

Missouri Public Service Commission

Staff's Gas Incident Report

910 W 48th Street
Kansas City, Missouri
February 19, 2013



Missouri Gas Energy
Case No. GS-2013-0400

Regulatory Review Division
Tariff, Safety, Economic and Engineering Analysis Department
Energy Infrastructure Reliability Unit
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I. EXECUTIVE SUMMARY

At approximately 6:02 p.m. Central Standard Time (CST) on February 19, 2013, a natural gas explosion and fire occurred at 910 W. 48th Street in Kansas City, Missouri, the location of JJ's Restaurant. The restaurant and its contents were destroyed as a result of the explosion and subsequent fire. Several adjacent buildings sustained extensive damage. Several JJ's Restaurant employees were inside of JJ's Restaurant at the time of the explosion. One employee was fatally injured and several other employees were severely injured. Missouri Gas Energy (MGE)¹ personnel, United States Infrastructure Corporation (USIC) personnel, and Heartland Midwest personnel were outside near the location of the damaged natural gas main at the time of the explosion. Several of these individuals received injuries as a result of the explosion and subsequent fire.

MGE provides natural gas service in Kansas City, Missouri. The buildings on W. 48th Street from Belleview Avenue to Roanoke Parkway are supplied natural gas through a 2-inch diameter polyethylene (PE) main installed along the north side of W. 48th Street. The natural gas main was operating at approximately 25 pounds per square inch gauge (psig) at the time of the incident.

The Missouri Public Service Commission's Energy Infrastructure Reliability Unit, Safety/Engineering Section Staff (Staff) has determined that the probable cause of the incident was the escape of natural gas from the 2-inch diameter PE natural gas main located at 910 W.

¹ Effective July 31, 2013, in Case No. GM-2013-0254, the Commission granted Laclede a CCN and all necessary authority to acquire and operate Southern Union Company's Missouri franchise, works and system, including the fictitious name "Missouri Gas Energy" or "MGE," and that transaction closed effective September 1, 2013. As required by the Commission's order, Laclede thereafter adopted Southern Union Company's existing tariffs and now provides retail natural gas service in Southern Union Company's former Missouri service area, using Southern Union Company's former franchise, works and system, pursuant to Southern Union Company's former tariffs under the fictitious name "Missouri Gas Energy" or "MGE." In this Report, Southern Union Company operating as "Missouri Gas Energy" or "MGE" provided retail gas service to JJ's Restaurant and vicinity.

1 48th Street. Upon excavating the 2-inch diameter PE main, an approximate 2-inch by 2-inch hole
2 was found in the top of the main (See Appendix C, Photographs 1 and 2).

3 Natural gas escaped from the hole in the 2-inch diameter PE main, migrated through
4 backfill material beneath the asphalt street, alley and sidewalk at 910 W. 48th Street, and through
5 nearby sanitary sewers. The migrating natural gas accumulated within the structure to an
6 explosive gas-in-air mixture located at 910 W. 48th Street and was ignited by an undetermined
7 ignition source.

8 The cause of the damage on February 19, 2013 to the 2-inch diameter main was a
9 horizontal directional drilling project by Heartland Midwest, a construction contractor for Time
10 Warner Cable. On February 19, 2013, Heartland Midwest personnel were using horizontal
11 directional drilling equipment to bore beneath the alley adjacent to the east side of 910 W. 48th
12 Street and across W. 48th Street in preparation for installing an underground telecommunications
13 cable. As the drilling progressed under the alley, from north to south, and into W. 48th Street, the
14 drill bit came in contact with the 2-inch diameter PE natural gas main causing the hole in the
15 main.

16 Heartland Midwest personnel submitted a request to Missouri One Call System, Inc. (MO
17 One Call) to locate the underground facilities in the area (910 W. 48th Street) on February 6,
18 2013. Beginning on February 9, 2013 and finishing on February 15, 2013, USIC marked the
19 ground with yellow paint to indicate natural gas, red paint to indicate electrical facilities, green
20 paint to indicate sanitary sewer facilities, and orange paint to indicate communication facilities in
21 the area Heartland Midwest proposed to excavate.

22 Based on the information available at the time of completing this Report, Staff was able
23 to conclude, based upon its investigation that the probable cause of the third-party damage to the

1 natural gas main on W. 48th Street was that there were two facilities marked at the location;
2 however, there were three facilities buried. As of the date of this Report, Staff has not
3 determined the reason for the discrepancy. Staff anticipates filing a supplement to this Report
4 after additional information is obtained.

5 In the area where the third-party damage occurred USIC placed on the pavement a single
6 line of yellow locate marks (indicating a natural gas facility) and a single line of red locate marks
7 (indicating an electrical facility). However, there were, in fact, three underground facilities in
8 the area (two electrical facilities and one natural gas facility). Had markings on the ground
9 indicated to Heartland Midwest personnel another underground electric facility was present, it is
10 probable that Heartland Midwest personnel would have been able to avoid damaging the natural
11 gas main.

12 Further, based on its investigation, Staff asserts that subsequent to the third-party damage
13 to the 2-inch diameter PE natural gas main there was an underground leak with blowing gas
14 located under pavement and near buildings. Approximately 32 minutes elapsed between the
15 arrival of MGE's first responder (approximately 5:16pm) and when MGE personnel first entered
16 JJ's Restaurant (approximately 5:48pm). MGE personnel did not conduct prompt and adequate
17 leak investigations to determine if additional hazards existed and to determine the extent of the
18 hazards in order to make the area safe and to protect life and property.

19 As a result of the incident investigation, Staff has determined that sufficient evidence
20 exists to assert that MGE violated Missouri Public Service Commission (MoPSC) Rules: 4 CSR
21 240-40.030(1)(G)3., and (12)(C) regarding its actions to protect persons and property subsequent
22 to the damage to the natural gas main by not conducting effective leak investigations as required
23 by 4 CSR 240-40.030(12)(J)1.C., (12)(J)1.E., (12)(J)1.G., (12)(D)4.F., (14)(B)3., and (14)(C)1.

1 Concurrent with the filing of this report, Staff is filing a complaint case against MGE. In
2 addition, recommendations are being made as a result of Staff's investigation.

3 **II. SYNOPSIS OF INCIDENT**

- 4 1. At approximately 6:02 p.m. Central Standard Time (CST) on February 19, 2013, an
5 explosion and subsequent fire involving natural gas occurred at 910 W. 48th Street in
6 Kansas City, Missouri.
- 7 2. There were multiple injuries and one fatality as a result of the explosion and subsequent
8 fire.
- 9 3. The explosion and subsequent fire destroyed the business at 910 W. 48th Street. Several
10 adjacent buildings sustained extensive damage. Other nearby businesses sustained glass
11 breakage.
- 12 4. The probable cause of the incident was the ignition of natural gas that had escaped from a
13 hole in a 2-inch diameter PE natural gas main located about 11 feet southeast of the
14 southeast corner of the structure at 910 W. 48th Street. The natural gas migrated through
15 backfill material beneath the street, alley and sidewalk and through nearby sanitary
16 sewers. The natural gas migrated into 910 W. 48th Street through one or more entry
17 locations, accumulated and was ignited. The probable source of ignition was not
18 determined.
- 19 5. The hole in the 2-inch diameter PE natural gas main was caused by third-party damage
20 when Heartland Midwest, a construction contractor for Time Warner Cable, was using
21 horizontal directional drilling (HDD) equipment in preparation to install
22 telecommunications cable for the Plaza Vista Building. During the drilling process, the

1 drill bit came into direct contact with the 2-inch diameter PE natural gas main, and made
2 an approximate 2-inch by 2-inch hole in the main.

