation of our safety procedures.

Q. WOULD YOU PLEASE SUMMARIZE PGW'S RESPONSE TO THE FACTUAL ASSERTIONS MADE AND CONCLUSIONS DRAWN BY THE BI&E WITNESSES?

A. Yes. Ms. Bozhko's basic conclusion is that: "The cast iron main cracked due to the instability of the soil due to water leaks and excavations to repair water and sewer laterals in the vicinity of the main" is speculative and does not verify the timeline for when the field conditions developed. BI&E St. 1 at 18. Mr. Whiteash's discussion about the appearance of voids in the street and the process of underground voids created by the "scouring" effect of leaky underground water and sewer lines does not address conditions that affected our gas main. BI&E St. 2 at 9.

PGW has numerous points of disagreement with the facts described by the witnesses and the conclusions drawn. I will address these in more detail, but summarized they are:

- The position that soil instability was the cause of the crack in the cast iron main in front of 1435 South 18th Street is an unsupported conclusion and does not address the timeline of events.
- It is conclusory to state that the soil instability was caused by the water/sewer excavations. The observations of the plumbers were about voids affecting water/sewer facilities solely. No observations were made about PGW facilities.
- While the excavators (the plumbers) identified underground voids under water/sewer facilities to the BI&E investigators, we do not know what remediation was undertaken by them to fill those underground voids.
- The work performed by the excavators was not "in the vicinity of" the main break and 1435 South 8th Street.

- The trolley tracks are located in the middle of the street and were supporting the surface above the water mains in the area – Not PGW's main which is located closer to the curb. There are no trolley tracks located above the PGW gas mains.
- The BI&E witnesses did not visit the scene until after the explosion.
- The investigation scene was highly compromised. All post explosion investigations occurred after the PFD poured large volumes of water over the scene at 1435 South 18th Street and heavy firefighting/first responder equipment had parked on the street.
- The BI&E testimony relies heavily on two neighbors for information regarding activity in the street prior to the explosion. The testimony is hearsay and unreliable to accurately establish conditions prior to the incident.
- There was a metal plate located in the middle of the street, but this was not covering PGW's main, and the parties do not know who placed it there.
- PGW has no prior knowledge of adverse underground street conditions at 1435 South 18th Street.
- The underground conditions were not apparent from the surface inspection undertaken by the Damage Prevention Inspectors that marked the location of PGW's mains in response to One Call tickets.
- The One Call tickets for water/sewer service line repair were not all marked "emergency." Only one involved involve water service line repairs. The classification of a ticket as "emergency" does not necessarily indicate a threat to PGW facilities.

Q. LET'S START WITH THE TOPIC OF UNDERGROUND VOIDS. PLEASE EXPLAIN.

A. Ms. Bozhko and Mr. Whiteash spend a considerable portion of their testimony discussing preexisting underground voids and trolley tracks observed in the middle of the street, that are not related to BI&E's theory that it was the water/sewer excavator activities that created the voids that created the crack that caused the explosion.

I believe that the issue of underground subsidence in the 1400 block of South 18th Street is overstated and not particularly germane. The discussion of scouring and underground void is technically accurate in the abstract but when and how this may have specifically affected the cast iron main in front of 1435 South 8th Street is never explored or

explained. There is no clear timeline or point of failure identified by the BI&E witnesses and they have no knowledge of water or sewer pressures on the 1400 block of South 8th Street so as to predict the amount of scouring. **See Exhibit JH-1 at 069-070, 091. (**Set IV – 19 and 20; Set V - 8.) The conclusion that the voids underneath the roadway "started around the summer of 2019" is based upon the two neighbors' statements and there is no independent verification of this assertion. **Exhibit JH-1 at 054 (**Set IV – 5).

Most Philadelphia streets, including the street in front of 1435 South 8th Street are older and have been dug up many times by various entities. Clearly, there are alternative causes of underground failure (water or sewer) after the plumbers completed their excavation work, including simply the age and graphitization of the cast iron pipe. Cast iron can break without an apparent cause.

The issue of the trolley tracks is also not germane. Almost all City streets have some mix of roadway base course that incorporates concrete/cobblestones/asphalt and supports the roadway surface. Concrete is the standard base course used by the Streets Department in street construction. So, all of Philadelphia's street have some base structure above the underground facilities that will support the road despite cavities underneath.

Also, the trolly tracks are located in the centerline of the road and not supporting the roadway above PGW's facilities, which are closer to the curb. As Ms. Bozhko recognizes, the trolley tracks were encountered by PWD, not PGW, when it was excavating its facilities in the center of the road, not near PGW's main. BI&E St. 1 at 17 and **Exhibit JH-1 at 064** (Set IV - 14). We did not encounter trolley tracks during any of our excavations of gas mains on South 8th Street.

Q. WERE THE ONE CALL MARKED LOCATIONS OF PGW FACILITIES "NEAR" OR "IN THE PROXIMITY" OR "IN CLOSE PROXIMITY" OF 1435 SOUTH 8TH STREET AS CLAIMED BY THE BI&E WITNESSES (BI&E ST. 1 AT 11 AND 23; BI&E ST. 2 AT 7)?

A. It depends upon what is meant by these terms. I will interpret them as it relates to the probability that the water/sewer line excavations at the One Call ticket locations would affect PGW's facilities at 1435 S. 8th Street. Mr. Whiteash identified "relevant excavation activities [which] occurred prior to the explosion" as the water/sewer line excavations at 1433 South 8th Street (Ticket 20192803422, a water repair by Lepore Plumbing) and 1431 South 8th Street (Ticket 20192960460, sewer repair by Bart Emanuel Plumbing). BI&E St 2 at 5-6. He also includes water main repair by the Philadelphia Water Department near 1427-1431 South 8th Street (Ticket 20192752094). I do not believe that these excavations affected PGW's gas main in front of 1435 South 8th Street. This is due to the lapse of time from the most recent One Call and the incident.

The one-call ticket nearest in time to the incident was performed 1 1/2 months prior to the incident. The excavation associated with the One Call ticket nearest to the location of 1435 South 8th Street was undertaken 2 1/2 months prior. The Damage Prevention Inspectors made no note of an underground street trouble at these locations, as they are trained to do. All on-site pictures and conditions noted by BI&E investigators were made after the incident, following heavy equipment and larger volumes of water that compromised the site.

The BI&E witnesses agree that they did not witness the plumbers' excavation and repairs and cannot estimate distance to PGW facilities. **Exhibit JH-1 at 053.** (Set IV - 4.)

Q. YOU MENTIONED PREVIOUSLY THAT PUBLIC PROTECTION UNDER ACT 50 (PA ONE CALL) IS A JOINT EFFORT BY EXCAVATORS AND FACILITIES OWNERS. WHAT ARE THE OBLIGATIONS OF THE EXCAVATORS?

A. Under Act 50, some of the responsibilities of the excavators are to:

> 1) Plan the excavation or demolition work to avoid damage to or minimize interference with a facility owner's facilities in the construction area. Excavation or demolition work which requires temporary or permanent interruption of a facility owner's service shall be coordinated with the affected facility owner in all cases.
>
> 2) After consulting with a facility owner, provide such support and mechanical protection for known facility owner's lines at the construction work site during the excavation or demolition work, including during backfilling operations, as may be reasonably necessary for the protection of such lines.

Q. DO THE BI&E WITNESSES RELY ON OTHER OBSERVATIONS TO SUPPORT THEIR ASSERTION OF PREEXISTING UNDERGROUND VOIDS?

A. The BI&E witnesses "did not personally visit the site prior to the explosion." **Exhibit JH-1 at 063 (**Set IV – 13).

Therefore, the BI&E case relies extensively upon the reported observation of *two* neighbors with whom BI&E discussed preexisting street conditions. These two persons are what BI&E references as "several members of the local public" or "local residents" in testimony, but there appear to be only two of them. BI&E St. 2 at 4 and 12-13. While their names are identified and redacted in Exhibit JH-1 to protect their identity, the two residents were not fully "identified" as requested in discovery. **Exhibit JH-1 at 082-084, 104-105 (**Set V – 1 and 21). None of these individuals are reported to have any training in or understanding of what they were observing, and reported nothing to PGW. The dates of the neighbors' observations are unknown. **Exhibit JH-1 at 054-055** (Set IV – 5). Same is true of "street depressions." **Exhibit JH-1 at 063** (Set IV – 13). Mr. Whiteash does not recall the physical descriptions of the street conditions by the two individuals, except to recall them using the term "sinkholes." **Exhibit JH-1 at 083 (**Set V - 1.f). No

investigation was undertaken to confirm the two neighbors' statements. **Exhibit JH-1 at 104-105 (**Set V – 21). This is not reliable information.

Attempts to independently verify some of the statements made by the two neighbors have been unsuccessful. For example, Mr. Whiteash reports that "local residents reported observing the Philadelphia Street Department placing fill in the roadway on a continuous basis up to the day of the explosion." BI&E St. 2 at 12-13. PGW asked the Street Department about their activity, and they responded with the attached report that shows no excavation was undertaken on the 1400 block of South 8th Street prior to the explosion. **Exhibit JH-4**. BI&E attempted to confirm the reported rerouting of SEPTA buses by looking though public notices but found no evidence of this either. **Exhibit JH-1 at 082-084, 106 (**Set V - 1.d and 22).

Q. BI&E WITNESS WHITEASH'S TESTIMONY ALSO REPORTS VERBAL INTERVIEWS WITH TWO PLUMBERS THAT REPAIRED TWO SERVICE LINES, ONE WATER AND ONE SEWER, IN THE 1400 BLOCK OF SOUTH 8TH STREET. DO YOU HAVE A REACTION?

A. Yes, but first, I want to note that, according to PGW counsel, the reported statements from these two plumbers,[8] as well as the two neighbors, are hearsay and they intend to object to them at the appropriate time.

According to Mr. Whiteash's testimony, Mr. Lepore from Rich Lepore Plumbing reported completing "a sewer lateral repair at 1433 South 8th St. around October 8, 2019" and "discovered multiple underground voids closest to the sewer main" and "a collapsed and separated sewer lateral." I&E St. 2 at 7-8. Mr. Emanuel from Emanuel Plumbing & Heating performed a repair on the water service line at 1431 South 8th Street on

[8] The water and sewer service line are not owned by the PWD. They are the property and maintenance responsibility of the water/sewer customer. Customers call plumbers to fix their service lines (laterals).

November 1, 2019. It should be noted that all work and observations reported to BI&E by these two individuals involve water/sewer related facilities exclusively.

The plumbers did not "report to BI&E that any water main or water lateral damage was visually observed" by them, except that Mr. Emanuel stated to the BI&E inspectors that he heard the sound of water draining into a sewer service line. BI&E St. 2 at 8; BI&E **Exhibit JH-1 at 094-095 (**Set V-11 and 12). Mr. Whiteash did not ask if water draining that Mr. Emanual heard appeared to be pressurized. **Exhibit JH-1 at 095** (Set V-12b).

Continuing with Mr. Whiteash's testimony: "Mr. Lepore noted that he reported the voids to the PWD and repaired the voids with backfill material." BI&E St. 2 at 8. Mr. Whiteash also reports that "Mr. Emanuel noted that he reported the water leak and voids to PWD and repaired the voids with backfill material." BI&E St. 2 at 8.

I can only conclude from these statements that either: these gentlemen did an adequate job making these repairs and backfilling the voids that involved the water/sewer mains; or that there was still an underlying issue at the locations that were not remedied but were covered up when backfilled. It would appear from the statement attributed to Mr. Emanuel that the water leak was backfilled without repair creating the potential for other underground failures caused by scouring. This water leak should have been addressed by Mr. Emanuel or the appropriate party before backfilling the trench.

PGW cannot speak to the quality of the workmanship performed or if there were other potential underlying issues that should have been addressed by Mr. Lepore or Mr. Emanuel before backfilling their trenches.

I can testify as to what PGW would do if an underground cavity/void is discovered. PGW would protect its structures and report the cavity/void to the City Streets Department.

PGW would not backfill the cavity until the City or appropriate party made repairs to address the underlying cause of the cavity.

Q. WHAT SHOULD HAVE BEEN DONE UNDER THESE CIRCUMSTANCES?

A. Because of the extent of the reported underground voids "10 feet between the water main and sewer," the street should have been shut down to protect the public health and safety of the community. The trench should not have been backfilled until the underlying issues were addressed. Also, based on my experience, the described voids could not have been adequately backfilled and compacted to support the roadway without further opening the roadway paving.

PGW does not backfill water leaks or cavities unless the underlying issue is addressed. PGW would protect its structures and report water leaks to the PWD and cavity/void to the City Streets Department. PGW would not backfill the water leak or cavity until the appropriate party makes repairs to address the underlying cause of the cavity.

Q. BASED ON THE AVAILABLE EVIDENCE, DID THESE WATER/SEWER REPAIRS ENDANGER THE NATURAL GAS MAIN?

A. No. According to Mr. Whiteash testimony, Mr. Lepore "showed that his repair of the sewer lateral did not undermine PGW's cast iron main as Mr. Lepore's excavation appeared no closer than twenty-seven (27) inches from PGW's cast iron main." BI&E St. 2 at 11. It bears emphasizing that the BI&E testimony contains no report from the plumber that there was a cavity near our gas main. There is no evidence that PGW's gas facilities were in any way endangered.

PGW did not need to be on location for Mr. Lepore's work.

After the third party repairs were made to the water and sewer service lines, the trenches backfilled, and final paving completed in October and early November, PGW would have

had no reason to suspect an ongoing underground street trouble which could potentially cause the cast iron main to break on December 19, over a month and one half after all plumbing repairs were completed. As previously noted, no information about these circumstances was reported to PGW contemporaneously.

In my view, BI&E witnesses are shifting the burden to PGW to be held accountable for oversight of all plumbers and other excavators simply because PGW was requested to mark its facilities.

Q. DOES PGW KNOW THE REASON THAT THE CAST IRON MAIN IN FRONT OF 1435 SOUTH 8TH STREET CRACKED?

A. No, we do not know why the main cracked. Drawing such a conclusion would be pure guesswork.

Q. WHAT DID THE METALLURGICAL EVALUATION CONCLUDE?

A. The metallurgical evaluation prepared by Affiliated Engineering Laboratories dated September 30, 2022 (See I&E Exhibit 25a), undertaking various analysis techniques, states:

> In conclusion, the incident pipe experienced an external bending force acting upon it where a through-wall crack initiated and propagated near its BOTTOM, where it was weakening progressively due to graphitic corrosion towards the TOP. Circumferential cracking is a common mode of failure for cast iron piping, when subjected to bending forces. Due to the inherent brittle nature of gray cast iron, the pipe will not plastically deform under bending loads but rather fracture. A crack initiates at the highest stressed region, whether it be at a thinned wall due to corrosion, large-sized casting flaw, or some other stress riser, and propagates rapidly along the pipe's circumference to alleviate the stresses induced by the bending forces. Such bending forces can occur as a result of frost upheaval during freeze/thaw cycles, poor bedding, loss of soil support or external force from soil disturbances near the buried pipe or undermining.

Q. WAS THERE ALSO AN EVALUATION OF THE CAUSAL ("ROOT CAUSE") FACTORS OF THE EXPLOSION AND FIRE UNDERTAKEN?

A. Yes. A study was undertaken by FCNA Partners, a forensic consulting group. The report is dated February 4, 2021. See **Exhibit JH-5.** The two main conclusions of the report are:

> Any theory, opinion, claim or allegation that PGW caused, was a cause, the proximate cause or a substantial contributing factor in the explosion and fire, fatalities and extent of property damage that occurred on December 19, 2019 cannot withstand the challenge of reasonable scientific, technical and forensic engineering evaluation when considering the now known facts and circumstances unique to this incident and all significant data and information reviewed to date (for the reasons discussed above and as evidenced by our report Appendices).
>
> The most reasonable scientific explanation of the root cause for this incident that occurred within the 1400 block of South 8th Street on December 19, 2019 relates directly to the soil disturbances near PGW's 6" cast iron gas main from water and sewer facility leakage and related construction work by City workers and private contractors resulting in ground movement and external force application which, in turn, caused the sudden rupture of PGW's main (also for the reasons discussed above).

Specific findings include the following:

> 1. Informal consultation with City of Philadelphia Fire and Police Department personnel provided information consistent with PGW records that there were no reported gas leaks or neighbor complaints of smelling natural gas odorant (Mercaptan) within the 1400 block of South 8th Street during the period of days and hours prior to the explosion.
>
> 4. PGW records reviewed to date do not show or indicate PGW's 6" diameter gas main was unserviceable, posed a hazard to the public, was not suitable for continued use as of December, 2019, was not operating properly or was not being maintained in accordance with Pennsylvania Public Utility Commission approval and oversight or Federal Regulations (*49 CFR Part 192 Subparts A - IM*).
>
> 18. It was the responsibility of the City of Philadelphia and private contractors, not PGW, to instruct their workers in the recognition and avoidance of unsafe conditions when excavating near underground natural gas distribution facilities including the potential hazards associated with digging, changes in underground water levels and soil saturation, the formation of underground cavities, thermal cycling, soil movement and potential pipe damage in areas being subjected to excavation operations (see e.g., *29 CFR Part 1926.21 (b) (2)*).

19. It was the responsibility of the City of Philadelphia and private contractors, not PGW, to provide for the frequent and regular inspections of the construction work of the City and private contractors within the 1400 block of South 8th Street by competent persons in accordance with standard utility construction industry practices (see e.g., *29 CFR Part 1926.20 (b) (2)*).

Q. WAS THE SCENE DISTURBED BY THE TIME THE BI&E INVESTIGATORS ARRIVED ON THE SCENE?

A. Yes. All of BI&E's observations and photos were made after the explosion, when the investigation scene was highly compromised. When PGW and BI&E personnel arrived, there were multiple fire trucks on the scene dumping many thousands of gallons of water on the houses and in the general vicinity. This undoubtedly disturbed the underground subsurface, so that by the time of our excavation the underground circumstances were different from when the gas main broke. As I reported previously, the main in front of the 1435 South 8th Street was full of water and could not be inspected until three days later. There was also a lot of heavy machinery utilized to fight the fire and engaged in public protection, which also likely damaged the scene, including underground conditions.

Q. DID PGW HAVE ANY PRIOR KNOWLEDGE OF THESE UNDERGROUND VOIDS REFERRED TO BY THE BI&E WITNESSES?

A. No. First, I want to emphasize the obvious -- that these voids are underground and only directly observable by excavation. PGW is not going to randomly dig up the streets of Philadelphia to spot check for voids.

Instead, we train our employees to use surface indications of UST, as I previously described. In my experience, this is the standard industry approach. PGW responds to indications of subsurface issues that we observe either directly or by inference or that are reported to us.

The experienced PGW Damage Prevention Inspectors responding to the One Call tickets included in BI&E Exhibit 4 looked for indications of underground street troubles as they are trained to do and saw none. Therefore, I totally disagree with Ms. Bozhko where she states, without any evidence, that "PGW employees before/while/after visiting the location did not perform inspection and necessary follow-up actions…" BI&E St. 1 at 23.

Q. WITHOUT ADVANCE KNOWLEDGE OF SUBSURFACE SUBSIDENCE, AS YOU DESCRIBE ABOVE, WHAT CAN PGW DO TO PROTECT ITS FACILITIES FROM THE LACK OF SUPPORT?

A. Without knowledge of an underground street condition to which we can respond, the best preventative action that we can undertake is continuing to pursue our aggressive cast iron replacement program, train our employees to constantly be "on patrol" and public safety education efforts to spot and report as explained by Mr. Leva.

Q. WITHOUT KNOWLEDGE, HOW CAN PGW BE HELD ACCOUNTABLE FOR NOT "SAFEGUARDING" ITS FACILITIES AND PREVENTING THE CRACKED CAST IRON MAIN?

A. BI&E's claim is that PGW "should have known" that there was underground subsidence, by deducing it from the seven One Call marking requests made in the 1400 block of 8th St. during the twelve-month period prior to the explosion of December 19, 2019. This level of marking is referred to as "concentrated" (BI&E St. 2 at 7) or "frequent excavation activity" prior to the incident (BI&E St. 1 at 11). There are several levels of problems with this claim.

The term "emergency," as used by water and sewer line excavators, does not necessarily indicate a true "emergency." Under Act 50, an emergency One Call ticket requires us to respond "as soon as practicable", whether there is a true emergency or not. In my experience, plumbers use this as a scheduling tool to keep their customer work as

continuously scheduled as possible. In other words, it is a simply not correct to suggest that the "emergency" designation on a One Call request suggests an "elevated risk" to PGW's structures. BI&E St. 1 at 12. Or is even "a potential sign of underground street trouble due to sudden or unforeseen occurrence(s) involving a clear and immediate danger to life, property, or the environment, including, but not limited to serious breaks or defects in a facility owner or several facility owner lines." **Exhibit JH-1 at 090 (**Set-V-7).

Of the eight One Call tickets referred to by BI&E witnesses, six were claimed to be "emergency" and two were "routine." And of the "emergency" tickets, only one was for water and the remaining five were for sewer. **Exhibit JH-1 at 092 (**Set-V-9).

Moreover, the notion that eight is a "concentrated" number of One Call tickets in a Philadelphia block is not empirically supported or rational. Eight tickets in one year on a block is not at all unusual in the City. PGW responds to over 70,000 One Call marking requests in a year. Over 17,000 of these are claimed to be of an "emergency" nature. PGW has approximately 31,600 city blocks in the city with gas structures and receives over 70,000 One Calls each year. So, there are many blocks with "concentrated" or "frequent" One Calls.

Finally, we are aware of no study or investigation anywhere that has demonstrated a positive correlation between the number of One Call marking requests and dangerous underground conditions. It is certainly not a relationship that PGW has ever observed. Nor am I aware of any other natural gas distribution company that utilizes such a standard for initiating monitoring.

Q. DO THE BI&E WITNESSES STATE WHAT THEY THINK PGW SHOULD HAVE DONE UNDER THESE CIRCUMSTANCES?

A. Yes. The BI&E witnesses argue that PGW should have deployed employees to be present during all water and sewer line excavation undertaken by these third parties. By not doing so, Ms. Bozhko asserts that PGW "did not safeguard their facilities, did not perform inspection and necessary follow-up actions upon receipt of notice of water and/or sewer system failures, and did not act on the concentrated number of One Call notices." BI&E St. 1 at 22. This is the essence of the BI&E case.

Q. WERE PGW EMPLOYEES PRESENT DURING ANY OF THE EXCAVATION ACTIVITY ASSOCIATED WITH THE SEVEN PRIOR ONE CALL TICKETS REFERENCED IN THE BI&E TESTIMONY?

A. No. We had no reason to be there.

Q. DOES A ONE CALL REQUESTS BY THIRD PARTY EXCAVATION RELATED TO WATER AND SEWER LINES TRIGGER AN OBLIGATION BY PGW TO BE PRESENT DURING THAT EXCAVATION TO "SAFEGUARD" ITS FACILITIES?

A. No. Eight One Call tickets in an area over a twelve month period does not trigger PGW "procedures relating to the protection of cast iron from disturbance…" BI&E St. 1 at 22. As explained previously, there was no indication that PGW facilities were either threatened by routine water/sewer line maintenance; nor was there any observed threat to those facilities.

As noted by Mr. Leva, PGW Bulletin No. 312 requires knowledge by PGW that its facilities "are or may be endangered." PGW Bulletin No. 54 requires that the trouble be "brought to PGW's attention." According to Mr. Whiteash's testimony "the presence of the voids was not obvious from mere visual inspection of the roadway surface." BI&E St. 2 at 5, 12-13. PGW's Damage Prevention Inspectors are trained to look for potential

underground street troubles and implement an UST investigation when one is identified. As Mr. Whiteash stated there were no "obvious" signs that an UST investigation was warranted. As Mr. Leva notes, these employees did their job.

Q. ARE THERE ANY FEDERAL REQUIREMENTS TO MONITOR THIRD PARTY EXCAVATION OF THIRD PARTY SERVICE LINE FACILITIES?

Yes, but they do not apply here. Ms. Bozhko refers to 49 CFR § 192.755 (BI&E St. 1 at 6-7) and 49 CFR §192.613 (BI&E St. 1 at 22). In my review of these PHMSA regulations, neither apply to the present situation.

§ 192.755 (Protecting cast-iron pipelines) applies in circumstances "[w]hen an operator has knowledge that the support for a segment of a buried cast-iron pipeline is disturbed…" PGW and BI&E agree that PGW did not have the required notice of any disturbance.

§192.613 is a maintenance requirement that operator have a procedure for "continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions." We have such procedures in place.

BI&E also cite to 49 CFR Part § 192.614(c)(6) in discovery as requiring PGW be present during third party excavation of third party facilities. **Exhibit JH-1 at 074, 096** (Set IV – 24 and Set V – 13). § 192.614(c)(6) requires the inspection of pipelines only "that an operator has reason to believe could be damaged by excavation." Again, we had no such notice.

Q. ARE THERE ANY STATE REQUIREMENT IN THIS REGARD?

A. None that I am aware of.

Q. OTHER THAN TO SAY THAT PGW SHOULD HAVE DEPLOYED EMPLOYEES TO OBSERVE THE REPAIR OF THESE PARTICULAR WATER AND SEWER LINE REPAIRS (EVEN THOUGH THEY HAD NO REASON TO DO SO), HAS BI&E GIVEN ANY GUIDANCE ON HOW SUCH AN OBLIGATION WOULD BE ADMINISTERED IN THE FUTURE?

A. No. BI&E leaves unaddressed when and under what circumstances PGW would dispatch crews to water and sewer line repair sites to "safeguard" its facilities. After marking, PGW does not know when, or even if, the excavator will arrive to excavate. The excavation could occur days or weeks after marking. BI&E also does not identify how long or how frequently PGW should monitor a location after the third party repairs have been completed. The explosion at 1435 South 8th Street occurred over one and a half months *after* all water and sewer repairs were completed by the plumbers. PGW cannot be indefinitely responsible to monitor locations where third parties may have made excavations.

Nor is there any discussion by the BI&E witnesses of what constitutes "frequent." BI&E has agreed in discovery that there are no regulations that define "frequent excavation activity." **Exhibit JH-1 at 056 (**Set IV – 6). When asked to provide a threshold of how this would apply in the field, Mr. Whiteash stated that "[t]he amount of excavation activity that is not frequent would be no excavation activity to one instance of excavation activity." **Exhibit JH-1 at 036-037 (**Set-III-1).

In other words, in BI&E's opinion, the obligation of onsite inspection of third party excavation occurs where there *are two or more* One Call marking requests. This claim is not only without any empirical support but is totally unworkable given the number of One Call requests that PGW receives in a year.

Q. BASED UPON YOUR EXPERIENCE WOULD PGW HAVE TO HIRE ADDITIONAL FIELD EMPLOYEES AND, IF SO, WOULD YOU PROVIDE AN ESTIMATED COST?

A. Yes. There is no question that our existing employee compliment is not sufficient to undertake the surveillance of all third-party excavations occurring in clusters of two or more across the City. We estimate that, on average, approximately 50% occur on the same block in the same year. Thus, PGW would have to hire an exorbitant number of employees to try and cover all excavator activities and for an indefinite time frame. This is not feasible.

Q. HAVE YOU ASSESSED HOW MANY EMPLOYEES PGW WOULD HAVE TO HIRE TO SURVEY THIRD-PARTY EXCAVATION ACROSS THE CITY AND WHAT THE COSTS MAY BE?

A. I have not fully assessed how many employees PGW would actually have to hire to survey "frequent" or "concentrated" third-party excavation activities in a given year. There are simply too many unknown variables to comply with BI&E's supervision request. However, based on the shear amount of One Call requests PGW receives, and due to the extent for which BI&E is proposing PGW monitor excavations for their duration, I believe that, in order to supervise street openings that are "frequent" or "concentrated" per BI&E's definition, PGW would need to hire no less than 198 employees. This is based on the following assumptions:

- PGW receives approximately 17,400 "Emergency" One Call requests / year
  - This equates to approximately 48 requests / day
  - For an "emergency" request, the line marker would remain onsite during work for the project to ensure safety of PGW's facilities.
  - The duration of an Emergency Project last 1 work day
  - Assume that total requests/day is reduced by a factor of 2 to trigger BI&E's definition of "Frequent" and "Concentrated"
- PGW receives approximately 52,600 non-"Emergency" One Call requests / year
  - This equates to approximately 144 requests / day

- For a non-emergency request, the line marker would not remain on site, as the line marking must be completed prior to excavation beginning, and excavation may not occur for days or weeks.
- The duration of a non-emergency project lasts 2 work days.
- Assuming that total requests/day is reduced by a factor of 2 to trigger BI&E's definition of "Frequent" and "Concentrated"

Based on these assumptions, I estimate that PGW would need to hire an additional 24 employees to mark and subsequently monitor all "Frequent" and "Concentrated" emergency One Call requests. I also estimate that PGW would need to hire an additional 174 employees to monitor all non-emergency One Call request and subsequent excavation which may take many days to complete.

Q. CAN YOU ESTIMATE HOW MUCH THIS WOULD COST PGW PER YEAR?

A. While most of the costs are unknown, assuming that each of the above 198 employees require a vehicle/work truck which I conservatively estimate to be approximately $5,000/year per vehicle with operation costs of $10,000/year per vehicle, and that each employee's salary and training will cost a conservative $70,000/employee (i.e. that each employee and equipment needed will total $85,000/year), I estimate that BI&E's request would cost no less than $16.8 million / year to implement. This assumes that PGW could even hire this number of employees in the current difficult employee market.

Q. DOES PGW HAVE THE INTERNAL CAPABILITY TO TRACK ONE CALL TICKETS AS SUGGESTED BY BI&E AND DEVELOP PATTERNS ABOUT "FREQUENCY" OR "CONCENTRATION"?

A. No. PGW does not track One Call tickets in this manner, which is why my above calculations are not tied to BI&E's suggested patterns or tracking. Assuming that there were clearly defined parameters of what we were supposed to be tracking, which there is not, PGW would have to develop the software programs to do so. I am not aware of any

other gas company required to do this. To the best of my knowledge, as the first, PGW would be designing software from scratch.

Q. SHOULD PGW BE REQUIRED TO DEVELOP A PROTOCOL OF ON-SITE MONITORING THIRD PARTY EXCAVATION UNRELATED TO PGW FACILITIES ONCE THE LOCATION OF PGW'S FACILITIES IS MARKED ACCORDING TO THE ONE CALL REQUEST?

A. No. PGW already trains employees to identify potential threats to the gas infrastructure and react accordingly. To overreact and require monitoring of all third party excavations is a waste of customer resources, because it does not solve any correlated risk. There is no correlation in my opinion between hazardous leaks and One Call marking tickets. And BI&E has not presented any evidence to show that there is one. Such an effort would also be cost prohibitive for ratepayers with no real improvement in safety.

Q. YOU SAY THAT RATEPAYER WOULD PAY? WHY SHOULD NOT THE SHAREHOLDERS OF THE COMPANY HAVE TO PAY FOR THESE MEASURES?

A. PGW has no investors. PGW has no shareholders and does not pay a dividend or a rate of return to its owners (instead it remits a statutorily fixed annual payment to the City of Philadelphia). Accordingly, all of the funds needed to run the Company come from ratepayers or from borrowing (the costs of which then must be paid by ratepayers). PGW's rates are set by determining the appropriate levels of cash and other financial metrics necessary to enable PGW to pay its bills and maintain access to the capital markets at reasonable rates. Accordingly, every dollar of extra cost that PGW would have to expend to monitor and observe thousands of excavations would have to be paid for by ratepayers. The same is true were a penalty to be imposed – it would be paid for by ratepayers. This drives PGW to be very conscious of mandates that have cost consequences.

Q. DOES BI&E MAKE OTHER RECOMMENDATIONS?

A. Yes. BI&E's testimony makes broad, and vague, recommendation that PGW undertake certain actions but without providing any specific details. We asked what BI&E to describe the specific underlying tasks that BI&E is recommending that PGW undertake and were told: "I&E is unable to answer this Interrogatory as [these] tasks are PGW's responsibility as it is the entity that possesses the knowledge and expertise to develop sufficient and adequate tasks." Although we asked, there is no estimation of scope of the project, cost or timeframe of completion either. These were the responses to the following recommendations:

- Recommendation that PGW undertake "every effort to ensure all work, done by … others, completed in or around its facilities restores the subsurface." BI&E St. 1 at 28; **Exhibit JH-1 at 073 (**Set IV – 23).
- Recommendation that PGW "create an OQ task to evaluate and perform continuing surveillance pursuant to 49 CFR § 192.613(a)," BI&E St. 1 at 28; **Exhibit JH-1 at 074 (**Set IV – 24).
- Recommendation that "PGW create and implement a process which uses specific criteria based on information gathered from Pennsylvania One Call tickets and other information," BI&E St. 1 at 28; **Exhibit JH-1 at 075 (**Set IV – 25).
- Recommendation that "PGW present a plan to accelerate the removal rate of its riskiest cast iron assets within ninety (90) days." . BI&E St. 1 at 30; **Exhibit JH-1 at 076 (**Set IV – 26). I would note that we had already applied for the grant funding prior to the complaint being filed.

As a result, PGW is unable to respond the BI&E's recommendations in a meaningful and responsive way.

Q. ONE FINAL TOPIC -- TRAINING. BI&E WITNESS BOZHKO ASSERTS THAT PGW EMPLOYEES ARE NOT ADEQUATELY TRAINED. ON WHAT BASIS DOES SHE SAY THIS?

A. Ms. Bozhko argues that employees are not trained sufficiently because we did not have personnel on-site to monitor the third-party excavation. "PGW's training is not

sufficient. Evidently, no reports of underground street troubles were initiated by PGW personnel, and no actions were taken to investigate despite receipt of several One Call tickets placed for water and sewer repair work." BI&E St. 1 at 24. In the same vein, she asserts that "the procedures for locators do not provide instructions to the locator on when to initiate an investigation for underground street trouble report." BI&E St. 1 at 26. In other words, PGW is being criticized for not addressing in past training, the new standard now proposed by BI&E. PGW personnel have never been required to be present during third party excavation of third party facilities where we have no notice of potential damage to our facilities. Obviously, PGW does not train its employees to this new proposed, ill-advised, unrequired standard.

Q. MS. BOZHKO ALSO CRITICIZES PGW'S TRAINING MATERIALS. WHAT IS YOUR RESPONSE?

A. Yes. There are some, I would describe as minor, criticisms by Ms. Bozhko that certain materials were not updated or are incomplete. Specifically, she raises the following:

- Old forms referred to in the Field Operations Training Program for Distribution Inspector School. "The training refers to outdated procedural steps such as using forms that are no longer in use or are inactive in PGW's reporting system." BI&E St. 1 at 24-25.
- Bulletin 313 used in training is missing a section: "… outdated version of Bulletin 313, which is reviewed during training, is missing Subsection III-D5." BI&E St. 1 at 25.
- Bulletin 54 used in training is outdated. "Bulletin 54 reviewed during training is dated May 21, 1999, while the current version of the Bulletin, in effect at the time of the explosion, was effective as of April 15, 2011." "There were significant changes made to the Bulletin in the consequent revisions." BI&E St. 1 at 25.

The bulletins and forms that Ms. Bozhko reviewed were simply a training syllabus summary of bulletins to be covered in the class. The actual documents that are reviewed in class come from PGW's policy and procedural management program, Policytech,

which is the tracking software that maintains all updated and active PGW procedures. PGW agrees that the training syllabus should be corrected to accurately reflect what is taught in class and will do so.

It should be noted that none of these changes have anything to do with the tragedy of December 19, 2019. We are always open to discussion with BI&E regarding our procedures and training materials. BI&E does so regularly. Waiting to raise these three minor issues for two and one half year in a complaint proceeding was unnecessary.

VII. CONCLUSION

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes. This concludes my rebuttal testimony. I reserve the right to file additional responsive testimony. Thank you.

Exhibit JH-1

BI&E'S RESPONSES TO PGW SET I

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
COMMONWEALTH KEYSTONE BUILDING
400 NORTH STREET, HARRISBURG, PA 17120

BUREAU OF
INVESTIGATION
&
ENFORCEMENT

September 21, 2022

Via Electronic Mail
Daniel Clearfield, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street
8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Philadelphia Gas Works
800 West Montgomery Ave.
Philadelphia, PA 19122
Craig.Berry@pgworks.com

Re: Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement v. Philadelphia Gas Works
Docket No. C-2022-3033834
I&E's Answer to Philadelphia Gas Works' Interrogatories – Set I

Dear Counsel:

Enclosed is the Bureau of Investigation and Enforcement's ("I&E") **Answer to the Interrogatories of Philadelphia Gas Works- Set I** in the above-referenced matter.

Copies have been served on the parties of record in accordance with the Certificate of Service. If you have any questions, please contact the undersigned.

Sincerely,

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Enclosures

cc: Per Certificate of Service
Secretary Rosemary Chiavetta (*via e-file – Cover Letter and Certificate of Service Only)*
Hon. Dennis Buckley *(via email - debuckley@pa.gov – Cover Letter and Certificate of Service Only)*
Michael L. Swindler, Deputy Chief Prosecutor *(via email - mswindler@pa.gov)*
Stephanie M. Wimer, Senior Prosecutor *(via email- stwimer@pa.gov)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

ANSWERS OF THE BUREAU OF INVESTIGATION AND ENFORCEMENT TO THE INTERROGATORIES OF PHILADELPHIA GAS WORKS- SET I

Pursuant to 52 Pa. Code § 5.342, the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Commission"), by and through its prosecuting attorneys, files the within Answers to Interrogatories of Philadelphia Gas Works ("PGW")- Set I, directed to I&E, and in support thereof, avers as follows:

ANSWERS

1. Regarding Paragraph No. 17 of the Complaint, please provide a full and complete copy of I&E's Pipeline Safety Inspectors' investigation report upon which the allegations of the Complaint are based.

ANSWER: I&E formally objected to this request based upon attorney-client privilege and deliberative process privilege. *See Objections of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set I*, dated September 12, 2022.

2. Regarding Paragraph No. 37 of the Complaint referencing "private contractors reported seeing underground voids … on or about October 21, 2019", please identify:

   a. The names of the private contractors who reported seeing underground voids;

   b. The person(s) to whom the contractors reported the presence of underground voids and the date upon which each such report was made;

   c. How I&E became aware of such reports and the date(s) upon which I&E became aware;

   d. The contents of each report. If the reports are in the possession of I&E, produce copies of the reports;

   e. If the reports were oral, provide any and all documents related thereto, including notes of any conversations;

   f. Any and all documents in I&E's possession relating to such "reports;" and

   g. Any and all basis upon which I&E believes that PGW received such reports or notice of such reports and the circumstance under which I&E believes that PGW received such reports or notice of such reports, including the date thereof.

Please provide copies of any and all documents reviewed by I&E in replying to this interrogatory.

ANSWER: I&E formally objected to (e), (f), and "Please provide copies of any and all documents reviewed by I&E in replying to this interrogatory," as the information sought is protected by attorney-client privilege and deliberative process privilege. *See Objections of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set I*, dated September 12, 2022. As for the remaining questions, I&E's answer is as follows:

a. Rich Lepore from Rich Lepore Plumbing and Joseph Emanuel from Emanuel Plumbing & Heating.

b. Reports were made verbally to I&E Pipeline Safety Inspector Christopher Whiteash at the explosion site on or about January 2, 2020.

c. Reports were made verbally to I&E Pipeline Safety Inspector Christopher Whiteash at the explosion site on or about January 2, 2020.

d. I&E Pipeline Safety was not provided any written report or document by a third-party contractor. However, I&E Pipeline Safety did have oral discussions which were reduced to writing and included in the investigative report which is protected. In an effort to be responsive to PGW's request, I&E has agreed to provide a summary.

Rich Lepore from Rich Lepore Plumbing reported completing an emergency sewer lateral repair at 1433 South 8th Street on October 8, 2019. Mr. Lepore reported no water in the trench but discovered multiple underground voids at a depth of two to three feet. He also reported seeing a collapsed and separated sewer lateral five to six feet below the asphalt surface.

Joseph Emanuel from Emanuel Plumbing & Heating reported performing an emergency repair at 1431 South 8th Street on November 1, 2019. Mr. Emanuel reported seeing water in the trench, which needed pumped, and hearing the distinct sound of water draining into the sewer main from another location. He also reported seeing underground voids for a distance of at least ten feet between the water main and sewer main.

e. Objection.

f. Objection.

g. I&E Pipeline Safety is unaware of any circumstance in which it believes PGW received any report, notice, or other communication related to these reports prior to the explosion.