3 6. Prior to excavating, Heartland Midwest notified Missouri One Call System, Inc. of its
4 intent to excavate for telecommunications cable in the alley between Belleview Avenue
5 and Roanoke Parkway south across W. 48th Street. Pursuant to the excavation
6 notification and prior to the HDD project, a locating contractor accurately located and
7 marked the location of the natural gas main with a single line of yellow paint marks and
8 marked the location of the electric lines with a single line of red paint marks.

9 7. MGE did not identify this HDD project for an excavation inspection since this excavation
10 was not within the Plaza area MGE had designated as "High Profile Mains".

11 8. The probable cause of the third-party damage was that there were two facilities marked at
12 the location; however, there were three facilities buried. As of the date of this Report,
13 Staff has not determined the reason for the discrepancy. Heartland Midwest personnel
14 stated that they believed they had excavated and exposed one electric line and one natural
15 gas main at a depth of approximately 24 inches. Heartland Midwest personnel stated that
16 the single line of yellow marks and the single line of red marks in the alley indicated to
17 them there was one natural gas main and one electric line below the surface at these
18 marks. Heartland Midwest personnel steered the drill bit down to a depth of
19 approximately 37 inches, so that it would pass under what they believed to be one electric
20 line and one natural gas main at that location, and continued drilling. The drilling rod
21 bored through the top half of the natural gas main.

22 9. It is probable that the damage to the natural gas main (and subsequent explosion) would
23 not have occurred if Heartland Midwest personnel had known there were two electric

1 lines beneath the single line of red paint marks, prompting them to take additional actions
2 to expose the natural gas main to confirm that the drill bit was at a location that would
3 avoid hitting the gas main.

4 10. Heartland Midwest reported the damaged natural gas facility to 911, MGE and Missouri
5 One Call System, Inc.

6 11. MGE responded to the third-party damage immediately, however the investigations to
7 determine if a hazard existed and to determine the extent of migration of the escaping
8 natural gas were not accomplished in a timely manner and were not adequate.

- 9 a. At about 4:55 p.m. MGE dispatcher receives notification of a natural gas main hit.
- 10 b. At about 4:56 p.m. MGE specialty person receives notice of the hit.
- 11 c. At about 4:58 p.m. MGE duty supervisor receives notice of the hit.
- 12 d. At about 5:06 p.m. MGE receives notice of a dig up notification.
- 13 e. At about 5:11 p.m. MGE dispatcher calls MO One Call for emergency locates in
14 response to the dig up notification.
- 15 f. At about 5:16 p.m. MGE first responder (specialty person)² arrives at scene.
- 16 g. At about 5:16 p.m. MGE service tech # 1 proceeds to scene from another location,
17 and arrives at scene at approximately 5:31 p.m.
- 18 h. At about 5:19 p.m. MGE specialty person calls MGE dispatch asking for
19 additional personnel.
- 20 i. Following call, MGE specialty person evaluates situation and confirms natural
21 gas was blowing based on hissing noise and bubbling of backfill.

² The job description of an MGE specialty person states they must have specific knowledge of Construction and Maintenance department duties, be able to locate MGE's natural gas facilities, meet with contractors digging near MGE's natural gas facilities, and be a first responder to third-party damages.

- 1 j. At about 5:25 p.m. MGE specialty person calls dispatch a second time to request
2 additional personnel.
- 3 k. At about 5:31 p.m. MGE service tech #1 arrives at scene.
- 4 l. At about 5:31 p.m. to about 5:37 p.m. service MGE tech #1 assists MGE
5 Construction and Maintenance Department (C&M) foreman and MGE C&M
6 crew truck gain access to the location of third-party damage. MGE service tech
7 #1 proceeded to 4746 Belleview Avenue to respond to odor call.
- 8 m. Between about 5:32 p.m. and 5:40 p.m. the MGE C&M foreman was briefed by
9 the specialty person, the MGE C&M foreman confirmed hearing blowing gas in
10 the pothole near the damaged main and MGE C&M crew began unloading a
11 backhoe and other equipment. Between approximately 5:40 p.m. and 5:57 p.m.
12 the MGE C&M foreman photographed the scene, USIC began taking
13 photographs, the MGE C&M foreman marked a small area of pavement for the
14 backhoe to remove and the backhoe began breaking pavement. Between
15 approximately 5:57 p.m. up until the explosion around 6:02 p.m. a bucket was
16 used to remove chunks of pavement and the MGE C&M foreman donned a fire
17 suit and began hand digging.
- 18 n. All of the following events occur between approximately 5:48 p.m. and 5:51 p.m.
19 MGE service tech #1 returns to scene, meets with MGE specialty person and
20 enters JJ's Restaurant to check for natural gas. The combustible gas indicator
21 (CGI) registers a reading of 2-3% gas-in-air, causing the CGI to audibly alarm.
22 Another alarm indicates a low battery condition for the CGI used by MGE service

1 tech #1. MGE service tech #1 tells JJ's Restaurant manager to evacuate. MGE
2 service tech #1 leaves JJ's Restaurant to get new batteries.

3 o. All of the following events occur between approximately 5:47 p.m. and 5:52 p.m.
4 MGE service tech #2 arrives at scene. He is in truck when MGE service tech #1
5 leaves JJ's Restaurant to get batteries for CGI. Service Tech #2 enters JJ's
6 Restaurant and obtains gas-in-air readings of 3.5-4% causing the CGI to audibly
7 alarm. MGE service tech #2 tells the manager of JJ's Restaurant to evacuate.

8 p. At about 5:51 p.m. MGE service tech #1 calls the duty supervisor to report that
9 the manager of JJ's Restaurant was told to evacuate and to report findings of leak
10 investigation.

11 q. At about 5:52 p.m. MGE service tech #2 calls the duty supervisor to report that
12 the manager of JJ's Restaurant was told to evacuate and to report findings of leak
13 investigation.³

14 r. At about 6:02 p.m. the explosion occurs at JJ's Restaurant.

15 12. Subsequent to the explosion, MGE conducted leak surveys to determine the extent and
16 migration of the leaking natural gas, removed sanitary sewer manhole covers to vent
17 natural gas in the sanitary sewer system and took steps to stop the flow of natural gas in
18 the damaged segment of gas main.
19

³ From about 5:31 p.m. throughout the evening, various MGE service techs responded to natural gas odor calls around the area. While not specifically outlined in this section of the Report, the details are contained in Appendix A – Facts and Staff's Investigation,

III. STAFF ANALYSIS OF INCIDENT AND CONCLUSIONS

A. Locating and Marking Natural Gas Main and Electric Lines

Analysis:

USIC located and marked the approximate location of the natural gas main on behalf of MGE and electric lines on behalf of the electric facility owner with a single line of yellow paint marks and a single line of red paint marks, respectively, on the pavement surface at the intersection of the alley and W. 48th Street. During on-site investigations after the incident, Staff verified that the line of yellow paint marks on the pavement surface at the location of the natural gas main damage accurately marked the approximate location⁴ of the natural gas main. Staff also verified that the single line of red paint marks marked the approximate location of the electric lines near the gas main damage. Buried beneath the location of the single line of red paint marks, were two parallel electric conduits in contact with one another. According to Heartland Midwest personnel, the intended bore path would cross the single line of red paint marks (marking the location of an underground electric line) and the single line of yellow paint marks (marking the location of an underground natural gas line) near the intersection of the alley and W. 48th Street. The Heartland Midwest crew stated in interviews the single line of yellow marks and the single line of red marks indicated to them there was one natural gas line and one electric line below the surface of these marks at approximately the alley and W. 48th Street. Because the line of red and yellow paint marks were parallel and close to each other (approximately 9 inches apart in the alley above the point of damage to the natural gas main), the Heartland Midwest crew made one pothole between the two lines of painted marks prior to the

⁴ "Approximate location" is defined as "a strip of land not wider than the width of the underground facility plus two feet on either side thereof" in RSMo 319.015.

1 HDD in an attempt to expose both the electric line beneath the line of red marks and the natural
2 gas main beneath the line of yellow marks.

3 During this potholing, the Heartland Midwest crew uncovered a ¾-inch diameter plastic
4 black line and a 2-inch diameter plastic black line next to each other at a depth of approximately
5 25 inches (both were later verified, during the course of Staff's investigation, to be street light
6 conduits). Because there was just a single line of red paint marks and a single line of yellow
7 paint marks at that location, the Heartland Midwest crew assumed that the ¾-inch diameter
8 plastic black line was the marked electric line and that the 2-inch diameter plastic black line was
9 the marked natural gas main. Adding to the assumption that the 2-inch diameter plastic black
10 line was the natural gas main was the fact that the Heartland Midwest crew had stated it did not
11 have any additional information regarding the natural gas main, such as size, color or depth. The
12 line of yellow paint marks was located south of, but within 24 inches (within "approximate
13 location") of the two plastic black lines that were exposed in the pothole. The Heartland
14 Midwest crew believed it had potholed and identified the two underground facilities (a natural
15 gas main and an electric line) marked by USIC. Because the Heartland Midwest crew thought
16 the 2-inch diameter plastic black line was the natural gas main and the ¾-inch diameter plastic
17 black line was the electric line, they did not enlarge the pothole (pothole #6) to the south or make
18 an additional pothole directly over the line yellow paint marks.

19 Staff was not able to determine the reason why there was only a single line of red paint
20 marks at the location of the two buried electric lines. However, several factors could have
21 contributed to USIC's marking only one electric line where it made the single line of red paint
22 marks. The two electric lines were in contact with each other and could have produced a more
23 narrow tone indicating to the locator that there was probably only one electric line below the

1 surface at this location. The USIC spokesperson stated that the two lines of red markings going
2 east of the alley could be because the tone was wider there than the tone at the location of the
3 single line of red paint marks in the alley. The USIC spokesperson further stated that when the
4 locator's tone produced a wider signal going east of the alley, it was an indication that there
5 could be more than one underground electric utility; hence, the two lines of red paint marks.
6 Staff could not determine if there were two parallel electric lines buried beneath the two parallel
7 single lines of red paint marks, since an excavation was not made through the sidewalk at this
8 location. However, during the on-site investigations, Staff did observe two electric conduits in
9 the excavation in the alley near the damage to the natural gas main, one of these electric lines
10 turned north up the alley near the east edge of the alley and at the east edge of the excavation,
11 Staff observed only one electric line continuing to the east.

12 In addition, the USIC spokesperson stated there are many factors which could affect
13 accuracy and the ability to predict exactly what is buried and out of sight. The spokesperson
14 stated the tone could have been "pulled" (affected) by something in the ground, soil type,
15 condition of the soil, grounding of the utility, etc. that caused the wider tone.

16 **Conclusion:**

17 Facility marking guidelines (Missouri Marking Standards) listed in the Missouri One Call
18 System Excavator Manual suggest that for the same type multiple facilities where a separate
19 signal is not possible, the markings on the surface above the underground facilities
20 include/identify the number of facilities below. As of the filing of this Report, Staff has not been
21 able to determine the reason the locate marks did not identify two electrical facilities.

22 It is probable that Heartland Midwest personnel would have enlarged the pothole
23 exposing the two electric lines, or made a separate pothole, to expose the natural gas main if it

1 had information that the 2-inch diameter plastic black line and ¾-inch diameter plastic black line
2 marked with the single line of red paint marks were both electric lines. It is also probable that
3 the Heartland Midwest crew would have enlarged pothole #6 or made a separate pothole over the
4 line of yellow paint marks on the pavement, if marks on the pavement would have indicated
5 there were two electric lines in addition to a natural gas main at the location. Had the natural gas
6 main been exposed, it is probable that the Heartland Midwest crew would have steered the drill
7 bit in a manner that would have avoided hitting the gas main.

8 **B. Third-Party Damage to Natural Gas Main**

9 On February 6, 2013, in anticipation of installing new cable for Time Warner, Heartland
10 Midwest complied with RSMo Chapter 319 by submitting notifications to MO One Call of its
11 intent to excavate by HDD in the vicinity of the proposed excavation. USIC marked
12 underground facilities in response to these notifications beginning on February 9, 2013 and
13 continuing into February 15, 2013. To document the locating, USIC took numerous pictures of
14 the locate marks on February 14, 2013. On February 19, 2013, in compliance with RSMo
15 Chapter 319, Heartland Midwest personnel notified Missouri One Call to report it had damaged a
16 natural gas line at W. 48th Street and Bellevue Avenue. USIC personnel responded and verified
17 the existing markings in the alley prior to the explosion.

18 Typically when HDD is used to install facilities under a street, an excavation is made to
19 allow the drill rod to enter the ground (entrance hole). A second excavation is made to receive
20 the drill bit (receiving hole) and the cable is pulled back through the bore path, starting at the
21 receiving hole and ending back at the entrance hole. Heartland Midwest personnel removed a
22 slab of pavement on the east side of the parking lot just north of the alley for the entrance hole
23 and excavated a receiving hole just south of the construction fence on W. 48th Street across from
24 the alley.