Objection.

Answer provided by: Christopher Whiteash, Fixed Utility Valuation Engineer

3. Regarding Paragraph No. 67 of the Complaint, please identify all documents that I&E Pipeline Safety Inspectors reviewed to support the conclusion that training given to locators did not address underground street trouble.

ANSWER: I&E Pipeline Safety reviewed the following documents:

- **Power Point presentation used for locator training presented to I&E Pipeline Safety Inspectors by J. Durante (Manager of Training, PGW) on January 29, 2020 during a meeting with PGW**
- **Bulletin #54, effective Date: 4/15/11, Protection of PGW facilities from underground street troubles**
- **Bulletin #312, effective date 9/1/13, Summary of distribution department damage prevention program**
- **Bulletin #313, effective date 8/2/16, Instructions for distribution department damage prevention inspectors**
- **List of PGW OQ tasks**

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

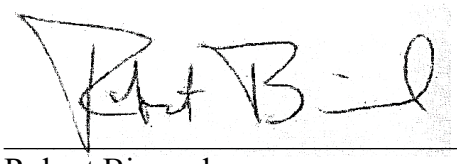
BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Robert Biggard, Supervisor, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: September 21, 2022



Robert Biggard
Supervisor, Pipeline Safety
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Elena Bozhko, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: September 21, 2022

Elena Bozhko
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing **Answer of the Bureau of Investigation and Enforcement to the Interrogatories of Interrogatories of Philadelphia Gas Works- Set I** dated September 21, 2022, upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

Service by Electronic Mail Only

Daniel Clearfield, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street
8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Senior Attorney
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122
craig.berry@pgworks.com

Kayla L. Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Date Created	Filing Number
9/21/2022	2435873

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Harrisburg, PA 17105-3265
EFILING - FILING DETAIL

Your filing has been electronically received. Upon review of the filing for conformity with the Commission's filing requirements, a notice will be issued acknowledging acceptance or rejection (with reason) of the filing. The matter will receive the attention of the Commission and you will be advised if any further action is required on your part.

The date filed on will be the current day if the filing occurs on a business day before or at 4:30 p.m. (EST). It will be the next business day if the filing occurs after 4:30 p.m. (EST) or on weekends or holidays.

Docket Number: C-2022-3033834
Case Description:
Transmission Date: 9/21/2022 3:01 PM
Filed On: 9/21/2022 3:01 PM
eFiling Confirmation Number: 2435873

File Name	Document Type	Upload Date
C-2022-3033834 (PGW) I&E Answer to PGW Interrogatories CL&COS.pdf	Certificate of Service	9/21/2022 3:00:57 PM

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BI&E'S RESPONSES TO PGW SET II

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
COMMONWEALTH KEYSTONE BUILDING
400 NORTH STREET, HARRISBURG, PA 17120

BUREAU OF
INVESTIGATION
&
ENFORCEMENT

October 27, 2022

Via Electronic Mail

Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Re: Pennsylvania Public Utility Commission,
Bureau of Investigation and Enforcement v.
Philadelphia Gas Works
Docket No. C-2022-3033834
I&E's Answer to Philadelphia Gas Works' Interrogatories – Set II

Dear Counsel:

Enclosed is the Bureau of Investigation and Enforcement's ("I&E") **Answer to the Interrogatories of Philadelphia Gas Works- Set II** in the above-referenced matter.

Copies have been served on the parties of record in accordance with the Certificate of Service. If you have any questions, please contact the undersigned.

Sincerely,

Kayla L Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

KLR/ac
Enclosures

cc: Per Certificate of Service
Secretary Rosemary Chiavetta (*via e-file – Cover Letter and Certificate of Service Only)*
Hon. Dennis Buckley *(via email - debuckley@pa.gov – Cover Letter and Certificate of Service Only)*
Michael L. Swindler, Deputy Chief Prosecutor *(via email - mswindler@pa.gov)*
Stephanie M. Wimer, Senior Prosecutor *(via email- stwimer@pa.gov)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

ANSWERS OF THE BUREAU OF INVESTIGATION AND ENFORCEMENT TO THE INTERROGATORIES OF PHILADELPHIA GAS WORKS- SET II

Pursuant to 52 Pa. Code § 5.342, the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Commission"), by and through its prosecuting attorneys, files the within Answers to Interrogatories of Philadelphia Gas Works ("PGW")- Set II, directed to I&E, and in support thereof, avers as follows:

ANSWERS

1. Regarding I&E's response to PGW-I-2:

   a. To the best of your knowledge and information, state whether Rich Lepore, Rich Lepore Plumbing, or any of its employees or agents reported underground voids to any other person or entity in addition to the described conversation with I&E Inspector Whiteash. If yes, identify the entity or person receiving such report, the date of such reporting and the basis of I&E's knowledge of such report.

   b. To the best of your knowledge and information, state whether Joseph Emanuel, Emanuel Plumbing & Heating, or any of its employees or agents reported underground voids to any other person or entity in addition to the described conversation with I&E Inspector Whiteash. If yes, identify the entity or person receiving such report, the date of such reporting and the basis of I&E's knowledge of such report.

   c. For (a) & (b) above, state whether any PA One Call Report was made by any party regarding observation of the underground voids on or about October 8, 2019 and November 1, 2019.

Please provide copies of any and all documents reviewed by I&E in replying to this interrogatory.

ANSWER: I&E formally objected to "Please provide copies of any and all documents reviewed by I&E in replying to this interrogatory" based upon attorney-client privilege and deliberative process privilege. *See Objections of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set II*, dated October 17, 2022.

(a) By way of an I&E interview with Rich Lepore of Rich Lepore Plumbing, I&E discovered that Mr. Lepore reported underground voids on October 8, 2019 to a Philadelphia Water Department ("PWD") employee (name unknown) who was inspecting the emergency repair of the sewer lateral located at 1433 South 8th Street. PWD contracted Rich Lepore Plumbing to perform water repair work.

(b) By way of an I&E interview with Joseph Emanuel of Emanual Plumbing & Heating, I&E discovered that Mr. Emanuel reported underground voids on November 1, 2019 to a PWD employee (name unknown) who was inspecting the emergency repair of the sewer lateral located at 1431 South 8th Street. PWD contracted Emanual Plumbing & Heating to perform water repair work.

(c) The term "PA One Call Report" does not exist as it relates to the Underground Utility Line Protection Law, Pennsylvania Act 287 of 1974 as amended by Act 50 of 2017, 73 P. S. § 176 *et. seq.* ("PA One Call Law"). Assuming that PGW intends to request one-call tickets or alleged violation reports ("AVRs") regarding "observation of the underground voids" at 8th Street on or about October 8, 2019 and November 1, 2019, I&E is not aware of any One Call document which includes observations made by third-party excavators during the excavation process.

Objection. Non-privileged documents responsive to this request are attached as I&E Set II-Attachment 1.

Answer provided by: Christopher Whiteash, Fixed Utility Valuation Engineer

2. Regarding I&E's response to PGW-I-2 (d):

   a. Confirm that the reports by Rich Lepore and Joseph Emanuel were limited to voids observed in and around water and sewer mains.

   b. Identify any and all voids at or near PGW gas mains reported by Rich Lepore and Joseph Emanuel.

ANSWER:

(a) To the best of I&E's information and belief, the reports made by Rich Lepore and Joseph Emanuel to the PWD concerned the voids they observed in and around water and sewer mains, as well as the associated remedial work that they performed.

(b) I&E is unable to identify any and all voids at or near PGW gas main reported by Rich Lepore and Joseph Emanuel beyond what was articulated in I&E's Answer to Question 1(a) and 1(b).

Answer provided by: Christopher Whiteash, Fixed Utility Valuation Engineer

3. Regarding Paragraph 71 of the Complaint. Fully and completely explain the basis for alleging that PGW "failed to repair" this section of 6-inch line given that PGW was unaware of its condition prior to the accident.

ANSWER: I&E disputes the characterization that PGW was unaware of the condition of the 6-inch cast iron main. Prior to the explosion, PGW received various notifications/One Call requests for the 1400 block of South 8th Street. The notifications mentioned water and/or sewer repairs, therefore PGW had been aware of the construction/repair work in the area.

PGW did not safeguard PGW facilities during those excavation activities. Water leaks scour and weaken the surrounding soil which is the foundation for pavement and underground utilities such as water, gas, or sewer facilities. Sewers and sewer laterals are located well below gas facilities, making the probability of gas mains losing support high. The repair process to excavate sewer facilities can also loosen and weaken soil due to the size of the excavation during the sewer repair process. The likelihood of further weakening of the soil surrounding the pipeline facilities is increased if there are multiple excavations in close proximity.

PGW employees who visited the location to mark PGW's facilities either prior or during excavation activities did not perform inspection and necessary follow-up actions in accordance with the "Protection of PGW Facilities from Underground Street Troubles," Bulletin #54, procedure upon receipt of notice of water or sewer system failures. Subsurface conditions, such as cavities or cave-ins may have been caused by such failures, which in turn affected the integrity of the cast-iron facilities. PGW did not inspect any underground street trouble encountered and did not report the same to the Distribution Dispatching and supervisor. PGW did not inspect third party construction activities for the purpose of protecting PGW underground structures and facilities.

Further, because PGW employees did not perform the required steps above, they did not report undermined gas mains immediately to the PGW supervisor. Since PGW did not act on the concentrated number of One Call notices on the 1400 block and the ensuing construction activity, this adversely affected the integrity of the 6-inch cast iron main by the weakening of the soil and/or undermining of the pipeline.

Thus, PGW failed to reinforce and protect the integrity of the main. PGW did not recognize, react, or investigate and take the proper steps to mitigate the danger caused by compromised soil conditions.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

4. Regarding Paragraph 72 of the Complaint. Fully and completely explain the basis for alleging that, prior to the accident, "[PGW] had knowledge that the support for the segment of this buried cast iron pipeline was disturbed by excavation activity near the pipeline.

ANSWER: See I&E's Answer to Question 3 and I&E Set II-Attachment 1.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

5. Regarding Paragraph 74 of the Complaint. Fully and completely explain the basis for alleging that PGW "failed to protect" the 6-inch cast iron main from the disturbance caused by the proximate water and sewer repair work given that PGW was unaware of this condition prior to the accident.

ANSWER: I&E disputes the characterization that PGW was unaware of the condition of the area near the 6-inch cast iron main. See I&E's Answer to Question 3.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

6. State each and every factual basis for I&E's allegations in Paragraph 70 of the Complaint that:

   a. PGW failed to adequately monitor its pipeline facilities;

   b. PGW failed to have a continuing surveillance procedure; and

   c. PGW failed to subsequently conduct a continuing surveillance of those pipeline facilities.

ANSWER:

(a) See I&E's Answer to Question 3.

(b) Pursuant to 49 CFR § 192.613(a), PGW is required to have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions. PGW has not developed or implemented a continuing surveillance procedure.

(c) For the reasons explained in I&E's Answer to Question 3, PGW was placed on notice of unusual operating and maintenance conditions surrounding its natural gas mains. PGW failed to continually survey those facilities in accordance with 49 CFR § 192.613(a).

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

REQUEST FOR ADMISSIONS

1. I&E has no record of any person contacting PGW to inform PGW that voids were observed during the emergency sewer lateral repair at 1433 South 8th Street undertaken on or about October 8, 2019.

   Admit __ Deny__

ANSWER: Admitted in part, Denied in part. Admitted that I&E has no record of any person directly contacting PGW regarding the voids observed during the emergency sewer lateral. Denied that no record exists to apprise PGW of the numerous emergency excavation and water/sewer repair work completed near its facilities.

2. I&E has no record of any person contacting PGW to inform PGW that voids were observed during the emergency sewer lateral repair at 1431 South 8th Street undertaken on or about November 1, 2019.

Admit __ Deny__

ANSWER: Admitted in part, Denied in part. Admitted that I&E has no record of any person directly contacting PGW regarding the voids observed during the emergency sewer lateral. Denied that no record exists to apprise PGW of the numerous emergency excavation and water/sewer repair work completed near its facilities.

I&E
Attachment 1

A8. Sewer Connection/Lateral Repair Inspection Report

Date: 10/8/2019

Time: _____

Project Address: 1433 S 8TH ST

Connection/ Repair Permit Number: 2019/2677 WO: 2406772 EMERGENCY REPAIR

Plumber Name: RICHARD LEPORE JR

Plumber Address: 44 STRATTON LANE SEWELL

Telephone Number: 215-778-6909

Contractor: LEPORE PLUMBING INC.

In witness that inspection is taking place (Please Sign and Print):

Inspector: _____ **Plumber:** _____

Please note if any of the information above is missing, the connection cannot proceed

Repair Type: ☐ House Drain (incidental only) ☐ Vent ☑ Lateral / Slant ☐ Curb Trap

Is this repair correctly represented on the Connection Permit? ☐ Yes ☐ No ☑ Emergency**

Please note if the above answer is no, work cannot continue until the Permit is corrected

Repair Location: 1433 S. 8th Street

Pipe Material: ☐ RCP ☑ CIP ☐ DIP ☐ VCP

Is excavation shored properly? ☑ Yes ☐ No ☐ N/A

Date and time for backfilling inspection: Same

Was the backfill tamped? ☑ Yes ☐ No ☐ Other: _____

Is the backfill material clean? ☑ Yes ☐ No ☐ Unknown

Was Streets Department Notified?: ☐ Yes ☑ No (**Means of Notification:** ☐ E-mail ☐ Phone call)

☑ **REPAIR COMPLIES** ☐ **REPAIR DOES NOT COMPLY**

Comments: Waited for permit number. Date changed to 10/15/19

Permit must be obtained within 3 days of repair or replacement. Must be a **true emergency.

Ticket Output Delivered to CDC: PZ

CDC 00000 POCS MM/DD/YY TT:TT:TT 20190592364-000 NEW XCAV EMER

==========PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST==========
Serial Number--[20190592364]-[000] Channel#--[1515A011][0428][2019-01]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA] Municipality--[PHILADELPHIA CITY] Ward--[01]
Work Site--[1411 S 8TH ST]
Nearest Intersection--[REED ST]
Second Intersection--[WILDER ST]
At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
Subdivision--[]
Location Information--
[]
Caller Lat/Lon--[]
Mapped Type--[X] Mapped Lat/Lon--
[39.931267/-75.157679]
Attachments--[http://www.pa811.org/attachments/20190592364]
Type of Work--[REPAIR OR REPL MAIN SWR LINE] Depth--[5FT]
Extent of Excavation--[] Method of Excavation--[HAND DIGGING]
Equip Type--[HAND TOOLS]
Street--[X] Sidewalk--[X] Pub Prop--[ ] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[X] Left--[X] Right--[X]

Lawful Start Dates--[ ] thru [ ] Response Due Date--[28-Feb-19]
Scheduled Excavation Date--[28-Feb-19] Dig Time--[1530] Duration--[]

Caller--[LAURA EGAN]
Caller Phone--[215-206-5351]
Excavator--[RAPID ROOTER PLUMBING AND HEATING]
Address--[6 W BLACKHORSE PIKE]
City--[WILLIAMSTOWN] State--[NJ] Zip--[08094]
FAX--[609-878-3332] Caller Type--[B]
Email--[rapidrooter412@gmail.com]
Work For--[RONALD FEDERICO]
Onsite Contact--[DAVID NIEVES]
Onsite Contact Phone--[215-206-5351]
Best Time to Call--[ANYTIME]
Onsite Contact Email--[rapidservices6@yahoo.com]

Prepared--[28-Feb-19] at [1522] by [VALERIE HENZE]
Remarks--
[]

CQ 0 CQ =COMCAST CABLE KA 0 KA =PECO SCKL PD 0 PD =PHILA C WTR DPT
PSD0 PSD=PHILADELPHIA ST PZ 0 PZ =PGW PHLA YA 0 YA =VERIZON PA PHIL

Serial Number--[20190592364]-[000]
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```
Ticket Output Delivered to CDC: PZ

CDC    00000 POCS MM/DD/YY TT:TT:TT 20192752094-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192752094]-[000] Channel#--[1202A022][0209][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1427-1431 S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930975/-75.157999,39.930829/-75.158030,39.930828/-75.158011,
      39.930973/-75.157976]
     Attachments--[http://www.pa811.org/attachments/20192752094]
Type of Work--[LOCATE AND REPAIR WATER LEAK]                  Depth--[]
Extent of Excavation--[]                Method of Excavation--[DIGGING]
Equip Type--[]
Street--[X] Sidewalk--[X] Pub Prop--[ ] Pvt Prop--[ ] Other--[]
Private Front--[ ] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[02-Oct-19]
      Scheduled Excavation Date--[02-Oct-19] Dig Time--[1215] Duration--[]

Caller--[ADRIENNE HARRIS]
Caller Phone--[215-685-9638]
Excavator--[PHILADELPHIA CITY WATER]
Address--[N 28TH ST AND W CAMBRIA ST]
City--[PHILADELPHIA]                                State--[PA] Zip--[19132]
FAX--[215-226-2409]              Caller Type--[B]
Work For--[PHILADELPHIA CITY WATER]
Onsite Contact--[EMERGENCY]
Onsite Contact Phone--[215-685-9638]
Best Time to Call--[ANYTIME]
Job Number--[2391952]

Prepared--[02-Oct-19] at [1205] by [DARLENE SPANO]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192752094]-[000]
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Ticket Output Delivered to CDC: PZ

CDC    00000 POCS MM/DD/YY TT:TT:TT 20192803422-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192803422]-[000] Channel#--[1536A013][0208][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1433 S 8TH ST]
     Nearest Intersection--[DICKINSON ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[Y]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930842/-75.157928,39.930798/-75.157935,39.930801/-75.158012,
      39.930849/-75.158003]
     Attachments--[http://www.pa811.org/attachments/20192803422]
Type of Work--[REPAIR SEWER LINE]                                Depth--[6FT]
Extent of Excavation--[2 AT 3FT X 6FT]  Method of Excavation--[DIGGING]
Equip Type--[BH AND HAND TOOLS]
Street--[X] Sidewalk--[X] Pub Prop--[ ] Pvt Prop--[ ] Other--[]
Private Front--[ ] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[07-Oct-19]
    Scheduled Excavation Date--[08-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[RICH LEPORE]
Caller Phone--[215-778-6909]
Excavator--[LEPORE PLUMBING]
Address--[44 STRATTON LN]
City--[SEWELL]                                  State--[NJ] Zip--[08080]
FAX--[856-232-0827]              Caller Type--[B]
Email--[leporeplumbing@gmail.com]
Work For--[JOE SMARK]
Onsite Contact--[RICH LEPORE]
Onsite Contact Phone--[215-778-6909]
Best Time to Call--[ANYTIME]
Onsite Contact Email--[leporeplumbing@gmail.com]

Prepared--[07-Oct-19] at [1540] by [STACY BOOKER]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192803422]-[000]
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Ticket Output Delivered to CDC: PZ

CDC    00000 POCS MM/DD/YY TT:TT:TT 20192901689-000 NEW  XCAV RTN

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192901689]-[000] Channel#--[1108A013][0178][2019-08]
Message Type--[NEW][EXCAVATION][ROUTINE]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1430 S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930903/-75.158090,39.930927/-75.158288,39.930975/-75.158277,
      39.930952/-75.158088]
     Attachments--[http://www.pa811.org/attachments/20192901689]
Type of Work--[REPLACE CURB TRAP LATERAL]                    Depth--[]
Extent of Excavation--[]               Method of Excavation--[DIGGING]
Equip Type--[BH AND JACKHAMMER]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[22-Oct-19] thru [31-Oct-19] Response Due Date--[21-Oct-19]
    Scheduled Excavation Date--[22-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[CHRISTINE LONG]
Caller Phone--[215-742-3813]
Excavator--[MISTER DS PLUMBING]
Address--[6001 RISING SUN AVE]
City--[PHILADELPHIA]                          State--[PA] Zip--[19111]
FAX--[215-725-7218]             Caller Type--[B]
Work For--[THE HELP PROGRAM]
Onsite Contact--[DIANE DIXON]
Onsite Contact Phone--[215-742-3813]
Best Time to Call--[0800-1600]

Prepared--[17-Oct-19] at [1111] by [STACY BOOKER]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL        PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA         YA 0  YA =VERIZON PA PHIL

Serial Number--[20192901689]-[000]
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Ticket Output Delivered to CDC: PZ

CDC    00000 POCS MM/DD/YY TT:TT:TT 20192940516-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192940516]-[000] Channel#--[0816A025][0217][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[S 8TH ST]
     Nearest Intersection--[WILDER ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     [WORKING AT 1428 AND 1430 S 8TH ST.]
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.930984/-75.157990,39.931022/-75.158283,39.930931/-75.158301,
      39.930894/-75.158011]
     Attachments--[http://www.pa811.org/attachments/20192940516]
Type of Work--[REPLACING A 5IN LATERAL]                        Depth--[7FT]
Extent of Excavation--[3FT X 4FT]       Method of Excavation--[DIGGING]
Equip Type--[BH]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[21-Oct-19]
    Scheduled Excavation Date--[22-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[BART EMANUEL]
Caller Phone--[215-467-5282]
Excavator--[BART EMANUEL PLUMBING]
Address--[2819 S SMEDLEY ST]
City--[PHILADELPHIA]                              State--[PA] Zip--[19145]
FAX--[]                        Caller Type--[B]
Work For--[BART EMANUEL PLUMBING]
Onsite Contact--[BART EMANUEL]
Onsite Contact Phone--[215-783-2780]
Best Time to Call--[ANYTIME]

Prepared--[21-Oct-19] at [0820] by [MYRA BOOK]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL         PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA          YA 0  YA =VERIZON PA PHIL

Serial Number--[20192940516]-[000]
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Ticket Output Delivered to CDC: PZ

CDC    00000 POCS MM/DD/YY TT:TT:TT 20192960460-000 NEW  XCAV EMER

============PENNSYLVANIA UNDERGROUND UTILITY LINE PROTECTION REQUEST============
Serial Number--[20192960460]-[000] Channel#--[0815A021][0260][2019-08]
Message Type--[NEW][EXCAVATION][EMERGENCY]

County--[PHILADELPHIA]    Municipality--[PHILADELPHIA CITY]          Ward--[01]
Work Site--[1431 S 8TH ST]
     Nearest Intersection--[DICKINSON ST]
     Second Intersection--[REED ST]
     At Intersection--[N] Between Intersections--[Y] Site Marked in White--[N]
     Subdivision--[]
Location Information--
     []
     Caller Lat/Lon--[]
Mapped Type--[P] Mapped Lat/Lon--
     [39.931532/-75.157482,39.930378/-75.157740,39.930454/-75.158477,
      39.931655/-75.158148]
     Attachments--[http://www.pa811.org/attachments/20192960460]
Type of Work--[REPL 5IN SWR LATERAL]                          Depth--[7FT]
Extent of Excavation--[3FT X 4FT]       Method of Excavation--[DIGGING]
Equip Type--[BH]
Street--[X] Sidewalk--[X] Pub Prop--[X] Pvt Prop--[X] Other--[]
Private Front--[X] Rear--[ ] Left--[ ] Right--[ ]

Lawful Start Dates--[         ] thru [         ] Response Due Date--[24-Oct-19]
    Scheduled Excavation Date--[25-Oct-19] Dig Time--[0800] Duration--[1 DAY]

Caller--[BART EMANUEL]
Caller Phone--[215-467-5282]
Excavator--[BART EMANUEL PLUMBING]
Address--[2819 S SMEDLEY ST]
City--[PHILADELPHIA]                              State--[PA] Zip--[19145]
FAX--[]                        Caller Type--[B]
Work For--[BART EMANUEL PLUMBING]
Onsite Contact--[BART EMANUEL]
Onsite Contact Phone--[215-783-2780]
Best Time to Call--[ANYTIME]

Prepared--[23-Oct-19] at [0820] by [VALERIE HENZE]
Remarks--
     []

CQ 0  CQ =COMCAST CABLE    KA 0  KA =PECO SCKL         PD 0  PD =PHILA C WTR DPT
PSD0  PSD=PHILADELPHIA ST  PZ 0  PZ =PGW PHLA          YA 0  YA =VERIZON PA PHIL

Serial Number--[20192960460]-[000]
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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Christopher Whiteash, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: October 27, 2022



Christopher Whiteash
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Elena Bozhko, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: October 27, 2022



Elena Bozhko
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing **Answer of the Bureau of Investigation and Enforcement to the Interrogatories of Interrogatories of Philadelphia Gas Works- Set II** dated October 27, 2022, upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

Service by Electronic Mail Only

Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Senior Attorney
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122
craig.berry@pgworks.com

Kayla L. Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Date Created	Filing Number
10/27/2022	2441168

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Harrisburg, PA 17105-3265
EFILING - FILING DETAIL

Your filing has been electronically received. Upon review of the filing for conformity with the Commission's filing requirements, a notice will be issued acknowledging acceptance or rejection (with reason) of the filing. The matter will receive the attention of the Commission and you will be advised if any further action is required on your part.

The date filed on will be the current day if the filing occurs on a business day before or at 4:30 p.m. (EST). It will be the next business day if the filing occurs after 4:30 p.m. (EST) or on weekends or holidays.

Docket Number: C-2022-3033834
Case Description:
Transmission Date: 10/27/2022 2:32 PM
Filed On: 10/27/2022 2:32 PM
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File Name	Document Type	Upload Date
C-2022-3033834 (PGW) I&E Answers to PGW Interrogatories - Set II CL&COS FINAL.pdf	Certificate of Service	10/27/2022 2:31:20 PM

For filings exceeding 250 pages, the PUC is requiring that filers submit one paper copy to the Secretary's Bureau within three business days of submitting the electronic filing online. Please mail the paper copy along with copy of this confirmation page to Secretary, Pennsylvania Public Utility Commission, 400 North Street, Harrisburg PA 17120 a copy of the filing confirmation page or reference the filing confirmation number on the first page of the paper copy.

No paper submission is necessary for filings under 250 pages.

You can view a record of this filing and previous filings you have submitted to the PUC by using the links in the Filings menu at the top of the page. Filings that have been submitted within the last 30 days can be viewed by using the Recent Filings link. Older filings can be viewed by using the search options available in the Filing History link.

BI&E'S RESPONSES TO PGW SET III

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
COMMONWEALTH KEYSTONE BUILDING
400 NORTH STREET, HARRISBURG, PA 17120

BUREAU OF
INVESTIGATION
&
ENFORCEMENT

December 5, 2022

Via Electronic Mail
Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Re: Pennsylvania Public Utility Commission,
Bureau of Investigation and Enforcement v.
Philadelphia Gas Works
Docket No. C-2022-3033834
I&E's Answer to Philadelphia Gas Works' Interrogatories – Set III

Dear Counsel:

Enclosed is the Bureau of Investigation and Enforcement's ("I&E") **Answer to the Interrogatories of Philadelphia Gas Works- Set III** in the above-referenced matter.

Copies have been served on the parties of record in accordance with the Certificate of Service. If you have any questions, please contact the undersigned.

Sincerely,

Kayla L Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

KLR/ac
Enclosures

cc: Per Certificate of Service
Secretary Rosemary Chiavetta (*via e-file – Cover Letter and Certificate of Service Only)*
Hon. Dennis Buckley *(via email - debuckley@pa.gov – Cover Letter and Certificate of Service Only)*
Michael L. Swindler, Deputy Chief Prosecutor *(via email - mswindler@pa.gov)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

ANSWERS OF THE BUREAU OF INVESTIGATION AND ENFORCEMENT
TO THE
INTERROGATORIES OF PHILADELPHIA GAS WORKS- SET III

Pursuant to 52 Pa. Code § 5.342, the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Commission"), by and through its prosecuting attorneys, files the within Answers to Interrogatories of Philadelphia Gas Works ("PGW")- Set III, directed to I&E, and in support thereof, avers as follows:

ANSWERS

1. Regarding paragraph 33 of the Complaint, which avers that "[t]he 1400-block of South 8th Street was the subject of frequent excavation activity":

   a. Define the term "frequent" as used in this paragraph.

   b. Identify any and all facts relied upon by I&E to support the averment that such excavation activity was "frequent."

   c. Identify the point(s) of comparative reference to conclude that excavation activity was "frequent."

   d. Define, in numeric terms, the amount of excavation activity that would not be "frequent."

e. If excavation activity had not been "frequent," state whether I&E believes that PGW would have been in violation as alleged at paragraphs 69, 70, 71 and 72. Explain your answer fully.

f. State whether the comparative point(s) of reference for allegation of "frequent" excavation activity is specific to PGW's service territory or some other. If not PGW, identify such area used.

ANSWER:

a. The term "frequent" is defined as "occurring or appearing often or at close intervals, habitual or constant, to visit repeatedly" or "to associate with, be in, or resort to often or habitually, often repeated or occurring." *See The Free Dictionary*, https://www.thefreedictionary.com/frequent; *Merriam-Webster Dictionary*, https://www.merriam-webster.com/dictionary/frequent.

b. The excavation activity was "frequent" because it occurred more than once. There were seven (7) One Call tickets made for the 1400-block of South 8th Street in the 12-months prior to the explosion. Six (6) of these locate requests occurred in the two and a half (2.5) months prior to the explosion, five (5) of which were classified as emergency requests in close proximity to the explosion site.

c. I&E referenced the definition of "frequent" as provided in I&E Answer-Set III, Question 1(a) to conclude that the excavation activity was frequent.

d. The amount of excavation activity that is not frequent would be no excavation activity to one instance of excavation activity.

e. The violations alleged in paragraphs 69-72 occurred regardless of whether the excavation activity was frequent or a one-time occurrence.

f. The comparative point of reference is not specific to PGW's service territory or any other service territory. The term "frequent' was used in accordance with its definition as provided in I&E Answer- Set III, Question 1(a).

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer
Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

2. Regarding paragraph 70 of the Complaint, which avers "unusual operating and maintenance conditions" on the 1400 block of South 8th Street:

   a. Define the term "unusual" as used in this paragraph.

   b. Identify the specific "operating and maintenance conditions" to which the averment is referring.

   c. Identify any and all facts relied upon by I&E to support the averment that operating and maintenance conditions were "unusual."

   d. Define, in numeric terms, the level of operating and maintenance conditions that would not be "unusual."

   e. If operating and maintenance conditions had not been "unusual," state whether I&E believes that PGW would have been in violation as alleged at paragraph 70. Explain your answer fully.

   f. State whether the comparative point of reference for the allegation of "unusual operating and maintenance conditions" is specific to PGW's service territory or some other. If not PGW, identify such area used.

ANSWER:

a. The term "unusual" is defined as "not usual, common, or ordinary; uncommon in amount or degree; exceptional" or "out of the ordinary; uncommon." *See Dictionary.com*, https://www.dictionary.com/browse/unusual; *The Free Dictionary*, https://www.thefreedictionary.com/unusual.

b. Operating and Maintenance conditions include the notice of excavation and PGW locate requests via the Pennsylvania One Call tickets, which indicated unstable soil conditions near PGW's cast iron pipeline facilities. See also I&E Answer- Set II, Question 3.

c. See I&E Answer- Set II, Question 1(a)-(b) and Attachment 1.

d. The level of operating and maintenance conditions that would not be unusual cannot be defined in numeric terms. The severity of a condition is not always number dependent.

e. The violations alleged in paragraph 70 occurred regardless of whether the operating and maintenance conditions had not been "unusual" because PGW does not have an adequate continuing surveillance procedure in place for identifying threatening integrity issues to the pipeline system

and PGW has not performed continuing surveillance according to its procedures.

f. The comparative point of reference is not specific to PGW's service territory or any other service territory.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer
Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

3. Regarding the fourth paragraph of I&E's response to PGW-II-3 and the statement "PGW did not act on the concentrated number of One Call notices on the 1400 block…":

   a. Define the term "concentrated" as used in I&E's response to PGW-II-3.

   b. To the best of I&E's information, knowledge, and belief, identify the number of One Call notices that normally occur on one city block in Philadelphia in a given year. Identify the source of such information.

   c. To the best of I&E's information, knowledge, and belief, identify how many One Call notices were made for the 1400 block of South 8th Street in the 12-months prior to the accident. Identify the source of such information.

   d. Define, in numeric terms, what constitutes a "concentrated number of One Call notices." Identify the sources of such information.

   e. Define, in numeric terms, what number of One Call notices would not be considered to be "concentrated." Identify the sources of such information.

   f. Provide any and all data that supports I&E's contention that a "concentrated number of One Call notices" occurred on the 1400 block of South 8th Street prior to the accident.

   g. Explain I&E's correlation between the number of One Call notices on a city block and the conclusion that the integrity of utility facilities on that block were adversely affected.

   h. Fully and completely state the basis for I&E's conclusion that a "[s]ince PGW did not act on the concentrated number of One Call notices on the 1400 block [of South 8th Street] and the ensuing construction activity, this adversely affected the integrity of the 6-inch cast iron main by weakening of the soil and/or undermining the pipeline."

   i. If the number of One Call notices were not "concentrated," state whether I&E believes that PGW would have been in violation as alleged at paragraphs 69, 70, 71 and 72. Explain your answer fully.

ANSWER:

a. The term "concentrated" is defined as "contained or existing or happening together in a small or narrow space or area, not spread out" or "clustered or gathered together closely." *See Merriam-Webster Dictionary*, https://www.merriam-webster.com/dictionary/concentrated; *Dictionary.com*, https://www.dictionary.com/browse/concentrated.

b. In reviewing the Pennsylvania One Call System, the number of tickets along the 1400-block of South 8th Street was one (1) ticket in 2016; three (3) tickets in 2017; and three (3) tickets in 2018. Many variables exist to determine the average or normal number of tickets on one city block in Philadelphia in any given year. However, the frequency, concentration, and type of One Call tickets (i.e., water leak), coupled with PGW's inability to protect its facilities in light of the frequent excavation activity, is the focus of this complaint proceeding.

c. Reference I&E's Answer to Set II- I&E Attachment 1, pages 2-7. There were seven (7) One Call tickets made for the 1400-block of South 8th Street in the 12-months prior to the explosion. The data is provided by Pennsylvania One Call System.

d. According to the Pennsylvania One Call System, there were five (5) tickets between October 2, 2019 through October 23, 2019, a 22-day period. However, the term "concentrated number of One Call notices" was used in accordance with the definition of "concentrated" and not as a definable, numeric term or calculation.

e. See I&E's Answer to Set III, Question 3(d). The term "concentrated" was used in accordance with the definition of "concentrated" as provided in I&E Answer to Set III, Question 3(a) and not as a definable, numeric term or calculation.

f. There were seven (7) One Call tickets made for the 1400-block of South 8th Street in the 12-months prior to the explosion. Six (6) of these locate requests occurred in the two and a half (2.5) months prior to the explosion, five (5) of which were classified as emergency requests in close proximity to the explosion site.

g. The number of One Call tickets on a city block and the effect on the integrity of utility facilities are not always directly related. The integrity of utility facilities will be most adversely affected by excavation activities that could undermine cast iron pipe, for example, water and/or sewer repairs. See also I&E Answer to Set II, Question 3.

h. See I&E's Answer to Set II, Question 3. Moreover, PGW had sufficient information and knowledge to determine that support for a segment of buried cast iron pipeline was compromised or had the potential to be compromised through the excavation activity occurring in the vicinity of its facilities. PGW did not have sufficient procedures in place to recognize or react to the threat in a proactive and safe manner, which resulted in the explosion at 1433 South 8th Street.

i. The violations alleged in paragraphs 69-72 occurred regardless of whether or not the One Call tickets were "concentrated."

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer
Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

4. Regarding the second paragraph of I&E's response to PGW-II-3 and the statement "if there are multiple excavations in close proximity":

   a. Define in units of feet, what I&E considers "close proximity" to pipeline facilities as used in the response. If "close proximity" as used in the response cannot be defined, fully and completely explain.

   b. Identify the location of PWD's water and sewer mains relative to those of PGW in the street of the 1400-block of South 8th Street.

ANSWER:

a. The term "close proximity" was not used in a definable, numeric term in I&E's response to PGW-II-3. "Close proximity" was used in the commonly accepted definition of "close to, near" and can be dependent on many factors, including but not limited to the type of excavation, the depth of excavation, and the local conditions. *See Merriam-Webster Dictionary*, https://www.merriam-webster.com/dictionary/in%20close%20proximity%20to.

b. I&E avers that if PGW were properly coordinating maintenance and construction efforts with other utilities, such as PWD, per its procedures, PGW would already have this information in its possession. With that said, I&E does not possess knowledge of the specific location of PWD's water and sewer mains. However, I&E understands that PWD's mains are under the same street as PGW's facilities and that both facilities run parallel to the street and parallel with each other under the same street, with the exception of some water and sewer laterals which branch off PWD's main and run perpendicular and underneath PGW's facilities.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer
Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Christopher Whiteash, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: December 5, 2022



Christopher Whiteash, P.E.
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

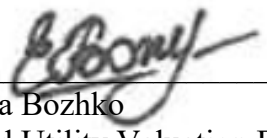
BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

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Dated: December 5, 2022



Elena Bozhko
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing **Answer of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set III** dated December 5, 2022, upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

Service by Electronic Mail Only

Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Senior Attorney
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122
craig.berry@pgworks.com



Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Date Created	Filing Number
12/5/2022	2446631

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Harrisburg, PA 17105-3265
EFILING - FILING DETAIL

Your filing has been electronically received. Upon review of the filing for conformity with the Commission's filing requirements, a notice will be issued acknowledging acceptance or rejection (with reason) of the filing. The matter will receive the attention of the Commission and you will be advised if any further action is required on your part.

The date filed on will be the current day if the filing occurs on a business day before or at 4:30 p.m. (EST). It will be the next business day if the filing occurs after 4:30 p.m. (EST) or on weekends or holidays.

Docket Number: C-2022-3033834
Case Description:
Transmission Date: 12/5/2022 2:38 PM
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eFiling Confirmation Number: 2446631

File Name	Document Type	Upload Date
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BI&E'S RESPONSES TO PGW SET IV

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
COMMONWEALTH KEYSTONE BUILDING
400 NORTH STREET, HARRISBURG, PA 17120

BUREAU OF
INVESTIGATION
&
ENFORCEMENT

March 1, 2023

Via Electronic Mail
Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Re: Pennsylvania Public Utility Commission,
Bureau of Investigation and Enforcement v.
Philadelphia Gas Works
Docket No. C-2022-3033834
I&E's Answer to Philadelphia Gas Works' Interrogatories – Set IV

Dear Counsel:

By email dated February 7, 2023, Philadelphia Gas Works granted the Bureau of Investigation and Enforcement's ("I&E") request for an extension to respond to Set IV, modifying the deadline from February 22, 2023 to March 1, 2023. Accordingly, enclosed is I&E's **Answer to the Interrogatories of Philadelphia Gas Works- Set IV** in the above-referenced matter. Please note that the Answer to No. 5(a) is **CONFIDENTIAL**.

Copies have been served on the parties of record in accordance with the Certificate of Service. If you have any questions, please contact the undersigned.

Sincerely,

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

KLR/ac
Enclosures

cc: Per Certificate of Service
Secretary Rosemary Chiavetta (*via e-file - Cover Letter and Certificate of Service Only)*
Hon. Dennis Buckley *(via email - debuckley@pa.gov - Cover Letter and Certificate of Service Only)*
Michael L. Swindler, Deputy Chief Prosecutor *(via email - mswindler@pa.gov)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

ANSWERS OF THE BUREAU OF INVESTIGATION AND ENFORCEMENT TO THE INTERROGATORIES OF PHILADELPHIA GAS WORKS- SET IV

Pursuant to 52 Pa. Code § 5.342, the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Commission"), by and through its prosecuting attorneys, files the within Answers to Interrogatories of Philadelphia Gas Works ("PGW")- Set IV, directed to I&E, and in support thereof, avers as follows:

ANSWERS

1. Refer to page 3, lines 5-6. State whether I&E believes that the level of reportable incidences since July 1, 2020 on the PGW system is high relative to other Pennsylvania gas distribution companies. If "yes," provide any and all documents, analysis, reports supporting such opinion.

ANSWER: I&E did not compare the level of reportable incidences on PGW's system to other Pennsylvania gas distribution companies.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

2. Refer to page 3, line 11.

   a. Define the term "hazardous leak."

   b. State whether I&E believes that the level of hazardous leaks between 2016 and 2020 on the PGW system is high relative to other Pennsylvania gas distribution companies. If "yes," provide any and all documents, analysis, reports supporting such opinion.

ANSWER:

a. Based on definition provided by PHMSA in document titled "Current GD Annual Instructions PHMSA F 7100.1-1 CY 2021 and Beyond Editorial.pdf,"[1] a "hazardous leak" means a leak that represents an existing or probable hazard to persons or property and requires immediate repair or continuous action until the conditions are no longer hazardous. A "hazardous leak" which occurs aboveground or belowground is a leak and must be reported.

b. Yes. Specifically, I&E reviewed the levels of hazardous leaks on the PGW system in 2019 and it was the highest relative to the six largest Pennsylvania gas distribution companies. [2]

Operator Name	Total Miles	Number of Services	Number of Hazardous leaks
Company A	20,054.67	595,741	1,162
Company B	16,273.43	621,616	1,457
Company C	11,927.37	433,668	630
Company D	13,347.82	460,656	668
Company E	7,422.36	193,847	463
Philadelphia Gas Works	5,929.24	476,605	2,049

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

1 https://www.phmsa.dot.gov/forms/gas-distribution-annual-report-instructions-f71001-1

2 https://www.phmsa.dot.gov/data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids

3. Refer to page 10, lines 4-7. State whether I&E believes that PGW's immediate response to the incident, including arrival interval, was appropriate. If "no" fully and completely identify the basis for such belief.

ANSWER: Based on the review conducted by I&E, no violations were found relating to PGW's immediate response to the incident.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

4. Refer to page 11, lines 3-4.

   a. Identify the measured distance between each and every "previous water/sewer repair" observed by the witness and the gas main failure near 1433 South 8th Street. If not measured, provide the witnesses' best estimate of the distance.

   b. Identify the One Call ticket number associated with each repair referenced.

ANSWER:

a. Ms. Bozhko did not personally witness any "previous water/sewer repairs" near 1433 South 8th Street and therefore cannot provide the best estimate of the distances.

b. The One Call ticket numbers are as follows: 20192752094; 20192803422; 20192901689; 20192940516; and 20192960460.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

5. Refer to page 11, lines 9-10.

   a. Identify the "neighbor."

   b. Identify the "construction crews."

   c. Provide a full and complete description of any discussion with the neighbor. Provide any and all documents related thereto.

   d. State whether the neighbor reported this information to PGW. If "yes," fully and completely describe how and where the information was provided to PGW.

   e. Identify the location of the settling of the road surface observed by the neighbor and the date of the observation.

   f. Describe the conditions of the settling observed by the neighbor.

ANSWER:

a. ***Confidential*** [redacted]

b. **Ms. Bozhko personally did not witness the repairs and therefore cannot identify the construction crews.**

c. **I&E partially objected to this Interrogatory. The neighbor, at the time of the interview, lived near the explosion site and was home at the time of the incident. He reported that there was a lot of utility work occurring in front of the exploded houses. Once such repair work included a water service repair to a fire hydrant which was leaking sometime in September 2019.**

The neighbor also stated that several contractors were working on sewer repairs in the area. Since homeowners are responsible for the sewer lateral repairs, there were several different contractors involved. One of the contractors was Bart Emanuel, who was called in to repair a sewer lateral and had to come back several times to do road surface restoration because the road kept settling.

The neighbor also reported seeing a large void in the roadway. However, he noted that when the Philadelphia Street Department came to repair the void, it only fixed a small section of it.

d. **Ms. Bozhko does not have any information on whether or not the neighbor reported this to PGW.**

e. The neighbor did not provide the dates of his observations. The neighbor did report seeing Bart Emanuel, one of the contractors who was completing repairs to a sewer lateral, come back to the location several times to do a road surface restoration because the road kept settling. Bart Emanuel had placed two One Call tickets dated October 21, 2019 and October 23, 2019 work completed on or around 1428, 1430, and 1431 South 8th Street.

f. See Answer to No. 5(c).

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

6. Refer to page 11, line 17.

   a. Identify any Federal statute or regulation, any Pennsylvania statute or regulation, or any PA jurisdictional gas distribution company standard operating procedures, including but not limited to PGW, which defines "frequent excavation activity."

   b. For any statute or regulation identified, state the basis for I&E imposing a heightened standard of care on PGW for affirmative actions based "frequent excavation activity" in proximity to utility infrastructure.

ANSWER:

a. I&E partially objected to this Interrogatory. Ms. Bozhko is not aware of any federal or Pennsylvania statute or regulation that defines "frequent excavation activity." See Set III, Answer to No. 1.

b. I&E denies that it is placing a "heightened standard of care" upon PGW. Rather, noting the fact that PGW has the most cast iron of all the gas utilities in Pennsylvania, PGW should be completing the appropriate actions and steps to protect its aging facilities. Moreover, undermining of pipelines is well-known[3] to be detrimental to the integrity of aged pipes such as gas, sewer, or water. Water leaks can cause softening and/or erosion of support, which is extremely detrimental to brittle pipe such as terracotta or graphitized cast iron.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

[3] https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory

7. Refer to page 12, line 4. State whether I&E believes that PGW properly marked out the locate requests. If "no" fully and completely identify the basis for such belief.

ANSWER: No, PGW did not properly mark the locate requests because all five tickets were marked late. According to PGW's procedures, an emergency One Call ticket is to be marked within two (2) hours of the notification and routine One Call tickets are to be marked within two (2) working days.

No. 20192752094 - Emergency - the ticket was called in on 02-Oct-2019 at 12:05 pm, so it needed to be marked by 02-Oct-2019 at 2:05 pm (within 2 hours). It was marked on 02-Oct-2019 at 7:50 pm, more than 5 hours late.

No. 20192803422 - Emergency - the ticket was called in on 07-Oct-2019 at 3:40 pm, so it needed to be marked by 07-Oct-2019 at 5:40 pm (within 2 hours). It was marked on 07-Oct-2019 at 9:46 pm, more than 4 hours late.

No. 20192901689 - Routine - the ticket was called in on 17-Oct-2019 at 11:11 am, so it needed to be marked by 21-Oct-2019 (within 2 working days). It was marked on 22-Oct-2019 at 11:40 am, more than a day later than required.

No. 20192940516 - Emergency - the ticket was called in on 21-Oct-2019 at 8:20 am, so it needed to be marked by 10:20 am of 21-Oct-2019. The ticket was marked at 11:43 on 21-Oct-2019, more than an hour late.

No. 20192960460 - Emergency - the ticket was called in on 23-Oct-2019 at 8:20 am, so needed to be marked within 2 hours or by 10:20 am of 23-Oct-2019. The ticket was marked on 24-Oct-2019 at 11:49 am, more than 25 hours later than required.

In addition, Ms. Bozhko cannot comment on the quality of the mark outs since she did not personally witness them.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

8. Refer to page 12, lines 17-18. Provide any and all photographs of the excavation of the cast iron main on December 22, 2019 in the possession of I&E that are not provided as exhibits.

ANSWER: See I&E Attachment IV-8.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

9. Refer to page 12, line 18.

   a. Identify the measured distance between each of the "fresh patches of pavement" and the "suspected main crack." If not measured, provide the witness' best estimate of the distance.

   b. Provide any and all photographs of the "fresh patches of pavement."

ANSWER:

a. Ms. Bozhko cannot provide an estimate of the distance.

b. None.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

10. Refer to page 16, lines 2-3 and Exhs. 15, 17 and 18. State whether the witness observed pre-existing voids under the cast iron main or whether the voids shown were the result of excavation of the line by PGW.

ANSWER: Yes. Exhibit 15 shows the excavation of the gas cast iron main, and the voids shown were the results of excavation. Exhibits 17 and 18 show the excavation of the water main in front of 1421 South 8th Street and are not results of the gas main excavation.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

11. Refer to page 13, lines 2-3. State whether I&E believes that PGW's excavation and extraction of the cast iron main was performed appropriately. If "no," fully and completely identify the basis for such belief.

ANSWER: Based on the review conducted by I&E, no violations were discovered during PGW's extraction of the cast iron main.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

12. Refer to page 13, lines 2-3 and 14 and I&E Exhs. 9 and 11. Identify the circumstances and the reason(s) that the metal plates were placed and the witness' source of such information. Identify all sources of information used to respond to this interrogatory. Provide any and all documents related thereto.

ANSWER: I&E partially objected to this Interrogatory. Ms. Bozhko does not have information as to the circumstances and reason(s) for the metal plates.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

13. Refer to page 13, lines 2-3 and I&E Exh. 9. Identify the causes of street depression. State specifically the whether the cause was or was not the previous presence and operation of heavy firefighting or other equipment due to the explosion. Provide any and all documents related thereto.

ANSWER: I&E partially objected to this Interrogatory. Ms. Bozhko cannot provide the causes of the street depression with 100% certainty because she did not personally visit the site prior to the explosion. Based on her interviews and investigation into this matter, at least one of the neighbors observed the repeated road settlement prior to the explosion. Ms. Bozhko has no information to contradict this information.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

14. Refer to page 16, lines 15 and 19-20.

    a. Identify the measured distance between the abandoned trolley tracks and PGW's gas main the 1400 block of South 8th Street. If not measured, provide the witnesses' best estimate of the distance.

    b. Provide any and all photographs of the trolley tracks in the possession of I&E.

ANSWER:

a. Ms. Bozhko did not personally measure the distance. However, I&E notes that PGW should have this information readily available, specifically the PGW drawing labeled 4X5111 with a revision date of February 7, 2020, final approval by Wenbin Zhao. This drawing was provided by PGW and includes detailed locations of all utilities on the 1400 block of South 8th Street and, among others, included the location of the trolly tracks (identified as "TRACKS (PAVED)".

b. None.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

15. Refer to page 17, lines 1-2.

a. Identify any standards, studies, or other literature which include generally accepted methodologies and principles that support or tend to support the witness' conclusion that the "tracks may have supported the pavement by preventing its collapse when the soil underneath was washed away."

b. State specifically all known and potential causes of the washed away the soil underneath the trolly tracks.

c. Provide copies of any and all documents relied upon in answering this interrogatory.

ANSWER:

a. I&E objected to this Interrogatory. Ms. Bozhko has no studies or literature.

b. The trolley tracks were first noted when Philadelphia Water Department ("PWD") employees were completing work in front of 1421 South 8th Street. When excavating in the middle of the roadway, PWD broke the pavement, and underneath the layers of asphalt and concrete, there was no soil. The pavement layers were supported by the trolley tracks as the layers of pavement collapsed downwards immediately after they were cut free. Several feet of soil underneath the pavement were completely washed away. When the One Call history for 1421 South 8th Street was requested, it showed that there were several One Call tickets for the area in the months prior to the above-mentioned excavation. All of the tickets involved various water and sewer repair work.

c. I&E partially objected to this Interrogatory. Pennsylvania One Call ticket Nos. 20170870096; 20180723184; 20180872591; 20181861383; and 20192562899. I&E does not possess a copy of the One Call tickets.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

16. Refer to page 17, lines 11-13. Confirm that, regarding the middle of the road excavation, no gas facilities were located or observed in PWD's excavation.

ANSWER: Ms. Bozhko did not observe any gas facilities during PWD's excavation.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

17. Refer to page 18, lines 17-28. State whether I&E believes that the performance of leak surveys by PGW, were appropriate. If "no" fully and completely identify the basis for such belief.

ANSWER: Based on the review conducted by I&E, no violations were discovered with regard to PGW's actual performance of leak surveys. However, I&E notes that PGW only initiated the leak surveys upon I&E's insistence that they be conducted. It is I&E's position that it was not appropriate that the leak surveys were not conducted until the end of January, over a month after the explosion occurred.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

18. Refer to page 23, line 3.

a. Identify each and every statute, regulation or other legal authority that expressly requires that the facilities owner be present, after appropriate One Call marking, during the excavation of the third-party facilities.

b. Identify any Pennsylvania natural gas distribution company that is required to be present, after marking, during the excavation of the third-party facilities. Provide any and all documents related to your response.

ANSWER:

a. Per 49 CFR Part § 192.614, Damage prevention program, Section (c)(6):

(c) The damage prevention program required by paragraph (a) of this section must, at a minimum:

(6) Provide as follows for inspection of pipelines that an operator has reason to believe could be damaged by excavation activities:

(i) The inspection must be done as frequently as necessary during and after the activities to verify the integrity of the pipeline; and

(ii) In the case of blasting, any inspection must include leakage surveys.

b. I&E objected to this Interrogatory.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

19. Refer to page 23, line 6.

    a. Identify the water pressure of water service lines in the 1400 block of South 8th Street.

    b. Given the soils conditions in the 1400 block of South 8th Street state the likelihood and degree scouring that would occur.

    c. Provide copies of any and all documents relied upon in answering this interrogatory.

ANSWER:

a. I&E possesses no knowledge relating to water pressure.

b. Ms. Bozhko has no knowledge of the soil conditions in the 1400 block of South 8th Street.

PGW's training materials, provided in response to I&E Interrogatories-Set I, state that "water leaks from either water mains or water services" are listed as the number one reason for underground street trouble in PGW's training document. In another section of the training manual, PGW lists the following underground troubles:

1. Water leaks from either water mains or water services.

2. Sewer system faults.

c. I&E objected to this Interrogatory.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

20. Refer to page 23, lines 9-10.

    a. State whether the sewer service lines in the 1400 block of South 8th Street are pressurized. If "yes," identify such pressures.

    b. State whether leaks in the sewer service lines in the 1400 block of South 8th Street would cause scouring. If "yes," fully and completely explain.

ANSWER:

a. Ms. Bozhko has no knowledge of whether the sewer service lines in the 1400 block of South 8th Street are pressurized.

b. Yes, leaks in sewer lines could cause scouring. "Sewer system faults" are listed as the number two reason for underground street trouble in PGW's training document, provided in response to I&E Interrogatories- Set I. In another section of the training manual, PGW lists the following underground troubles:

1. Water leaks from either water mains or water services.

2. Sewer system faults.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

21. Refer to page 23, lines 19-22. Fully and completely explain the steps that the witness believes PGW personnel should have undertaken to "inspect any underground street trouble…" in the 1400 block of South 8th Street.

ANSWER: As explained in Ms. Bozhko's testimony, PGW employees needed to inspect third party construction activities for the purpose of protecting PGW underground structures and facilities, inspect the underground street troubles encountered (water and sewer leaks), and report them to the Distribution Dispatching and supervisor.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

22. Refer to page 24, lines 5-8.

    a. Identify any Pennsylvania natural gas distribution company that is required to establish criteria that triggers an investigation for underground street troubles.

    b. For each and every natural gas distribution company so identified provide a full and complete description of such a program. Provide any and all documents related thereto.

ANSWER: I&E objected to this Interrogatory.

23. Refer to page 28, lines 12-15.

a. Fully and completely describe each and "every effort to ensure all work, done by … *others*, completed in or around its facilities restores the subsurface to a condition that ensures long-term stability and safe operation of its natural gas distribution facilities" which I&E recommends that PGW undertake.

b. Identify any analysis undertaken by I&E regarding the costs associated with any recommendations identified in (a).

c. State whether I&E would support recovery of such related costs in PGW's tariffed rates.

ANSWER:

a. I&E is unable to answer this Interrogatory as the long-term stability and safe operation of PGW's facilities is PGW's responsibility as it is the entity that possesses the knowledge and expertise to develop sufficient processes.

b. No analysis was taken.

c. I&E Safety does not make recommendations regarding whether a specific expense claimed in a base rate case should or should not be approved. However, I&E Safety understands that I&E Rates, as the statutory advocate charged with protecting the public interest, reviews every specific expense claimed in a base rate case for reasonableness and prudency.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

24. Page 28, lines 19-22.

a. Fully and completely describe each and every "OQ task to evaluate and perform continuing surveillance pursuant to 49 CFR § 192.613(a)" the witness recommends that PGW undertake.

b. Identify any analysis undertaken by I&E regarding the costs associated with such recommendations.

c. State whether I&E would support recovery of such related costs in PGW's tariffed rates.

ANSWER:

a. I&E is unable to answer this Interrogatory as OQ tasks are PGW's responsibility as it is the entity that possesses the knowledge and expertise to develop sufficient and adequate tasks.

b. No analysis was taken.

c. I&E Safety does not make recommendations regarding whether a specific expense claimed in a base rate case should or should not be approved. However, I&E Safety understands that I&E Rates, as the statutory advocate charged with protecting the public interest, reviews every specific expense claimed in a base rate case for reasonableness and prudency.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

25. Refer to page 29, lines 13-19.

a. Fully and completely describe the "process" I&E recommends that PGW undertake.

b. Fully and completely identify the "specific criteria" that I&E recommends be employed.

c. Identify any analysis undertaken by I&E regarding the costs associated with implementing such a process.

d. State whether I&E would support recovery of such related costs in PGW's tariffed rates.

ANSWER:

a. I&E is unable to answer this Interrogatory as the process that PGW should undertake is PGW's responsibility to determine as it is the entity that possesses the knowledge and expertise to develop sufficient processes.

b. I&E is unable to answer this Interrogatory as the specific criteria that PGW should undertake is PGW's responsibility to determine as it is the entity that possesses the knowledge and expertise to develop sufficient criteria.

c. No analysis was taken.

d. I&E Safety does not make recommendations regarding whether a specific expense claimed in a base rate case should or should not be approved. However, I&E Safety understands that I&E Rates, as the statutory advocate charged with protecting the public interest, reviews every specific expense claimed in a base rate case for reasonableness and prudency.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

26. Refer to page 30, lines 7-8.

a. Fully and completely describe all elements of the "plan to accelerate the removal rate of its riskiest cast iron assets" that I&E recommends.

b. Identify any analysis undertaken by I&E regarding the costs associated with implementing such a plan.

c. State whether I&E would support recovery of such related costs in PGW's tariffed rates.

ANSWER:

a. I&E is unable to answer this Interrogatory as the plan to accelerate the removal of the riskiest case iron assets is PGW's responsibility to determine as it is the entity that possesses the knowledge and expertise to develop such plan.

b. No analysis was taken.

c. I&E Safety does not make recommendations regarding whether a specific expense claimed in a base rate case should or should not be approved. However, I&E Safety understands that I&E Rates, as the statutory advocate charged with protecting the public interest, reviews every specific expense claimed in a base rate case for reasonableness and prudency.

Answer provided by: Elena Bozhko, Fixed Utility Valuation Engineer

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Elena Bozhko, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: March 1, 2023



Elena Bozhko
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing **Answer of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set IV** dated March 1, 2023, upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

Service by Electronic Mail Only

Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Senior Attorney
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122
craig.berry@pgworks.com

Kayla L. Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Date Created	Filing Number
3/1/2023	2459639

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Harrisburg, PA 17105-3265
EFILING - FILING DETAIL

Your filing has been electronically received. Upon review of the filing for conformity with the Commission's filing requirements, a notice will be issued acknowledging acceptance or rejection (with reason) of the filing. The matter will receive the attention of the Commission and you will be advised if any further action is required on your part.

The date filed on will be the current day if the filing occurs on a business day before or at 4:30 p.m. (EST). It will be the next business day if the filing occurs after 4:30 p.m. (EST) or on weekends or holidays.

Docket Number: C-2022-3033834
Case Description:
Transmission Date: 3/1/2023 2:38 PM
Filed On: 3/1/2023 2:38 PM
eFiling Confirmation Number: 2459639

File Name	Document Type	Upload Date
C-2022-3033834 (PGW) I&E Answer to PGW Interrogatories - Set IV CL&COS.pdf	Certificate of Service	3/1/2023 2:38:06 PM

For filings exceeding 250 pages, the PUC is requiring that filers submit one paper copy to the Secretary's Bureau within three business days of submitting the electronic filing online. Please mail the paper copy along with copy of this confirmation page to Secretary, Pennsylvania Public Utility Commission, 400 North Street, Harrisburg PA 17120 a copy of the filing confirmation page or reference the filing confirmation number on the first page of the paper copy.

No paper submission is necessary for filings under 250 pages.

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BI&E'S RESPONSES TO PGW SET V

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
COMMONWEALTH KEYSTONE BUILDING
400 NORTH STREET, HARRISBURG, PA 17120

BUREAU OF
INVESTIGATION
&
ENFORCEMENT

February 27, 2023

Via Electronic Mail
Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Re: Pennsylvania Public Utility Commission,
Bureau of Investigation and Enforcement v.
Philadelphia Gas Works
Docket No. C-2022-3033834
I&E's Answer to Philadelphia Gas Works' Interrogatories – Set V

Dear Counsel:

Enclosed is the Bureau of Investigation and Enforcement's ("I&E") **Answer to the Interrogatories of Philadelphia Gas Works- Set V** in the above-referenced matter. Please note that the Answer to No. 1(a) is **CONFIDENTIAL**.

Copies have been served on the parties of record in accordance with the Certificate of Service. If you have any questions, please contact the undersigned.

Sincerely,

Kayla L Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

KLR/ac
Enclosures

cc: Per Certificate of Service
Secretary Rosemary Chiavetta (*via e-file - Cover Letter and Certificate of Service Only)*
Hon. Dennis Buckley *(via email - debuckley@pa.gov - Cover Letter and Certificate of Service Only)*
Michael L. Swindler, Deputy Chief Prosecutor *(via email - mswindler@pa.gov)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

ANSWERS OF THE BUREAU OF INVESTIGATION AND ENFORCEMENT
TO THE
INTERROGATORIES OF PHILADELPHIA GAS WORKS- SET V

Pursuant to 52 Pa. Code § 5.342, the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Commission"), by and through its prosecuting attorneys, files the within Answers to Interrogatories of Philadelphia Gas Works ("PGW")- Set V, directed to I&E, and in support thereof, avers as follows:

ANSWERS

1. Refer to page 4, lines 17-20.

   a. Identify, as that term is defined above, each of the "several members of the local public."

   b. Provide a full and complete description of each and every "interview" or other discussion with "members of the local public" referenced on lines 13 and 18. Provide any notes or other documents related thereto.

   c. Identify how and from whom each identified "member of the local public" obtained the knowledge that rerouting was due to "instability."

   d. State whether the cause of rerouting was the work being performed on water and sewer facilities.

   e. State whether I&E independently investigated and confirmed the veracity of the stated reason that SEPTA rerouted bus traffic off the 1400-block of 8th Street.

   f. Describe the physical characteristics and location of "instability" and location of the roadway observed by the "local public."

i. Fully and completely describe any and all investigation undertaken by I&E regarding the SEPTA rerouting of bus traffic off the 1400-block of 8th Street and the reasons therefore.

g. Describe any and all investigation undertaken by I&E to confirm the statements made by "members of the local public."

h. Provide any and all information known to I&E that support or tend to support the statements made by "members of the local public."

ANSWER:

a. ***Confidential*** **The members of the local public are [redacted] individuals who reside or resided near the site of the explosion.**

b. **I&E partially objected to this Interrogatory. To the best of my recollection, I met in person with David Jen once within the days following the explosion. I questioned Mr. Jen in order to get a better understanding of the day-to-day activities along the 1400 block of South 8th Street in the days, weeks, and months prior to the explosion. Almost every time I was physically at the explosion site, Francis Hoeber approached me and I also questioned him in order to get a better understanding of the day-to-day activities along the 1400 block of South 8th Street in the days, weeks, and months prior to the explosion.**

c. **The individual identified in (a) witnessed the Philadelphia Street Department frequently utilizing fill material and metal road plates along South 8th Street near the explosion site to address subsidence within the roadway.**

d. **According to the individuals identified in (a), the Street Department's continuous use of fill material along South 8th Street was caused by continuous water main leaks. There was no mention of SEPTA rerouting bus traffic due to water and sewer main repairs.**

e. **I&E performed a public notice search in an attempt to confirm the rerouting of SEPTA bus traffic from the 1400 block of South 8th Street, but the search didn't yield any such information.**

f. **The word "sinkholes" is the only physical description that I recall being utilized by the public. The location described was approximately from 1429 South 8th Street to 1439 South 8th Street.**

i. **See answer to (e).**

g. **During the January 28, 2020 meeting with PGW, I&E attempted to confirm the statements made by "members of the local public." PGW**

representatives could not confirm or deny those statements. See answer to (e).

h. The individuals identified in (a) frequently witnessed the day-to-day activities along the 1400 block of South 8th Street, and thus no additional support is needed. I&E is not aware of any information to contradict or deny the statements and observations made by those individuals.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

2. Refer to page 4, line 15. Provide a full and complete copy of the "timeline of events and details" referred to by the witness.

ANSWER:

- **Summer of 2019 to day of the explosion- reports of Philadelphia Street Department utilizing plates along the 1400 block of South 8th Street and filling in subsidence along the same block. SEPTA traffic being diverted from the same block.**
- **October 2, 2019 – PWD Pennsylvania One Call ticket for emergency water leak repair near 1427-1431 South 8th Street.**
- **October 8, 2019 – Pennsylvania One Call ticket for emergency sewer repair at 1433 South 8th Street. Reported underground voids.**
- **October 25, 2019 – Pennsylvania One Call ticket for emergency sewer repair at 1431 South 8th Street.**
- **November 1, 2019 – Mr. Emanual performed repair at 1431 South 8th Street and reported underground voids.**
- **December 19, 2019 – Explosion at 1435 South 8th Street, Philadelphia, PA.**

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

3. Refer to page 5, lines 3-14. State whether I&E has ever previously observed the same subsurface conditions described by the witness along the 1400 block of South 8th Street in any other I&E investigation of PGW or another natural gas distribution company. If "yes," describe any and all such observation. Provide any and all documents, analysis, reports, and other documentation relating thereto.

ANSWER: I&E partially objected to this Interrogatory. Without waiving that objection, and in an attempt to respond in good faith without divulging privileged, confidential information and communications, Mr. Whiteash previously observed subsurface conditions where a pressurized leak from a water main scoured earthen material and a hole into a non-PGW gas distribution main, which resulted in gas migration into a local residence and a subsequent explosion and single fatality. Any further information or description related to this observation is protected, privileged information.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

4. Refer to page 5, line 11-14, Exhibits 17-20.

   a. State whether I&E has concluded when, approximately, the observed voids underneath the roadway surface were formed.

   b. If the presence of voids was not obvious from visual inspections of the roadway surface, explain what the "local public" observed as referenced at page 4, lines 17-20.

ANSWER:

a. According to the individuals identified in Answer to No. 1(a), the subsidence near the explosion site started around the summer of 2019.

b. See Answer to No. 1(b), (c), (d), and (f).

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

5. Refer to page 5, line 17 through page 6, line 3 and I&E Exhibit 4. State why the excavations under One Call tickets 20192752094, 20192803422, and 20192960460 are identified specifically as "relevant excavation activities [that] occurred prior to the explosion" and not the other tickets referenced elsewhere in the I&E testimony. Describe how they are distinguished.

ANSWER: The tickets are distinguished as emergency tickets within a concentrated area and within a short period of time.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

6. Refer to page 6, lines 8-10. State whether I&E believes that PGW properly marked the locate requests. If "no" fully and completely identify the basis for such belief.

ANSWER: No, PGW did not properly mark the locate requests as all five tickets were marked late. See Set IV, Answer to No. 7.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

7. Refer to page 6, lines 11-20 and I&E Exhibit 4. State the witness' understanding of what an "emergency repair" indicates when identified on a PA One Call request.

ANSWER: An emergency repair indicates a potential sign of underground street trouble due to sudden or unforeseen occurrence(s) involving a clear and immediate danger to life, property, or the environment, including, but not limited to serious breaks or defects in a facility owner or several facility owner lines.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

8. Refer to page 6, lines 16-20 and I&E Exhibit 4.

   a. Identify the water pressures associated with the water and sewer lines near PGW's cast iron main on the 1400-block of 8th Street that were the subject of the One Call tickets.

   b. State the number of the One Call tickets related to water and sewer excavations separately.

ANSWER:

a. I&E has no knowledge related to the water pressure of the water and sewer lines.

b. The Pennsylvania One Call tickets relating to "Drinking Water Excavations" are one (1) routine & one (1) emergency. The Pennsylvania One Call tickets relating to "Sewer Water Excavations" is one (1) routine and three (3) emergency.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

9. Refer to page 7, lines 9-12. State the basis for the conclusion that the sewer leaks associated with the One Call tickets identified in I&E Exhibit 4 had the potential to "scour" earthen support underneath PGW's cast iron.

ANSWER: Scour is the eroding or rough abrasion of material via pressurized water leaks from the drinking water mains. When these leaks are associated with broken sewer laterals (sewer leaks), it allows scoured material (earthen material) to be carried away into the broken sewer lateral and into the sewer main. In other words, a broken sewer lateral can act as a conduit to carry away earthen material along with the water leaking from the pressurized main. In the absence of broken sewer laterals, the pressurized water often travels into a homeowner's basement or it rises onto the street surface versus being disguised underground. Such conditions should be treated as a potential sign of underground street trouble.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

10. Refer to page 7, lines 9-12. Provide full and complete copies of any and all regulations, treatises or other documents that support or tend to support the proposition that: "Any emergency sewer/water utility repair concentrated within close proximity to [] cast iron mains should be of immediate concern…" In any documents provided, identify the recommended action.

ANSWER: Any emergency sewer/water utility repair concentrated within close proximity to cast iron mains is a threat to the integrity of the cast iron main. Unique threats to natural gas distribution facilities need to be identified and managed accordingly within an operator's O&M plan or an operator's DIMP plan. See 49 CFR § 192, Subpart L, M, and P.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

11. Refer to Page 8, lines 1-7. Identify whether Mr. Lepore observed that any water main or lateral was damaged on or around October 8, 2019.

ANSWER: Mr. Lepore did not report to I&E that any water main or water lateral damage was visually observed on or around October 8, 2019.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

12. Refer to Page 8, lines 8-15.

    a. Identify whether Mr. Emanuel observed that any water main or lateral was damaged on or around November 1, 2019.

    b. Regarding the distinct sound of water draining Mr. Emanuel reported, did I&E inquire about whether the water draining heard appeared to be pressurized? If "yes," state the response to such inquiry.

    c. State whether Mr. Emanuel had an obligation to report the sound of water to PWD and/or PGW.

ANSWER:

a. Mr. Emanuel did not report to I&E that any water main or water lateral damage was visually observed on or around November 1, 2019. However, Mr. Emanual observed the presence of signs suggesting a water leak within the general vicinity of his excavation.

b. No.

c. I&E is not aware of any obligations or contractual rights to report the draining water to PWD and/or PGW.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

13. Refer to Page 10, lines 3-13. Identify any Pennsylvania statute, regulation, and Commission Order, or any Federal Statute, regulation, or Order, or any existing PGW operating procedure which expressly requires PGW to be present during third-party excavation activities for their duration after PGW has marked its local facilities in compliance with the PA One Call Law. For each statue, regulation, order, or operating procedure identified, state with specificity the explicit requirements imposed on PGW to be present during all third-party excavation activities. Provide full and complete copies of any and all documents or references identified.

ANSWER: 49 CFR § 192.614(c)(6)(i) requires PGW to provide inspection of pipelines that an operator has reason to believe could be damaged by excavation activities. The inspection must be done as frequently as necessary during and after the excavation activities to verify the integrity of the pipeline.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

14. Refer to Page 10, lines 16-22. Provide full and complete copies of any and all documents that supports or tends to support the proposition that PGW "incorrectly mapped the emergency sewer repair at 1433 South 8th Street."

ANSWER: At the January 28, 2020 meeting, PGW provided a paper map to reference during our discussions. The map included measurements, utility locations, and the extent of excavation for emergency sewer repair at 1433 South 8th Street. The map indicated that the extent of excavation included underneath PGW's cast iron main and to the curb line near 1433/1435 South 8th Street.

During I&E's investigation on the days following the explosion, Lepore Plumbing & Excavating, LLC's excavation was witnessed to be approximately two to three feet west of PGW's cast iron main and approximately five to six feet west of the curb line near 1433/1435 South 8th Street. I&E's field investigations on the days following the explosion contradicted the map PGW presented on January 28, 2020.

Further research by I&E included Google Map screenshots taken on May & October 2019 (compiled by I&E on February 20, 2023) of the area in question, coupled with the results of the February 5, 2020 on site investigation, which contradict PGW's map. See I&E Attachment- Set V.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

15. Refer to Page 10, line 18. Identify the PGW employee taking this position.

ANSWER: No single PGW employee took this position. Rather, this position was provided through an overall discussion with the 4-6 PGW employees who were present for the conversation.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

16. Refer to Page 11, lines 1-15. Regarding the February 5, 2020 excavation, produce any and all evidence that PGW was "invited to the field visit but declined to send any representatives," and that "PGW's presence at the filed visit was requested by I&E." Provide copies of all correspondence regarding the February 5, 2020 meeting between any PGW employee and any member of I&E.

ANSWER: PGW was verbally invited and encouraged to attend a follow-up field inspection during the January 20, 2020 meeting. The actual date of the February 5, 2020 field investigation was communicated to all potential interested parties via phone calls. I&E did not log the phone calls to any of the potential interested parties nor did anyone inquire after the fact on the status of the said field investigation.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

17. Refer to Page 11, lines 14-15. Identify any and all efforts by I&E to obtain a "corrected map" from PGW. Provide any and all documents related thereto.

ANSWER: During the January 20, 2020 meeting, a discussion ensued regarding items that I&E suggested should be corrected on the map and that a corrected map be submitted to I&E.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

18. Refer to Page 12, lines 10-15. Identify any Pennsylvania statute, regulation, Commission Order or any Federal Statute, regulation, or Order, or any existing PGW operating procedure which requires "monitoring" of cast iron pipeline facilities when a third-party observes a subsurface condition during non-PGW facility related excavations, but such observations are not reported to PGW.

ANSWER: 49 CFR § 192.613 (Continuing Surveillance). Specifically, 49 CFR § 192.614(c)(6)(i) requires PGW to provide inspection of pipelines that an operator has reason to believe could be damaged by excavation activities. The inspection must be done as frequently as necessary during and after the excavation activities to verify the integrity of the pipeline.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

19. Refer to Page 12, line 12. Fully and completely describe the "monitoring" that the witness believes that PGW should have undertaken.

ANSWER: This information is detailed within Section IV. (Requested Relief), Item 76 of the filed complaint. Although the word "monitoring" is not utilized within Item 76, many of the proposed corrective actions include enhanced monitoring initiatives.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

20. Refer to Page 12, lines 13-14. Fully and completely describe any and all steps that the witness believes the One Call mark out person should have undertaken and did not undertake to "check[] for underground street trouble."

ANSWER: This information is detailed within the Complaint and various I&E Answers to Interrogatories.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

21. Refer to Page 12, lines 19 – Page 13, line 1. Regarding the "local residents reporting" the Philadelphia Street Department placing metal plates on the roadway and placing fill:

a. Identify, as that term is defined above, each of the "local residents" referred to.

b. Provide a full and complete description of each and every "report" or other discussion with "local residents". Provide any notes or other documents related thereto.

c. Identify when the plates were placed by Philadelphia Street Department and when fill was added.;

d. Identify how many plates were placed by Philadelphia Street Department.

e. Identify where exactly on the 1400 block the plates were placed and fill added.

f. State whether these are the same plates referred to in I&E Statement No. 1.

g. State any and all basis for I&E's conclusion that the plates were placed "due to sink holes forming".

h. Produce any evidence in I&E's possession which shows metal plates in place or that fill was added on the 1400 block of 8th street prior to the accident.

i. Fully and completely state the basis for I&E's conclusion that fill was added "on a continuous basis up to the day of the explosion." Provide any documents that support or tend to support this conclusion.

i. Fully and completely describe any and all investigation undertaken by I&E regarding the Street Department's placement of metal plates or the adding of fill and the reasons therefore.

j. Describe any and all investigation undertaken by I&E to confirm the statements made by "local neighbors."

k. Provide any and all third-party verification or confirmation known to I&E that support or would tend to support the statements made by "local residents."

ANSWER:

a. See Answer to No. 1(a).

b. I&E partially objected to this Interrogatory. See Answer to No. 1(b).

c. The individuals identified in Answer to No. 1(a) witnessed the Philadelphia Street Department frequently utilizing fill material and metal road plates along South 8th Street near the explosion site due to subsidence within the roadway on a continuous basis from the summer of 2019 up until the day of the explosion.

d. Unknown.

e. The location described was approximately from 1429 South 8th Street to 1439 South 8th Street.

f. Yes.

g. The individuals who witnessed these activities concluded that the plates were placed "due to sink holes forming," and I&E possess no information or documentation to contradict this conclusion.

h. See I&E Attachment- Set V.

i. See Answer to No. 21(c).

i. No additional investigation into the matter was performed. However, Google Map photographs taken on May & October 2019 (compiled by I&E on February 20, 2023) support the notion of street activity (asphalt patches along roadway and a metal plate along the street.) The photographs capture two days during an eight-month period, which supports the statements provided by the public of the existence of underground street trouble in the vicinity of the explosion. See I&E Attachment- Set V.

j. No investigation was completed at that time. However, the Google Map photographs were discovered on February 20, 2023. See I&E Attachment- Set V.

k. See I&E Attachment- Set V.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

22. Refer to Page 13, Lines 1-4. Produce any and all evidence supporting the witness' statement that SEPTA was rerouting bus traffic off of South 8th Street due to "instability in the roadway."

ANSWER: I&E performed a public notice search in an attempt to confirm the rerouting of SEPTA bus traffic from the 1400 block of South 8th Street, but the search didn't yield any such information.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

23. Refer to Page 13, Lines 3-4. Fully and completely describe the "system of checks and balances" that the witness believes that PGW should put in place.

ANSWER: I&E is unable to answer this Interrogatory as establishing a system of checks and balances is PGW's responsibility as it is the entity who possesses the knowledge and expertise to develop sufficient processes.