During the process of HDD, Heartland Midwest used potholes in addition to a locating device to verify and track the location of the drill bit and drilling rod. Referring to Appendix B, FIGURE 1, potholes 1 and 2 were made to expose the communication facilities running perpendicular to the bore path. Potholes 3, 4 and 5 were made to track the drill bit and drilling rod and verify the depth of the bore. Pothole 6 (See Appendix C, Photograph 3) was made to expose an electric line and natural gas line that had been marked with red and yellow markings on the pavement surface, respectively.

Conclusion:

Heartland Midwest personnel saw what appeared to be a 2-inch black plastic pipe and a ¾-inch black conduit in pothole 6. Because these two facilities corresponded to the red and yellow markings on the pavement surface, Heartland Midwest personnel took measurements to the depth of the top of the facilities. The facilities were measured at an approximate depth of 25 inches. Heartland Midwest personnel steered the drill bit and drilling rod down to a depth of approximately 37 inches to avoid hitting the two underground facilities believed to be the natural gas line and electric line. Appendix C, Photograph 4 shows that the Heartland Midwest crew tracked the drill bit and drilling rod by placing white dots on the pavement above the location of the drilling rod. The number “37” written on the alley pavement by Heartland Midwest personnel as shown in Appendix C, Photograph 3 indicates the depth, in inches, of the drilling rod. At this depth the drill bit was at the same depth as the 2-inch natural gas main. The Heartland Midwest crew made potholes 7 and 8 to expose and verify the location of the bundle of communication facilities that were marked south of the damaged natural gas main and southwest of the manhole.

C. Natural Gas Escape and Migration

Analysis:

The natural gas escaping from the third-party damaged 2-inch diameter PE natural gas main exited at a pressure of approximately 25 psig, according to pressure charts provided by MGE. The approximate 2-inch by 2-inch (See Appendix, Photographs 1 and 2) hole in the natural gas main would have allowed the natural gas to escape at a rapid rate. Natural gas leaking from an underground pipe would tend to migrate along paths of least resistance laterally through the soil and upward through the soil toward the atmosphere because natural gas is lighter than air (natural gas has a specific gravity of 0.6 while air has a specific gravity of 1.0).

There are several factors that influence the rate and direction of natural gas migration such as operating pressure, volume, pavement and soil type. In order to determine the soil type in the vicinity of the bore path, various soil samples were taken from locations as shown in Appendix B, Figure 2. An engineering analysis and lab tests indicate the majority of these soil samples are a clay-type soil. Clay-type soils have small void spaces, air spaces between soil particles. With smaller void spaces, natural gas migration to the atmosphere is limited. Near the northeast corner of JJ's Restaurant, soil samples 4, 5 and 6 contained a layer of aggregate in-between the pavement and clay. The aggregate would provide an easy migration path for natural gas because the larger particle size and larger void spaces provide less resistance to natural gas migration.

In addition, depth of cover can also affect natural gas migration. When natural gas is trapped deeper underground, natural gas has a longer distance to travel in order to vent into the atmosphere. Thus, natural gas would have a tendency to migrate laterally along paths of least resistance.

1 During Staff's on-site investigations, MGE personnel removed a slab of pavement that
2 contained potholes 3, 4 and 5 (See Appendix C, Photograph 5). Underneath the removed slab of
3 pavement was a layer of aggregate. On the west side of where the slab was removed, there was a
4 large void space between the floor in JJ's Restaurant (See Appendix C, Photograph 6) and the
5 aggregate. This location is another possible migration path for natural gas. Natural gas could
6 have accumulated in this large void space, coinciding with the reports of stronger natural gas
7 odors in the east side of JJ's Restaurant.

1 **Conclusion:**

2 Natural gas leaking from an underground pipe would tend to migrate along paths of least
3 resistance. Staff's investigation revealed the soil contained a layer of aggregate, and also
4 revealed large voids providing possible paths of migration for the gas.

5 **D. Natural Gas Entrance, Accumulation, and Ignition**

6 **Analysis:**

7 Natural gas migrated through the soil and entered the sewer system. Leak investigations
8 by MGE personnel after the explosion found natural gas in four manholes on W. 48th Street, all
9 of which were west of the third-party damage. In addition, when air at a pressure of
10 approximately 25 psig was introduced into the main during Staff's investigations, it was evident
11 from observations in the manhole near the damaged main that air exiting from the damaged main
12 was entering the manhole. Natural gas in the sanitary sewer could have migrated into JJ's
13 Restaurant through the floor drains. Natural gas could have also migrated and accumulated in
14 the voids between the floor slab and the soil on the east side of the building and migrated through
15 cracks in the floor to enter JJ's Restaurant.

16 Natural gas entering the structure at 910 W. 48th Street accumulated to an explosive
17 mixture between 4.5% and 14.5% gas-in-air and was ignited. JJ's Restaurant personnel stated
18 the grill in the kitchen was shut off, a gas heater on the patio that was built into the structure was
19 turned off and candles throughout JJ's Restaurant had been extinguished.

20 **Conclusion:**

21 Staff was not able to determine the exact entrance point(s) of the natural gas migration
22 into the structure at 910 W. 48th Street, but it may have traveled through one or a combination of
23 paths through the soil, aggregate and sanitary sewer into the structure. There were several
24 possible ignition sources including electrical devices, pilot lights, telephones/cellular phones and

1 static electricity. Staff could not determine the specific ignition source. MGE did not discuss
2 eliminating possible ignition sources with JJ's Restaurant personnel. The natural gas service to
3 910 W. 48th Street was not shut off.

4 **E. MGE's Emergency Response and Actions Prior the Explosion**

5 The first responding party to the reported third-party damage and natural gas leak was the
6 KCFD. KCFD pumper 19 arrived at 910 W. 48th Street at approximately 5:04 p.m. KCFD
7 personnel entered JJ's Restaurant and immediately noticed the odor of natural gas inside, advised
8 that ignition sources should be extinguished and propped the door open to vent the gas.
9 According to the fire report filed by KCFD, MGE personnel arrived about one minute before
10 KCFD left the scene at approximately 5:17 p.m. The KCFD fire report also states MGE
11 personnel told KCFD personnel that equipment was en route from Raymore and the situation
12 was under control. However, when interviewed by Staff, MGE personnel stated they never had
13 any contact with KCFD at the scene. Staff was unable to determine if any communication
14 occurred between these two parties prior to the explosion.

15 The first responding MGE personnel (specialty person) arrived at 910 W. 48th Street
16 around 5:16 p.m. on February 19, 2013, approximately 22 minutes after MGE first received
17 notification of the third-party damage. Upon arrival at 910 W. 48th Street, the MGE specialty
18 person immediately called the MGE Dispatcher for additional personal from MGE Installation
19 and Service Department (I&S). Once the request for additional personnel was made, the MGE
20 specialty person went to the area of the third-party damage. There were potholes near the
21 location of the damage to the natural gas main. The specialty person could see bubbling in one
22 of the potholes, indicating blowing natural gas. The strong odor also indicated that natural gas
23 was leaking at that location. After assessing the third-party damage, the specialty person made a

1 second call to dispatch at approximately 5:25 p.m., requesting personnel from I&S. This phone
2 call was made after the specialty person's initial assessment.