Answer provided by: Christopher Whiteash, P.E., Fixed Utility Valuation Engineer

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

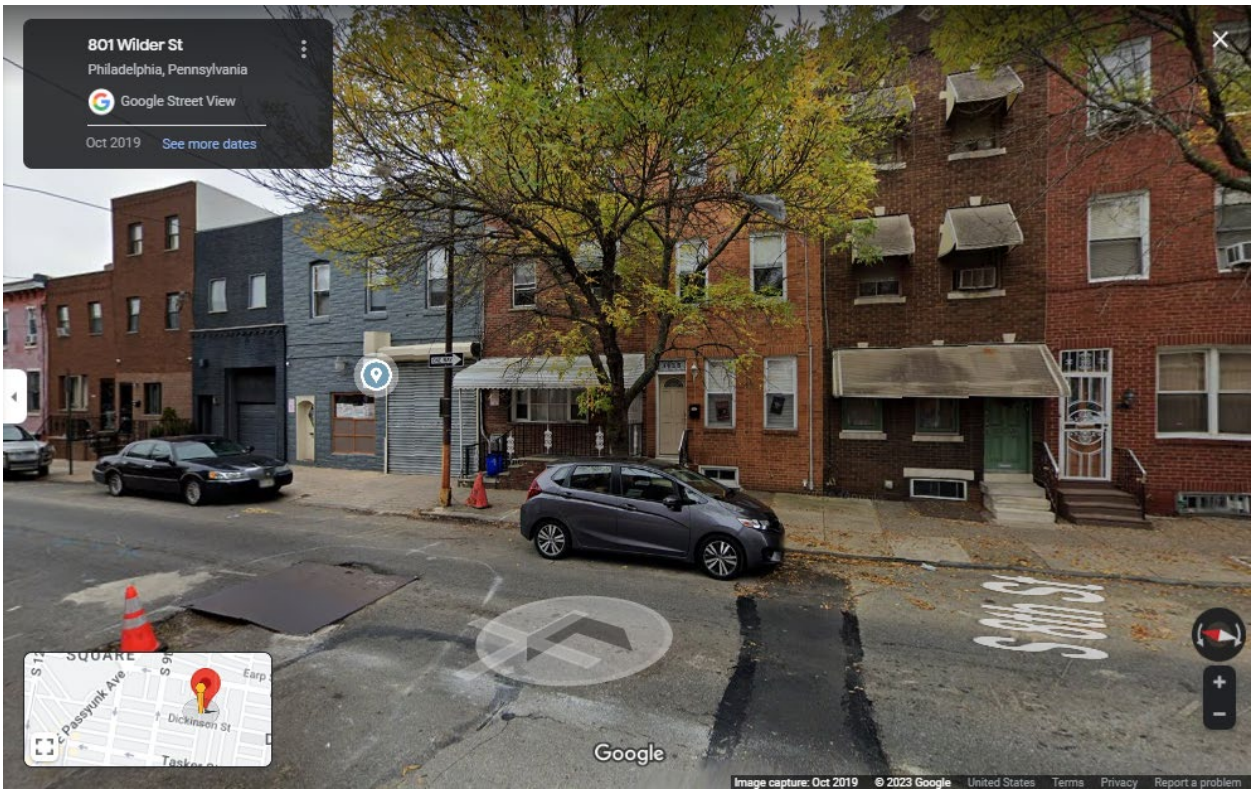
I, Christopher Whiteash, Fixed Utility Valuation Engineer, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: February 27, 2023

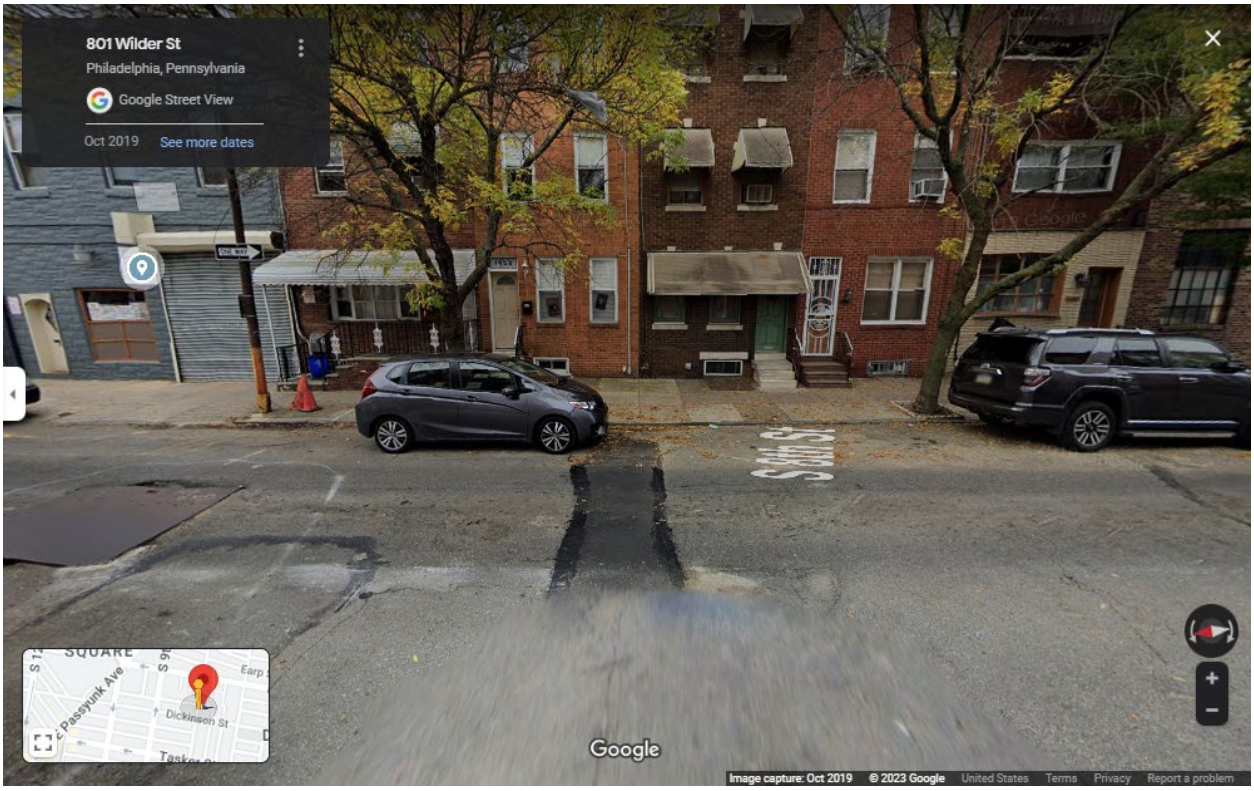


Christopher Whiteash
Fixed Utility Valuation Engineer
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

I&E
Attachment - Set V


801 Wilder St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
See more dates
Google
Image capture: Oct 2019 © 2023 Google United States Terms Privacy Report a problem


801 Wilder St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
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Image capture: Oct 2019 © 2023 Google United States Terms Privacy Report a problem

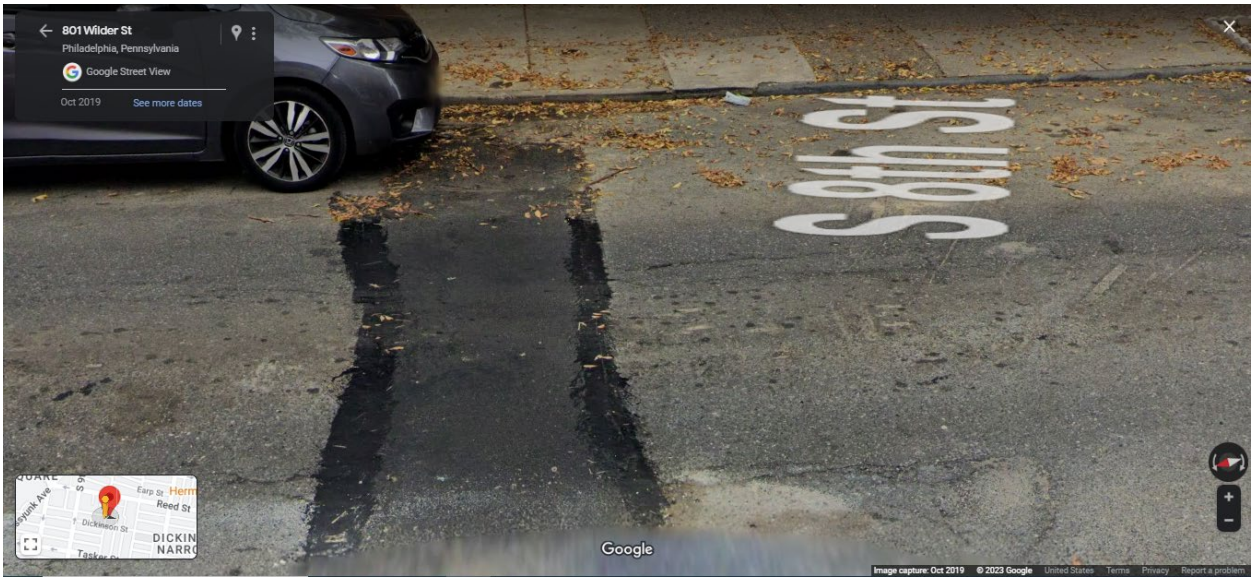

801 Wilder St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
See more dates
South St
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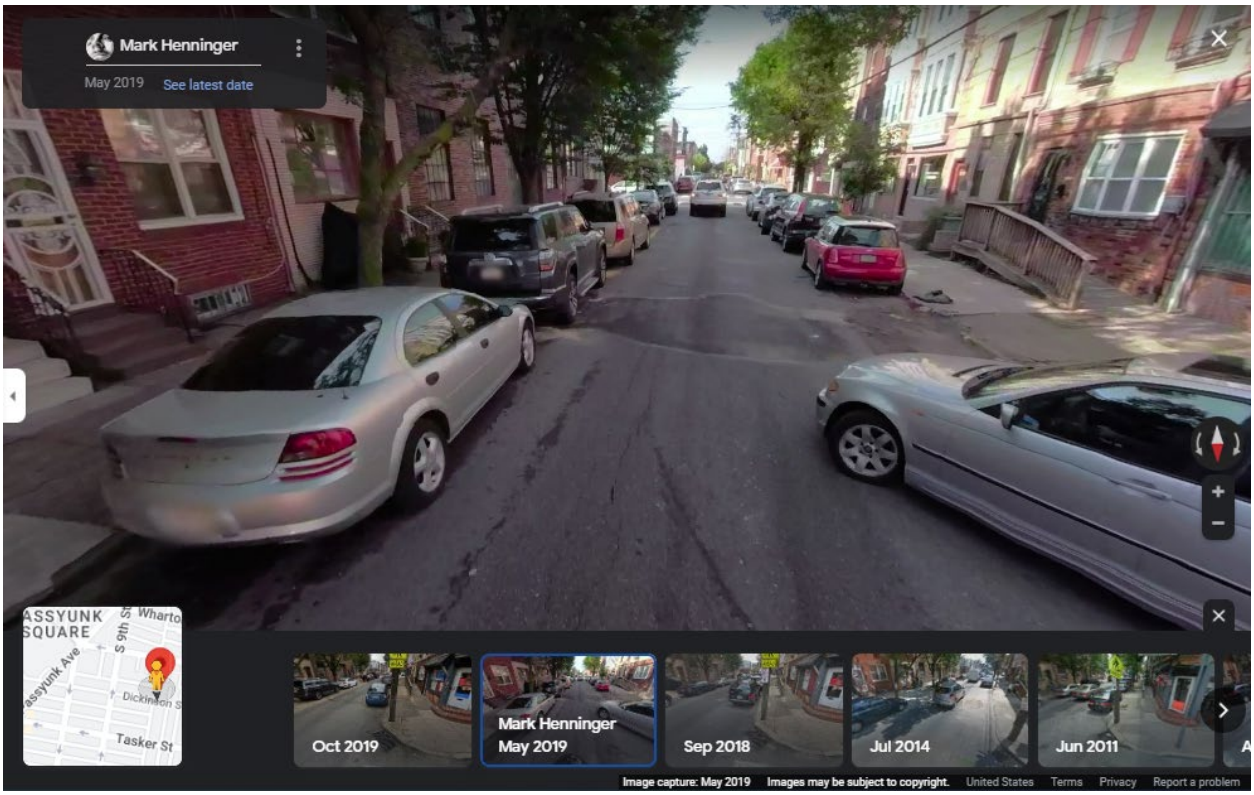

801 Wilder St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
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Image capture: Oct 2019 © 2023 Google United States Terms Privacy Report a problem


1435 S 8th St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
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801 Wilder St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
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801 Wilder St
Philadelphia, Pennsylvania
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801 Wilder St
Philadelphia, Pennsylvania
Google Street View
Oct 2019
See more dates
58th St
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Mark Henninger
May 2019
See latest date
ASSYUNK SQUARE
Wharto
S 9th St
Assyunk Ave
Dickinson St
Tasker St
Oct 2019
Mark Henninger
May 2019
Sep 2018
Jul 2014
Jun 2011
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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing **Answer of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set V** dated February 27, 2023, upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

Service by Electronic Mail Only

Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Senior Attorney
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122
craig.berry@pgworks.com

Kayla L. Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Date Created	Filing Number
2/27/2023	2459000

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Harrisburg, PA 17105-3265
EFILING - FILING DETAIL

Your filing has been electronically received. Upon review of the filing for conformity with the Commission's filing requirements, a notice will be issued acknowledging acceptance or rejection (with reason) of the filing. The matter will receive the attention of the Commission and you will be advised if any further action is required on your part.

The date filed on will be the current day if the filing occurs on a business day before or at 4:30 p.m. (EST). It will be the next business day if the filing occurs after 4:30 p.m. (EST) or on weekends or holidays.

Docket Number: C-2022-3033834
Case Description:
Transmission Date: 2/27/2023 2:37 PM
Filed On: 2/27/2023 2:37 PM
eFiling Confirmation Number: 2459000

File Name	Document Type	Upload Date
C-2022-3033834 (PGW) I&E Answer to PGW Interrogatories - Set V CL&COS.pdf	Certificate of Service	2/27/2023 2:36:51 PM

For filings exceeding 250 pages, the PUC is requiring that filers submit one paper copy to the Secretary's Bureau within three business days of submitting the electronic filing online. Please mail the paper copy along with copy of this confirmation page to Secretary, Pennsylvania Public Utility Commission, 400 North Street, Harrisburg PA 17120 a copy of the filing confirmation page or reference the filing confirmation number on the first page of the paper copy.

No paper submission is necessary for filings under 250 pages.

You can view a record of this filing and previous filings you have submitted to the PUC by using the links in the Filings menu at the top of the page. Filings that have been submitted within the last 30 days can be viewed by using the Recent Filings link. Older filings can be viewed by using the search options available in the Filing History link.

Exhibit JH-2

CHRONOLOGY OF EVENTS WORKSHEET

Exhibit JH-2

TIME	EVENT
11:45	Received call from Fire Department as Inside Explosion.
11:45	Emergency Grease Truck dispatched.
11:46	FSD Specialist Bradley Dziedzic dispatched.
11:46	FSD Supervisor Eric Lopez dispatched.
11:47	FSD Technician Nicholas Ganues dispatched.
11:48	Distribution Supervisor Jasmine Ralph dispatched.
11:48	Distribution Crew Jim Paul dispatched.
11:49	Distribution Area Supervisor Chris Mitchell called Dispatch to state that he was
	coincidentally close to the incident site.
11:49	James Bowe, Mobile Equipment Operator, dispatched.
11:49	Joseph Leva, Superintendent of Operations & Maintenance, was notified.
11:49	Abe Awad, Director of Field Services & Maintenance, was notified.
11:49	Joseph Hawkinson, Vice President of Field Operations, was notified.
11:49	Tom Pendergast, Director of Engineering, Design, and Construction, was notified.
11:50	FSD Area Supervisor Gerry Gaydosh dispatched.
11:53	FSD Specialist Jared Fredell dispatched.
11:53	Corporate Communications VP Melanie McCottrey notified.
11:55	FSD Specialist Bradley Dziedzic arrived.
11:55	FSD General Supervisor Quentin Jones left for scene.
11:55	FSD Supervisor Daniel Jones dispatched .
11:57	Ray Welte, Senior Vice President of Operations and Supply Chain, was notified.
11:59	FSD Technician Scott Kirk dispatched.
11:59	FSD Specialist Jared Fredell arrived.
12:00	Distribution Crew Anthony Benjamin dispatched.
12:01	Distribution Inspector Ryan Graser called dispatch to state that he was on location
	(Was not dispatched, coincidentally nearby).
12:01	Notified Robert Widhson, General Supervisor at Supply Chain, that Cut & Cap trailer
	was needed.
12:03	FSD Supervisor Eric Lopez arrived.
12:03	FSD Technician Nicholas Pomponio dispatched.
12:03	Jeff Ham, Manager of Chemical & Environmental Services, was notified.
12:03	Regulatory Compliance Analyst Racquel Chepress was notified.
12:04	Distribution Supervisor Johnny Marrero dispatched.
12:04	Sean Strohm, Mobile Equipment Operator, dispatched.
12:05	FSD Technician Nicholas Ganues arrived.
12:05	FSD Superintendent Burt Jefferson left for scene.
12:05	Distribution Crew Geoffrey Benefield dispatched.
12:08	Distribution Supervisor Jasmine Ralph arrived.
12:09	COO Doug Moser notified.
12:11	Risk Management Claims & Litigation Specialist, Anne Mitchell, was notified.
12:11	Mike Parzanese, Superintendent of Construction, was notified.
12:12	CEO Craig White notified.
12:13	FSD Technician Peter Paige dispatched.
12:14	FSD Technician Nicholas Pomponio arrived.
12:14	Joe Durante, Manager of Training, Safety, and OQ, was notified.
12:15	Kerry Hummel, Manager of Labor Administration, was notified.
12:17	Emergency Grease Truck arrived.
12:18	FSD Technician Shamere Blanford dispatched to location.
12:25	Distribution Crew Jim Paul arrived.
12:25	FSD Area Supervisor Gerry Gaydosh arrived.
12:26	FSD Technician Scott Kirk arrived.
12:27	Distribution Area Supervisor Nestor Rodriguez notified (Distribution Reserve R1).
12:28	FSD Technician Shamere Blanford arrived.
12:30	FSD Supervisor Daniel Jones arrived.
12:35	2nd Grease Truck dispatched (Driver Kevin Wallace).
12:42	FSD Technician Peter Paige arrived.
12:43	Distribution Crew Geoffrey Benefield arrived.
12:45	Distribution Crew Anthony Benjamin arrived.
12:50	Joseph Leva arrived.
12:55	Jeff Ham, Chem Lab, arrived.
12:59	Distribution Supervisor Johnny Marrero arrived.
13:02	2nd Grease Truck arrived.
13:27	6" low pressure Cast Iron main is greased off.
13:35	PECO arrived on location.
16:52	Cut & capped 6" Cast Iron main on 1400 S 8th Street @ 51'6" NNC Dickinson.
17:30	Cut & capped 6" Cast Iron main on 1400 S 8th Street @ 146' SSC Reed.

Exhibit JH-4

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1307326	**Request Status: CLOSED**
Date/Time Initiated: 10/3/2019 10:28:41 AM	Projected Completion Date: 10/3/2019 6:28:42 PM
Problem Code: EUN No Excavation	Priority: Medium
Problem Address: 1400 S. 8th St	

Initiated By: **EUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **10/3/2019 10:28:41 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
Utility	10/3/2019 10:28:42 AM	DWIGHT	GREN		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
- Utility :Philadelphia Water Department; Reason: Collapse; Expected Duration : 8; Closure : Full; /Septa/

Service Request Comments:

By EUNSUBMIT,: 10/3/2019 10:28:42 AM
- Utility :Philadelphia Water Department; Reason: Collapse; Expected Duration : 8; Closure : Full; /Septa/

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1334935	**Request Status: CLOSED**
Date/Time Initiated: 12/16/2019 11:21:56 AM	Projected Completion Date: 12/16/2019 7:21:00 PM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1400 S 58TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/16/2019 11:21:56 AM**
Highways District: **1**
Highways Section & Subsection: **G4**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone

UTILITY	12/16/2019 11:21:56 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Partial

Service Request Comments:

By PGWEUNSUBMIT,: 12/16/2019 11:21:56 AM
;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Partial

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1336738	**Request Status: CLOSED**
Date/Time Initiated: 12/19/2019 12:46:13 PM	Projected Completion Date: 12/20/2019 1:46:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1400 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/19/2019 12:46:13 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/19/2019 12:46:13 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 13 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/19/2019 12:46:13 PM
;Utility: PGW;Reason: Leak;Expected Duration: 13 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1336811	Request Status: CLOSED
Date/Time Initiated: 12/19/2019 2:42:26 PM	Projected Completion Date: 12/20/2019 12:42:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1400 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/19/2019 2:42:26 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/19/2019 2:42:26 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/19/2019 2:42:26 PM
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1336893	Request Status: CLOSED
Date/Time Initiated: 12/19/2019 6:58:11 PM	Projected Completion Date: 12/20/2019 6:58:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1400 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/19/2019 6:58:11 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/19/2019 6:58:11 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/19/2019 6:58:11 PM
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1336925	**Request Status: CLOSED**
Date/Time Initiated: 12/19/2019 11:58:47 PM	Projected Completion Date: 12/20/2019 9:58:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/19/2019 11:58:47 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/19/2019 11:58:48 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/19/2019 11:58:48 PM
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1336930	**Request Status: CLOSED**
Date/Time Initiated: 12/20/2019 1:48:30 AM	Projected Completion Date: 12/20/2019 11:48:00 AM
Problem Code: EUN Excavation	Priority: Medium

Problem Address: 1414 S 8TH ST

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/20/2019 1:48:30 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/20/2019 1:48:31 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/20/2019 1:48:31 AM
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337023	**Request Status: CLOSED**
Date/Time Initiated: 12/20/2019 9:03:37 AM	Projected Completion Date: 12/20/2019 9:03:00 PM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/20/2019 9:03:37 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/20/2019 9:03:37 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/20/2019 9:03:37 AM
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337279	**Request Status: CLOSED**
Date/Time Initiated: 12/20/2019 3:48:46 PM	Projected Completion Date: 12/21/2019 1:48:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/20/2019 3:48:46 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/20/2019 3:48:47 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/20/2019 3:48:47 PM
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337343	**Request Status: CLOSED**
Date/Time Initiated: 12/20/2019 10:16:50 PM	Projected Completion Date: 12/21/2019 8:16:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**

Submission Date/Time: **12/20/2019 10:16:50 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/20/2019 10:16:51 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/20/2019 10:16:51 PM
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337350	**Request Status: CLOSED**
Date/Time Initiated: 12/20/2019 11:38:05 PM	Projected Completion Date: 12/21/2019 7:38:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/20/2019 11:38:05 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/20/2019 11:38:06 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/20/2019 11:38:06 PM

/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337357	**Request Status: CLOSED**
Date/Time Initiated: 12/21/2019 3:38:52 AM	Projected Completion Date: 12/21/2019 11:38:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/21/2019 3:38:52 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/21/2019 3:38:53 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/21/2019 3:38:53 AM
/Time Extension/;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337365	**Request Status: CLOSED**
Date/Time Initiated: 12/21/2019 9:18:14 AM	Projected Completion Date: 12/21/2019 7:18:00 PM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/21/2019 9:18:14 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/21/2019 9:18:15 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/21/2019 9:18:15 AM
;Utility: PGW;Reason: Leak;Expected Duration: 10 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337369	**Request Status: CLOSED**
Date/Time Initiated: 12/21/2019 10:57:46 AM	Projected Completion Date: 12/21/2019 10:57:00 PM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/21/2019 10:57:46 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/21/2019 10:57:47 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/21/2019 10:57:47 AM
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337378	**Request Status: CLOSED**
Date/Time Initiated: 12/21/2019 12:41:25 PM	Projected Completion Date: 12/22/2019 12:41:00 AM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/21/2019 12:41:25 PM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/21/2019 12:41:25 PM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/21/2019 12:41:25 PM
;Utility: PGW;Reason: Leak;Expected Duration: 12 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1337463	**Request Status: CLOSED**
Date/Time Initiated: 12/22/2019 8:37:38 AM	Projected Completion Date: 12/22/2019 8:37:00 PM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1414 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/22/2019 8:37:38 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/22/2019 8:37:38 AM	DISTRIBUTION	PGW		

		DISPATCHER			

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Collapse;Expected Duration: 12 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/22/2019 8:37:38 AM
;Utility: PGW;Reason: Collapse;Expected Duration: 12 hours;Closure: Full

City of Philadelphia, Streets Department
Cityworks Service Request Submitted to Highways Division

Request ID: 1339810	**Request Status: CLOSED**
Date/Time Initiated: 12/30/2019 11:47:02 AM	Projected Completion Date: 12/30/2019 7:47:00 PM
Problem Code: EUN Excavation	Priority: Medium
Problem Address: 1418 S 8TH ST	

Initiated By: **PGWEUNSUBMIT,**
Submitted To: **ROW EUN,**
Submission Date/Time: **12/30/2019 11:47:02 AM**
Highways District: **2**
Highways Section & Subsection: **C5**
Council District:

Caller Information:

Caller Type	Call Date/Time	First Name	Last Name	Home Phone	Work Phone
UTILITY	12/30/2019 11:47:03 AM	DISTRIBUTION DISPATCHER	PGW		

Related Workorders (WOs):

WO ID	WO Description	WO Status	Date Initiated	Date Closed

Service Request Details:
;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Full

Service Request Comments:

By PGWEUNSUBMIT,: 12/30/2019 11:47:03 AM
;Utility: PGW;Reason: Leak;Expected Duration: 8 hours;Closure: Full

Exhibit JH-5

520 Fellowship Road, Suite E-504
Mount Laurel, New Jersey 08054

FCNA PARTNERS
FORENSIC CONSULTING

Phone: (856) 780-5658
Fax: (856) 780-5659

February 4, 2021

Mr. Raymond Welte,
PGW Senior Vice President of Operations
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122

Mr. Robert Horensky, Manager
Safety Division – Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
400 North Street
Harrisburg, PA 17120

Loss Location:	1400 South 8th Street Philadelphia, PA 19147
Date of Explosion/Fire Loss:	December 19, 2019
FCNA File No.:	11232

Dear Messrs. Welte and Horensky:

We are continuing our interdisciplinary forensic engineering and fire science evaluation of the causal factors ("root cause") of the explosion and fire that occurred late Thursday morning (approximately 11:30 am) of December 19, 2019 within South Philadelphia rowhomes located in the 1400 block of South 8th Street, City of Philadelphia, PA ("subject premises"). The City of Philadelphia Fire Department Fire Marshal's Office, in conjunction with state investigators, have investigated the cause of this explosion and fire and determined the proximate cause of this incident was the accidental ignition of leaking natural gas from PGW's 6" diameter underground cast iron pipe located below street level at the area fronting 1435 South 8th Street (see January 16, 2020 press conference video of City of Philadelphia Fire Department and Water Department personnel). At the direction of public sector investigators, PGW removed by excavation a damaged section of PGW's cast iron pipe and customer service lines of 1433, 1435 and 1437 South 8th Street for metallurgical examination.

Methodology and Standards

You specifically asked us to determine the root cause of this explosion/fire event which occurred on December 19, 2019 following the nationally recognized consensus standard guidelines of the National Fire Protection Association (NFPA) *921 (2017-2021 Editions)* and current interdisciplinary consensus standard ASTM International guidelines (*E678-07 (Reapproved 2013)* and ASTM E2713-18 (see e.g., *NFPA 921 2017 Chapter 21 Sections 21.1.1(1), (2), (3)* and *(4)*, *21.2, 21.3* and *21.4*; *ASTM E678-07* (*Reapproved 2013*) *Sections 1.1, 3.1, 3.2, 5.1, 5.1.4 and 6.1*). We have prepared this correspondence as our preliminary report to set forth a summary of the results of our investigation and evaluation at this time. Included in our report are highlights of the reviewed documents and information, and the contents of this preliminary report are not

to be considered partial or complete summaries of the information contained within the reviewed documents. Our technical and engineering findings and opinions regarding this explosion/fire event are determined to a reasonable degree of scientific, forensic engineering and technical certainty based upon our education, background, experience and training in the interdisciplinary fields of forensic engineering, civil and materials engineering and forensic explosion and fire investigation methodology relevant to this explosion and fire.

Our interdisciplinary investigation and analyses at this date have included consideration of, and are not limited to, the following: observations upon inspection of the subject premises on December 19-20, 2019, December 22-23, 2019 and January 2, 2020; live stream destructive pipe testing on June 24-25, 2020; informal consultation with Philadelphia Fire Department Assistant Fire Marshal Lt. Steven McMichael at the explosion site on January 2, 2020; informal discussion with City of Philadelphia Police Department Lt. Anthony Mirabella at the explosion site; witness accounts provided during informal discussion with neighbors (e.g., 1421 and 1430 South 8th Street dwelling occupants); newspaper photographs and media videotape segments; NOAA area weather data of the City of Philadelphia, Philadelphia County, PA of multiple reporting stations for December, 2019 (e.g., PHL, PNE, South Jersey Regional Airport and Wings Field); video of the January 16, 2020 press conference attended by City of Philadelphia Fire Department and Water Department personnel, PGW and others; the September 30, 2020 metallurgical evaluation report of Engineering Consultant and Materials Scientist John P. Gashinski, P.E., CFEI of Affiliated Engineering Laboratories, Inc. (“Gashinski metallurgical report”); the October 14, 2020 addendum report of John P. Gashinski, P.E., CFEI of Affiliated Engineering Laboratories, Inc. (“Addendum report”).

Our continuing interdisciplinary investigation and analyses at this date also have included consideration of: PGW Pennsylvania One Call, Job Journal and Activities records relating to the 1400 block of South 8th Street; US DOT Pipeline and Hazardous Materials Safety Administration Portal records; PGW’s Distribution System Improvement Charge (“DSIC”) approved by The Pennsylvania Public Utility Commission (“PUC”); PGW’s Long-Term Infrastructure Improvement Plan (“LTIIP”) approved by the PUC; PGW’s Implementation Plan; *49 CFR Part 192 Subparts A - IM*; NFPA *921 Guide for Fire and Explosion Investigations* (2017-2021 Editions); NFPA *1033 Standard for Professional Qualifications for Fire Investigator (2014 Edition)*; *29 CFR Part 1926 Revised*; OSHA *3071 2002 Revised Job Hazard Analysis*; *ASTM E678-07 (Reapproved 2013) Standard Practice for Evaluation of Scientific or Technical Data*; *ASTM E2713-18 Standard Guide to Forensic Engineering*; years of training and practical experience in the interdisciplinary fields of fire science, forensic fire and explosion investigations and the interpretation and implementation of worker safety practices involving or near fuel gas systems (see Curriculum Vitae of James M. Jones, III, C.F.E.I.); and years of engineering education, training and field experience in construction work involving civil and materials engineering and subsurface utility engineering (see Curriculum Vitae of Jody F. DeMarco, P.E.).

Appendices

A Color copy of Google Street View taken in October of 2019 showing the explosion/fire area with rowhomes identified as 1428 - 1441 South 8th Street (1 page).
B Color site photographs 1 - 18, including narratives, taken on December 19, 2019 (9 pages).
C Color site photographs 1 - 15, including narratives, taken on December 20, 2019 (8 pages).
D Color site photographs 1 - 22, including narratives, taken on December 22, 2019 (11 pages).
E Color site photographs 1 - 6, including narratives, taken on December 23, 2019 (3 pages).
F Color site photographs 1 - 7, including narratives, taken on January 2, 2020 (4 pages).
G Copy of NOAA area weather data of multiple reporting stations for December, 2019 (12 page aggregate).

Specific reference is made to the attached photographs for visual orientation of the explosion and fire scene (the details of which are not repeated in our preliminary report findings).

Engineering and Technical Findings

We have determined within a reasonable degree of scientific, forensic engineering and explosion and fire science certainty that the following facts and circumstances unique to this explosion and fire event known to date are relevant and significant to any opinion regarding the most reasonable scientific explanation of the root cause of this explosion/fire incident which occurred on December 19, 2019 within the 1400 block of South 8th Street:

1. Informal consultation with City of Philadelphia Fire and Police Department personnel provided information consistent with PGW records that there were no reported gas leaks or neighbor complaints of smelling natural gas odorant (Mercaptan) within the 1400 block of South 8th Street during the period of days and hours prior to the explosion which occurred at approximately 11:30 am during late Thursday morning of December 19, 2019.

2. This (no reports of a potential gas leak) is also consistent with witness accounts, the joint press conference on January 16, 2020 of public officials and information provided during informal discussion with neighboring dwelling occupants row homes within the 1400 block of South 8th Street.

3. The information provided by PGW indicates the subject 6” cast iron main had been installed underground and below the existing roadway of the 1400 block of South 8th Street in approximately 1928.

4. It is significant that PGW records reviewed to date do not show or indicate PGW's 6" diameter gas main was unserviceable, posed a hazard to the public, was not suitable for continued use as of December, 2019, was not operating properly or was not being maintained in accordance with Pennsylvania Public Utility Commission approval and oversight or Federal Regulations (*49 CFR Part 192 Subparts A - IM*).

5. Prior to and at the time of this incident, PGW had implemented a pipeline integrity management program in accordance with Federal Safety Standards (*49 CFR Part 192*).

6. Prior to and at the time of this incident, PGW also had accelerated its approved PUC long-term infrastructure improvement plans for the replacement of 8" and small cast iron mains, and PGW had exceeded its approved implementation plan during the period of years prior to and in 2019 (see e.g., August 28, 2018 PGW Plan Exhibit II-1 of the PUC MEI Report).

7. The physical damage to the site showed that the locus of the explosion was at the basement level of 1435 South 8th Street (see Appendix photographs).

8. This locus of the explosion within the basement of 1435 South 8th Street is also consistent with the source of the natural gas leak from a crack within the 6" diameter cast iron pipe located in an area fronting 1435 South 8th Street, and natural gas migration following a path of least resistance, provided by the customer's service lateral equipment, to the dwelling structure of 1435 South 8th Street where it entered the basement level and was capable of being ignited by multiple potential accidental ignition sources.

9. We do agree with the Gashinski metallurgical report (e.g., Pages 3, 26 and 36-37 of 38) that the fracture of the cast iron pipe is scientifically explained by an overload condition that resulted in the fracture of the pipe at a crack initiation site near the pipe's bottom surface with crack spread along the circumference of the pipe.

10. It is significant that multiple sources of information reviewed to date, including information provided by the City of Philadelphia Water Department during the January 16, 2020 joint press conference, show that multiple water main and sewer facilities within the 1400 block of South 8th Street had been leaking and repaired by City workers and private contractors during the period of months prior to this explosion/fire event.

11. It is also significant that there were multiple private sewer laterals within the 1400 block of South 8th Street that were considered defective, and repairs reportedly had been completed approximately one (1) month prior to December 19, 2019.

12. Ongoing repairs of water main and sewer facilities and private sewer laterals reportedly continued within the 1400 block of South 8th Street after December 19, 2019.

13. Private contractors on behalf of area homeowners reportedly performed excavation work of roadway and adjoining sidewalk surfaces during the repair of multiple private sewer laterals within the 1400 block of South 8th Street in the weeks prior to December of 2019.

14. During the days (December 12-13, 2019) prior to this incident City Water and Streets Department crew members, not PGW, apparently had been back filling sinkholes that had developed within the roadway of the 1400 block of South 8th Street by the use of gravel, dirt and pieces of concrete as a result of subsurface undermining due to water main and sewer leakage.

15. This (erosion underneath the roadway surface in the area of the gas main fracture) is also consistent with observations made by site representatives of PGW, the City of Philadelphia Fire Department, the City of Philadelphia Police Department and as shown by site photographs (see e.g., photographs at Appendices D and F).

16. The undermining of the soil support for the water and sewer facilities also undermined the support for the gas main explaining why the crack in the pipe initiated near the bottom of PGW's pipe (see e.g., photographs 17-20 at Appendix D).

17. During the months, weeks and days prior to and at the time of this explosion and fire event PGW was not a "controlling", "correcting", "exposing" or "creating" employer with regard to City and private contractor construction work within the 1400 block of South 8th Street (see e.g., *OSHA Directive CPL 02-00-124 X., B. – E.*).

18. It was the responsibility of the City of Philadelphia and private contractors, not PGW, to provide for the frequent and regular inspections of the construction work of the City and private contractors within the 1400 block of South 8th Street by competent persons in accordance with standard utility construction industry practices (see e.g., *29 CFR Part 1926.20 (b) (2)*).

19. It was the responsibility of the City of Philadelphia and private contractors, not PGW, to instruct their workers in the recognition and avoidance of unsafe conditions when excavating near underground natural gas distribution facilities including the potential hazards associated with digging, changes in underground water levels and soil saturation, the formation of underground cavities, thermal cycling, soil movement and potential pipe damage in areas being subjected to excavation operations (see e.g., *29 CFR Part 1926.21 (b) (2)*).

20. It is also significant that ground movement due to City and private water and sewer system leakage and related construction activities by both City workers and private contractors scientifically explain the circumferential break of PGW's 6" cast iron pipe which was the source of natural gas leakage.

21. NOAA local climatological data for the Philadelphia area also shows higher than normal precipitation during the days preceding this explosion/fire event and below normal temperatures with a significant departure from average minimum temperatures during the period of hours prior to this incident (beginning shortly prior to midnight of December 18, 2019 through the morning hours at the time of this explosion and fire) (see highlighted local climatological data records at Appendix G).

22. Seasonal frost heave, considering water and sewer facility leakage, also serves to scientifically explain and support the opinion of Engineering Consultant and Materials Scientist John P. Gashinski, P.E. that the pipe fracture was the result of a "one-time overload condition."

23. A one-time overload condition of PGW's 6" main resulting in a short term low pressure leak during the later morning hours of December 19, 2019 also explains why the leak went undetected by area neighbors and the physical condition of the pipe's fracture surface, which shows no evidence of a pre-existing leak condition prior to the explosion and resultant fire (as discussed in the Gashinski report, the details of which need not be repeated).

24. Stated simply, consideration of the facts and circumstances of this explosion and fire incident known to date and logical and scientific principles are supportive that a sudden rupture of PGW's 6" cast iron pipe located below street level at the area fronting 1435 South 8th Street shortly prior to 11:30 am on Thursday morning of December 19, 2019 resulted in a sudden leak of natural gas that provided the fuel source for the explosion and fire which originated within 1435 South 8th Street (as discussed above).

25. Based upon an objective evaluation of all data and information reviewed to date, the most reasonable scientific explanation of the root cause of this explosion and fire relate directly to soil disturbances near PGW's 6" cast iron gas main resulting from City and customer water and sewer facility leakage and related construction work that caused ground movement, underground cavity formation, external force application and the sudden rupture of PGW's main with underground gas migration extending into the basement of 1435 South 8th Street (for the reasons discussed above and evidenced by our report Appendices B-G).

Conclusions

Based upon our years of education, training and experience in the forensic investigation and analyses of subsurface utility facility damage and explosion and fire events, the

following are a summary of our forensic opinions and conclusions that have been established to a reasonable degree of scientific, forensic engineering and technical certainty, including and not limited to:

- Any theory, opinion, claim or allegation that PGW caused, was a cause, the proximate cause or a substantial contributing factor in the explosion and fire, fatalities and extent of property damage that occurred on December 19, 2019 cannot withstand the challenge of reasonable scientific, technical and forensic engineering evaluation when considering the now known facts and circumstances unique to this incident and all significant data and information reviewed to date (for the reasons discussed above and as evidenced by our report Appendices).

- The most reasonable scientific explanation of the root cause for this incident that occurred within the 1400 block of South 8th Street on December 19, 2019 relates directly to the soil disturbances near PGW's 6" cast iron gas main from water and sewer facility leakage and related construction work by City workers and private contractors resulting in ground movement and external force application which, in turn, caused the sudden rupture of PGW's main (also for the reasons discussed above).

We will supplement this preliminary report as additional information becomes available or is presented for review as our investigation and analyses continue. File materials including report references and Appendices are to be considered supplements to our preliminary report and may be used by us in support of our findings and conclusions set forth above.

Respectfully submitted,

FCNA Partners, Inc.

James M. Jones

James M. Jones, III, C.F.E.I.



Jody F. DeMarco, P.E.

Attachments: CV and Appendices

VERIFICATION

I, Joseph Hawkinson, hereby state that: (1) I am the Vice President, Field Operations for Philadelphia Gas Works (PGW); (2) in that capacity, I am authorized to present testimony on PGW's behalf; (3) the facts set forth in my testimony are true and correct to the best of my knowledge, information and belief; and (4) I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

March 10, 2023
Dated

Joseph Hawkinson
Vice President, Field Operations
Philadelphia Gas Works

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

REBUTTAL TESTIMONY OF

JOSEPH C. LEVA

ON BEHALF OF
PHILADELPHIA GAS WORKS

Docket No. C-2022-3033834

Formal Complaint of Bureau of
Investigation and Enforcement

TOPICS:

Responding to the Direct Testimony of
BI&E Witnesses Bozhko and Whiteash

March 10, 2023

TABLE OF EXHIBITS

I. INTRODUCTION..... 1
II. STREET MARKING..... 2
III. ACTIVITIES ON DAY OF INCIDENT..... 8
IV. REBUTTAL TO BI&E TESTIMONY. 10
V. CONCLUSION 13

Exhibit JCL-1	Distribution Inspector Duties
Exhibit JCL-2	Cast Iron Damage Prevention Brochure

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND POSITION WITH PHILADELPHIA GAS WORKS ("PGW" OR "COMPANY").

A. Joseph C. Leva, PGW, Superintendent, Operations and Maintenance.

Q. HOW LONG HAVE YOU HELD THIS POSITION?

A. Six years.

Q. WHAT ARE YOUR JOB RESPONSIBILITIES?

A. In my present position, I manage all construction activities performed by leak repair crews in the Distribution Department. I also oversee PGW's Damage Prevention, Leak Survey, Service Abandonment and Leak Inventory management programs.

Q. PLEASE SUMMARIZE YOUR BACKGROUND AND EXPERIENCE.

A. I have been employed with PGW since 2002. I spent the first nine years both in and leading a crew primarily involved with leak investigations and repair. This included protecting underground structures that were compromised by underground street troubles. From 2012 to 2017, I held various supervisory positions that also involved overseeing crews who repaired and protected PGW's underground facilities. I received my Bachelor's Degree from Temple University in 2015.

Q. HAVE YOU EVER PREVIOUSLY OFFERED TESTIMONY BEFORE THIS COMMISSION?

A. No.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of PGW regarding the formal complaint filed with the BI&E.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY IN THIS PROCEEDING?

A. My testimony will discuss the numerous efforts PGW makes to provide safe and reliable service in the context of the events that occurred on 1400 S. 8th Street on December 19, 2023. I will also address the testimony of the Bureau of Investigation and Enforcement ("BI&E") witnesses.

Q. PLEASE IDENTIFY THE EXHIBITS THAT ACCOMPANY YOUR REBUTTAL TESTIMONY.

A. The exhibits that accompany my testimony include:

Exhibit JCL-1	Distribution Inspector Duties
Exhibit JCL-2	Cast Iron Damage Prevention Brochure

Q. WERE THOSE EXHIBITS PREPARED BY YOU OR UNDER YOUR DIRECTION AND SUPERVISION?

A. Yes.

II. STREET MARKING

Q. PLEASE DESCRIBE THE PA ONE CALL SYSTEM FOR TICKETING RELATED TO FACILITIES MARKING.

A. The Pennsylvania One Call ("One Call") System is a statewide, statutory clearinghouse for identifying the location of underground facilities when excavation is going to occur. Such identification protects both the surrounding structures and the public, as well as the excavator. An excavator can place a variety of line locate requests based on the work they are planning, and the underground facility owner then has the legal obligation to mark the location of the line in a particular way, based on the type of ticket that was entered. "Ticket" is the term used in the industry for One Call marking requests.

Q. WHAT IS THE MEANING OF EMERGENCY AS APPLIED TO ONE CALL TICKETS?

A. Act 50 defines emergency as "a sudden or unforeseen occurrence involving a clear and immediate danger to life property or the environment, including, but not limited to serious breaks or defects in the facility owner's line." So, an emergency ticket involving a water service line, for example, means that the water service line is affected and work needs to be undertaken promptly. Under Act 50, an emergency designation requires facilities owners, like PGW, to make contact with the excavator and mark its facilities location "as soon as practicable" and "the response by the facility owner shall be consistent with the nature of the emergency information received by the facility owner." Without the emergency designation, marking is due within two days.

Q. FROM YOUR PROFESSIONAL EXPERIENCE DO ALL "EMERGENCY" ONE CALL REQUESTS MEET THE ABOVE CRITERIA?

A. No. The designation of "emergency" is defined by the excavator and automatically accepted and entered by the Pennsylvania One Call system. An emergency designation by an excavator which does not meet the criteria of an emergency can be utilized to expedite the utility response for the convenience of the excavator. The issue of overuse has been raised before the One Call Board, but curbing abuse is difficult to administer. Approximately twenty-five percent of the tickets processed by PGW (17,000 per year) are excavator-designated as "emergency."

Q. DOES THE DESIGNATION OF AN "EMERGENCY" NECESSARILY MEAN THAT THERE IS A THREAT TO PUBLIC SAFETY INVOLVED?

A. No. An emergency could and frequently does mean that a home or business is without water or sewer service (or other utilities) but not necessarily that the condition of the subject facility poses a physical danger to anyone or anyone else's facilities.

Q. WHO ARE THE PERSONNEL THAT RESPOND TO ONE CALL TICKETS AND MARK THE LOCATION OF PGW FACILIITIES?

A. The term used by PGW for personnel that mark the location of our lines is "Damage Prevention Inspector." Many natural gas distribution companies hire external locator contractors to mark their structures. PGW utilizes in house, trained Damage Prevention Inspectors to not only locate PGW structures but also to ensure the safety of PGW's underground facilities from outside disturbances during their line marking duties.

I have attached the official PGW job description for Damage Prevention Inspector, which describes their prescribed duties. See **Exhibit JCL-1**. These responsibilities include making direct contact with excavators before, during and after work is completed on larger projects where PGW may have moved structures that need to be put back once the excavator is finished, contacting other facility owners when failures of their system affect our facilities and being subject matter experts in One Call practices. We believe that arrangement best promotes the public safety.

Q. DO THE PROCEDURES THAT PGW HAS IN PLACE REQUIRE DAMAGE PREVENTION INSPECTORS TO ADDRESS UNDERGROUND STREET TROUBLES?

A. Yes. There are several internal procedures that PGW has implemented on which employees are trained that address underground street trouble identification and remediation. They are required to follow this training while in the field.

PGW Bulletin No. 312 dated September 1, 2013 (See **I&E Exhibit 1**), is a short directive that describes PGW's participation in One Call and notes PGW's obligation to mark facilities. The Bulletin states that: "Upon receipt of notice of water or sewer system failures, or surface conditions, such as cavities or cave-ins which may be caused by such failures, the location of gas pipeline facilities shall be determined." In such

circumstances "[W]herever pipeline facilities are or may be endangered, the appropriate supervisor shall be promptly informed."

PGW Bulletin No. 313 dated August 2, 2016 (See **I&E Exhibit 2**) is addressed to Damage Prevention Inspectors and marking activities: "To provide clear instructions for Distribution Department damage prevention inspectors regarding the various duties of their job." There are a variety of ongoing and constant "patrol" duties assigned to the Damage Prevention Inspectors, including to "always report or act upon":

- Any excavations (including backfilled openings that are not familiar to the inspectors), grading, demolition, or other construction activity which could result in damage to a pipeline, loss of support due to settlement or shifting of soil around a pipeline, undermining or damage to a pipeline support, or loss of cover or excess fill.
- Land subsidence, earth slippage, soil erosion, extensive tree root growth, flooding, climatic conditions, soil accumulation and other natural causes that can create additional external loading.
- Damage to pipeline markers, the need to replace them, or add additional pipeline markers. (Look to see that emergency contact information is clear and visible on all markers).

Bulletin No. 313 is a comprehensive list of the Damage Prevention Inspector duties that separate them from a routine locator that is more typical in the industry. In addition to locating PGW structures, Bulletin No. 313 outlines a list of physical cues that an Inspector is to be attentive to, and follow up actions that are to be taken if the select condition is identified.

PGW Bulletin No. 54 dated April 15, 2011 (See **I&E Exhibit 3**). This procedure addresses the "[d]ispatching and investigating failures of underground structures such as water and sewer mains that could reduce or eliminate support of PGW pipelines." The Bulletin notes that: "Underground troubles are usually brought to PGW's attention due to a condition observed on the street surface; or as a result of a pre-existing condition

encountered in the performance of PGW work but not caused by PGW activity." The trigger for an investigation is "the result of a telephone message or an observation on the street." The Bulletin also states that: "It is important to emphasize that every complaint of underground street troubles must immediately be brought to the attention of the Dispatcher in the same manner as gas leaks." (Underlined in the Bulletin). The investigation procedures undertaken upon notice or discovery of underground street troubles is then detailed.

There is a One Call notice procedure for reporting underground street trouble by an excavator to a facilities owner. Section 5.6.ii of Act 50 states that: "After consulting with a facility owner, provide such support and mechanical protection for known facility owner's lines at the construction work site during the excavation or demolition work, including during backfilling operations, as may be reasonably necessary for the protection of such lines."

It is important to note that, under all of these procedures, PGW must have prior notice, either internal or external, to dispatch for underground street trouble.

Q. HOW OFTEN ARE PGW FIELD PERSONNEL TRAINED ON THESE MATERIALS?

A. Theses safety measures are reviewed annually at the Distribution School for Foreman and Damage Prevention Inspectors held in September every year.

Q. HAVE THE PROCEDURES YOU DESCRIBED PREVIOUSLY IN YOUR TESTIMONY BEEN REVIEWED BY BI&E?

A. Yes. We routinely submit our written procedures to BI&E for their review and commentary. Most recently, PGW submitted numerous bulletins to BI&E on January 31,

2019, including Bulletins Nos. 54, 312 and 313, as part of an O&M Inspection that occurred February 28, 2019 and March 5, 2019. No deficiencies were noted by BI&E.

Q. OUTSIDE OF THE COMPANY, DOES PGW OFFER EXCAVATOR EDUCATION AND TRAINING AS WELL?

A. Yes. We meet with Philadelphia Water Department ("PWD") and the excavators working on water and wastewater systems regularly.

Since February 14, 2020, we began disseminating brochures to the excavators encouraging them to be cautious when excavating around PGW facilities. These brochures outline the safety concerns and protocols to take when digging around cast iron mains. We distribute the brochure at meetings described below with the City, facilities owners and excavators. We also provide copies to the City's Department of Licenses and Inspections ("L&I") who issue the street opening permits and ask them to distribute to all permit applicants. See **Exhibit JCL-2**.

PGW meets monthly with front line supervisors from PWD and L&I. The purpose of these meetings is to discuss problem excavations and, during those discussions, excavation safety is a routine topic.

In addition, the PGW maintenance team attends a City-sponsored semi-annual meeting at which all relevant City departments attend alongside a liaison from One Call at which presentations on various topics about City operations are made. Excavation safety is a key topic at these meetings. The meetings are also open to all City and contractors and excavators working on water and sewer facilities.

Q. PLEASE DESCRIBE PGW'S OUTREACH TO OTHER UNDERGROUND FACILITIES OWNERS, INCLUDING PWD.

A. PGW meets regularly with the majority of underground facility owners in the City of Philadelphia at the monthly "DITCH" meeting. Representatives include, PWD water and sewer divisions, the Philadelphia Streets Department, the Southeast Pennsylvania Transportation Authority ("SEPTA") and the Pennsylvania Department of Transportation ("PENNDOT").

PGW's planning and construction team also meets with the city facility owners during their planning and design meetings for large construction projects.

Q. DOES PGW ALSO OFFER PUBLIC/CUSTOMER EDUCATION?

Yes. PGW has a robust communication program to better explain the Company's investment in its infrastructure, expand communication of pipeline improvement efforts, improve public perception, build stronger, more collaborative external relationships, and help to increase customer satisfaction.

III. ACTIVITIES ON DAY OF INCIDENT

Q. WERE YOU DEPLOYED TO THE SCENE AT 1435 SOUTH 8TH STREET ON DECEMBER 19, 2019?

A. Yes. I was given the job by Dispatch once it was called in by the Philadelphia Fire Department ("PFD") at 11:49 am. After setting up the maps for our inside command center, I reported to the field and arrived at 12:50 pm. I was the incident Commander on the scene for PGW.

Q. DID PGW CONTACT BI&E ABOUT THE INCIDENT?

A. Yes. PGW contacted Mr. Robert Horensky, Safety Manager at the Bureau of Investigation and Enforcement at 12:05 pm.

Q. WHAT WAS THE CONDITION OF THE SCENE AT 1435 SOUTH 8TH STREET WHEN YOU ARRIVED?

A. At the time of my arrival, properties were still on fire with debris scattered outward into the street in front of 1435 S. 8th Street. The PFD was in the process of putting out the fire and taking pictures of the scene, and talking to the Office of Emergency Management and the media.

Q. WHAT ACTIVITIES DID PGW UNDERTAKE THAT DAY?

A. PGW's first responder Chris Mitchell arrived on scene at the same time the PFD notified us at 11:49 am. He was a few blocks away and noticed smoke on the horizon and was already en route to investigate. In total, the PGW Distribution team responded with a Superintendent, three Supervisors, two Grease Trucks and three separate crews of between two and four personnel. Our job was to make conditions safe by shutting the gas main down and setting up to cut and cap.

The PGW Field Services Department ("FSD") technicians responded with three supervisors and seven technicians. Their primary responsibility was to assist with safety checks and getting people evacuated. Shutting off gas where we had access to the inside of the property and completing odorant checks with PGW's Chemical Services Department who are responsible for making sure the odorant smell and levels are correct in the distribution system. We checked properties away from the incident for pressure because water was infiltrating the main due to PFD activity. The Distribution Inspector was there to provide Incident command with one-call information. Philadelphia Electric Company was there to shut power off to customers on the block to eliminate other potential ignition sources.

Q. WHAT CONCLUSIONS DO YOU DRAW FROM PGW'S RESPONSE TO THE INCIDENT?

A. As a whole, the response to the emergency by all PGW personnel on scene that day was above and beyond the call of duty and followed all procedures and protocols designed to protect life and property from further damages. It was an excellent example of a real world, dangerous and life-threatening scenario that showcased the excellence and experience of PGW's field staff firsthand.

IV. REBUTTAL TO BI&E TESTIMONY.

Q. WERE MARKING REQUESTS SUBMITTED TO PGW ON THE 1400 BLOCK OF S. 8TH STREET IN THE TWELVE MONTHS PRIOR TO DECEMBER 19, 2019?

A. Yes. There were eight One Call tickets submitted by third party excavators on behalf of water/sewer customers of the PWD in the twelve months preceding December 19, 2019. Of these, five were related to sewer and three to water. Water/sewer customers own and are required to maintain the service lines that connect to PWD's mains. Of the eight requests, six were labeled "emergency" on the ticket and two were "routine."

Q. HAVE YOU REVIEWED THE MARKING ACTIVITIES OF PGW AS THEY RELATED TO THESE EIGHT TICKETS?

A. Yes. There were three PGW Damage Prevention Inspectors involved in these marking. I oversee all three and have discussed the performance of their duties regarding those eight tickets.

These are experienced personnel. They each have between twelve and twenty years of experience with PGW and have been fully trained in marking procedures, including the responsibility to observe what they can about underground street conditions from the surface according to Bulletin Nos. 312, 313, and 54.

The three inspectors undertaking these marking on the 1400 block of South 8th Street have been fully trained on Bulletin No. 54 and related protocols in Bulletin Nos. 313 and 314. Bulletin Nos. 313 and 314, at PGW's annual Distribution School, including in September 2019, just 1-2 months prior to the One Call markings on the 1400 block of South 8th St.

Q. WERE THE MARKING LAID OUT ACCURATE AND IN COMPLIANCE WITH ALL PROCEDURES?

A. Yes. All markings were accurately laid out.

Q. DID YOU INVESTIGATE THE PROCEDURES THAT THEY FOLLOWED IN MARKING PGW FACILITIES AND OBSERVING ONSITE CONDITIONS?

A. Yes. The Damage Prevention Inspectors who performed marking of the eight One Call tickets referenced by the BI&E witnesses did their job in full compliance with the published procedures of PGW at Bulletin Nos. 54, 312 and 313.

In this instance, they looked for indications of underground street troubles when they marked and they found none. BI&E witness has agreed that "the presence of the voids was not obvious from mere visual inspection of the roadway surface." BI&E St. 2 at 5, Lines 12-13. The word choice of "mere" is his own. These are substantial duties, and we take them seriously.

Q. DID BI&E WITNESSES INTERVIEW ANY OF THE THREE DAMAGE PREVENTION INSPECTORS INVOLVED AS PART OF THEIR INVESTIGATION?

A. No. There was no request by the BI&E inspectors to speak to the three Damage Prevention Inspectors at any time during their investigation.

Q. MR. WHITEASH SEEMS TO BE SKEPTICAL ABOUT WHETHER THE LINE MARKING DAMAGE PREVENTION INSPECTORS LOOKED FOR SIGNS OF UNDERGROUND TROUBLE BECAUSE PGW "COULD NOT PROVIDE ANY DOCUMENTATION." BI&E St. 2 AT 12. CAN YOU RESPOND?

A. Written documentation is only required in the event that the Distribution Inspectors identify an underground street trouble and, as I have stated, none were found. No documentation is necessary if there is no trouble found.

Q. HOW DO YOU RESPOND TO MS. BOZHKO'S CLAIM THAT "PGW EMPLOYEES BEFORE/WHILE/AFTER VISITING THE LOCATION DID NOT PERFORM INSPECTION AND NECESSARY FOLLOW-UP ACTIONS IN ACCORDANCE WITH BULLETIN #54" (BI&E ST. 1 AT 23)?

A. I totally disagree with BI&E's position. The BI&E Inspectors are misinterpreting, and then retroactively applying the PGW Bulletins, to require that PGW personnel be present at most, if not all, third party excavations on third party facilities, which is not our procedure and never has been. What Ms. Bozhko appears to be saying is that the Damage Prevention Inspectors were not present during the excavation at the marked sites and this is a "necessary follow-up action."

As Mr. Hawkinson explains, supervision of third party excavation on third party facilities is not required, is unnecessary and would be very expensive and impractical to implement. In addition to costing ratepayers tens of millions of dollars, it would likely add many hours if not days to every one of thousands of excavations. Customers without water or sewer service would be understandably concerned about such delays.

Q. WAS THERE ANY NOTICE GIVEN TO PGW PRIOR TO THE INCIDENT THAT THERE WERE UNDERGROUND STRUCTURAL ISSUES IN THE 1400 BLOCK OF SOUTH 8TH STREET?

A. None. Mr. Whiteash reports that on or about January 2, 2020 he spoke verbally with two plumbers who were involved in the street excavations: Rich Lepore from Rich Lepore

Plumbing; and Joseph Emanuel from Emanuel Plumbing & Heating regarding underground street troubles in the 1400 block of South 8th Street. BI&E St. 2 at 7-8. Mr. Whiteash's interviews were reduced to writing and included in the investigative report surrounding the incident of December 19, 2019. BI&E has declined to provide either notes or report to PGW. Instead, we were offered a summary description. See **Exhibit JH-1 at 003-004** (Set I-1 and 2).

However, Mr. Whiteash has agreed that no "report, notice, or other communication" related to these excavators' observations was provided to PGW. I can confirm this. Neither of the two plumbers with whom Mr. Whiteash spoke informed PGW of their observations. PGW had no notice of the subsurface conditions described by them to BI&E in the 1400 block of South 8th Street.

More importantly, the plumbers' observations as described by Mr. Whiteash were limited to conditions surrounding water/sewer facilities; not PGW's natural gas facilities. I&E St. No. 2 at 9-10. The plumbers had no information to share about PGW's facilities. This means that there was no particular evidence at the time that any PGW facility was affected by these excavations. As stated in discovery: "I&E is unable to identify … voids at or near PGW gas main reported by Rich Lepore and Joseph Emanuel…" **Exhibit JH-1 at 015** (Set II-2).

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes. This concludes my rebuttal testimony. I reserve the right to file additional responsive testimony as necessary. Thank you.

Exhibit JCL-1

Exhibit JCL-1

PGW
JOB EVALUATION ANALYSIS

DEPARTMENT: Distribution/Operations

JOB TITLE: Distribution Inspector

SUPERVISION RECEIVED: 10% Direct, 90% Indirect

ADVERSE WORKING CONDITIONS: Must work in all sorts of inclement weather, winter and summer, when emergency work is necessary. Exposed to traffic and construction hazards on a daily basis. May be subjected to mandatory overtime.

NATURE OF DUTIES: Performs all inspection functions as required in the Distribution Construction Maintenance areas including operating functions as follows:

A) Contractors Performing PGW Construction Work

Inspects work of contractors performing gas main and service installations, Regardless of pipe size, for adherence to Company specifications and construction methods. Responsible for all work performance by contractors in accordance with the terms of the particular contract. Has authority to halt progress of work if needed to accomplish same. Within this work, specific duties included are:

1) Interprets and enforces contract specifications and construction methods of applicable gas main and service installations which requires knowledge of construction methods, drawings and sketches and repaving methods
2) Compiles records and reports of work in progress including measurement of any quantities completed using standard arithmetical formulas for measurement.
3) Observes contractors' work in progress for any effects on other underground structures and assures compliance with safe construction practices to avoid damage to such structures.
4) Orders and returns materials for contractors performing contract work.
5) Determines need for "contingency" work required by unforeseen conditions. Describes, records and submits required forms for such extra work.
6) Visually inspects welding, fusion and corrosion control methods for adherence to required specifications. Seeks technical assistance through supervision as needed.
7) Advises contractors of the importance of minimizing adverse effects of contractors' work on customer relations and the general public.

B) Damage Prevention

Must follow all PGW damage prevention procedures. Upon notification by the Pa. One Call System or some other means of communication visits construction sites of work in progress by other utilities or contractors to insure that all PGW structures are protected and undisturbed by such work. Informs various utilities' and contractors' representatives of locations of gas structures and the necessary precautions to be taken. Must be familiar with safe construction methods and practices and recognize unsafe practices that may affect the safety of PGW structures. Must be able to read and interpret construction drawings including General Main Maps and Detail Main Maps.
Must have complete familiarity with PGW main and service records.
Must be able to recognize, evaluate and react according to Operator Qualification Requirements according to DOT Part 192.805 to prevent conditions which could result in hazards to natural gas structures.
Makes daily visits to jobsites that are assigned with a PGW Watchman to insure compliance with foreign construction responsibilities.

C) **Walking (Footways) and Mobile (Roadways) Surveys, Flame Ionization Survey, Optical Methane Detection Survey and Curb Box Inspections**

Conducts walking or mobile survey throughout the City using various detection devices such as: Optical Methane Detectors, Flame Ionization Instruments, Gas Detection Instruments (GDI's), or any other gas detection instruments to conduct leak detection surveys and general safety monitoring. This work may require the assistance of a helper.
Must follow the existing leak Investigation Procedure when leaks are found on survey including taking necessary actions to protect people first and then property.
May be required to inspect exposed mains on bridges and report on conditions found and necessary maintenance.
Makes necessary adjustments to curb boxes as required or issues orders to rectify same.

D) **Repaving of PGW Trenches**

Inspects repaving of PGW trenches by various contractors.
Determines and elucidates, in writing, reasons for paving requirements in excess of reported quantities by PGW forces.
Must be capable of handling customer complaints related to trenches, repaving of trenches or repaving methods.

E) **Underground Metered Gas/House Piping Installations**

May be called upon to inspect underground gas lines being installed by plumber's or customer's contractors to insure compliance with PGW Underground House Piping Specifications.

F) **Plastic Fusion Requirements**

Capable of butt fusion, saddle fusion or electrofusion in accordance with manufacturers' procedures and in compliance with DOT Parts 192.283, 192.285 and 192.287.
Makes templates for fusing various special shapes.
Fits and fuses specials such as bends, crosses, tees and drip pots.
Fits and fuses service connection on mains
May be required to fit and fuse in a trench.
Fuses on pipe or uses electrofusion fittings where required on high, intermediate or low pressure gas mains.
Must have the ability to lay out angles, calculate runs, establish travel lengths involving angles, rolls and sets for plastic pipe.
Uses various types of Plastic Fusion Equipment and performs Plastic Fusion Procedures in accordance with manufacturer's specifications to join plastic mains and services.

G) **General Requirements**

Must maintain a valid driver's license.
Performs as ventilating crew or backfilling crew leader when required.
Must meet all requirements of PGW's Operator Qualification Plan.
Operates various types of equipment such as Pipe Line Locators, Box Locators, etc.
Must have thorough knowledge of and adhere to all requirements of the Pa. One Call System.
Must have thorough knowledge of safe excavation practices and trench protection systems such as, shoring, sloping or shielding.
Responsible for all tools, equipment and materials issued and utilized.
Immediately reports any unusual or unexpected condition encountered. Reacts appropriately to

abnormal operating conditions.
Writes complete and accurate reports of work completed in connection with assigned work, underground street troubles, injuries, accidents, incidents, etc.
Makes intelligent and accurate reports which may be written, entered on a computer or reported by radio or telephone.
Utilizes Computer technology to retrieve, enter and store data related to work assigned.
Responsible for a clean, safe and properly secured jobsite.
Responsible for enforcing and following established safety procedures.
Performs other related duties for which previously trained.

APPROVALS:

Company _____ **Date** 12-19-07 **Union** _____ **Date** _____
Company _____ **Date** 12-19-07 **Union** _____ **Date** 12/19/07

12-14-07

12-14-07

DD
Revised 11/20/07

Exhibit JCL-2

PHILADELPHIA GAS WORKS
800 West Montgomery Avenue, Philadelphia, PA 19122

Urgent Safety Notice!

Cast Iron gas pipe is susceptible to failure when it is disturbed or undermined.

Notify PGW immediately if the gas pipe is either undermined or disturbed. CALL **215-235-1212**

Potential conditions that can damage cast iron pipe by disturbing it or removing its support include the following:

- Water Main Breaks or Leaks
- Sewer line failures which cause **cavities**
- Improper support during excavation or backfill
- Poor backfill material or not compacted properly
- No protection of exposed facilities
- Settlement or Depressions
- Trenchless installations
- Vibrations from heavy construction equipment
- Trench or Shoring collapse
- Washouts, floods, unstable soil, landslides
- Blasting, boring, tunneling, the removal of aboveground structures by either explosive or mechanical means

Call 8-1-1 Before You Dig

Working on a project that requires digging? **Call 8-1-1.** This free service ensures underground utility lines are marked, preventing damage to service lines and keeping you and your property safe. Remember, **it's the law**.

Know what's below.
Call 811 before you dig.

PHILADELPHIA GAS WORKS
800 West Montgomery Avenue, Philadelphia, PA 19122

SMELL GAS?

CALL 215-235-1212

Natural gas smells bad on purpose. That "rotten egg" smell is the smell of natural gas. If you think you smell gas, **leave the area immediately** and then call PGW from a safe location.

IF YOU SMELL GAS:

- Do not use electrical devices including cell phones which may cause a spark and ignite the gas.
- Do not use an open flame, matches or lighters.
- Do not try to locate the source of the gas leak.
- Do not try to shut off any natural gas valves or gas appliances.
- Do not start vehicles.
- Do not re-enter the building or return to the area until a PGW employee or a qualified utility representative says it is safe to do so.
- Do not put out the flames if natural gas ignites.

Promptly report damage of gas facilities to PGW, securing the area, and standing by at a safe distance.

- Avoid any attempt to repair the damage or restrict the flow of gas. Leave the repairs to PGW.
- Allow the gas to vent to the atmosphere.
- Do not put out the flame if gas ignites, but let it burn. Burning gas will not explode.
- Do not cover the damaged pipe with dirt as a means of stopping the leak.
- Report coating damage, dents, and gouging. Surface damage that appears minor can lead to future failure and serious consequences.

Know what's below.
Call 811 before you dig.

VERIFICATION

I, Joseph C. Leva, hereby state that: (1) I am the Superintendent, Operations, and Maintenance for Philadelphia Gas Works (PGW); (2) in that capacity, I am authorized to present testimony on PGW's behalf; (3) the facts set forth in my testimony are true and correct to the best of my knowledge, information and belief; and (4) I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

March 10, 2023
Dated

Joseph C. Leva
Superintendent, Operations, and Maintenance
Philadelphia Gas Works

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

REBUTTAL TESTIMONY OF

ROBERT K. SMITH

ON BEHALF OF
PHILADELPHIA GAS WORKS

Docket No. C-2022-3033834

Philadelphia Gas Works

TOPICS:

Responses to BI&E's Methane Detector Program Proposals

March 10, 2023

TABLE OF CONTENTS

Page

I. INTRODUCTION 1
II. PGW'S EXISTING DISTRIBUTION INFRASTRUCTURE AND RATES 2
III. PGW'S CURRENT INFRASTRUCTURE DOES NOT SUPPORT ADVANCE METERING INFRASTRUCTURE TECHNOLOGY 4
IV. SUMMARY OF BI&E STATEMENT NO. 3 5
V. THE SHORT TIMEFRAME AND IMMENSE LOGISTICAL BURDEN OF BI&E'S ARMD AND SRMD PROGRAMS ARE, RESPECTIVELY, UNREASONABLE AND PRESENTLY IMPOSSIBLE AND NOT IN THE PUBLIC INTEREST. 9
(A) Timeframe and logistical burden of BI&E's ARMD proposal 9
(B) Timeframe and logistical burden of BI&E's SRMD proposal 15
VI. BI&E HAS FAILED TO SHOW ARMD AND SRMD PROPOSALS ARE IN THE PUBLIC INTEREST AS BI&E FAILED TO ASSESS THE COSTS AND ULTIMATE IMPACT ON PGW'S CUSTOMER RATES AS A CASH FLOW UTILITY. 20
VII. THE COMMISSION SHOULD ASSESS MANDATING A METHANE DETECTOR PROGRAM THROUGH POLICY OR RULEMAKINGS TO ENGAGE ALL STAKEHOLDERS. 27
VIII. CONCLUSION 28

LIST OF EXHIBITS

Exhibit RKS-1	September 28, 2020 – Con Edison Press Release
Exhibit RKS-2	Con Edison's Methane Detector Website (as of 3.1.23)
Exhibit RKS-3	NYPSC Order Approving Proposed Use of Settlement Funds, Case No. 14-G-0201
Exhibit RKS-4	BI&E's Responses to PGW Set VI Interrogatories

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND POSITION WITH THE COMPANY.

A. My name is Robert K. Smith. My position is Senior Vice President, Operations & Supply Chain for Philadelphia Gas Works ("PGW" or "Company").

Q. HOW LONG HAVE YOU HELD THIS POSITION?

A. Since January 1, 2023.

Q. WHAT ARE YOUR JOB RESPONSIBILITIES?

A. I am responsible for the Distribution, Field Service, Resource Management, Supply Chain and Fleet Departments.

Q. PRIOR TO JANUARY 1, 2023, WERE YOU EMPLOYED WITH PGW? IF SO, IN WHAT CAPACITY?

A. Yes, I was Vice President of Operations & Resource Management from December 2020 through December 2022. Prior to that I was Director of Employee Relations, Development, and Support Services for Field Operations and Supply Chain from May of 2013 through December of 2020. I held the position of Manager of Labor and Administration, Field Services Department from March of 2011 through May of 2013. Prior to March of 2011, I held various union covered field positions in the Field Services Department.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND.

A. I received a Bachelor of Science degree in Business Administration from Pierce College in 2018. Also, I received a Master of Business Administration from Gwynedd Mercy University in 2021.

Q. HAVE YOU EVER PROVIDED TESTIMONY BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION ("COMMISSION" OR "PUC")?

A. Yes. I provided testimony in PGW's recently filed Base Rate Case at Docket No. R-2023-3037933.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony will respond to BI&E's witness Robert Horensky's testimony, BI&E St. 3, and provide a practical analysis of Mr. Horensky's proposed Methane Detector Programs as outlined in BI&E Exhibit No. 27.

In doing so, I will: 1) generally describe PGW's current system and utility infrastructure as background; 2) discuss PGW's system as it relates to Advanced Metering Infrastructure upgrades; 3) discuss and summarize BI&E St. 3 and the Con Edison program benchmark on which BI&E relies; 4) discuss the impracticability and logistical burden of BI&E's Methane Detector Program proposals; 5) discuss how the proposals are not in the public interests due to the immense cost and present a basic cost study using the Con Edison benchmark on which BI&E relies as applied to PGW; and 6) discuss how methane detector programs should be evaluated in a policy or rulemaking proceeding at the Commission to engage all stakeholders, not through a Complaint proceeding.

II. PGW'S EXISTING DISTRIBUTION INFRASTRUCTURE AND RATES

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF PGW'S GAS DISTRIBUTION SYSTEM.

A. PGW's gas distribution system serves approximately 518,000 customers in Southeastern Pennsylvania in the County and City of Philadelphia, using approximately 3,046 miles of

natural gas mains ("Mains") and some 476,600 service lines ("Services").[1] Details regarding PGW's safety and cast iron replacement achievements and programs are described in Joseph Hawkinson's testimony, PGW St. 1-R.

Q. PLEASE DESCRIBE HOW PGW'S RATES ARE DETERMINED.

A. PGW is a "City Natural Gas Distribution Operation" as that term is defined in the Public Utility Code.[2] As such, just and reasonable rates for PGW are determined using the Cash Flow Method. PGW has no shareholders and does not pay a dividend or a rate of return to its owner (PGW does remit a fixed annual payment to the City of Philadelphia). Accordingly, all of the funds PGW needs to run the Company come from ratepayers or from borrowing (the costs of which then must be paid by ratepayers). Therefore, rather than having its revenue requirement determined on the basis of a fair rate of return on a used and useful rate base, PGW's rates are set by determining the appropriate levels of cash and other financial metrics necessary to enable PGW to pay its bills and maintain access to the capital markets at reasonable rates. The PUC issued a policy statement more fully setting forth these criteria and the financial and other considerations that are to be looked to in setting PGW's base rates at just and reasonable levels.[3]

Q. WHEN ASSESSING RATES, WHAT ARE PGW'S MAJOR OBJECTIVES?

A. PGW seeks Commission approval to establish affordable rate levels that are adequate to continue its efforts to modernize its system and to provide safe and adequate service by making its system safer and more efficient and improving customer service. To do this,

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1 PGW owns and operates all of the service lines from the mains to the inlet side of the meters. There are no customer-owned service lines in the PGW service territory.

2 66 Pa.C.S. § 102 (definitions).

3 52 Pa. Code §§ 69.2702, 2703.

PGW must be able to have the cash to pay its bills, to provide for other obligations, and to achieve financial metrics that will enable it to maintain its present bond ratings and, if possible, improve its rating. An improved bond rating will reduce borrowing costs which, in turn will reduce costs that customers will have to bear over the life of PGW's bonds.

III. PGW'S CURRENT INFRASTRUCTURE DOES NOT SUPPORT ADVANCE METERING INFRASTRUCTURE TECHNOLOGY

Q. PLEASE DESCRIBE PGW'S CURRENT INFRASTRUCTURE AS IT RELATES TO ADVANCE METERING INFRASTRUCTURE TECHNOLOGY.

A. The Energy Information Administration defines Advanced Metering Infrastructure ("AMI") as "meters that measure and record usage data at a minimum, in hourly intervals and provide usage data at least daily to energy companies and may also provide data to consumers. Data are used for billing and other purposes. Advanced meters include basic hourly interval meters and extend to real-time meters with built-in two-way communication capable of recording and transmitting instantaneous data."[4] PGW's existing infrastructure does not support AMI.

Q. HAS PGW ASSESSED OR CONSIDERED IMPLEMENTING AMI IN ITS SERVICE TERRITORY?

A. Yes. PGW is in the early stages of assessing the future deployment of AMI in its service territory. However, as such upgrades to the entirety of PGW's existing infrastructure are very expensive and time/resource intensive, PGW has not yet determined when it will begin the buildout of AMI. As a cash-flow utility, PGW must assess infrastructure upgrades based on the adequacy of existing service, and the ultimate cost/rate burden on

[4] https://www.ferc.gov/power-sales-and-markets/demand-response/reports-demand-response-and-advanced-metering

PGW's customers to implement systemwide upgrades like AMI. While PGW expects to at some point in the future deploy AMI, that process is still in the early planning stages and will take many years to complete in order to not over burden rate payers or create rate shock when PGW does seek to recover the costs of those upgrades in base rates.

Q. DO YOU HAVE A PRELIMINARY UNDERSTANDING OF THE COSTS AND TIME INVOLVED FOR PGW TO IMPLEMENT AMI IN ITS SYSTEM?

A. PGW has not set a date certain or ironed out all of the technological issues involved before it can justify and move forward with deploying AMI and a supporting network. PGW's very early assessment is that the deployment of AMI upgrades will take no less than 8-10 years to complete once started. Additionally, while costs of materials are always changing, and specifically as related to AMI electronics and chip supply chain issues in the world today may drastically change PGW's understanding of the ultimate costs, PGW's assessment is that upgrading to AMI will cost PGW hundreds of millions of dollars, which should be spread out over a period of time. The upgrades needed include, but a are not limited to: purchase of replacement meters; purchase and installation of AMI equipment and instrumentation; replacement of BPS Metscan and LBS Metretek units; purchase additional AMI specific shop equipment; and other general installation costs which may include additional workforce personnel.

IV. SUMMARY OF BI&E STATEMENT NO. 3

Q. HAVE YOU REVIEWED BI&E ST. 3 AND THE ASSOCIATED EXHIBIT NO. 27?

A. Yes.

Q. PLEASE SUMMARIZE THE TESTIMONY YOU REVIEWED.

A. Robert Horensky, BI&E Safety Manager, presented testimony to address BI&E's requested relief: "That PGW shall, within ninety (90) days of entry of a Final Order, work with BI&E Pipeline Safety to create and implement a methane detection program(s) to ensure the safety of PGW customers during PGW's replacement of its cast iron facilities." BI&E St. 3 at 5. Mr. Horensky goes on to discuss two proposals which BI&E seeks PGW to be ordered to implement, including deployment of two separate but simultaneous programs including: 1) the deployment of an Audible Alarm Residential Type Methane Detector ("ARMD") across PGW's entire service territory; and 2) the deployment of Smart Remote Methane Detectors ("SRMD") across PGW's entire service territory. BI&E St. 3 at 5-6; BI&E Exhibit 27.

Mr. Horensky then describes the benefits of methane detectors and the success of the New York Public Service Commission's collaboration with GTI Energy and Con Edison in deploying SRMD technology throughout New York City and Con Edison's territory. BI&E St. 8-10.

Q. ARE YOU FAMILIAR WITH THE CON EDISON NATURAL GAS DETECTOR PROGRAM WHICH BI&E USES AS A BENCHMARK?

A. I have reviewed the Con Edison Natural Gas Detector Program (the "CE Program"). Based on Mr. Horensky's testimony, I researched the CE Program on Con Edison's website. My research in particular led me to Con Edison's September 28, 2020 press release, titled "Con Edison Providing Smart Gas Detectors In Major Breakthrough For Customer Safety."[5] I have attached a copy of this press release as **Exhibit RKS-1**. I also

[5] The press release can be found here: https://www.coned.com/en/about-us/media-center/news/2020/09-28/con-edison-providing-smart-gas-detectors-in-major-breakthrough-for-customer-safety

reviewed Con Edison's current Natural Gas Detector information website which provides information for customers, including installation timeframe, important safety information and warnings, how the natural gas detector works, and installation scheduling information.[6] I have attached a copy of Con Edison's information website as **Exhibit RKS-2**. I have also reviewed the New York Public Service Commission's Order ("NYPSC") which initiated the main portion of the CE Program by approving a settlement involving a natural gas explosion which occurred on March 12, 2014 in East Harlem, New York, that caused eight deaths, an estimated 48 serious injuries, and millions of dollars in structural damage. I have attached a copy of the NYPSC's July 12, 2018 Order approving proposed use of settlement funds with modifications at Case No. 14-G-0201 as **Exhibit RKS-3**.

Q. PLEASE DISCUSS THE DETAILS OF THE CON EDISON PROGRAM.

A. The NYPSC, as part of a Complaint proceeding settlement in 2018, ordered Con Edison, among other things, to investigate and deploy $1 million in settlement funds once Con Edison was prepared to deploy an automated remote detector pilot program (SRMD). **Exhibit RKS-3**. This number excluded the prior $1.975 million in research and development costs previously expended by Con Edison to study providing residential methane detectors approved by a separate NYPSC Rate Order. **Exhibit RKS-3** at 13. This CE Program pilot ran from October 2018 – September 2020 (23-months) where Con Edison installed 9,000 SRMD detectors. **Exhibit RKS-1**.

Beginning September 2020 and lasting until December 2025, a total of 63-months, Con Edison is installing an additional 367,000 SRMD detectors at all service locations in its

[6] https://www.coned.com/en/safety/energy-safety/gas-safety/natural-gas-detector

territory. **Exhibit RKS-1 and RKS-2.** The estimated costs of this program from September 2020 – December 2025 is $130 million. **Exhibit RKS-1**. Con Edison states that each install should take less than one (1) hour to complete, and there is no need to turn off gas service during the install. **Exhibit RKS-2**. Based on the information provided in Exhibit RKS-1, 2, and 3, I have compiled the following information in Table 1 below which I will use as a benchmark to assess the reasonableness of BI&E's proposals in this matter:

Table 1

Parameter	Information / Data	Source
CE Research and Development Duration	17 Months	Exhibit RKS-3
CE Research and Development Costs	$1.975 Million	Exhibit RKS-3
CE Pilot Duration	23 Months	Exhibit RKS-1
CE Pilot Detectors Installed	9,000	Exhibit RKS-1
CE Pilot Costs[7]	$1 Million	Exhibit RKS-3
CE Program Duration	63 Months	Exhibit RKS-1 & 2
CE Program Detectors Installed	367,000	Exhibit RKS-1
CE Program Costs	$130 Million	Exhibit RKS-1

Q. TURNING BACK TO BI&E STATEMENT NO. 3, DO YOU HAVE A RESPONSE TO MR. HORENSKY'S TESTIMONY?

A. Yes. PGW's first and foremost priority is safety. This is shown by PGW's aggressive stance in replacing its cast iron infrastructure which is supported by the Commission. As

[7] This number excludes $1.975 million in a previously approved program Con Edison initiated pursuant to a Rate Order issued January 25, 2017 which funded research and development costs to provide residential methane detectors at no charge on a first-come, first-served basis to its customers. See Exhibit RKS-3, page 12-13. This amount was fully spent prior to the NYPSC's settlement order initiating the pilot, or as of July 2, 2018.

discussed in Mr. Hawkinson's testimony, leaks on both PGW's mains and services have seen significant improvements over the years, showing PGW's commitment to safety and reliability of its infrastructure since coming under the Commission's jurisdiction. PGW supports any and all cost-effective improvements which will increase the overall safety and reliability of its public utility service. However, I have major concerns with BI&E's proposals.

Q. WHAT CONCERNS DO YOU HAVE WITH BI&E'S PROPOSED PROGRAMS IN BI&E EXHIBIT 27?

A. I have three main concerns, which I will discuss below:

1. The prohibitively short time and immense logistical burden of BI&E's proposals are unreasonable, or even presently impossible for PGW.
2. BI&E's proposals are prohibitively costly, which will burden PGW's customers with paying for these costs as PGW is a Cash Flow method utility. I present a preliminary cost study based on the CE program to estimate costs for PGW and show the immense expense to PGW and its ratepayers that would result from BI&E's proposals.
3. The Commission should assess mandating a methane detector program through policy or rulemakings to engage all stakeholders, not through individual safety enforcement complaints.