3 The C&M foreman arrived at 910 W. 48th Street at approximately 5:32 p.m. and met with
4 the specialty person to discuss the third-party damage. The C&M crew truck with the back hoe
5 arrived approximately five minutes after the C&M foreman. C&M crew members (backhoe
6 operator and the compressor person) unloaded the back hoe and other equipment while the C&M
7 foreman took pictures of the area surrounding the third-party damage.

8 A USIC representative also took pictures of the locate markings on the ground around the
9 area of the third-party damage. The C&M foreman marked out an area for the back hoe to
10 remove pavement so the MGE C&M crew could vent the escaping natural gas to atmosphere and
11 either install a 2-inch repair clamp on the damaged natural gas main or pinch off the pipe to
12 isolate the damaged section of main.

13 The C&M backhoe operator began digging using the breaker attachment for the backhoe.
14 The breaker attachment was not made of non-sparking material. The bucket attachment for the
15 backhoe being used to scoop the pavement fragments out of the excavation was not made of non-
16 sparking material. Following the removal of the pavement, the C&M foreman began hand
17 digging down to the natural gas main. The hand tools being used were non-sparking.

18 Separate from the C&M crew, service tech #1 received a call from dispatch to investigate
19 a natural gas odor call at 4746 Bellevue Avenue. After assisting with the C&M foreman's
20 arrival to 910 W. 48th Street, service tech #1 began an investigation at 4746 Bellevue Avenue.
21 Service tech #1 did not detect natural gas with a CGI; therefore, service tech #1 called the duty
22 supervisor at approximately 5:46 p.m. to ask for permission to forego a shut-in test. The duty

1 supervisor granted permission to forego the shut-in test and service tech #1 proceeded to 910 W.
2 48th Street to assist with the leak investigations related to the third-party damage.

3 Within approximately three minutes after arriving at 910 W. 48th Street (following his
4 leak investigation at 4746 Belleview Avenue), service tech #1 took gas-in-air readings inside of
5 JJ's Restaurant, told the manager of JJ's Restaurant to evacuate, and contacted the MGE duty
6 supervisor to report these findings.

7 When service tech #1 entered JJ's Restaurant to investigate possible natural gas migration
8 inside of the structure, a reading between 2%-3% gas-in-air was detected on the CGI. After the
9 reading was obtained by service tech #1, the low battery indicator came on. However, since a
10 reading above 1% gas-in-air was found inside, service tech #1 told the manager of JJ's
11 Restaurant to evacuate the building.

12 While service tech #1 was putting new batteries in his CGI, service tech #2 went into JJ's
13 Restaurant to determine if natural gas had accumulated inside. Service tech #2 recorded a
14 reading of 3.5%-4% gas-in-air on his CGI and service tech #2 told occupants of JJ's Restaurant
15 to evacuate. After new batteries were put in his CGI, service tech #1 re-entered JJ's Restaurant
16 after service tech #2, took readings and again recorded 3.5%-4% gas-in-air on his CGI. This
17 confirmed service tech #1's CGI was working properly because the same readings were obtained
18 twice and they were very similar to the gas-in-air readings obtained by service tech #2.

19 At approximately 5:52 p.m., service tech #1 ended the phone call with the duty
20 supervisor and went over to the House of Elan adjacent to JJ's Restaurant on the east side of the
21 alley to check for natural gas inside of the building.

22 Service tech #1 investigated possible natural gas migration into the House of Elan, found
23 gas concentrations of 1.1% gas-in-air at the front door and evacuated the House of Elan a few

1 minutes before the explosion occurred. According to MGE procedures, the occupants of the
2 building are to be evacuated when gas-in-air levels are 1% or greater.

3 When the explosion occurred, there were multiple occupants inside JJ's Restaurant. Staff
4 interviewed several of the individuals who were inside JJ's Restaurant at the time of the
5 explosion. The general consensus of this group of individuals was that MGE personnel did not
6 project any sense of urgency to exit the building. MGE personnel stated they told the manager of
7 JJ's Restaurant to evacuate the building. MGE did not evacuate all of the occupants inside of
8 JJ's Restaurant prior to the explosion.

9 If gas-in-air readings found inside of a structure are at or in excess of 20% of the lower
10 explosive limit (LEL) in free air⁵, MGE's emergency plan contains provisions that MGE
11 personnel should "establish a restricted zone using vehicles, barricades, safety cones and/or
12 warning tape. Heartland Midwest personnel had cones set out blocking off W. 48th Street from
13 Bellevue Avenue, and once the C&M crew truck arrived, the backhoe operator instructed the
14 compressor person to set cones at W. 48th Street and Roanoke Parkway.

15 There were also multiple individuals standing around the perimeter of JJ's Restaurant;
16 more specifically near the damaged main when the explosion occurred. MGE's emergency plan
17 contains provisions that if gas-in-air readings found inside a structure are at or in excess of 20%
18 of the lower explosive limit (LEL) in free air, MGE personnel should "evacuate all Company
19 employees and building occupants, unless the gas accumulation is limited to a particular area,
20 and the evacuation of the immediate area, as well as adjacent rooms including those above and
21 below would be sufficient, in the judgment of Company personnel."⁶

⁵ The LEL is the minimum amount of gas-in-air required for ignition to occur. The LEL is approximately 5% gas-in-air. MGE's emergency procedure defines 20% of the LEL as 1% gas-in-air.

⁶ MGE Emergency plan section 4.1.3.3.

1 After the explosion at JJ's Restaurant, one of the several priorities for MGE personnel
2 was stopping the flow of natural gas to the damaged pipeline. One scenario would have been for
3 MGE personnel to close the four "emergency" valves⁷ designated by MGE for this area.
4 "Emergency" valves are valves necessary for the safe operation of a distribution system and must
5 be maintained for accessibility and serviced annually. In this case the four valves were
6 "emergency" valves because closing these four valves provided a zone of isolation sized such
7 that MGE could relight the lost customer services within a period of eight hours after restoration
8 of system pressure as is required by Commission rule. Closing these four "emergency" valves,
9 located at surrounding district regulator stations, would have isolated the damaged section of
10 main on W. 48th Street from the distribution system. MGE estimated that closing these valves
11 would have interrupted natural gas service to approximately 2,990 meters and 2,115 services in
12 the isolated area. Closing these "emergency" valves would have isolated a large area from the
13 distribution system and interrupted service to a large number of customers, but the large volumes
14 of natural gas remaining in the isolated area would have continued to escape from the damaged
15 main for an unknown amount of time until pressure in the main reached atmospheric pressure.

16 Another scenario for stopping the flow of natural gas to the damaged main would have
17 been for MGE personnel to locate and close valves in the distribution system that were not
18 designated by MGE as "emergency" valves and/or expose the PE natural gas main and "squeeze-
19 off"⁸ the main. This is the scenario MGE personnel used to stop the flow of natural gas on
20 February 19, 2013.

⁷ MoPSC regulation 4 CSR 240-40.030(13)(V)3.C. requires valves that are necessary for the safe operation of a distribution system to provide isolation zones that are sized such that the operator could relight the lost customer services within a period of eight (8) hours after restoration of system pressure

⁸ A squeeze-off tool is used to clamp the pipe shut, eliminating the flow of natural gas downstream.

1 The valve located at Roanoke Parkway and W. 48th Street was closed at approximately
2 7:20 p.m. on February 19, 2013 and MGE personnel attempted to locate and close a valve at
3 Ward Parkway and Belleview Avenue. However, the valve at Ward Parkway and Belleview
4 Avenue was inaccessible at the time of the incident because the valve was paved over with
5 asphalt. Closing the valve at Ward Parkway and Belleview Avenue and the valve at Roanoke
6 Parkway and W. 48th Street, would have isolated the damaged section of main. If MGE
7 personnel would have closed these two valves, natural gas would have continued to escape for an
8 unknown amount of time from the damaged main until line pressure equalized to atmospheric
9 pressure.

10 Since the valve at Ward Parkway and Belleview Avenue was inaccessible, MGE
11 personnel exposed and squeezed-off the natural gas main on Belleview Avenue and W. 48th
12 Street at approximately 8:00 p.m. on February 19, 2013. With the valve closed at Roanoke
13 Parkway and W. 48th Street and the main squeezed off at Ward Parkway and Belleview Avenue,
14 the damaged section of the main was isolated and natural gas service was interrupted to
15 approximately 35 customers. The amount of time for the natural gas to escape from the system
16 to equalize with atmospheric pressure was minimal with this approach because the isolated
17 section was small and the volume of gas in the isolated section is small.

1 **Conclusion:**

2 Approximately 32 minutes elapsed between the arrival of MGE's specialty person, the
3 first responder for MGE, and when MGE personnel first entered JJ's Restaurant to check for
4 natural gas.⁹ It appears approximately 36 minutes elapsed from the time the MGE's first
5 responder arriving and the House of Elan was checked for natural gas.

6 Too much time elapsed between MGE personnel arriving at 910 W. 48th Street and the
7 beginning of the leak investigation in buildings on both sides of the alley where the damage to
8 the natural gas main had occurred. Based on the strong odor of natural gas and the hissing and
9 bubbling of natural gas blowing in pothole 6, the specialty person should have begun
10 investigating the migration of natural gas based on the steps listed in MGE's Emergency Plan
11 under Section 4.0 Incident Response. The Plan states that after assessing the situation to
12 determine if a hazardous condition exists, requesting additional personnel and informing the
13 dispatcher or duty supervisor of the situation, the next step should be to test the atmosphere with
14 a CGI if there is reason to suspect that natural is escaping and/or accumulating inside of a
15 structure. In this particular incident, there was sufficient reason to believe natural gas could have
16 escaped and accumulated in nearby structures.

17 The qualifications of a specialty person, the first responder from MGE to the third-party
18 damage, include performing functions of a Class A leak inspector and must be able to
19 proficiently use all leak survey equipment. The specialty person had two CGI's, neither of
20 which was used. One of the two CGI's, serial number 153, had been calibrated February 12,
21 2013, one week before the incident.

⁹ This timeframe comes from the 5:16 p.m. arrival time of the specialty person until service tech #1 gets off of the two minute phone call with the duty supervisor at 5:48 p.m. Service tech #1 was investigating an odor call at 4746 Bellevue Avenue which is across Bellevue Avenue from JJ's Restaurant on the west side of the street. Service tech #1 entered JJ's Restaurant to check for natural gas after walking across Bellevue Avenue once the phone call with the duty supervisor ended.

1 The MGE specialty person had sufficient time to conduct an inside leak investigation
2 inside JJ's Restaurant before MGE service tech #1 arrived. Leak investigations inside of
3 surrounding structures (starting at approximately 5:48 p.m.) later verified the accumulation of
4 natural gas inside of multiple surrounding structures.

5 According to MGE's Operations and Maintenance plan regarding leak investigations,
6 Section 3.1.3 states MGE personnel should remove vault, manhole and valve box covers as
7 appropriate. MGE personnel did not remove the manhole cover located south of the third-party
8 damage (See Appendix C, Photograph 7) at any point prior to the explosion.

9 MGE leak investigations detecting CGI readings above 1.0% gas-in-air inside JJ's
10 Restaurant and the House of Elan should have prompted MGE personnel to consider moving
11 people away from the area. However, MGE personnel were not aware that there were gas-in-air
12 readings above 1% in both buildings until right before the explosion occurred. MGE personnel
13 were not aware of the full extent of the migration of natural gas until sometime after the
14 explosion when natural gas concentrations were detected in sanitary sewer manholes, in other
15 buildings and at other locations in the area.

16 Based on its investigation, Staff asserts that subsequent to the third-party damage to
17 the 2-inch diameter PE natural gas main, MGE did not conduct prompt and adequate leak
18 investigations to determine if hazards existed and to determine the extent of the hazards in order
19 to make the area safe and to protect life and property.

20 MGE personnel and all other individuals outside near the damaged main should have
21 moved to a safe distance away from the third-party damage once MGE personnel discovered
22 natural gas at concentrations above 1% gas-in-air was accumulating inside both the buildings
23 adjacent to the damaged main.

1 As a result of the incident investigation, Staff has determined that sufficient evidence
2 exists that MGE violated Missouri Public Service Commission (MoPSC) Rules: 4 CSR 240-
3 40.030(1)(G)3. and (12)(C) regarding its actions to protect persons and property subsequent to
4 the damage to the natural gas main by not conducting effective leak investigations as required by
5 4 CSR 240-40.030(12)(J)1.C., (12)(J)1.E., (12)(J)1.G., (12)(D)4.E., (14)(B)3., and (14)(C). Ten
6 recommendations to MGE are being made as a result of Staff's investigation.

7 **F. Locate Marks near the Damaged Main**

8 **Analysis:**

9 MGE called in an emergency locate ticket for the excavation to dig down to the natural
10 gas main; however, the locate markings on the ground did not appear to be remarked. As stated
11 in Section 319.026RSMo, "When markings have been provided in response to a notice of intent
12 to excavate, excavators may commence or continue to work within the area described in the
13 notice for so long as the markings are visible."

14 **Conclusion:**

15 The locate markings, as provided by USIC from a routine locate request from Heartland
16 Midwest, in the vicinity of the excavation were clear enough for the C&M crew to excavate to
17 the natural gas main around the electrical facility next to the main.