V. THE SHORT TIMEFRAME AND IMMENSE LOGISTICAL BURDEN OF BI&E'S ARMD AND SRMD PROGRAMS ARE, RESPECTIVELY, UNREASONABLE AND PRESENTLY IMPOSSIBLE AND NOT IN THE PUBLIC INTEREST.

(A) *Timeframe and logistical burden of BI&E's ARMD proposal*

Q. PLEASE DESCRIBE BI&E'S ARMD PROGRAM PROPOSAL AS PROVIDED IN BI&E EXHIBIT 27.

A. BI&E's proposal for the ARMD program is detailed on page 1 of BI&E Exhibit 27. BI&E seeks that Commission order PGW to implement BI&E's ARMD proposal within 45 days of a Final Commission Order in this matter. The ARMD program is divided into two parts: 1) a six (6) month pilot, whereby PGW must install 7,000 ARMD devices at

the nearest 7,000 gas services to 8th Street; and 2) begin a phased roll-out approach to install ARMD at all service locations in PGW's territory within the subsequent six (6) months. In short, BI&E's ARMD proposal requires PGW to provide and install an ARMD at every service location within one-year and 45 days (13.5 months) from a Final Commission Order.

Q. WHAT CONCERNS DO YOU HAVE WITH BI&E'S ARMD PROPOSAL?

A. BI&E's ARMD proposal is, for all intents and purposes, an unprecedented undertaking. The ARMD proposal would be nearly, if not actually, impossible for PGW to achieve, setting aside the estimated costs of the ARMD program which I discuss later in my testimony. First, I do not believe that BI&E studied how impractical the 45-day implementation period, the 6-month pilot and the subsequent 6-month program (totaling 13.5 months) are when compared to the CE Program benchmark. Second, I do not believe that BI&E appreciates the immense time commitment and employee resource requirements involved for PGW to complete the ARMD program within 13.5 months. Third, based on present supply chain issues PGW has experienced in other areas of operation, I do not believe it is possible for PGW to attain and install the 476,600 ARMD devices required by the 13.5-month program.

Q. PLEASE DISCUSS YOUR FIRST CONCERN – THE IMPRACTICALITY OF THE TIMING MANDATES IN BI&E'S ARMD PROPOSAL BASED OFF OF CON EDISON'S PROGRAM.

A. As stated above, BI&E has proposed a 13.5-month mandate that PGW: 1) research and develop a residential methane detector program within 45 days of a Commission Order; 2) implement that program as a 6-month pilot and install 7,000 detectors; and 3) complete a final 6-month deployment of ARMD to the remaining 469,000 services within PGW's territory. Respectfully, BI&E's 13.5-month ARMD deployment proposal is not feasible

when looking exclusively at the CE Program as a benchmark. As shown in BI&E St. 3, the CE Program is the basis for BI&E's methane detector proposals for which BI&E relies. I have tabulated a comparison of the CE Program timeline (sources provided in Table 1 above) and BI&E's ARMD proposal in BI&E Exhibit 27 below in Table 2:

Table 2

Parameter	CE Program Timelines	BI&E's ARMD Proposal
Research and Development Duration	17 Months	45 days (1.5 months)
Pilot Duration	23 Months	6 Months
Pilot Detectors Installed	9,000	7,000
Program Duration	63 Months	6 Months
CE Program Detectors Installed	367,000	469,000
Total Duration	**103 Months (8 Years, 7 Months)**	**13.5 Months (1 Year, 1.5 Months)**

As shown, a service territory wide methane detector program took Con Edison over 8 years and 7 months to complete, assuming the program is completed on its projected schedule by December 2025. Simply put, BI&E's 13.5-month mandate, in my opinion, is not reasonable, prudent, or in the public interest.

It is unreasonable to expect that PGW to be able to complete the necessary planning, research, and development of the ARMD program within 45 days of a Commission Order when the same research and development of the CE Program in a real-world example took Con Edison 17 months. Additionally, it is unreasonable to expect PGW to be able to complete the Pilot portion of the program, which BI&E has proposed to install a similar quantity of detectors as Con Edison's pilot (9,000 v. 7,000) in just 6 months when the same pilot program in a real-world example took Con Edison 23 months to complete.

Lastly, it is unreasonable to expect PGW to be able to complete a service territory wide deployment of detectors which total over 100,000 *more* service locations than Con Edison's, in just 6 months when Con Edison has proposed the program will take 63 months to complete (through December 2025). It is my opinion that BI&E's timeline is unreasonable, unachievable, and likely impossible for PGW to complete based on the similar CE Program.

Q. WHAT OTHER CONCERNS DO YOU HAVE REGARDING THE PROPOSED 13.5 MONTH ARMD PROGRAM MANDATE?

A. As another matter of practicality, it is my opinion that that PGW's existing workforce lacks the capacity to install the 7,000 detectors during the 6-month pilot, and the 469,600 detectors during the subsequent 6-month program. According to Con Edison's program information, **Exhibit RKS-2**, each detector installation "should take less than an hour" once the trained installer arrives at a customer home or building. **Exhibit RKS-2.** Keep in mind, the Con Edison pilot and program (excluding research and development) is taking place over 86 months. Using the CE Program information identified above as an example, and assuming reasonable travel time and other factors leading up to an install, I estimate that each ARMD install, from PGW's prospective, will take 1 hour assuming the installer does not experience any abnormal delays, and is permitted access[8] to the property at the time of the scheduled appointment with the customer.

[8] As noted in Exhibit RKS-2, the CE Program has a customer Opt-out feature, a consideration which BI&E's proposal does not address.

Q. HAVE YOU ASSESSED PGW'S WORKFORCE REQUIREMENTS TO MEET THE PROPOSED 13.5 MONTH ARMD PROGRAM?

A. Yes. In order to complete BI&E's proposed 6-month pilot and 6-month program, I have estimated that PGW would be required to train and hire approximately 593 new employees to complete the program. My assumptions include:

1. PGW's existing workforce has no capacity for additional job duties to assign ARMD installation to meet BI&E's ARMD 13.5 month program.
2. Each install will take a PGW employee one (1) working hour to complete
3. There are, on average, 22 working days in each month (excluding weekends and estimated 1 day/month holiday)
4. Each working day allows each new employee 6 hours of detector installation, with 2 hours withheld for other tasks, administrative duties, and required breaktime.
5. The 6-month pilot and subsequent 6-month program must install 7,000 and 469,600 detectors respectively

The details of my calculation are provided below in Table 3:

Table 3

	Analysis of working hours required per workday (22 days/month)	**New employees needed, assuming 6 hrs/day installing meters**
BI&E ARMD 6-month Pilot	53 hours[9]	9 new employees[10]
BI&E ARMD 6-month Program	3,558 hours[11]	593 new employees[12] (less 9 new employees hired for pilot = 584 for program)
Totals	**3,611 hours**	**593 new employees**

[9] Formula: (7,000 ARMDs)/(6 months * 22 workdays)

[10] Formula: (53 work hours per day)/(6 work hours per day per employee)

[11] Formula: (469,600 ARMDs)/(6 months * 22 workdays)

[12] Formula: (3558 work hours per day)/(6 work hours per day per employee)

As a matter of perspective, PGW currently has over 1,600 employees trained to maintain, operate and support its operations. Assuming that PGW could even hire the additional 593 temporary employees to meet BI&E's 13.5-month proposal, which in the current employment environment I have significant reservations could even occur, BI&E's proposal would require PGW to expand its payroll and total employees by nearly 40%, on a temporary basis. Based on the workforce demands of BI&E's 13.5-month ARMD program, the program is not reasonable, prudent, or in the public interest.

Q. IN YOUR OPINION, DID BI&E CONSIDER THE WORKFORCE AND EMPLOYEE REQUIREMENTS NEED TO UNDERTAKE THE 13.5 MONTH ARMD PROGRAM?

A. No. In my opinion, BI&E has not considered any impacts of the program on PGW. Mr. Horensky provided no testimony to support whether or not the ARMD program is practical or achievable by PGW in his testimony. PGW recognizes that safety is its utmost priority, but the Commission's role is to balance the interest of utilities and customers alike under the adequate, efficient, safe and reasonable service standard which focuses on balancing interests for the accommodation, convenience, and safety of the public. Specific to workforce, there is no evidence that BI&E has evaluated the practicality of his proposal regarding the workforce needs based on the comparable CE Program for which he relies.

Further, when asked in discovery in PGW Set VI whether BI&E undertook a study to determine, *inter alia*, the requirements for PGW to implement the Methane Detector Program, PGW received the following response:

> 1. Regarding the two (2) types of methane, or natural gas, detectors referenced by BI&E, has BI&E undertaken a study to determine the approximate cost of each type, the installation costs, and the implementation requirements in PGW's territory? If so, will BI&E

support recovery of the Methane Detector Program costs in PGW's base rates? If not, explain how the Program would be funded.

ANSWER:

No, BI&E Safety did not undertake a study to determine the approximate cost of each type of methane/natural gas detector. However, I did have an informal discussion with GTI Energy and was advised that, historically, standalone ARMD units cost approximately $40.00 and the SRMD technology costs approximately $100.00 per device/unit. Also, BI&E Safety does make recommendations regarding whether a specific expense claimed in a base rate case should be approved.

See **Exhibit RKS-4**, which provides a complete copy of BI&E's responses to PGW's Set VI interrogatories. See also **Exhibit RKS-4**, response to PGW Set VI, No 2(a).

Q. WHAT ARE YOUR SUPPLY CHAIN CONCERNS AS IT RELATES TO THE ARMD PROPOSAL?

A. Due to many different factors, PGW has been experiencing ever increasing supply chain disruptions for materials to support its operations. These interruptions have impacted PGW's ability to timely acquire many materials, ranging from piping for mains to certain electronics. These issues are not unique to PGW – the are a factor of the supply chain disruptions in the world today. Because of these issues, I have a concern that PGW may not be able to acquire the 476,600 ARMD devices within 45 days of a Commission Order in order to comply with BI&E's ARMD proposal.

(B) *Timeframe and logistical burden of BI&E's SRMD proposal*

Q. PLEASE DESCRIBE BI&E'S SRMD PROGRAM PROPOSAL AS PROVIDED IN BI&E EXHIBIT 27.

A. The proposal for the SRMD program is detailed on pages 1-2 of BI&E Exhibit 27. In short, BI&E seeks that the SRMD program shall be researched and implemented by PGW within 45 days of a Final Commission Order in this matter. The SRMD program is divided into two parts: 1) a nine (9) month pilot, whereby PGW must install 750 SRMD

devices at addresses used for the ARMD program; and 2) after the pilot, PGW shall begin a rollout of SRMD technology to all service locations in PGW's territory within twenty-four (24) months, with the goal of every service line being equipped with SRMD within three (3) years of the date of a Final Order.

Q. WHAT CONCERNS DO YOU HAVE WITH BI&E'S SRMD PROPOSAL?

A. While I noted above that the ARMD proposal is an unprecedented undertaking for PGW, BI&E's SRMD proposal, which research be completed and deployment must start 45 days after a Commission Order and conclude within three (3) years, is simply not possible for PGW as SRMD is not compatible with PGW's existing infrastructure. As I discussed above, PGW current infrastructure is not AMI, and therefore cannot support SRMD technology. PGW is many years away from being able to implement AMI, and only preliminary investigation into deploying AMI has been undertaken to date. Without an AMI system in place, SRMD simply will not work, and it is impossible for PGW to comply with BI&E's SRMD proposal. To even allow SRMD to be considered, PGW would have to undertake an unprecedented system wide overhaul, which PGW believes will take 8-10 years to complete, including modification of each and every meter to be AMI compatible, upgrades to PGW's existing distribution infrastructure to integrate AMI into its systems, and relatedly, workforce requirements to upgrade PGW's entire system to AMI as well as information technology upgrades to support AMI. In short, the SRMD proposal requires a cascade of impractical and presently impossible events to occur, starting first with expansive upgrades to even begin system wide deployment of SRMD.

Q. EVEN IF PGW'S INFRASTRUCTURE HAD THE CAPABILITY TO SUPPORT SRMD TECHNOLOGY, WHICH IT DOES NOT, WHAT ARE YOUR SPECIFIC TIMING CONCERNS WITH BI&E'S SRMD PROPOSAL BASED OFF THE CE PROGRAM?

A. In summary form, even if PGW's system could support SRMD technology, which it cannot today, I have reservations based off the CE program benchmark related to the timeframes sought by BI&E. The three (3) year SRMD deployment proposal is not feasible when looking exclusively at the CE Program. I have tabulated a comparison of the CE Program timeline (sources provided in Table 1 above, and the same for ARMD above) and BI&E's SRMD proposal in BI&E Exhibit 27 below in Table 4:

Table 4

Parameter	CE Program Timelines	BI&E's SRMD Proposal
Research and Development Duration	17 Months	45 days (1.5 months)
Pilot Duration	23 Months	9 Months
Pilot Detectors Installed	9,000	750
Program Duration	63 Months	24 Months
CE Program Detectors Installed	367,000	475,850
Total Duration	**103 Months (8 Years, 7 Months)**	**34.5 Months (2 Year, 10.5 Months)**

As shown, a service territory wide methane detector program took Con Edison over 8 years and 7 months to complete (103 Months), assuming the program is completed on its 2025 projected schedule. Simply put, the 2 years and 10.5-month (34.5-month) SRMD proposal, in my opinion, is not reasonable, prudent, or in the public interest for the reasons I discussed above related to ARMD. Again, I note that PGW's infrastructure does not have the capability to implement SRMD technology today.

Q. WHAT OTHER CONCERNS DO YOU HAVE REGARDING THE PROPOSED 34.5 MONTH SRMD PROGRAM MANDATE?

A. As I discussed above related to ARMD, I have the same workforce and employee concerns for the SRMD proposed mandate. Using the same assumptions as my ARMD analysis above, but instead using the 34.5 months proposed deployment time and a 9-month pilot and subsequent 24-month program that must install 750 and 475,850 detectors respectively, PGW would need to hire an additional 150 employees, apart and above the ARMD employees as BI&E has proposed the ARMD and SRMD programs run concurrently as shown in Table 5 below:

Table 5

	Analysis of working hours required per workday (22 days/month)	**New employees needed, assuming 6 hrs/day installing meters**
BI&E SRMD 9-month Pilot (simultaneous to ARMD)	4 hours[13]	1 new employee[14]
BI&E SRMD 9-month Program	901 hours[15]	150 new employees[16] (less 1 new employee hired for pilot = 149 for program)
Totals	**905 hours**	**150 new employees**

[13] Formula: (750 SRMDs)/(9 months * 22 workdays)

[14] Formula: (4 work hours per day)/(6 work hours per day per employee)

[15] Formula: (475,850 SRMDs)/(24 months * 22 workdays)

[16] Formula: (901 work hours per day)/(6 work hours per day per employee)

Q. IN YOUR OPINION, DID BI&E CONSIDER THE WORKFORCE AND EMPLOYEE REQUIREMENTS NEEDED TO UNDERTAKE THE 34.5 MONTH SRMD PROGRAM?

A. No. In my opinion, BI&E has not adequately considered the impacts of the program on PGW or PGW's capability to implement SRMD within its existing infrastructure or whether the SRMD program is practical or achievable by PGW. Further, when asked in discovery if BI&E assessed whether PGW's system could support SRMD or if BI&E would consider withdrawing the SRMD recommendation as PGW's existing infrastructure cannot support SRMD technology and offering that PGW would agree to conduct a study to implement both AMI and subsequent SRMD, Mr. Horensky concerningly responded:

> No. 2(b)(i). Has BI&E assessed whether or not PGW's existing non-AMI (Advance Metering Infrastructure) utility systems and infrastructure can support SRMD technology?
>
> No. 2(b)(iii). If PGW's existing infrastructure cannot support SRMD technology, is BI&E willing withdraw it recommendation for Pilot 2 at this time? In the alternative, would BI&E agree to PGW conducting a study of the costs and requirements to implement both AMI utility infrastructure and subsequent SRMD technology, and report such findings to BI&E at a later time?
>
> **ANSWER:**
>
> **No. 2(b)(i). No.**
>
> **No. 2(b)(iii). No, BI&E will not consider withdrawing Pilot 2. BI&E submits that PGW should be conducting a study of the costs and requirements prior to the implementation of Pilot 2.**

See **Exhibit RKS-4.**

As with my points above, BI&E's position is unreasonable, and not based on the facts and restrictions of PGW's existing resources and infrastructure. BI&E's SRMD proposal did not assess whether or not PGW's existing infrastructure can support SRMD.

Q. WHAT ARE YOUR SUPPLY CHAIN CONCERNS AS IT RELATES TO THE SRMD PROPOSAL?

A. My SRMD supply chain disruption concerns are the same as my ARMD supply chain concerns raised above.

Q. IS PGW WILLING TO AFFIRMATIVELY COMMIT TO STUDYING AMI AND SRMD IN THE FUTURE?

A. Yes. PGW has a very early understanding of the implications of deploying new AMI technology in its system. PGW is willing to undertake a detailed analysis of SRMD deployment as a component of future AMI deployment.

VI. BI&E HAS FAILED TO SHOW ARMD AND SRMD PROPOSALS ARE IN THE PUBLIC INTEREST AS BI&E FAILED TO ASSESS THE COSTS AND ULTIMATE IMPACT ON PGW'S CUSTOMER RATES AS A CASH FLOW UTILITY.

Q. PLEASE DISCUSS YOUR NEXT CONCERN WITH BI&E'S ARMD AND SRMD PROPOSALS.

A. My next concern is the cost and ultimate impact that the programs would have on PGW's ratepayers as a Municipally owned, Cash Flow Method utility. As I stated above, all of the funds PGW needs to run the Company come from ratepayers or from borrowing (the costs of which then must be paid by ratepayers).

Q. DID MR. HORENSKY ADDRESS THE COSTS OF THE PROPOSED ARMD AND SRMD PROGRAMS IN HIS TESTIMONY?

A. No, he did not. Further, when responding to PGW's Interrogatories Set VI, attached as **Exhibit RKS-4**, Mr. Horensky declined to support recovery of the proposed ARMD and SRMD costs in PGW's base rates, stating that:

> BI&E Safety does [not] make recommendations regarding whether a specific expense claimed in a base rate case should be approved.

See Set VI No. 1. While PGW fully appreciates the internal division between BI&E Safety and BI&E Rates, PGW is simply seeking recognition of core ratemaking

principles and the fundamental purpose of the Commission – to balance the interests of Utilities and Consumers alike. Those interest, as discussed above, are of a particular concern here as any costs associated with BI&E's ARMD and SRMD proposals will burden PGW's customers and increase rates above where they are today.

Q. HAVE YOU ASSESSED THE COSTS OF BI&E'S ARMD AND SRMD PROPOSALS?

A. Yes, I have investigated the cost of BI&E proposal for ARMD and SRMD. However, I would note that PGW only became aware of the specifics of BI&E's ARMD and SRMD proposals as of the filing of their direct testimony on January 13, 2023, and only had until March 10, 2023 to prepare this testimony and assess BI&E's ARMD and SRMD proposals. In light of these restrictions, however, I was able to preliminary asses estimated costs for PGW to implement the ARMD and SRMD programs based exclusively on the CE Program as a benchmark and other considerations (i.e. workforce) which I discussed above. My analysis used the following assumptions shown in Table 6 below:

Table 6

Parameter	Information / Data	Source
CE Research and Development Costs	$1.975 Million	Exhibit RKS-3
CE Pilot Detectors Installed	9,000	Exhibit RKS-1
CE Pilot Costs	$1 Million	Exhibit RKS-3
CE Program Detectors Installed	367,000	Exhibit RKS-1
CE Program Costs	$130 Million	Exhibit RKS-1
BI&E ARMD Cost (excl. installation)	$40	BI&E Response Set VI-1
BI&E SRMD Cost (excl. installation)	$100	BI&E Response Set VI-1
Installation Cost based on Con Ed per SRMD	$254.22	Formula: $\frac{CE\ Program\ Cost}{\#\ CE\ Program\ Detectors\ Installed} - (I\&E's\ SRMD\ Cost)$
Expedited Time Cost Modifier	1.25x	Modifier based on expected supply chain issues and delivery in order to comply with BI&E expedited proposal timeframes to begin within 45 days of a Commission Order

Q. DO YOU HAVE ANY FURTHER CLARIFICATIONS ON THE INFORMATION PROVIDED IN TABLE 6?

A. Yes. I have chosen to use BI&E's proposed ARMD and SRMD per unit costs which BI&E provided in response to PGW Set VI-1 based on an informal discussion with GTI Energy that historically ARMD units cost $40 per unit and SRMD units cost $100 per unit. See **Exhibit RKS-4**. We do not know when this data was gathered, or how long ago the "historical" per unit costs were determined. While I am using these numbers to show the costs of BI&E's proposals below, PGW believes that the current price of ARMD units exceeds $100 per unit, and SRMD units exceed $275 per unit. However, for

simplicity, I will use the per unit costs which BI&E believes to be "historically" accurate for my below analysis.

Q. BASED ON THE ABOVE ASSUMPTIONS, DO YOU HAVE AN ESTIMATE OF WHAT BI&E'S PROPOSED ARMD PROGRAM MIGHT COST.

A. Yes. Based on the assumptions above, I have estimated that the entire 13.5-month ARMD program would, at a minimum, cost PGW over $177.2 million dollars for just the ARMD devices and installation costs alone based on the CE Program. My calculation regarding the ARMD pilot cost is provided below:

$$ARMD\ Pilot\ Est. = (CE\ Program\ Research\ Costs) + (No.of\ Detectors) * (ARMD\ cost + CE\ Installation\ cost) * 1.25$$

$$ARMD\ Pilot\ Estimate = (\$1.975\ million) + (7{,}000\ detectors) * (\$40 + \$254.22) * 1.25$$

$$ARMD\ Pilot\ Estimate = \$4{,}549{,}425$$

For the post-pilot ARMD 6-month program, my calculation provides:

$$ARMD\ Prog.Est. = (No.of\ Detectors) * (ARMD\ cost + CE\ Installation\ cost) * 1.25$$

$$ARMD\ Program\ Estimate = (469{,}600\ detectors) * (\$40 + \$254.22) * 1.25$$

$$ARMD\ Program\ Estimate = \$172{,}707{,}140$$

I next calculated the estimated employee costs to staff the program, based on my above work-hours analysis in Table 3. For this calculation and given the rapidity for which PGW would need to attract capable employees on a 45-day short notice, I have estimated the cost of employee's that PGW must expend to secure a workforce of 584 new employees to be an average of $50,000, including salary, training, and other on-boarding costs for these temporary employees. Assuming these temporary employees are employed for 1 year, simple arithmetic provides that PGW's employee costs for the ARMD program (584 employees x $50,000 x 1 year) to be $29.2 million for the 12-month installation window.

Q. BASED ON THE ABOVE, WHAT IS THE TOTAL ESTIMATE FOR WHAT BI&E'S ARMD PROGRAM WILL COST?

A. Including estimated research, pilot, program costs and employee costs, I estimate that BI&E's ARMD proposal would cost PGW no less than $206 Million. For reference, this reflects approximately 26% of PGW's 2021-2022 revenues. As a Cash Flow Method utility, PGW must pass this 26% increase onto customers. Even if PGW were to spread out the rate recovery over a three-year period, I estimate that customer bills would need to increase by over 8% to pay for the program (26% / 3 years). I note that this is only an estimate to frame the issue, and I am not an expert on, nor in charge of calculating PGW's rates.

Q. BASED ON THE ABOVE ASSUMPTIONS, DO YOU HAVE AN ESTIMATE OF WHAT BI&E'S PROPOSED SRMD PROGRAM MIGHT COST.

A. Yes. First, I note that my calculations below do not include an estimate on what the cost is for PGW to implement AMI throughout its system. As explained above, PGW presently does not have the infrastructure to support BI&E's requested SRMD program. It is very likely that upgrading the entirety of PGW's infrastructure to an AMI based system would costs hundreds of millions of dollars and take many years to complete. That said, ignoring the fact PGW currently lacks AMI, based on the assumptions above, I have estimated that the 34.5-month SRMD program mandate would, at a minimum, cost PGW over $231 million dollars for just the SRMD devices and installation costs based on the CE Program. My calculation regarding the SRMD pilot portion is provided below:

$$SRMD\ Pilot\ Est. = (CE\ Program\ Research\ Costs) + (No.of\ Detectors) * (SRMD\ cost + CE\ Installation\ cost) * 1.25$$

$$SRMD\ Pilot\ Estimate = (\$1.975\ million) + (750\ detectors) * (\$100 + \$254.22) * 1.25$$

$$SRMD\ Pilot\ Estimate = \$2{,}307{,}081$$

For the post-pilot SRMD 24-month program, my calculation provides:

$$SRMD\ Prog.Est. = (No.of\ Detectors) * (SRMD\ cost + CE\ Installation\ cost) * 1.25$$

$$SRMD\ Program\ Estimate = (475{,}850\ detectors) * (\$100 + \$254.22) * 1.25$$

$$SRMD\ Program\ Estimate = \$210{,}694{,}484$$

I next calculated the estimated employee costs to staff the program, based on my above work-hours analysis and the employee costs discussed above and shown in Table 5. Assuming these temporary employees would be employed for duration of the program, simple arithmetic provides that PGW's new employee costs for the SRMD program (150 employees x $50,000 x 2.75 years) to be $20.6 million for the 34.5-month installation window

Q. BASED ON THE ABOVE, WHAT IS THE TOTAL ESTIMATE FOR WHAT BI&E'S SRMD PROGRAM WILL COST?

A. Including estimated research, pilot, program installation costs and employee costs, and excluding the required AMI infrastructure upgrades to even being installation of SRMD, I estimate that BI&E's SRMD proposal would cost PGW no less than $233 Million, or approximately $84 million / year (over the 2.75-year program). This reflects approximately 10% of PGW's 2021-2022 revenues, each year for three (3) years. As a Cash Flow utility, PGW would be required to pass this 10% / year increase onto customers. Again, I would note that this is only an estimate to frame the issue, and I am not an expert on, or in charge of calculating PGW's rates.

Q. ASSUMING THAT PGW COULD IMPLEMENT SRMD CURRENTLY, WHAT WOULD BE THE TOTAL COST AND THE BREAKDOWN OF COST / YEAR TO SIMULTANEOUSLY IMPLEMENT BI&E'S ARMD AND SRMD PROPOSALS?

A. Based on the above, the total estimated cost to implement BI&E's ARMD and SRMD proposals would cost a total of $440 Million. Below is a table showing the estimated cost

per year to simultaneously implement BI&E's ARMD and SRMD proposals based on my above stated assumptions shown below in Table 7:

Table 7

	Year 1	**Year 2**	**Year 3**
ARMD Proposal	$206 Million	$0 (COMPLETE)	$0 (COMPLETE)
SRMD Proposal	$36 Million (9-month pilot + 3-month program)	$113 Million (12-months program)	$85 Million (9-months program)
TOTAL	$242 Million	$113 Million	$85 Million

Q. HOW WOULD PGW RECOVER THESE EXPENSES?

A. I am not responsible for calculating rates or expense recovery for PGW. However, I am advised by counsel that because PGW is a Cash-Flow utility, the $440 Million would have to be funded through base rates or borrowing to be recovered in base rates, or that PGW could pursue other recovery mechanisms such as a surcharge on top of existing rates, subject to Commission investigation and approval. Regardless, I do not recommend that the costs of these programs be funded by existing rates or in lieu of other infrastructure improvements like PGW's primary focus of replacing cast iron infrastructure under its LTIIP. The replacement of cast iron mains, as the Commission has approved through PGW's LTIIP, should remain PGW's main priority to ensure the continued safety of its utility service.

Q. WOULD BI&E'S ARMD AND SRMD PROGRAMS BE "ONGOING" AFTER THE INITIAL ARE COMPLETED?

A. Yes, BI&E's Exhibit 27 in its "miscellaneous" category on page 2 provides:

> PGW shall develop and create a replacement program for those methane detectors that are either found to be damaged, defective, or nearing the end of their useful life.

As a practical matter, it is PGW's understanding that the life of ARMD and SRMD units vary by manufacturer, and ranges from 6-10 years. In I&E's response to PGW Set VI-2, BI&E states that the average lifespan of ARMD and SRMD also vary based on different factors but stated the average lifespan of the devices are approximately 10 years. **Exhibit RKS-4**. Therefore, PGW believes that BI&E's ARMD and SRMD proposals and costs would continue beyond the initial pilot and installation proposals as an ongoing replacement program. While PGW recognizes that an ongoing replacement program over a 6-10 year replacement life cycle for ARMD and SRMD would not have nearly the cost impacts of BI&E's expedited ARMD and SRMD initial 13.5-month and 34.5-month proposals respectively, the costs of these ongoing programs would have to be passed onto ratepayers to fund the ongoing replacement program as PGW, again, is a Cash Flow utility.

VII. THE COMMISSION SHOULD ASSESS MANDATING A METHANE DETECTOR PROGRAM THROUGH POLICY OR RULEMAKINGS TO ENGAGE ALL STAKEHOLDERS.

Q. PLEASE DISCUSS YOUR CONCERN REGARDING BI&E'S ARMD AND SRMD PROPOSALS UNDER THE CURRENT LAW, POLICY, AND INDUSTRY PRACTICES, AND WHY BI&E'S PROPOSALS IN THIS COMPLAINT CONCERN YOU.

A. BI&E's ARMD and SRMD proposals are costly, resource intensive, and unprecedented in the state of Pennsylvania. It is my understanding that no other Natural Gas Distribution Company has either in place, or has been ordered to put in place, a system wide methane detector program in Pennsylvania to date. As I've shown above, these programs are extremely detailed initiatives for which PGW's customers must bear the costs. PGW should not be compelled to follow new rules not presently required by any law, regulation, or Commission Order. I'm advised by Counsel that such large reaching

initiatives are best left for Commission initiated policy investigations and rulemaking where the issues can be properly vetted by all stakeholders before PGW's rate payers must be forced to bear the costs of the unreasonable or even presently impossible ARMD and SRMD mandate BI&E is seeking in this matter.

VIII. CONCLUSION

Q. DOES THAT COMPLETE YOUR REBUTTAL TESTIMONY?

A. Yes. This concludes my rebuttal testimony. I reserve the right to file additional responsive testimony as necessary. Thank you.

Exhibit RKS-1

Con Edison Providing Smart Gas Detectors In Major Breakthrough For Customer Safety

CON EDISON MEDIA RELATIONS | New York – September 28, 2020 -- 10:00 AM

Devices Sound an Alarm & Recorded Warning, Notifying Con Edison of Possible Natural Gas Leak

Feedback

Con Edison is installing 376,000 smart-technology natural gas detectors for customers in New York City and Westchester County, providing an unprecedented level of protection against potentially dangerous leaks.

The distribution of the detectors follows a successful pilot in which Con Edison provided 9,000 detectors. Those detectors sounded 250 alarms since the first installations in October 2018.



The company places the detectors at the spot inside the building where the gas service line enters. When the detector senses natural gas, it sounds an alarm and voice warning. It also alerts operators at Con Edison's Gas Emergency Response Center, who notify the local fire department.

"This is a life-saving technology," said Marc Huestis, Con Edison's senior vice president, Gas Operations. "These detectors urge anyone nearby to leave and prompt a swift response from our gas crews and the local fire department so that they can shut off the gas, find the leak and make it safe."/

The alarm will sound until Con Edison silences the unit. The voice recording advises occupants to evacuate and call 911 from outside the building.

Using a phone, turning lights, appliances or a flashlight on or off, lighting a match or starting a car can create a spark and cause the gas to ignite.


conEdison
ML-310CE
Natural Gas Detector
Power
Trouble
Alarm
Test
ITS BATTERY. Doing so could disable the gas detector and/or prevent it from functioning properly.
DO NOT PAINT OVER THIS DEVICE, OBSTRUCT OR COVER IT IN ANY WAY, OR GET IT WET. Doing so may clog or block the openings to the sensing chambers and/or prevent the gas detector from operating properly.
For information or questions about this gas detector, call 1-800-75-CONED (1-800-752-6633).
conEdison
Natural Gas Detector

New Rochelle resident Clarence Stanley was part of the pilot program and he's thankful that he was.

One night this summer, he got out of bed to watch TV and catch up on sports scores and the political shows he enjoys when he heard the alarm. He woke his wife and called Con Edison from a phone not located near the basement. A Con Edison representative who answered advised him to leave the house.

By the time of his call, Con Edison and New Rochelle fire personnel were already on their way. As the Stanleys waited outside, the crews arrived.

It turned out that there was a small gas leak, which Con Edison repaired.

"This is an extra layer of protection and I'm glad we had it," Stanley said of the device. "It was a small leak but this ultra-sensitive device detected it."

Con Edison was the first utility in the United States to deploy the technology, a product of New Cosmos, when it began the pilot in Lower Manhattan and several Westchester County communities.

The company has 376,000 gas service lines, which carry gas from the main in the street to the customer's home or business. Those lines serve the company's 1.1 million gas customers. The service line usually enters the building in the basement near the gas meter.

The company will install all the detectors by 2025 under a $130 million program. Each installation takes less than an hour and there is no charge to the customer. Installation does not require gas service to be turned off and customers do not have to perform any maintenance on the detectors once they are installed.

The devices will not detect gas in other areas of a building. Con Edison recommends that building owners and tenants place gas detectors in areas where

The current version of the detector lasts six years. Due to technology improvements, those installed starting in the middle of next year will last seven years and those installed starting in 2023 will have a 10-year lifespan.

How to Recognize a Gas Leak

A person in a building may smell natural gas before the detector's alarm sounds. If you think you smell gas, act fast. Leave the home or business and take others with you. Report the leak by calling 911 or 1-800-75CONED once you are safely outside. Do not assume that someone else will call.

Natural gas carries an odorant that smells like rotten eggs. A leak may cause a roaring, hissing or whistling sound. See other natural gas safety tips.

Con Edison is a subsidiary of Consolidated Edison, Inc. [NYSE: ED], one of the nation's largest investor-owned energy companies, with approximately $13 billion in annual revenues and $59 billion in assets. The utility delivers electricity, natural gas and steam to 3.5 million customers in New York City and Westchester County, N.Y. For financial, operations and customer service information, visit conEd.com. For energy efficiency information, visit coned.com/energyefficiency. Also, visit us on Twitter and Facebook.

WAS THIS INFORMATION HELPFUL?

Outages

Skip to Main Content

Safety

Exhibit RKS-2

Exhibit RKS-2

Natural Gas Detector

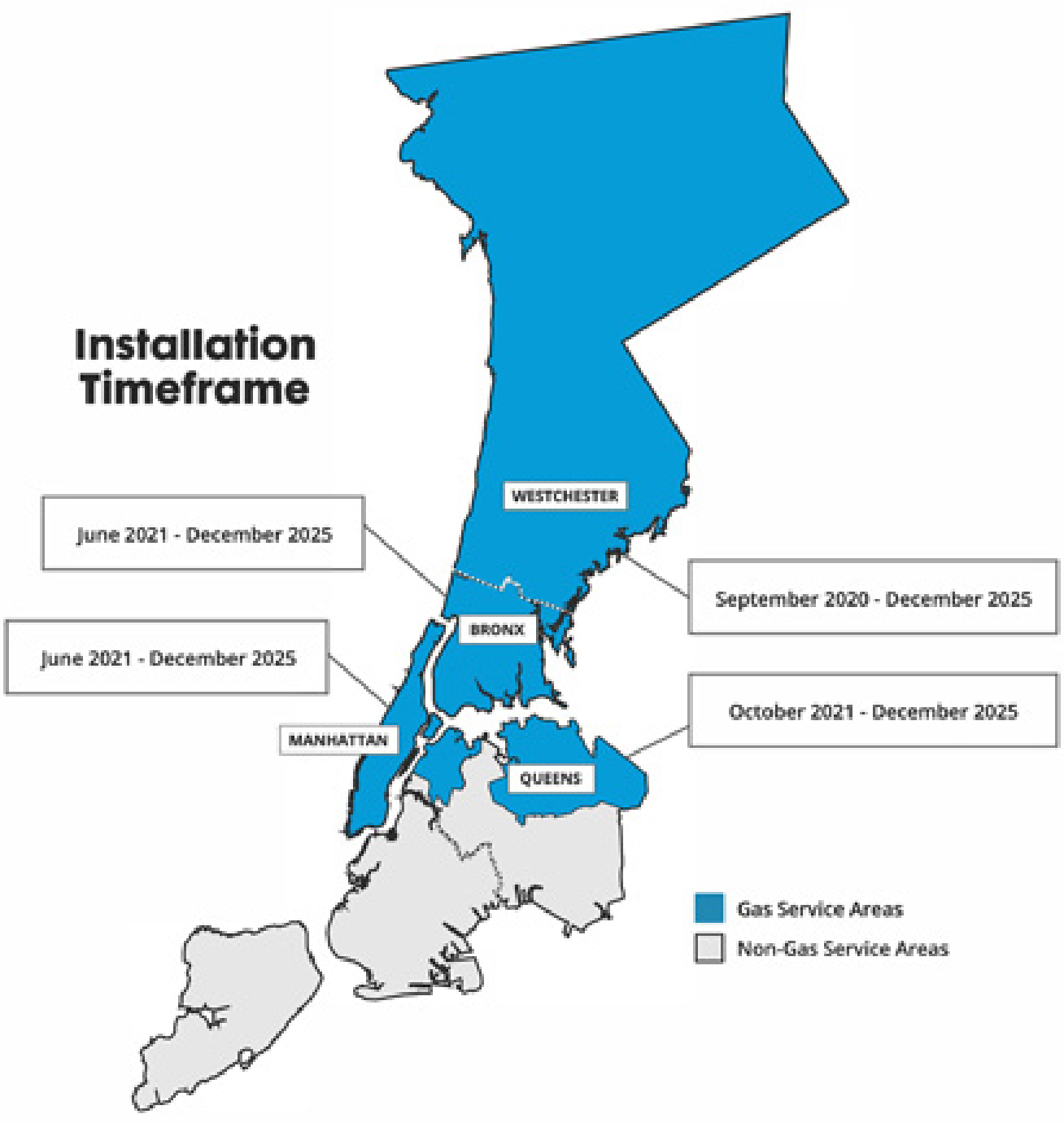
Our free device monitors the air in the area where our gas service pipe enters your home or building, and will sound an audible alarm and send us an alert if a potential gas leak is detected.

Installation Timeframe Important Safety Information & Warnings How the Natural Gas Detector Works

Schedule Your Appointment

Installation Timeframe

Over the next several years, we will be installing natural gas detectors as part of a program to help enhance gas safety in the communities we serve.



Skip to Main Content →

Exhibit RKS-2

Important Safety Information & Warnings

For your safety and the safety of those around you, please read the tag attached to your natural gas detector carefully and review this important guide with safety information and warnings.

Important Safety Information & Warnings (PDF)



How the Natural Gas Detector Works

If levels of natural gas indicate a potential leak, the natural gas detector will beep loudly and sound the following audible alarm: "Danger. Gas leak explosion risk. Evacuate, then call 911." It will also send an alert to us. Con Edison and the fire department will then respond and investigate. The alarm will continue to sound until we arrive and silence the unit.

What You Should Do if the Detector's Alarm Sounds

If your natural gas detector's alarm sounds or if you smell or hear a natural gas leak:

- **Evacuate immediately and take others with you.**
- **Do not use a phone; light a match; turn on or off lights, flashlights, or appliances; start a car; or do anything else that could create a spark and cause the gas to explode.**
- **When you are safely outside, call 911. You can report leaks anonymously.**
- **Do not re-enter the premises until told to do so by authorities. Never assume that someone else will report the leak or that the natural gas detector has already notified Con Edison. In some situations, you may smell gas before the natural gas detector's alarm sounds.**

How to Recognize a Gas Leak

Smell—A distinctive, strong odor similar to rotten eggs
See—A white cloud, mist, fog, bubbles in standing water, blowing dust, or vegetation that appears to be dead or dying for no reason
Hear—Roaring, hissing, or whistling

Learn more about how to prevent, detect, and report gas leaks.