18 **G. Other Odor Calls**

19 **Analysis:**

20 During the course of its investigation, Staff became aware of several individuals who
21 reported smelling gas as early as 2:00 p.m. on February 19, 2013. Staff was able to speak with
22 these individuals, but was unable to determine the location or a firm time they smelled gas. A
23 record search of MGE's odor call and response actions did not reveal any earlier odor calls prior
24 to the odor call for the damaged natural gas main.

1 **Conclusion:**

2 Interviews of witnesses who walked near the southeast corner of JJ's Restaurant around
3 4:00 p.m. did not smell gas. Witness interviews revealed that, except for the several individuals
4 noted in the preceding paragraph, persons did not smell gas until sometime between 4:30 p.m.
5 and 4:45 p.m. This time frame generally coincides with the time the natural gas main was
6 damaged.

7 **IV. STAFF RECOMMENDATIONS**

8 Based on Staff's investigation, analysis, and conclusions, Staff makes the following
9 recommendations.

- 10 1. Staff recommends that MGE review and revise as necessary its procedures to
11 make certain fire department, police department or any other entities with
12 authority to evacuate individuals from buildings remain on the scene or are
13 present during an emergency situation which may require evacuation of
14 buildings. In addition, Staff recommends that MGE review and revise as
15 necessary its liaison program with the KCFD for identifying the various
16 situations that may constitute a hazardous situation involving natural gas, the
17 various actions that should be taken before MGE personnel arrive when a
18 hazardous situation is identified and when KCFD assistance may be needed.
- 19 2. Staff recommends that MGE review and revise as necessary its procedures
20 and employee training to ensure that when situations occur, such as when a
21 gas-in-air reading above 1% is obtained in a structure, MGE personnel clearly,
22 quickly, and forcefully communicate to building occupants the eminent
23 danger of the situation and the urgency to immediately evacuate, regardless of

1 the presence of fire, police or other public officials with authority to evacuate
2 buildings. If these situations are encountered and fire, police or other public
3 officials are not at the scene, they should be contacted immediately to respond
4 and assist with evacuations and other emergency actions. MGE should not
5 wait for them to arrive before beginning the evacuation.

6 3. Staff recommends that MGE designate a person or persons that will be
7 responsible when at the scene of an event where hazardous situations are
8 identified, that are responsible for making certain that all the procedures
9 contained in MGE's Emergency Plan are followed and executed promptly and
10 adequately. This person or persons should ensure, coordinate and evaluate
11 what actions have been taken and what actions need to be taken. Such actions
12 can include, but are not limited to, leak surveys, leak investigations,
13 evacuations, response to odor calls, conversations with individuals, closing
14 valves, shutting off gas, making repairs/replacements to MGE facilities and
15 removing lids to manholes, valves, etc. to allow natural gas to vent to the
16 atmosphere.

17 4. Staff recommends that MGE include provisions in its emergency response
18 procedures that, where possible, require emergency response efforts to be
19 conducted at a safe distance from a potentially hazardous site. Staff
20 recommends MGE's procedures identify parameters for determining when a
21 "safe zone" should be established during hazardous situations, such as gas-in-
22 air readings above 1% detected in structures or significant concentrations of
23 natural gas detected in sewers. The provisions should include the dangers of

1 working in close proximity to potentially hazardous locations when sources of
2 ignition have not been eliminated. Procedures and training should be explicit
3 enough, and should detail a sequence of actions to be taken, that would allow
4 field personnel to take the actions necessary to promptly avert safety hazards
5 and to protect life and property. The boundaries of the “safe zone” should
6 allow MGE personnel and emergency personnel to work at a safe distance
7 from the hazard. In addition, MGE should consider eliminating sources of
8 ignition, such as electric and gas service, in the “safe zone.” All individuals,
9 including MGE personnel, must stay out of the “safe zone” until the identified
10 hazards to property and life have been mitigated. The circumstances of this
11 incident should be incorporated into the training process.

12 5. Staff recommends that MGE review and revise as necessary its procedures
13 and employee training for responding to and taking appropriate actions for
14 natural gas leaks that are considered as emergency gas leaks, identifying the
15 various actions that should be taken when a hazardous situation is identified.
16 Specifically, MGE procedures and employee training should include
17 instruction on prompt and thorough leak investigations for early recognition of
18 the existing hazards, including the magnitude and extent of migration of
19 escaping natural gas and on appropriate actions contained in the Emergency
20 Plan to protect life and property. The circumstances of this incident should be
21 incorporated into this training process.

22 6. Staff recommends that MGE review and revise its procedures as necessary to
23 determine if/when MGE personnel should perform construction inspections

1 when MGE is aware contractors are using the horizontal directional drilling
2 method near MGE's underground facilities in areas with pavement contiguous
3 to buildings. MGE may want to consider expanding the definition of areas
4 designated as "High Profile Areas".

- 5 7. Staff recommends the Commission order MGE to file an action plan regarding
6 each of the recommendations (numbered 1-6) contained in Staff's Report at
7 such time as the Commission shall designate. Staff further recommends the
8 Commission order that the action plan include MGE's proposed resolution for
9 addressing each recommendation and the timeframe for implementing the
10 resolution. For those recommendations where MGE determines no action is
11 necessary, Staff recommends the Commission order MGE to explain, and
12 provide supporting documentation as available, the reason(s) no action is
13 required. Finally, Staff recommends the Commission order MGE to submit to
14 Staff, any proposed revisions to its Emergency Plan and training process for
15 review prior to implementation.
- 16 8. Staff recommends that the Staff Counsel's Office cause a complaint to be filed
17 with the Commission regarding the violation noted in this Incident Report.

APPENDIX A: DETAILED DISCUSSION OF FACTS AND STAFF'S INVESTIGATION

NOTE: The detailed information presented in Appendix A was obtained through Staff's on-site investigation, interviews, MGE records, and reports of other entities.

A. The Incident

At approximately 6:02 p.m. CST on Tuesday, February 19, 2013, a natural gas explosion and subsequent fire occurred in a structure at 910 W. 48th Street (JJ's Restaurant) in Kansas City, Missouri.

B. Personal Injuries

Several individuals were inside JJ's Restaurant when the explosion occurred. There was one fatality and many of the individuals inside JJ's Restaurant were injured. In addition, there were employees of Missouri Gas Energy (MGE), Heartland Midwest and United States Infrastructure Corporation (USIC) outside of the structure near the location of the damaged main. Some of these individuals were also injured when the explosion occurred. The news media reported there were a total of 12 people injured as a result of the explosion and fire.

C. Property Damage

The structure located at 910 W. 48th Street (JJ's Restaurant) and its contents were destroyed as a result of the explosion and subsequent fire. The adjacent multistory building to the north, the Plazaview Building, and the building east of the alley, the House of Elan (medical office), sustained significant damage. Several other buildings sustained damage as well.