Skip to Main Content →

How to Schedule Your Installation Appointment and What to Expect

Exhibit RKS-2

If you'd prefer to schedule your own appointment, please reach out to our trained Con Edison contractors:

Bronx: 1-347-514-9133
Westchester: 1-833-243-4520
Queens: 1-855-217-3409
Manhattan (excluding 10025, 10026, 10029): 1-866-483-2341
Manhattan (10025, 10026, 10029): 1-855-217-3409

The natural gas detector will then be installed in your basement, typically in the area where the gas service pipe or other utilities enter your home or building. This area may be near Con Edison's gas meter but will vary depending on the location of the meter and the layout of your basement. The installation should take less than an hour and there is no need to turn off your gas service.

Frequently Asked Questions

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- Renters and Homeowners
- Multifamily Building Managers
- Small & Medium Businesses
- Commercial & Industrial

Skip to Main Content →

Exhibit RKS-2

Investors

Rates & Tariffs

Social

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Exhibit RKS-3

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on July 12, 2018

COMMISSIONERS PRESENT:

John B. Rhodes, Chair
Gregg C. Sayre
Diane X. Burman
James S. Alesi

CASE 14-G-0201 - In the Matter of the Investigation Relating to the Explosion and Collapse of the Buildings at 1644 and 1646 Park Avenue, New York, New York in the Service Territory of Consolidated Edison Company of New York, Inc. on March 12, 2014.

ORDER APPROVING PROPOSED USE OF SETTLEMENT FUNDS WITH MODIFICATIONS

(Issued and Effective July 12, 2018)

BY THE COMMISSION:

INTRODUCTION

On February 16, 2017, the Commission approved a $153 million settlement with Consolidated Edison Company of New York, Inc. (Con Edison, Company) to resolve a possible penalty action with respect to the March 12, 2014 gas incident in East Harlem, New York (Incident).[1] The Incident caused eight deaths, an estimated 48 serious injuries, and millions of dollars in structural damage. In addition to Con Edison withdrawing and forbearing requests for ratepayer-funded deferrals of the Company's costs incurred responding to an increase in natural gas odor reports in the three years following the East Harlem

[1] Case 14-G-0201, Order Approving Settlement Agreement (issued February 16, 2017) (East Harlem Settlement Order).

Incident, the settlement included approximately $25 million, plus interest, to be used for the benefit of gas customers.[2]

As required by the settlement, Con Edison, on December 15, 2017, submitted a Consolidated Edison Company of New York, Inc. Petition Regarding Settlement Funds (Petition) describing the proposed use of the settlement funds. This Order approves the Petition with modifications, as described herein. Foremost, the Petition does not include any proposed reporting mechanism to ensure the funds are being used appropriately, efficiently, and effectively. Therefore, in addition to some reassignment of program funds, this Order adopts reporting requirements.

In conformance with the State Administrative Procedure Act (SAPA) §202(1), notice of Con Edison's Petition was published in the State Register on March 13, 2018 (14-G-0201SP1). The SAPA §202(1)(a) period for submitting comments in response to the notice expired on May 14, 2018. Comments were received from the County Executive of Rockland County, first responders Gerald Knapp and Daniel Moran (Rockland County fire fighters), Assemblyman Robert Rodriguez, who represents East Harlem in New York's 68th Assembly District, and the Fire Department of the City of New York (FDNY).

THE PETITION

In its Petition, Con Edison describes that, in surveys, community members urged that settlement funds be used to educate children of all ages about gas safety and to improve leak detection. Earlier, community requests included job training for youth in East Harlem. In developing the specific

[2] Con Edison states that, due to interest accrued, the Company estimates the total disbursement will be $25.5 million since at the time the Petition was filed it was $25.3 million. Petition at 3, fn.4.

programs it proposes, Con Edison worked with Staff to be responsive to these community requests and to advance gas safety overall.

Therefore, Con Edison proposes using $25.5 million in the following manner: $11.3 million would be spent to improve detection of gas leaks (specifically, providing funds to the FDNY and Westchester County to purchase Remote Methane Leakage Detectors (RMLDs) and high-powered blower aeration equipment and providing residential methane detectors to customers); $11.8 million to improve infrastructure in the East Harlem neighborhood where the Incident occurred (specifically, installing sectionalizing valves at 18 New York City Housing Authority (NYCHA) buildings, replacing large diameter cast iron main, a size that is not included in the Company's approved leak prone pipe replacement program, and lining other cast iron pipes where appropriate); and $2.4 million to develop educational programs for school-aged children, to fund high school internships, and to educate building superintendents in gas safety.

Gas Detection Proposal

Con Edison proposed natural gas detection programs that would provide (1) $5.4 million to the FDNY and Westchester County to purchase RMLDs and train first responders in using the devices; (2) $2.9 million to the FDNY and Westchester County to purchase high-powered blowers to aerate locations where gas has collected due to leakage; (3) $2 million for methane detectors to be distributed to East Harlem residents, which will include instructions on how and where to install the methane detectors; and (4) $1 million to fund a pilot program for remote methane

detectors that can communicate through Con Edison's automated metering infrastructure communications system.[3]

Infrastructure Improvements Proposal

Con Edison proposed infrastructure improvements that include (1) using $1.5 million to add sectionalizing valves at 18 NYCHA facilities in the East Harlem area. These valves will allow Con Edison to continue to serve customers if there is a large gas incident that could affect the continued provision of service; and (2) rehabilitating cast iron gas pipes in East Harlem by investing $3.3 million to line existing cast iron pipe and $7 million to replace other cast iron mains (totaling $11.3 million).

Gas Safety Education

To advance gas safety education, Con Edison proposed to (1) use $500,000 to fund a gas safety training program and summer internship program for local youth who participate in the East Harlem Technical high school's plumbing program. This program provides the dual benefit of professional training for local youth and advancing gas safety education; (2) develop, in cooperation with the City University of New York (CUNY), a gas safety education curriculum to be presented to elementary to high school-aged youth, at a cost of $1 million over five years; (3) leveraging CUNY's relationship with the NYC-based local of the Service Employees International Union (SEIU) and non-union superintendents who manage residential buildings, using $500,000 to supplement CUNY's existing Superintendent training sessions with gas safety training; and (4) provide CUNY funds to conduct a behavioral economic study to better understand the factors

[3] RMLDs are laser-based methane detection devices that can be used at up to 100 feet away from a leak and are able to detect methane within the building through windows or other openings.

that motivate children and adults to call 9-1-1 or Con Edison when they smell gas, at a cost of $400,000.

In addition to the $25.5 million investment in gas safety programs, the Company has committed to working closely with Community Board 11, a sub-unit of New York City Government that addresses issues facing groups of neighborhoods. Community Board 11 includes East Harlem, whose residents are very active in attending Community Board 11 meetings (Con Edison reports that oftentimes 100-150 people attend). Further, Con Edison proposed to increase its attendance at other community outreach events and meetings throughout New York City, such as local East Harlem health fairs, senior events, and community group information exchanges.

COMMENTS

The Rockland County fire fighters support providing RMLDS to fire departments in Con Edison's service territory and recommend that Rockland County be used as a pilot location for RMLDS. They state that fire units have only a "vague description" of the possible leak in responding to an odor call and now must approach the area with a combustible gas indictor while other parts of the area could be collecting gas. Further, models of existing gas detection equipment "become saturated" and are slow to detect gas again after initial readings. RMLDs, on the other hand, allow for "instant" confirmation that gas exists or does not exist at the site. RMLDS provide a 100-150-foot sweep of an area and allow for checking the migration of gas from the soil, road surfaces, meters, buildings and sub-surface structures. This allows fire fighters to remain safer by allowing them to test gas levels far away from where hazards exist. RMLDs work inside buildings as well, including basements in which flooding has occurred and pilots have been

extinguished. That said, training the personnel who use RMLDS is as important as the equipment itself.[4]

The Rockland County Executive states his fire departments would greatly benefit from being included in the use of the settlement funds. He cites to a 2012 gas incident in which two fire fighters were seriously injured and which RMLDs could have prevented, and urges the Commission to purchase RMLDs for all Rockland County fire departments.

Assemblyman Rodriguez found "that [Con Edison's] plan addresses the need to enhance safety by providing fire departments with equipment for easier gas leak detection." He believes that "[a]s a safety measure to prevent explosions in the future, methane detectors should be required by law to be in every residence and commercial unit."[5] As part of the consumer education initiatives, Assemblyman Rodriguez supports "outreach and educational programing dedicated for commercial and in particular small businesses, such as restaurants and delis that utilize gas-powered appliances." He sought further Con Edison "engagement" with new businesses.[6]

The Acting Chief of the FDNY's Fire Academy explained that it had consulted with Con Edison before proposing that the settlement funds for the FDNY be assigned as follows: With respect to Remote Laser Methane Detectors, the FDNY seeks 40 Hazardous Material Technician II Units (HMTU II)(2 per Unit); 25 HMTU I Units (1 per Unit); 1 per Unit for the HM Battalion, Rescue Battalion, and Safety Battalion (total, 3 Units); Marine and Marine Training (Total 10 Units); Training (10 Units); and

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[4] Comments of Gerald Knapp, dated February 11, 2018 and Daniel Moran, dated February 24, 2018.

[5] Assemblyman Rodriguez comments at 1.

[6] Assemblyman Rodriguez comments at 2.

Spares (42 Units). In addition to these RMLDs, the FDNY seeks $500,130 assigned to a 10-year maintenance, repair, replacement, and gas window trainers program, totaling: $1,825,130.

With respect to the blowers, the FDNY identified the need for 15 Vent Support Units, or "Intrinsically Safe Fans" with added logistical support (maintenance, repairs, training) at a cost estimate of $90,000 and $25,000 for maintenance, repairs, training in the use of the fans, totally $115,000.[7] The total cost of the intrinsically safe fans and the RMLDs would be $1.94 million.

The FDNY also seeks funds for training fire fighters in the properties of natural gas fires, stating that the "balance of Settlement, [about] $6,400,000, would allow [the FDNY] to reach all potential Incident Commanders (Lieutenants, Captains, and Battalion Chiefs) for 4-8 hrs. training." The FDNY notes this allocation is "optimally" the outcome of the funding assigned to the FDNY.[8]

DISCUSSION AND CONCLUSION

Overall, Con Edison's proposed use of the East Harlem settlements funds is sound. The settlement funds will be used fully for the benefit of gas customers, as required by the East Harlem Settlement Order. A significant portion of the funds will improve infrastructure in the East Harlem neighborhood directly affected by the 2014 Incident and will provide gas detection equipment and natural gas education directly to East Harlem residents. The proposal also responds to community requests for job training for local youth.

[7] Fire departments must use "intrinsically safe" equipment, which is designed not to spark to avoid further incident.

[8] FDNY Comments at 2.

That said, some use of the funds that Con Edison proposes are being modified based on the FDNY's comments and other factors. They are described below.

Moreover, reporting requirements and Department evaluation of the progress on the use of the funds and the effectiveness of each program are necessary. Therefore, to ensure the funds are being used appropriately, the Department must be kept apprised of the programs' progress. To allow the Department the opportunity for such oversight, Con Edison shall fund one-half of each program within 45 days of the date of this Order to allow each program recipient to begin using the funds immediately. After one year, program recipients that have sufficiently shown that they have made successful progress implementing the program for which they were provided funds, will be provided the balance of the funds by Con Edison. Program recipients that sufficiently show that they have made significant progress implementing the program for which they were provided funds before the one-year mark, after documenting such progress, may ask Con Edison for the remaining funds. After the first six-months of funding, if any of the funds are not forecast to be used in accordance with the specific programs set forth in this Order, or if more funds become available under the terms of the East Harlem Settlement Order, the funds will be used for other gas safety programs approved by the Commission.

Leak Detection Equipment

Remote Methane Leakage Detection Equipment

Con Edison proposed to provide $5.4 million directly to the FDNY for the purchase of RMLDs.[9] RMLDs will allow first

[9] Pursuant to coordination changes for odor calls after a 2009 gas incident, customers in New York City are now told to call 911 when they smell a gas odor. Such calls go directly to the FDNY. The FDNY then alerts Con Edison of the odor report call and its location.

responders to detect and measure the presence of gas as soon as they arrive at the location of an odor call. Included in this proposal is that Con Edison will provide funds for training to the FDNY on the use of RMLDs.

The Rockland County first responders describe that RMLDs "will greatly enhance the ability of the fire department to identify" leaking natural gas and allow leaks to be detected "a safe distance away".[10] Assemblyman Rodriguez agrees, stating RMLDs enhance gas safety by making gas detection easier.[11] The FDNY seeks to use the funds assigned to RMLDs to "improve gas safety, increasing the F.D.N.Y.'s ability to respond to gas emergencies and "reducing existing threats."[12]

The FDNY consulted with Con Edison in the purchase of what the FDNY proposes to be 130 RMLDs, with an added budget of $500,000 for ten years of repairs, totaling approximately $1.8 million. The FDNY believes that the cost to train all FDNY Battalion Chiefs, Captains, and Lieutenants in gas emergency response will be an additional $6.5 million.[13] That said, the FDNY allowed that it will modify its planned use of the funds based upon the amount assigned to the FDNY.

Con Edison's proposal - to provide funds for RMLDs and training to the FDNY and Westchester County - is consistent with the approved settlement, which states the settlement funds shall be used for Con Edison's gas customers. The equipment will allow first responders to make an area safe immediately upon arrival by assessing the threat with the RMLDs and aerating near where gas is leaking, which will protect residents, first

[10] Comments of Gerald Knapp and Danial Moran at 1-2.

[11] Assemblyman Rodriguez Comments at 1.

[12] FDNY Comments at 1.

[13] FDNY comments at 1-2.

responders, and bystanders. This equipment, therefore, can save lives; its purchase, therefore, is approved.

Given the FDNY's stated preferences, funds will be assigned to the FDNY in a manner that is responsive to its requests.[14] However, the FDNY's proposed funding did not include Westchester County fire departments. Westchester should also receive gas safety funding for first responders, as Con Edison proposed, because Westchester is part of Con Edison's service territory. Therefore, given the FDNY's stated flexibility in its proposed budget, Con Edison shall work with the Westchester County Fire Services Division to determine an amount to be provided Westchester County fire departments for RMLDS and for training fire fighters in their use.[15]

High-Powered Blowers

Con Edison also proposed to provide the FDNY $2.9 million to purchase high-powered blowers ("aerator funds"), which will be used to aerate areas in which natural gas has collected. Such aeration dissipates any gas that may have accumulated, making the area safe for first responders, residents, and bystanders.

[14] While Con Edison does not provide natural gas service to all five boroughs of New York City, the FDNY does serve all five boroughs. For this reason, the funds provided to the FDNY are not limited to Con Edison's natural gas service territory.

[15] The Rockland County commenters' request for RMLD funds is rejected. Rockland County is not in Con Edison's service territory nor is the Rockland County fire department operated by the FDNY. Notably, however, in Case 14-G-0186, In the Matter of an Enforcement Proceeding Against Orange and Rockland Utilities, Inc. (ORU) for Alleged Violations of 16 NYCRR Part 753 - Protection of Underground Facilities, in the Service Territory of Orange and Rockland Utilities, Inc., Rockland County was provided $150,000 to build a gas response training center for fire fighters in a Commission settlement reached with Orange and Rockland Utilities, Inc.

In its comments, the FDNY seeks 15 intrinsically safe fans, which the FDNY believes can be purchased for $90,000. With training costs, the FDNY estimates aerators will cost $115,000. Therefore, Con Edison's proposed assignment of $2.9 million for high-powered blowers is excessive. Instead, Con Edison may provide the FDNY $115,000 to purchase 15 aerators and for training in how to use them. Some portion of the settlement funds shall also be provided to the Westchester County Fire Services Division for aerators. Con Edison will work with Westchester County Fire Services Division to discern how many intrinsically safe aerators Westchester County first responders need.

In sum, with respect to the fire department funding, a total of $8.3 million of the settlement funds will be set aside in a separate account for the FDNY and Westchester fire departments. The FDNY will receive sufficient funding for 130 RMLDs and 15 intrinsically safe natural gas aerators. Con Edison shall work with the Westchester County Fire Services Division to determine the needs of Westchester's fire departments and shall, in Con Edison's 60-day report required herein, propose the number of RMLDs and aerators for Westchester County. The remaining funds shall be used for training for both the FDNY and Westchester County fire departments in safe response to gas incidents a manner proposed by Con Edison with Department approval.

Supporting first responders is essential to gas safety. Fire fighters are often the first to arrive on site when an incident occurs; therefore, their need to have a complete understanding of natural gas properties, how natural gas differs from other types of fires, and equipment that can be life-saving cannot be overstated. It is also essential,

however, that the generous funding from this settlement be managed well and transparently.

Therefore, as a condition of accepting the settlement funds for RMLDs, aerators and training, the FDNY and the Westchester County Fire Services Division will follow a reporting system with proof of equipment purchases. Once Con Edison, the FDNY, and the Westchester County Fire Services Division establish the budgets for the FDNY and Westchester County, with which the Department must agree, a schedule of FDNY and Westchester County reporting will need to be established. In its 60-day report, therefore, Con Edison shall include the agreements from the FDNY and the Westchester County Fire Services Division to maintain documentation of their use of the funds, the development of the schedules for first responder training, and confirmation that the fire departments' plans are consistent with this Order. Con Edison should also clarify in its reporting how the Fire Department Gas Emergency Training provided for in the Order Approving Electric and Gas Rate Plans differs from what will be provided through use of the East Harlem settlement funds.[16]

Methane Detector Distribution

From customer surveys, Con Edison learned that customers wanted "gas detection devices" to be made available to the community. Therefore, Con Edison proposed to use $2 million to provide residential methane detectors to East Harlem residents. The methane detectors are appropriate for placement in individual residential units. Assemblyman Rodriguez supports this effort and expresses his support for pending legislation

[16] See Case 16-G-0061 - Consolidated Edison Company of New York, Inc. Gas Rates, Order Approving Electric and Gas Rate Plans (issued January 25, 2017) (Rate Order); see Joint Proposal at 88.

consistent with Con Edison's proposal to provide methane detectors to residential customers; he believes "methane detectors should be required by law to be in every residence and commercial unit."[17] Con Edison also proposed to use $1 million for a pilot for remote methane detectors using automated meter reading equipment.

It should be noted that, in the Rate Order, Con Edison was directed to spend $1.975 million from a reconciliation of research and development costs to provide residential methane detectors at no charge on a first-come, first-served basis to its customers.[18] As of July 2, 2018, Con Edison had spent that entire amount. Therefore, when Con Edison provides reporting on how much has been spent on residential methane detectors, any funding attributed to the East Harlem settlement must be incremental to what has been spent in compliance with the Rate Order.

These Con Edison proposals are adopted with the conditions described as follows. First, when distributing the methane detectors, Con Edison shall also provide a manual that instructs residents how and where to install the methane detector. Second, Con Edison shall maintain a log that allows the Company to directly contact customers who receive the methane detectors. This will both help to ensure each residence receives only one methane detector and will allow for follow-up to gauge the success of the program. Third, in 2016, the City of New York enacted a City Code requirement that methane detectors be installed and maintained in all dwellings in New

[17] Assemblyman Rodriguez Comments at 1.

[18] Rate Order at 84-85.

York City after "industry standards have been promulgated."[19] Con Edison shall provide those who receive methane detectors notice of this New York City law. Finally, Con Edison shall track all reported leaks detected by the devices provided as part of this settlement by comparing, at year's end beginning December 31, 2018, the list of addresses that received the devices with the list of all reported leaks. Con Edison shall report the information to DPS Staff by the following March 31, 2018, and on March 31st for three years thereafter.

Due to the fewer than expected customer requests to obtain methane detectors after the Commission authorized $1.975 million in Con Edison rates for methane detector distribution, East Harlem residents may not request methane detectors in this program to the extent funding is available. Or, once customers accept a methane detector, they may not install it after seeing that methane detectors, unlike carbon monoxide detectors, require specific placement that may require hard-wiring the detector. Therefore, Con Edison shall reach out to gas customers who have received methane detectors (including, to the extent possible, those who have received them in the rate case distribution program) to ask whether the customer installed the detector and, if not, why not. Con Edison shall then include this information in its reporting to the Department on the status of the settlement funds.

Con Edison's proposed use of $1 million to fund a pilot for remote methane detectors using automated meter reading

[19] See NYC Building Code §908.10. Extensive studies by the Gas Technology Institute have identified methane detector models that can be used effectively and efficiently (e.g. they do not go off for smells other than methane). Con Edison shall distribute the models that were found work best in a residential environment.

equipment is modified.[20] The Company has been exploring the use of remote methane detectors, apparently using Company Research and Development funds. Therefore, Con Edison shall hold and not disburse this $1 million until Con Edison's development of these automated remote detectors are ready for deployment. As such, this funding will not be a pilot program as Con Edison proposes. After the efficacy of the devices are proven, this $1 million will be used to purchase and install the actual methane equipment.

East Harlem Infrastructure Improvements

Sectionalizing Valves

Con Edison proposed to dedicate $1.5 million of the settlement funds to installing sectionalizing valves on 18 NYCHA Housing buildings in East Harlem. The existence of such valves allows Con Edison, if a leak is detected inside one of the buildings that has an isolation or sectionalizing valve, to isolate that building so gas service can be maintained to everyone else in the neighborhood. As such, the 18 NYCHA buildings in East Harlem will, when appropriate, maintain gas service in the event of a gas incident. This proposal is approved.

Cast Iron Pipe Rehabilitation and Replacement

The Company's proposal to replace and rehabilitate cast iron main in the East Harlem area affected by the 2014 Incident is approved. Replacement ($7 million) or rehabilitation ($3.3 million) of gas mains 12-inches in diameter or larger, which are not planned for replacement in Con Edison's

[20] Assemblyman Rodriguez stated in comments that he would like more information on this initiative. Con Edison is directed to provide that information to the Assemblyman and to copy the Department on any such correspondence.

leak-prone pipe replacement program, will reduce the possibility of future leaks.[21]

Con Edison shall maximize the amount of replaced pipe given its cost of $7 million. Where 16-inch to 30-inch diameter pipe will be installed at intersections, it is reasonable to expect that the costs will be higher; however, a fully competitive bidding process must be used to ensure cost-efficiencies.[22]

Educational Programs

The $2.4 million in educational programs Con Edison proposes are approved with modifications. Gas safety education is fundamental to the success of any gas safety program – odor calls and accepting offers of methane detectors, for instance, only occur when people understand their importance. Assemblyman Rodriguez is "impressed with the attention paid to gas safety education in schools and Con Edison's proposed work with CUNY."[23] Assemblyman Rodriguez supports educating small businesses as well about gas safety.[24]

Educating children from elementary to high school ages is well-known to be successful in reaching the larger community. Therefore, Con Edison's proposal to begin a gas safety curriculum at the East Harlem Technical School and the development of educational programs with CUNY's existing University Explorer's program, which focuses on 10 Technical

[21] The rehabilitation will be completed by lining the pipe with a protective material that discourages leaks.

[22] Given Con Edison's history with respect to construction bids, the Company shall confirm in its reporting details of the competitive bidding process used.

[23] Assemblyman Rodriguez Comments at 1.

[24] Assemblyman Rodriguez Comments at 1.

Schools that teach energy management (a proposal totaling $1 million and includes the added benefit of skills training) are useful educational tools.

The $500,000 budget for the East Harlem technical high school training in gas safety and summer internships is approved. Like the fire department reporting, as a condition of receiving the $500,000 grant the East Harlem technical high school and Con Edison shall include in Con Edison's 60-day report a copy of the gas safety curriculum to be taught. For Con Edison's six-month report, the technical high school shall provide Con Edison, in detail, the program's success in placing students into internships. Con Edison will include updates on the program's progress in its annual reporting to the Department and will also discuss how the funding for this proposal differs from, and is incremental to, the Workforce Development funding provided for in the Rate Order.[25]

Con Edison's proposal to allot $500,000 with respect to educating building superintendents, however, does not go far enough. During Staff's investigation after the East Harlem Incident, residents shared that superintendents had told them not to call Con Edison but to call the superintendent if a person smelled natural gas. Since building superintendents are responsible for the upkeep of multi-unit residences, a more robust effort should be made to educate them about gas safety. Therefore, $500,000 of Con Edison's proposed $1 million to be directed to CUNY's University Explorers program and high-school-aged students will instead be assigned to the work CUNY is currently doing with Local 32BJ of the Service Employees International Union (SEIU) and non-union superintendents. As

[25] Rate Order at 3.

such, the University Explorers program and high school program will receive $500,000 and the work with SEIU will receive $1 million. As part of this superintendent training grant, Con Edison shall commission signs that alert tenants who and how they should call in case of a gas odor and provide the signs to trained superintendents for display in buildings using natural gas.

The proposed CUNY study focusing on how the public responds to gas leaks can help Con Edison gear its public educational initiatives effectively. Con Edison shall show in its reporting how it has or will incorporate the study's findings into its planned 5-year educational series. A $400,000 allowance for this purpose is approved.

In sum, of the $2.4 million in gas safety education, the East Harlem technical high school program shall be allotted $500,000. The elementary to high school education curriculum and education shall be awarded $500,000. CUNY Superintendent training will be assigned $1 million of the funds, and the CUNY study will receive a $400,000 allowance.

Con Edison shall provide a detailed curriculum and timeline for its training programs, including an estimate of the number of students and superintendents reached. Con Edison shall include these results in its reporting to the Department.

Ongoing Community Outreach

Con Edison states it will work closely with Community Board 11 by attending Board meetings when possible. With attendance usually between 100-150 people, Con Edison will offer gas safety literature and interpreters when it presents at Community Board 11 meetings. The Company will be present at health fairs, senior events, and other community groups to educate the public about gas safety. Con Edison's proposal for ongoing community outreach, as described in its proposal, is

approved. To address Assemblyman Rodriguez' concern that Con Edison reach small business owners in East Harlem, Con Edison shall hold at least three gas safety forums focused on the needs of small businesses.

Reporting

To verify completion and compliance with the parameters of the settlement fund approvals, Con Edison shall submit reports to chronicle program progress until all the funds are used. The purpose of the required, detailed, 60-day report is to better shape Con Edison's plans and to provide the Department a guidepost for oversight. For instance, in addition to the details described above, for the funds the FDNY seeks for RMLDs and aerators that Con Edison will provide, the FDNY and Westchester County shall provide Con Edison for its 60-day report exactly how many units of RMLDs and aerators will be or have been purchased, at what price, and which fire companies will receive or have received them.

Further, as a condition of receiving these funds, the FDNY and Westchester County are obligated to provide receipts to Con Edison for all equipment purchased as well as a detailed accounting of how many fire fighters have been trained. Con Edison will include the FDNY and Westchester County's reporting in its reporting to the Department.

The 60-day report will also confirm events at which Con Edison plans to provide or has provided community education. Such education shall include a Con Edison presentation to the East Harlem community explaining the programs adopted herein. The 60-day report will include Con Edison's plan for obtaining competitive bids to complete the East Harlem infrastructure remediation and replacement project.

Second, six months after issuance of this Order, Con Edison shall report on the progress to date of each

project/program. The purpose of the six-month report is to allow the Department to assess both that Con Edison is making sufficient progress in funding each program and to confirm that the funds assigned to each program are being used appropriately. Specifically, the six-month report shall show how many residential customers have obtained methane detectors and how much pipe in East Harlem has been remediated or replaced, the status of the gas safety curricula, and how many schools and community groups have been reached. The report will include a status report on the FDNY and Westchester County's first responder equipment purchased and training completed.

Con Edison will also provide the schedule for completing and presenting the gas safety curriculum in schools. Con Edison will use its log of customers who received methane detectors, contact them, and determine how many customers have installed the detectors. Con Edison shall report on its participation in Community Board 11 meetings describing the issues discussed and planned events for future community meetings.

After the six-month report is filed, Department of Public Service Staff will determine whether the funds, as apportioned in this Order, are being used effectively. If they are not, Department Staff will propose additional gas safety programs to use the funds for Commission approval. Similarly, if additional funds become available under the terms of the East Harlem Settlement Order, Staff will propose additional gas safety programs to use the funds for Commission approval.

Thereafter, each year, starting July 1, 2019, until all funds are depleted, Con Edison shall report in detail on the use of funds, including the number of gas customers reached (either estimated, by public education sessions held, or, directly, such as the number of methane detectors distributed

and installed and the numbers of students who participated in gas safety internship programs). Con Edison shall also report the funds remaining in each program. The first annual report may include Con Edison's recommendations for reassignment of the remaining funds, if warranted, or other funds that may become available pursuant to the East Harlem Settlement Order, which the Commission shall approve.

CONCLUSION

With the reporting requirements and the Department's evaluation of progress on the use of funds and the effectiveness of each program, gas safety will be improved with the use of settlement funds in this Order. Con Edison's Petition is approved with the modifications described herein.

The Commission orders:

1. Consolidated Edison Company of New York, Inc. shall distribute to each recipient one-half of the assigned settlement funds for each program within 45 days of the date of this Order. One year from the date of this Order, program recipients that have sufficiently shown that they have made successful progress implementing the program for which they were provided funds, may notify Consolidated Edison Company of New York, Inc. to seek the balance of their funds. Program recipients that sufficiently show that they have made successive progress implementing the program for which they were provided funds before one year from the date of this Order, after documenting such success, may request from Consolidated Edison Company of New York, Inc. their remaining allocated funds.

2. Consolidated Edison Company of New York, Inc., shall provide, 60 days after the date of this Order, a detailed plan that includes timelines and milestones for each program approved and such other information described in the body of

this Order. Any changes to the timelines or milestones reported shall be approved by the Department of Public Service Chief of Pipeline Safety.

3. Consolidated Edison Company of New York, Inc. shall present to the New York City Community Board 11, or other East Harlem community forum a presentation explaining the use of the funds described in this Order and shall, at the time it offers methane detectors to residents, offer instructions showing residents how to install residential methane detectors. Further, Consolidated Edison Company of New York, Inc. shall hold at least three gas safety community education forums for small business owners in the East Harlem community.

4. Six months after the date this Order is issued, Consolidated Edison Company of New York, Inc. shall report on the progress of each project/program approved in this Order. Such report shall include details such as the status of competitive bidding process used to hire a contractor to replace the large diameter pipe in East Harlem and how many residential customers have obtained methane detectors. At this six-month interval, Department of Public Service Staff will determine whether the funds, as apportioned, are being used effectively. If the funds are not being used in accordance with this Order or the Order Approving Settlement Agreement (issued February 17, 2017) at any time during the pendency of the use of the settlement funds, the Department of Public Service shall propose their use in gas safety programs approved by the Commission.

5. The Fire Department of New York and the Westchester County Fire Service Divisions shall, before Consolidated Edison Company of New York, Inc.'s six-month report to the Commission, provide to Consolidated Edison Company of New York, Inc., the number of Remote Methane Leak Detectors and aerators purchased or to be purchased and their types, details

of the natural gas training program developed, and the number of personnel trained in natural gas response and the use of the Remote Methane Leakage Detectors and aerators.

6. Every year, starting July 1, 2019, until all settlement funds are spent, Consolidated Edison Company of New York, Inc. shall report to the Department of Public Service's Chief of Pipeline Safety on the use of funds and the success or completion of programs. Such reports shall include, for instance, an estimated or precise number of gas customers who attended public education sessions held and the number of methane detectors distributed, the total feet of replaced cast iron pipe, as well as the funds remaining in each program. The reports shall include updates on Consolidated Edison Company of New York, Inc.'s timelines and milestones for each program.

7. On March 31, for the next three years, starting March 31, 2019, Consolidated Edison Company of New York, Inc. shall report to the Department of Public Service's Chief of Pipeline Safety on the number of gas leaks reported at the locations where residents have been provided residential methane detectors.

8. Consolidated Edison Company of New York, Inc. is directed to provide to Assemblyman Robert Rodriguez further details on Consolidated Edison Company of New York, Inc. research and development of remote methane detectors using automated meter reading equipment and shall copy the Department on any such correspondence.

9. Within 60 days of the date of the complete depletion of the settlements funds, Consolidated Edison Company of New York, Inc. shall submit its final, comprehensive, report to the Secretary.

10. Consolidated Edison Company of New York, Inc. shall provide to the Department of Public Service Chief of

Pipeline Safety a recommendation for the use of any unused funds or unassigned interest accrued if necessary.

11. Consolidated Edison Company of New York, Inc. shall maintain the East Harlem Settlement funds in a separate account that may be audited by the Department of Public Service.

12. In the Secretary's sole discretion, the deadlines set forth in this order may be extended. Any request for an extension must be in writing, must include a justification for the extension, and must be filed at least one day prior to the affected deadline.

13. This proceeding is continued.

By the Commission,

(SIGNED) KATHLEEN H. BURGESS
Secretary

Exhibit RKS-4

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
COMMONWEALTH KEYSTONE BUILDING
400 NORTH STREET, HARRISBURG, PA 17120

BUREAU OF
INVESTIGATION
&
ENFORCEMENT

February 27, 2023

Via Electronic Mail
Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Re: Pennsylvania Public Utility Commission,
Bureau of Investigation and Enforcement v.
Philadelphia Gas Works
Docket No. C-2022-3033834
I&E's Answer to Philadelphia Gas Works' Interrogatories – Set VI

Dear Counsel:

Enclosed is the Bureau of Investigation and Enforcement's ("I&E") **Answer to the Interrogatories of Philadelphia Gas Works- Set VI** in the above-referenced matter.

Copies have been served on the parties of record in accordance with the Certificate of Service. If you have any questions, please contact the undersigned.

Sincerely,

Kayla L Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

KLR/jfm
Enclosures

cc: Per Certificate of Service
Secretary Rosemary Chiavetta (*via e-file – Cover Letter and Certificate of Service Only)*
Hon. Dennis Buckley *(via email - debuckley@pa.gov – Cover Letter and Certificate of Service Only)*
Michael L. Swindler, Deputy Chief Prosecutor *(via email - mswindler@pa.gov)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	:	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

ANSWERS OF THE BUREAU OF INVESTIGATION AND ENFORCEMENT TO THE INTERROGATORIES OF PHILADELPHIA GAS WORKS- SET VI

Pursuant to 52 Pa. Code § 5.342, the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Commission"), by and through its prosecuting attorneys, files the within Answers to Interrogatories of Philadelphia Gas Works ("PGW")- Set VI, directed to I&E, and in support thereof, avers as follows:

ANSWERS

1. Regarding the two (2) types of methane, or natural gas, detectors referenced by I&E, has I&E undertaken a study to determine the approximate cost of each type, the installation costs, and the implementation requirements in PGW's territory? If so, will I&E support recovery of the Methane Detector Program costs in PGW's base rates? If not, explain how the Program would be funded.

ANSWER:

No, I&E Safety did not undertake a study to determine the approximate cost of each type of methane/natural gas detector. However, I did have an informal discussion with GTI Energy and was advised that, historically, standalone ARMD units cost approximately $40.00 and the SRMD technology costs approximately $100.00 per device/unit. Also, I&E Safety does make recommendations regarding whether a specific expense claimed in a base rate case should be approved.

Answer provided by: Robert Horensky, Safety Manager

2. Refer to I&E's proposed Methane Detector Program outline, I&E Exhibit No. 27:
    a. Regarding "Pilot 1":
        i. What analysis has I&E undertaken to determine that the ARMD proposed can be implemented within 45 days of a final order?
        ii. State why only GTI Energy was proposed as a vender/consultant for PGW.
        iii. Has I&E determined the cost per unit, with requested installation by PGW, for the ARMD? If yes, produce any study or assessment of those costs.
        iv. Regarding the "nearest 7,000 gas service" as a focus for the pilot, how does I&E propose that PGW make such determination?
        v. Regarding ARMD funding for the 6-month pilot program and beyond, confirm whether I&E will expressly support PGW recovering the costs of the program when PGW seeks recovery of the costs in base rates. If the answer is anything other than an unequivocal "yes", how does I&E propose PGW fund the ARMD project?
        vi. Has I&E assessed what the useful life of an ARMD is? If so, please provide it.
    b. Regarding "Pilot 2":
        i. Has I&E assessed whether or not PGW's existing non-AMI (Advance Metering Infrastructure) utility systems and infrastructure can support SRMD technology?
        ii. If PGW's existing non-AMI utility infrastructure cannot support SRMD technology, would I&E expressly support recovery of the SRMD Program and all necessary system wide infrastructure upgrades in PGW's next rate case? If the answer is anything other than an unequivocal "yes", how does I&E propose PGW fund the SRMD project and infrastructure upgrades required to utilize SRMDs?
        iii. If PGW's existing infrastructure cannot support SRMD technology, is I&E willing withdraw it recommendation for Pilot 2 at this time? In the alternative, would I&E agree to PGW conducting a study of the costs and requirements to implement both AMI utility infrastructure and subsequent SRMD technology, and report such findings to I&E at a later time?
        iv. What analysis has I&E conducted in concluding that three (3) years is a feasible goal for City-wide AMI build out and subsequent SRMD technology in PGW's infrastructure?

v. Has I&E assessed what the useful life of an SRMD is? If so, please provide it.

ANSWER:

a. Regarding Pilot 1:

i. I&E reviewed the successful ARMD implementation plan completed in New York as a guideline and outline in drafting the proposal.

ii. This question misconstrues I&E's position. GTI Energy was not proposed as a vendor. Rather, GTI Energy was introduced as a resource that has experience in the creation and implementation of methane detector pilot programs.

iii. See Answer to Set VI, No. 1.

iv. PGW is the entity with the knowledge and resources to determine the nearest 7,000 service addresses as PGW is in the best position to identify its customer base.

v. See Answer to Set VI, No. 1.

vi. Through my research, the useful life of an ARMD may vary based upon many different factors. However, the average lifespan is approximately 10 years.

b. Regarding Pilot 2:

i. No.

ii. I&E Safety does not make recommendations regarding whether a specific expense claimed in a base rate case should be approved. However, I&E Safety understands that I&E Rates reviews every specific expense claimed in a base rate case for reasonableness and prudency.

iii. No, I&E will not consider withdrawing Pilot 2. I&E submits that PGW should be conducting a study of the costs and requirements prior to the implementation of Pilot 2.

iv. I&E reviewed the successful methane detector implementation program of Con Edison as a guideline and outline in drafting its proposal.

v. The useful life of a SRMD may vary depending upon many different factors. However, the average lifespan is approximately 10 years.

Answer provided by: Robert Horensky, Safety Manager

3. Regarding the New York Public Service Commission's collaboration with GTI and the methane detector program in New York City and across the state:
   a. How long did the New York Public Service Commission's collaboration with GTI take from initiation to completion?
   b. Regarding the New York City specific infrastructure of Con Edison Company, state whether Con Edison's infrastructure has AMI and is compatible with SRMD when the program was proposed. If not, identify any upgrades undertaken by Con Edison to implement AMI and SRMDs to the best of your knowledge, information, and belief.
   c. What was the total cost, if known, for Con Edison to implement the AMI and/or SRMD program, to the best of your knowledge, information, and belief?
   d. What is the useful life of an SRMDs used by Con Edison?

ANSWER:

a. I cannot state with certainty how long the collaboration occurred.

b. I cannot state with certainty if compatible AMI technology existed or if technological upgrades were needed.

c. To the best of my knowledge, the average cost was approximately $100 per unit. I do not know the total cost incurred by Con Edison in implementing the program.

d. I cannot state with certainty the useful life of the SRMDs used by Con Edison. The average lifespan of a SRMD is approximately 10 years.

Answer provided by: Robert Horensky, Safety Manager

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

VERIFICATION

I, Robert Horensky, Safety Manager, in the Bureau of Investigation and Enforcement's Safety Division, hereby state that the facts above set forth are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 relating to unsworn falsification to authorities.

Dated: February 27, 2023

Robert Horensky
Safety Manager
Bureau of Investigation and Enforcement
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, Bureau of Investigation and Enforcement	: :	
v.	:	Docket No. C-2022-3033834
Philadelphia Gas Works	:	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing **Answer of the Bureau of Investigation and Enforcement to the Interrogatories of Philadelphia Gas Works- Set VI** dated February 27, 2023, upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

Service by Electronic Mail Only

Daniel Clearfield, Esq.
Norman J. Kennard, Esq.
Bryce R. Beard, Esq.
Eckert Seamans Cherin & Mellott, LLC
213 Market Street, 8th Floor
Harrisburg, PA 17101
dclearfield@eckertseamans.com
nkennard@eckertseamans.com
bbeard@eckertseamans.com

Craig W. Berry, Esq.
Senior Attorney
Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, PA 19122
craig.berry@pgworks.com

Kayla L. Rost

Kayla L. Rost
Prosecutor
Bureau of Investigation and Enforcement
PA Attorney ID No. 322768
(717) 787-1888
karost@pa.gov

Exhibit RKS-4

Date Created	Filing Number
2/27/2023	2459003

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Harrisburg, PA 17105-3265
EFILING - FILING DETAIL

Your filing has been electronically received. Upon review of the filing for conformity with the Commission's filing requirements, a notice will be issued acknowledging acceptance or rejection (with reason) of the filing. The matter will receive the attention of the Commission and you will be advised if any further action is required on your part.

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Docket Number: C-2022-3033834
Case Description:
Transmission Date: 2/27/2023 2:45 PM
Filed On: 2/27/2023 2:45 PM
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C-2022-3033834 (PGW) I&E Answers to PGW Interrogatories - Set VI CL&COS.pdf	Certificate of Service	2/27/2023 2:44:59 PM

For filings exceeding 250 pages, the PUC is requiring that filers submit one paper copy to the Secretary's Bureau within three business days of submitting the electronic filing online. Please mail the paper copy along with copy of this confirmation page to Secretary, Pennsylvania Public Utility Commission, 400 North Street, Harrisburg PA 17120 a copy of the filing confirmation page or reference the filing confirmation number on the first page of the paper copy.

No paper submission is necessary for filings under 250 pages.

You can view a record of this filing and previous filings you have submitted to the PUC by using the links in the Filings menu at the top of the page. Filings that have been submitted within the last 30 days can be viewed by using the Recent Filings link. Older filings can be viewed by using the search options available in the Filing History link.

VERIFICATION

I, Robert K. Smith, hereby state that: (1) I am the Senior Vice President, Operations & Supply Chain for Philadelphia Gas Works (PGW); (2) in that capacity, I am authorized to present testimony on PGW's behalf; (3) the facts set forth in my testimony are true and correct to the best of my knowledge, information and belief; and (4) I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

March 10, 2023
Dated

Robert K. Smith

Digitally signed by Robert K. Smith
DN: cn=Robert K. Smith, o=Philadelphia Gas Works, ou=Field Operations & Supply Chain, email=robert.smith@pgworks.com, c=US
Date: 2023.03.10 08:46:37 -05'00'

Robert K. Smith
Senior Vice President, Operations & Supply Chain
Philadelphia Gas Works

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

REBUTTAL TESTIMONY OF

GARY D. WORLAND

MANAGING OWNER OF NATURAL GAS
SPECIALISTS LLC

ON BEHALF OF
PHILADELPHIA GAS WORKS

Bureau of Investigation and Enforcement v. Philadelphia Gas Works

Docket No. C-2022-3033834

TOPICS:

REVIEW OF PGW'S PROCEDURES AND
STANDARD INDUSTRY PRACTICES

March 10, 2023

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. SUMMARY OF CONCLUSIONS 4

III. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 69 OF THE COMPLAINT AND RELATED TESTIMONY 9

IV. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 70 OF THE COMPLAINT AND RELATED TESTIMONY 17

V. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 71 OF THE COMPLAINT AND RELATED TESTIMONY 17

VI. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 72 OF THE COMPLAINT AND RELATED TESTIMONY 18

VII. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 73 OF THE COMPLAINT AND RELATED TESTIMONY 19

VIII. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 74 OF THE COMPLAINT AND RELATED TESTIMONY 20

LIST OF EXHIBITS

Exhibit GDW-1	Curriculum Vitae

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME FOR THE RECORD.

A. My name is Gary D. Worland.

Q. BY WHOM ARE YOU EMPLOYED?

A. I am the Managing Owner of Natural Gas Specialists LLC.

Q. PLEASE DESCRIBE YOUR WORK AT NATURAL GAS SPECIALISTS LLC.

A. At Natural Gas Specialists, our mission is to consult with and assist those engaged in natural gas litigation and to evaluate and certify those who recognize and react to natural gas abnormal operation conditions as detailed in the various entities' operator qualification plans for which we assist. We offer a wide range of services to natural gas companies ranging from site inspections, O&M review, emergency response planning, and many other aspects of operating a natural gas utility or business. A complete list of the services we provide can be found on our website.[1] I have attached a copy of my Curriculum Vitae as **Exhibit GDW-1.**

Q. WHAT IS YOUR PROFESSIONAL BACKGROUND?

A. I have over 40 years of experience in the natural gas and utility industry, including first-responder, line locator, service technician, Trainer, Training Supervisor, Field Maintenance Supervisor, and Manager of Customer Field Services. Prior to my work with Natural Gas Specialists LLC, I was employed from 1980-2018 with Citizens Energy Group in Indianapolis, IN. At Citizens Energy Group, I have held various roles to include Field Serviceman / First Responder, Maintenance Supervisor – Operations, Utilization Supervisor – Operations, Training/Operator Qualifications Supervisor – Operations, and

[1] https://naturalgasspecialists.com/

Manager of Customer Field Services. I was also an Adjunct Instructor – Project Management at the University of Indianapolis from 2003-2017.

Q. WHAT OTHER PROFESSIONAL BACKGROUND DO YOU HAVE?

A. I am veteran of the United States Marine Corps and served from 1984-1988, achieving the rank of Sergeant, and receiving an Honorable Discharge.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND.

A. I have a B.S. in Organization Leadership from the University of Indianapolis, and a Master of Business Administration from Anderson University.

Q. PLEASE SUMMARIZE CERTIFICATIONS YOU HOLD OR RECEIVED DURING YOUR CAREER.

A. I have held or hold the following certifications: Midwest Energy Association Operator Qualification (OQ) Proctor and Evaluator (2010 – Present), SIF Operator Qualifications Trainer and Evaluator (2012-2019), Operator Qualification (OQ) Train the Evaluator (2000-2018), OQ Module Administrator – Energy World Net (2010-2019), OQ Modules and PEF – Midwest Energy Association (2000-2014), PMP Certification (2010), Certified Fire and Explosion Investigator (CFEI), Certified Fire Investigator Instructor (CFII), IDEM Backflow Inspector (BF-15-5378).

Q. PLEASE SUMMARIZE YOUR PROFESSIONAL AFFILIATIONS.

A. I was an American Gas Association (AGA) field services team member, and participated in AGA's Peer to Peer Review Committee, a member of the Indiana Energy Consortium and previously was the Chairperson for Midwest Energy Association (MEA) Operator Qualification Steering Committee. I am still an active member of the National Association of Fire Investigators (NAFI).

Q. HAVE YOU EVER PROVIDED TESTIMONY BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION ("COMMISSION" OR "PUC")?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony will address the allegations made by the Commission's Bureau of Investigation and Enforcement (BI&E) as it relates to Philadelphia Gas Works (PGW) procedures and industry practices.

Q. WHAT DID YOU REVIEW IN PREPARATION OF YOUR TESTIMONY?

A. I have reviewed the following documents related to the Complaint: the formal complaint and answer; the Direct Testimony of BI&E – Statement Nos. 1-3 and I&E Exhibits 1-27; PGW's Bulletin Nos. 54, 312, and 313; Pennsylvania One Call (POC) specific literature, including Pennsylvania Excavation Safety Guide and Directory dated 2019, PA811 Locator Effectiveness Guidelines,[2] POC System Routine Notifications and Safety Bulletins; Common Ground Alliance Best Practices (Version 18.0)[3] (CGA), the Underground Utility Line Protection Law (a/k/a PA One Call Law) Act 50 signed October 30, 2017, 49 C.F.R Part 192, the Commission's Regulations at 52 Pa. code Chapter 59, and various sites within the PAPUC's and PA One Call websites. I have also reviewed the testimony of PGW, Statements 1R, 2R, and 3R and associated exhibits.

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2 https://ams.pa1call.org/pa811/Public/Resource%20Center/Brochures/Public/POCS_Content/Links/Brochures.aspx?hkey=415b43c0-06bb-40c9-8959-804fea0078bc

3 https://commongroundalliance.com/Publications-Media/Best-Practices-Guide. The Common Ground Alliance is dedicated to preventing damage to underground utility infrastructure and protecting those who live and work near these important assets through the shared responsibility of our stakeholders. The CGA Best Practices Guide was the result of a report from the U.S. Department of Transportation that established the stakeholder engagement model still used today. *Id.*

II. SUMMARY OF CONCLUSIONS

Q. WHAT IS YOUR PROFESSIONAL OPINION OF PGW'S BULLETIN NOS. 54, 312 AND 313?

A. In my professional opinion, these Bulletins accurately and comprehensively address the proper measures to be followed by PGW employees in fulfilling their marking duties and safeguarding PGW facilities and the public safety. The Bulletins require that Damage Prevention Inspectors be vigilant in identifying potential underground street troubles and, where indicated, require PGW to properly respond. Compared to the other protocols that I have reviewed, PGW's Bulletin Nos. 54, 312, and 313, focus more heavily on the topics of water leaks, sewer leaks, and verbiage such as "cavity", "undermining," and "washout." PGW appears to be highly aware of these issues and proactive in addressing them.

Q. DO THESE BULLETINS REQUIRE PGW EMPLOYEES TO BE ON-SITE DURING SUBSEQUENT EXCAVATION BY THIRD PARTIES ONCE THE LOCATION OF ITS MAIN HAS BEEN MARKED PURSUANT TO A POC REQUEST IN YOUR PROFESSIONAL OPINION?

A. No. The Bulletins do not require PGW employees to be on-site during third party water/sewer related excavation after the location of a low pressure distribution main has been marked pursuant to a POC request. If excavation takes place in the direct area of a high pressure transmission line, a utility employee would certainly be on-site from excavation start to the conclusion of backfilling. But the facilities being repaired at issue in this matter were typical low pressure sewer laterals and water distribution mains located in the center of the roadway, not near the South 8th Street PGW gas main which was located approximately three feet west of the east curb.

The Bulletins do require PGW to respond to any underground street trouble reports, but both PGW and BI&E agree that no underground street trouble in the 1400 block of South

8th Street was reported to or identified by PGW prior to the explosion of December 19, 2019.

In my experience, referring back to the Common Ground Alliance (CGA) best practices - a nationally recognized authority identifying facility owner and excavator best-practices, to include more than 130 practices covering all of the phases of the 811 process - there are no CGA best practices requiring locators to remain on-site (or re-visit a site) where water and sewer repairs are taking place in the absence of any reported or observed underground street trouble.

Q. DO FEDERAL REGULATIONS REQUIRE PGW EMPLOYEES TO BE ON-SITE DURING THE SUBSEQUENT EXCAVATION RELATED TO WATER AND SEWER REPAIRS ONCE THE LOCATION OF ITS LOW PRESSURE DISTRIBUTION MAIN HAS BEEN MARKED PURSUANT TO A POC REQUEST IN THE ABSENCE OF INFORMATION INDICATING UNDERGROUND STREET CONDITIONS IN YOUR PROFESSIONAL OPINION?

A. No. Absent observed or noticed conditions indicating underground street conditions, federal regulations do not require PGW to be on-site during the subsequent excavation related to water and sewer repairs once the location of its low pressure distribution main has been marked pursuant to a POC request.

Q. DID PGW HAVE NOTICE OF UNDERGROUND STREET TROUBLE PROR TO THE EXPLOSION?

A. No, based upon my factual review of the record, PGW did not observe and was not informed of any underground street trouble in the 1400 block of South 8th Street prior to the explosion.

PGW witnesses have stated that the Damage Prevention Inspectors who marked the streets in this area are trained to look for and recognize underground street troubles. They further state, that in the markings in the 1400 block of South 8th Street, no

underground street troubles were found. Mr. Whiteash has agreed that the presence of the underground voids "was not obvious" from a visual inspection of the roadway surface. BI&E St. 2 at 5, lines 12-13.

It does not appear that there was anything to report about PGW's facilities. The plumbers' observations, as described by Mr. Whiteash, were limited to conditions surrounding water/sewer facilities in the center of the street; not PGW's natural gas facilities. BI&E St. 2 at 9-10. The plumbers had no information to share about PGW's facilities. There was no evidence known to the plumbers that any PGW facility was affected by their excavations or the underground voids that they describe. As stated in discovery by Mr. Whiteash: "I&E is unable to identify … voids at or near PGW gas main reported by Rich Lepore and Joseph Emanuel…" See **Exhibit JH-1 at 014** (Set II-2). Finally, if there were conditions that adversely affected PGW facilities, none were communicated to PGW. Mr. Whiteash has also stated that no "report, notice, or other communication" related to these excavators' observations were provided to PGW. See **Exhibit JH-1 at 014-015** (Set II-1, 2). PGW has confirmed in testimony that no report, notice or other communication regarding conditions that may adversely affect PGW's facilities was received.

Q. WERE THE NUMBER AND TYPE OF POC MARKING REQUESTS INDICATIVE OF UNDERGROUND STREET TROUBLES SUCH THAT PGW PERSONNEL SHOULD HAVE BEEN ON SITE DURING EXCAVATION?

A. No. The number and type of POC marking requests are of the type typically received and were not indicative of underground street troubles such that PGW personnel should have been on site during excavation. There were 6 POC locate requests for the 1400 block from September 2019-December 2019. The first request, 1421 S. 8th St on 9/13/2019, was not in proximity to the location of the incident. The remaining 5 requests to POC for

PGW markings seem to be logical. On October 2, 2019, an initial locate request was for just up the street (1427 – 1431) where Philadelphia Water Department excavated to make a repair on their distribution water main and while doing so, appear to have identified several sewer laterals in need of repair given the subsequent POC. Private contractors then made the lateral repairs at 4 of the premises from October 7, 2019 until October 25, 2019. The contractors requested a range of requests to PA One Call ranging from "emergency" to "routine". Additionally, up to two days of lag occurred between PGW's marking of the "emergency" requests, and the actual dig dates, as shown below:

Premises	**Date of request**	**Dig date**	**Type**	**Who**	**Purpose**
1421 S. 8th Street	9/13/2019	9/23/2019	Routine	Frusco	R&R Water Service
1427 - 1431 S. 8th Street	10/2/2019	10/2/2019	Emergency	PWD	Locate/ Repair Water Leak
1433 S. 8th Street	10/7/2019	10/8/2019	Emergency	Lepore	Repair Sewer Leak
1430 S 8th Street	10/17/2019	10/22/2019	Routine	Mister DS	R&R Curb Trap Lateral
1428 - 1430 S. 8th Street	10/21/2019	10/22/2019	Emergency	Emanuel	R&R 5-inch Lateral
1431 S. 8th Street	10/23/2019	10/25/2019	Emergency	Emanuel	R&R 5-inch Sewer Lateral

The locates requested through POC appeared to be typical "routine" and "emergency" locates.

In my experience 1 water repair and 4 sewer lateral repairs (out of the over 70,000 locates performed by PGW annually), with the latest one occurring 1.5 months before the incident even occurred, would not warrant additional surveillance above the scheduled patrol and monitoring (as required by 49 CFR Part 192). I've confirmed that prior to the incident, PGW conducted its scheduled patrol, monitoring, and leak survey on January 14, 2019. I found no documentation or POC request where PGW would have been notified by the excavators for the need for PGW to return to the 8th Street location.

Q. WHAT ARE THE OBLIGATIONS OF EXCAVATORS TO REPORT UNDERGROUND STREET TROUBLES?

A. If a water maintenance crew exposes a gas main while excavating, they should follow industry best practices, the notice requirements under the PA One Call Law related to notifications to facility owners, and general best practices like CGA's Practice 5-24 which provides:

> **Practice Statement:** An excavator discovering or causing damage to underground facilities notifies the facility owner/operator and the one call center. All breaks, leaks, nicks, dents, gouges, grooves, or other damages to facility lines, conduits, coatings, or cathodic protection are reported.
>
> **Practice Description:** A majority of states require notification for damage or substantial weakening of an underground facility (27 states). The possibility of facility failure or endangerment of the surrounding population dramatically increases when a facility has been damaged. Although the facility may not immediately fail, the underground facility owner/operator is provided the opportunity to inspect the damage and make appropriate repairs.

In my opinion, the Philadelphia Water Department ("PWD") should be commended for proactively identifying the needed sewer lateral repairs beginning with its' One Call request on October 2, 2019. It is my assumption, based on experience, that if the water maintenance crews who subsequently excavated the street had encountered any voids and cavities, that they would notify the proper authorities; to include PGW, if PGW facilities were affected, which they apparently were not. I would also assume that if the excavators involved with repairs to water and sewer lines on the 1400 block of 8th Street from September-October 2019 (Frusco, Lapore, Mister DS, or Emanuel) encountered any voids or cavities while excavating that affected PGW's marked lines, that they also would have followed common sense, CGA best practices, PA One Call requirements and notified local authorities, including PGW.

Q. WHAT IS YOUR OVERALL OPINION OF THE ALLEGATION OF VARIOUS PROTOCOL AND REGULATORY VIOLATIONS CONTAINED IN PARAGRAPHS 69 THROUGH 74 OF THE COMPLAINT?

A. I have found no violation by PGW of these Bulletins or Federal regulations. PGW has acted according to the requirements of these documents.

The allegations contained in the Complaint do not accurately recite or interpret PGW's Bulletins or Federal regulatory requirements. In fact, my reading of BI&E's complaint at Paragraphs 69-74 shows me that, when viewing the documents themselves in their entirety, BI&E strategically selected phrases and provisions from PGW's Bulletins in an attempt to paint PGW as culpable for not remaining onsite and monitoring the excavator's conduct for the duration of all street work in Q3 and Q4 2019. In my view, PGW's bulletins must be read as a whole and complete instructive documents and procedures, and BI&E's complaint, rather than doing so, attempts to create violations of PGW's procedures where there are none – especially when, again, PGW had no notice of any potential impacts to its facilities or the underground street conditions.

III. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 69 OF THE COMPLAINT AND RELATED TESTIMONY

Q. HAVE YOU REVIEWED THE ALLEGATIONS CONTAINED IN THE COMPLAINT OF BI&E?

A. Yes, I have reviewed the complaint filed by BI&E and offer the following analysis of the allegations made.

Q. PARAGRAPH 69 ALLEGES THAT PGW FAILED TO FOLLOW ITS PROCEDURES SET FORTH IN BULLETIN NOS. 312 AND 313 IN THAT PGW FAILED TO "SAFEGUARD PGW FACILITIES DURING CONSTRUCTION." DO YOU HAVE A RESPONSE?

A. The obligation to "safeguard PGW facilities during construction" is a portion of the PGW Bulletin 312 "Mission Statement," which provides that part of the damage prevention missions is:

> To observe contractor activities when necessary and to offer assistance to safeguard PGW facilities during construction.

This quotation from the generalized "mission statement" is not an action item for PGW. The actual directive of Bulletin No. 312 states that:

> Upon receipt of notice of water or sewer system failures, or surface conditions, such as cavities or cave-ins which may be caused by such failures, the location of gas pipeline facilities shall be determined. Where pipeline facilities may be affected, appropriate personnel shall be dispatched promptly to determine the effect of the failure on pipeline facilities. Inspection and necessary follow-up action shall be in accordance with the "Protection of PGW Facilities from Underground Street Troubles" procedure.

Bulletin No. 312, Sec. III.B.

PGW fulfilled the purpose of the mission statement. The fact that PGW employees accurately marked the location of the gas main demonstrated a positive response and "assistance to safeguard PGW facilities." No further action was indicated as "necessary." There is no evidence contained in BI&E's reporting of statements by the plumbers that that an additional site visit was required once excavation began. I do not see any documentation that would require PGW to remain on site (or return to the site) to observe third party contractor activities. In my experience, I am unaware of any gas utility locator being required to remain on-site while routine water and sewer repairs are conducted unless if a gas transmission line is involved.

It is my opinion that PGW did safeguard its facilities by accurately marking its facilities pursuant to the PA One Call Procedure, and where, again, PGW had no notice of underground conditions, PGW was under no obligation to further observe construction as such was not "necessary" or known to be "necessary" by PGW. Additionally, I have reviewed PGW's other witnesses' testimony, which report that PGW receives over 70,000 PA One Call requests per year. Nothing in the One Call tickets discussed by BI&E and described above indicate anything to deem these requests "necessary" for PGW to continue to be present at the site after its facilities were appropriately marked.

Q. PARAGRAPH 69 OF THE COMPLAINT ALSO ALLEGES THAT PGW FAILED TO "SUPPORT, REPLACE, RELOCATE, OR REMOVE FROM SERVICE GAS PIPELINE FACILITIES THAT ARE OR MAY BE ENDANGERED." DO YOU HAVE A RESPONSE TO THIS ALLEGED VIOLATION?

A. The language cited by the complaint - "Support, replace, relocate, or remove from service gas pipeline facilities that are or may be endangered" - refers to an action item, but appears to be an edited portion of PGW Bulletin 312 Section III.A. Read in its entirety, the complete quote of this section states that:

> Wherever pipeline facilities are or may be endangered, the appropriate supervisor shall be promptly informed. The supervisor shall, after consulting with his/her superiors, institute necessary actions such as patrolling, supporting, replacing, relocating or removing from service the affected gas facilities.

Bulletin No. 312, Sec. III.A.

This procedure was not applicable under the circumstances. The evidence shows that PGW did not observe or was made aware of an "endangered" facility warranting PGW to return to support, replace, relocate, or remove service gas pipeline facilities.

Q. NEXT, PARAGRAPH 69 OF THE COMPLAINT ALLEGES THAT PGW FAILED TO "PERFORM INSPECTION AND NECESSARY FOLLOW-UP ACTIONS IN ACCORDANCE WITH THE PROTECTION OF PGW FACILITIES FROM UNDERGROUND STREET TROUBLES PROCEDURE." DO YOU HAVE A RESPONSE?

A. This "violation" which states PGW failed to: "perform inspection and necessary follow-up actions in accordance with the Protection of PGW Facilities from Underground Street Troubles procedure upon receipt of notice of water or sewer system failures, or surface conditions, such as cavities or cave-ins which may be caused by such failures where pipeline facilities may be affected."

Like the above, this again appears to be an editorialized portion of PGW Bulletin 312, Section III.B., which as I explained previously provides that:

> Upon receipt of notice of water or sewer system failures, or surface conditions, such as cavities or cave-ins which may be caused by such failures, the location of gas pipeline facilities shall be determined. Where pipeline facilities may be affected, appropriate personnel shall be dispatched promptly to determine the effect of the failure on pipeline facilities. Inspection and necessary follow-up action shall be in accordance with the "Protection of PGW Facilities from Underground Street Troubles" procedure.

This procedure was also not applicable under the circumstances. The locates requested through the Pennsylvania One Call are typical "routine" and "emergency" locates, as I have explained previously. There is no evidence that "notice of water or sewer system failures, or surface conditions, such as cavities or cave-ins" was ever provided to PGW. There is no documentation where PGW was notified informing them of an exposed facility warranting PGW to return to support, replace, relocate, or remove from service gas pipeline facilities that are or may be endangered.

Q. PARAGRAPH 69 OF THE COMPLAINT ALLEGES THAT PGW FAILED TO "VISIT ANY UNDERGROUND STREET TROUBLE ENCOUNTERED AND REPORT THE SAME TO THE DISTRIBUTION DISPATCHING AND SUPERVISOR." DO YOU HAVE A RESPONSE TO THIS ALLEGED VIOLATION?

A. In reviewing the referenced Underground Street Troubles Bulletin 54, the verbiage provides:

> Underground troubles are usually brought to PGW's attention due to a condition observed on the street surface; or as a result of a pre-existing condition encountered in the performance of PGW work but not caused by PGW activity. Some underground troubles are:
>
> - Water Leaks
> - Washouts
> - Sewer System Failure – Signs of a sewer system failure are as follows: cavity, cave-in, or paving faults such as a surface crack, settlement, or depression in the street or curb area.
> - Paving depressions – These may be caused by settlement in "area" fill or settlement caused by poor backfill.

Bulletin 54, Sec, III.

Again, this procedure was not applicable under the circumstances. The locates requested through the PA One Call were typical "routine" and "emergency" locates. As I explained previously, both BI&E and PGW agree that underground street troubles were not observable on the street surface and that notice of an adverse underground condition was never provided to PGW.

Q. THE NEXT PORTION OF PARAGRAPH 69 OF THE COMPLAINT ALLEGES THAT PGW FAILED TO: "INSPECT FOREIGN CONSTRUCTION ACTIVITIES FOR THE MAIN PURPOSE OF PROTECTING PGW UNDERGROUND STRUCTURES AND FACILITIES." DO YOU HAVE A RESPONSE?

A. This language comes from the "Objectives" section of PGW Bulletin 313, which states that:

> The following are the main functions of PGW Damage Prevention Inspectors:
>
> 1. To inspect foreign construction activities for the main purpose of protecting PGW underground structures and facilities….

PGW Bulletin 313, Sec. III.A. (Objectives).

As I have previously stated, there is no indication that PGW had notice that any of the excavator's activities would or did impact PGW's facilities, as the work by the plumbers and PWD was in the middle of the street, not near PGW's facilities. The locates requested through POC were typical "routine" and "emergency" locates. I see no documentation or POC request where PGW would have been notified of a need to return to the South 8th Street location to investigate an exposed PGW facility that would warrant "protecting." The testimony of Whiteash: "On February 5, 2020, Rich Lepore performed an open excavation which showed that his repair of the sewer lateral did not undermine PGW's cast iron main as Mr. Lepore's excavation appeared no closer than twenty-seven (27) inches from PGW's cast iron main." BI&E St. 2 at 11.

Q. THE NEXT PORTION OF PARAGRAPH 69 OF THE COMPLAINT ALLEGES THAT PGW FAILED TO "REPORT UNDERMINED GAS MAINS IMMEDIATELY TO THE PGW SUPERVISOR." DO YOU HAVE A RESPONSE TO THIS ALLEGED VIOLATION?

A. PGW Bulletin 313, Section D.5. states that:

> When the inspector comes across an excavation that is in direct conflict with PGW structure, he/she must notify the contractor as well as the PGW supervisor.

PGW Bulletin 313, Section D.6. states that:

> Undermined gas mains will be reported immediately to the PGW supervisor.

There is no evidence that there was an observed or reported "direct conflict with PGW structure" or an "undermined gas main." As Mr. Whiteash has testified; "On February 5,

2020, Rich Lepore performed an open excavation which showed that his repair of the sewer lateral did not undermine PGW's cast iron main as Mr. Lepore's excavation appeared no closer than twenty-seven (27) inches from PGW's cast iron main." BI&E St. 2 at 11. There is no statement reported by BI&E from Mr. Emanuel of Emanuel Plumbing that his operations effected PGW facilities either.

Q. CONTINUING, PARAGRAPH 69 OF THE COMPLAINT THAT PGW "FAILED TO REPORT OR ACT UPON ANY EXCAVATIONS OR OTHER CONSTRUCTION ACTIVITY WHICH COULD RESULT IN DAMAGE TO A PIPELINE, LOSS OF SUPPORT DUE TO SETTLEMENT OR SHIFTING OF SOIL AROUND A PIPELINE, UNDERMINING OR DAMAGE TO A PIPELINE SUPPORT." DO YOU HAVE A RESPONSE TO THIS ALLEGED VIOLATION?

A. This language is a partial quote from Bulletin No. 313, Section III.E. entitled (Pipeline Patrol Activities"). Quoted in context the provision starts by stating that:

> When performing a pipeline patrol, the inspector should be looking for any activity or changes in the environment that could affect the safety of the pipeline. An activity or changes found **must** be reported to the Supervisor immediately and documented in the corresponding AIMS order.

Then continues:

> The following is a sampling of items the inspector should always report or act upon:
>
> Any excavations (including backfilled openings that are not familiar to the inspectors), grading, demolition, or other construction activity which could result in damage to a pipeline, loss of support due to settlement or shifting of soil around a pipeline, undermining or damage to a pipeline support, or loss of cover or excess fill.

This is a patrolling function, which requires the Damage Prevention Inspector to be alert for and report adverse conditions.

As has been previously stated, no observation of "damage to a pipeline, loss of support due to settlement or shifting of soil around a pipeline, undermining or damage to a pipeline support, or loss of cover or excess fill." Mr. Whiteash agreed that the

underground conditions discussed in BI&E's testimony were not observable from the street. There was no notice given to PGW of such condition. As stated above, without notice to PGW, there is no way for PGW to have known that undermining or damage to support could have occurred.

Q. THE LAST PORTION OF PARAGRAPH 69 ALLEGES THAT THE PRIOR ALLEGATION CONSITUTUE A "CONTINUING VIOLATION OF 52 PA. CODE § 59.33(B) …. AND 49 CFR § 192.605(B)(1)." DO YOU HAVE A RESPONSE?

A. 49 CFR Part 192.605(a) requires every pipeline operator to "prepare and follow … a manual of written procedures for conducting operations and maintenance activities and for emergency response." 49 CFR Part 192.605(b)(1) requires that the manual include procedures related to: "(1) Operating, maintaining, and repairing the pipeline in accordance with each of the requirements of this subpart and subpart M of this part." The PGW Bulletins of which there are many more that discussed in this case constitute PGW's written operating procedures. Thus, PGW is in compliance with 49 CFR Part 192.605(b)(1).

To the extent that BI&E is alleging that PGW did not follow its Bulletins, I have addressed this allegation previously.

The Commission's regulation at 52 Pa. Code § 59.33(b) simply adopts the federal, United States Department of Transportation ("DOT") safety standards at 49 U.S.C. §§ 60101 - 60503 for gas transmission and distribution facilities. This not an independent, standalone safety regulation by the Commission and any violations would be interpreted by reference to 49 USC. So, claiming a violation of 52 Pa. Code § 59.33(b) is the same as saying a violation of federal safety standards.

IV. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 70 OF THE COMPLAINT AND RELATED TESTIMONY

Q. PARAGRAPH 70 OF THE COMPLAINT ALLEGES THAT PGW VIOLATED 52 PA. CODE § 59.33(B) AND 49 CFR § 192.613(A) "IN THAT IT FAILED TO HAVE A CONTINUING SURVEILLANCE PROCEDURE, AND SUBSEQUENTLY CONDUCT A CONTINUING SURVEILLANCE OF THOSE PIPELINE FACILITIES LOCATED NEAR THE VARIOUS WATER AND SEWER REPAIR WORK THAT OCCURRED IN THE FALL OF 2019." DO YOU HAVE A RESPONSE TO THESE ALLEGATIONS?

A. 49 CFR § 192.613 ("Continuing Surveillance") states that:

> (a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions.

Obviously, PGW has procedures for continuing surveillance. Bulletin No. 313, Section III.E. is an example of one procedure for "patrol activities." So, the primary requirement of this section is satisfied.

V. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 71 OF THE COMPLAINT AND RELATED TESTIMONY

Q. PLEASE SUMMARIZE PARAGRAPH 71 OF THE COMPLAINT.

A. Paragraph 71 states that:

> PGW failed to repair, replace, or remove from service the unsafe portion of the 6-inch cast iron main in that it continued to operate this unsafe segment of the pipeline.
> This is a continuing violation of 52 Pa. Code § 59.33(b) (related to the minimum safety standards for natural gas public utilities) and 49 CFR § 192.703(a)-(b) (related to maintenance - general). (multiple counts).

Q. DO YOU HAVE A RESPONSE TO THESE ALLEGATIONS?

A. CFR § 192.703(a) and (b) state that:

> (a) No person may operate a segment of pipeline, unless it is maintained in accordance with this subpart.
>
> (b) Each segment of pipeline that becomes unsafe must be replaced, repaired, or removed from service.

The topics addressed in this subpart include distribution line patrolling, leak surveys, and the accurate placement of line marks. These have been previously addressed. Other requirements in the subpart do not seem germane here include oversight of transmission lines. I do not see any documentation provided by BI&E that PGW's pipeline maintenance has been faulty or that it failed to replace a faulty line. PGW witnesses have testified, and BI&E witnesses concur, that the entirety of the cast iron main in the 1400 Block of South 8th Street was replaced.

CFR § 192.755 addresses the protection of cast-iron pipelines and requires that:

> (a) When an operator has knowledge that the support for a segment of a buried cast-iron pipeline is disturbed ..: That segment of the pipeline must be protected, as necessary, against damage..
>
> (b) As soon as feasible, appropriate steps must be taken to provide permanent protection for the disturbed segment from damage that might result from external loads….

Once again preventive measures are triggered by knowledge that a condition exists that requires remedy.

VI. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 72 OF THE COMPLAINT AND RELATED TESTIMONY

Q. PLEASE SUMMARIZE PARAGRAPH 72 OF THE COMPLAINT.

A. Paragraph 72 states:

> PGW failed to adequately protect the 6-inch cast iron main on South 8th Street in that PGW had knowledge that the support for the segment of this buried cast iron pipeline was disturbed by excavation activity near the pipeline and PGW failed to take appropriate steps to provide permanent protection from any damage that might result from external loads.

> This is a continuing violation of 52 Pa. Code § 59.33(b) (related to the minimum safety standards for natural gas public utilities) and 49 CFR § 192.755 (related to protecting cast iron pipelines). (multiple counts).

Q. DO YOU HAVE A RESPONSE TO THESE ALLEGATIONS?

A. As I discussed regarding Paragraph 71 of the complaint, 49 CFR § 192.755 is premised on "when an operator has knowledge," a critical component that is missing here. The statement "failed to adequately protect" seems to be unfair to PGW. Again, PGW had no notice that the cast iron pipeline may have been or was disturbed by the excavation activity in the middle of the street, not at PGW's facilities. Additionally, the excavators which reported seeing voids or cavities to PWD did not inform PGW of those voids or cavities. The locates requested through the Pennsylvania One Call appeared to be typical "routine" and "emergency" locates. I do not find any documentation from excavators reporting that an additional site visit was required once excavation began due to any conditions observed.

VII. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 73 OF THE COMPLAINT AND RELATED TESTIMONY

Q. PLEASE SUMMARIZE PARAGRAPH 73 OF THE COMPLAINT.

A. Paragraph 73 states:

> PGW failed to ensure that its personnel had the necessary knowledge and skills to perform covered tasks in a manner that ensures the safe operation of its pipeline facilities in that PGW could not demonstrate that its personnel received underground street trouble training, including training on the investigative process and procedures.
>
> This is a continuing violation of 52 Pa. Code § 59.33(b) (related to the minimum safety standards for natural gas public utilities) and 49 CFR § 192.805(h) (related to qualification program). (multiple counts).

Q. DO YOU HAVE A RESPONSE TO THESE ALLEGATIONS?

A. I do not. PGW's St. Nos. 1R and 2R discuss training of its personnel.

VIII. DISCUSSION OF ALLEGED VIOLATIONS IN PARAGRAPH 74 OF THE COMPLAINT AND RELATED TESTIMONY

Q. PLEASE SUMMARIZE PARAGRAPH 74 OF THE COMPLAINT.

A. Paragraph 74 states:

> PGW failed to furnish and maintain adequate, efficient, safe, and reasonable service and facilities in that it failed to protect the 6-inch cast iron main from the disturbance caused by the proximate water and sewer repair work which undermined the support of the cast iron main, resulting in a break of the cast iron main.
> This is a continuing violation of 66 Pa.C.S. § 1501 (related to character of service and facilities). (multiple counts).

Q. DO YOU HAVE A RESPONSE TO THESE ALLEGATIONS?

A. These repetitive allegations of "failure to protect" PGW's facilities from unknown and unreported threats, where none were evident has been discussed previously in my testimony and that of the other PGW witnesses. I have no professional understanding of the requirements of 66 Pa.C.S. § 1501 as they apply to pipeline safety and, therefore, offer no opinion on this allegation.

Q. DOES THAT COMPLETE YOUR REBUTTAL TESTIMONY?

A. Yes. However, I reserve the right to supplement or amend this testimony based upon any additional materials that I review, or new information discovered.

Exhibit GDW-1

Curriculum Vitae

Gary D. Worland PMP/ CFII / CFEI
GWorland@naturalgasspecialists.com
Greenwood, IN 46143
317-691-3192

PROFESSIONAL EXPERIENCE

- Manager of Customer Field Services (CFS) for Citizens Gas/ Citizens Energy Group (CEG) – approx. 81 employees
- Provide leadership for the employees responsible for interfacing services thru Customer Field Services
- Managed Training/ Operator Qualification (OQ) Department for approx. 150 employees – Operations
- Conducted OQ evaluating process/ database for employees - Operations
- Created and implemented Natural Gas Associate Degree curriculum for Ivy Tech (Indpls. campus)
- Created and conducted numerous 2-day training sessions related to natural gas first responders (to include both hands-on and classroom)
- Monthly/ yearly evaluation and edits of O&M Manual for CEG
- Performed yearly review and recommended edits for the Operations Emergency Plan
- Adjunct university instructor – Project Management and Data Management
- Conducted/ participated in root cause analysis and after-action reviews and narrated lessons learned
- Functional Project Manager – mergers and acquisition team for integration of gas, water and wastewater
- Facilitated the development of learning objectives and milestones for the cross training of UST and USS personnel (field techs: gas and water)
- Created and conducted monthly safety meetings - Operations
- AGA Field Services Committee member
- Responded to fires and explosions in positions to include Meter Serviceman, Gas Service Specialist, District Supervisor, Training Supervisor, Manager of Customer Field Services
- Held various field Incident command roles while investigating possible gas explosions/ incidents
- Testified in (2) Capital Murder Trials as a Natural Gas SME (Richmond Hills Explosion)

EMPLOYMENT

Natural Gas Specialists LLC 2018-Present

- Expert consultation with law firms and gas utilities regarding operation and maintenance (O&M), and gas distribution system
- Audit O&M Manuals and Emergency Plans for compliance
- Knowledge of CFR49 Part 192, RP1162, Operator Qualifications, NFPA 54, International Fuel Gas Code, Damage Awareness Plans, Underground Common Alliance, etc.
- Conduct Operator Qualification Workshops, proctor exams and perform one-on-one field evaluations
- Respond to natural gas incidents in the field
- Conducted Leak Surveys and other field testing utilizing the Combustible Gas Indicator, Flame Ionization unit, Line Locator, etc.

Citizens Energy Group, Indianapolis, IN 1980-2018

- Manager of Customer Field Services
- Training/ Operator Qualifications Supervisor - Operations
- Utilization Supervisor - Operations
- Maintenance Supervisor - Operations
- Field Serviceman/ First Responder

University of Indianapolis, Indianapolis, IN 2003-2017

- Adjunct Instructor – Project Management (ORGL-404)
  - Create course curriculum
  - Create course syllabus and evaluation guidelines
  - Assist adult students in the implementation of projects at their respective workplace

United States Marine Corps, Cherry Point, N.C. 1984-1988

- Sergeant
  - Supervised direct reports in the maintenance and repair of cryptographic equipment
  - Conducted regular training sessions
  - Top Secret classification
  - Responsible for the well-being of direct reports

EDUCATION

- MBA: Anderson University, Anderson, IN, 2005
- B.S. (Organizational Leadership): University of Indianapolis, Indianapolis, IN, 2002
- Courses in Manufacturing Technology (HVAC), East Carolina University, 1987
- Electronics/ Crypto Specialist Course, USMC, Twenty-Nine Palms, CA, 1984-1985

CERTIFICATIONS

- SIF Operator Qualifications Trainer and Evaluator (2012-2019)
- Operator Qualification (OQ) Train the Evaluator (2000-2018)
- OQ Module Administrator – Energy World Net (2010-2019)
- OQ Modules and PEF – Midwest Energy Association (2000-2014)
- PMP Certification (2010)
- Certified Fire and Explosion Investigator (CFEI)
- Certified Fire Investigator Instructor (CFII)
- IDEM Backflow Inspector (BF-15-5378)

OTHER EDUCATION

- Cathodic Protection, Purdue University – 4 years
- Benchmarking and Best Practice, Midwest Energy Association (MEA)
- University of Indianapolis, School of Adult Learning, Adult Brain-based Learning Workshops
- Expanded Leadership Capabilities for Utility Succession Planning
- Situational Leadership, Charlotte Roberts
- Train the Trainer, Citizens Gas/ MEA
- Supervisory Institute, University of Indianapolis

BOARD MEMBERSHIP

- AGA Peer to Peer Operations/ O&M Audit Committee (2015-2018)
- Chairperson: MEA Operator Qualification Steering Committee (2000-2014)
- AGA Field Services Committee
- Indiana Energy Consortium

ASSOCIATION MEMBERSHIP

- National Association of Fire Investigators

VERIFICATION

I, Gary D. Worland, hereby state that: (1) I am the Managing Owner of Natural Gas Specialists LLC; (2) I have been retained by Philadelphia Gas Works ("PGW") and am authorized to present testimony on its behalf; (3) the facts set forth in my testimony are true and correct to the best of my knowledge, information and belief; and (4) I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

March 10, 2023
Dated

Gary D. Worland
Managing Owner
Natural Gas Specialists LLC