D. Site Description

JJ's Restaurant is located at 910 W. 48th Street (the northeast corner of W. 48th Street and Belleview Avenue) in Kansas City, Missouri near the west end of the area known as the Plaza (See Appendix B, Figure 3). W. 48th Street runs in an east/west direction. There are several

1 structures surrounding JJ's Restaurant: commercial businesses, single-family residences and
2 apartment buildings (See Appendix B, Figure 4). The main entrance to JJ's Restaurant faced
3 south toward W. 48th Street; however, there were also entrances at the southwest corner of JJ's
4 Restaurant and near the northeast corner of JJ's Restaurant facing the alley.

5 **E. Meteorological Data**

6 On February 19, 2013, the National Weather Service recorded a high temperature of 35
7 degrees Fahrenheit and a low temperature of 22 degrees Fahrenheit. No precipitation was
8 recorded on this date. The wind was generally blowing from the northwest at 21 miles per hour,
9 gusting up to 33 miles per hour. Given the structures in the immediate area, the wind direction
10 and speed at ground level at the location of the hit line is unknown. The temperature at the time
11 of the explosion was approximately 30 degrees Fahrenheit¹⁰.

12 On February 21, 2013, two days after the incident, the Kansas City area accumulated
13 approximately 0.43 inches of precipitation and 11 inches of snow. On Monday, February 25,
14 2013, the Kansas City area received approximately 0.09 inches of precipitation and 0.5 inches of
15 snow. The following day, Tuesday, February 26, 2013, the Kansas City area received
16 approximately 0.26 inches of precipitation and 9.5 inches of snow¹¹.

17 **F. Natural Gas System**

18 Natural gas service in Kansas City, Missouri is provided by MGE. The natural gas
19 distribution mains supplying 910 W. 48th Street are 2-inch diameter polyethylene (PE) pipe
20 running east and west along the north side of 48th Street and north and south along the east side
21 of Bellevue Avenue. Both mains, one on W. 48th Street east of Bellevue Avenue and one
22 running north and south on Bellevue Avenue, were installed by MGE's subcontractor in 2000.

¹⁰ All meteorological data in this paragraph was obtained from the National Weather Service for Kansas City, MO.

¹¹ Precipitation amounts for the dates listed in this paragraph were obtained from AccuWeather.com.

1 The mains were operating at a pressure of approximately 25 psig at the time of the incident. The
2 maximum allowable operating pressure (MAOP) established by MGE for this main is 58 psig.
3 Two service lines ran to JJ's Restaurant from the main on W. 48th Street and a third service line
4 ran to JJ's Restaurant from Belleview Avenue. All three meters to JJ's Restaurant were active as
5 of February 19, 2013.

6 **G. MGE's Damage Prevention Program**

7 MGE is required by 4 CSR 240-40.030(12)(I)1. to follow a written program to prevent
8 damage to pipelines from excavation activities. This program must address the requirements in 4
9 CSR 240-40.030(12)(I)3. and 4. as listed below.

10 1. 4 CSR 240-40.030 (12)(I)3.A.¹² - MGE is a member of the Missouri One Call System,
11 Inc. (MO One Call). MO One Call, on behalf of its member utilities like MGE, maintains a list
12 of known excavators, identifying those who normally engage in excavation activities in areas
13 near pipelines owned by MGE. Excavators who called MO One Call prior to engaging in
14 excavation near MGE pipelines in the past twelve months are used as a starting point by MGE
15 for updating the list. Each year MO One Call provides MGE access to the MO One Call
16 excavator database to allow MGE to supplement the excavator database with any excavators
17 identified that are not listed. MGE also identifies excavators to add to the MO One Call database
18 by reviewing third-party damage records for the period from when the list was last updated, and
19 supplements the database accordingly. This allows MGE to ensure that all excavators who
20 damage natural gas facilities are included in the MO One Call database and will be included in
21 educational notifications from MO One Call.

¹² 4 CSR 240-40.030 (12)(I)3.A. requires among other things that a damage prevention program Include the identity, on a current basis, of persons who normally engage in excavation activities in the area in which the pipeline is located. A listing of persons involved in excavation activities shall be maintained and updated at least once each calendar year with intervals not exceeding fifteen (15) months.

1 MGE provided annual excavator updates on March 1, 2011 and on February 15, 2012.
2 Heartland Midwest is on the list of excavators maintained by Mo One Call.

3 2. 4 CSR 240-40.030 (12)(I)3.B., C., and F.¹³ – MGE participates in the MO One Call
4 excavator education program under which MO One Call sends out educational materials semi-
5 annually to member excavators and excavators listed on the MO One Call excavator list.

6 The two most recent semi-annual notifications to excavators concerning underground
7 facility safety and damage prevention prior to the incident were made during Spring and Fall
8 2012. Included in these mailings were MO One Call's Excavator Manual, which includes
9 information about MO One Call and the Missouri Underground Facility Safety and Damage
10 Prevention statute (Chapter 319), as well as incorporating procedures and requirements involving
11 directional drilling. These notifications included information on how to confirm the horizontal
12 and vertical location of marked underground facilities in the drill path by various means,
13 including potholing¹⁴ and how to confirm the horizontal and vertical location of the boring
14 device during boring operations.

15 MGE's safety brochure, billing inserts, gas bills, customer newsletters, newspaper ads,
16 radio spots, vehicle logos, door hangers, letters to residents along MGE's transmission pipelines,
17 MGE's website, and the MO Safe Gas website are resources MGE uses to notify the public,
18 which includes excavators, about the necessity of calling for the location of buried facilities prior
19 to commencing excavation activities. These resources include information on how to dig with

¹³ 4 CSR 240-40.030 (12)(I)3.B.,C., and F. require among other things periodic notifications of the public, those entities engaged in excavation activities, mailings, an one-call system's excavator education program, and notification of the types of markings to be provided and how to identify the markings.

¹⁴ A pothole is a hole dug by non-mechanical means (e.g., hand-dig, soft-dig with water and air tools) to expose an underground facility to verify its location and depth. A pothole is a method that can be used to comply with the Section 319.037 RSMo (See Appendix C) requirement that an excavator make careful and prudent efforts to confirm the horizontal and vertical location of a marked underground facility when horizontal boring within the marked approximate location.

1 care, safety actions that should be taken if a gas pipeline leak or damage occurs during the
2 excavation, reporting the leak or damage to MGE and MO One Call (phone numbers provided),
3 and instructions to call 911 in an emergency.

4 3. 4 CSR 240-40.030 (12)(I)3.D. – MO One Call receives and records notifications of
5 planned excavation activities for MGE as required by this Commission rule.

6 4. 4 CSR 240-40.030 (12)(I)3.E. – MGE and MO One Call maintain records of the
7 excavator mailings and the excavation notifications/responses as required by this Commission
8 rule.

9 5. 4 CSR 240-40.030 (12)(I)3.G. – MGE provides for temporary marking of buried
10 pipelines in response to excavation notifications (locate requests) received through MO One Call
11 as required by this Commission rule. The location marking of MGE natural gas facilities is
12 performed by MGE personnel or by MGE’s contract locating company, United States
13 Infrastructure Corporation (USIC).

14 6. 4 CSR 240-40.030 (12)(I)3.H¹⁵. and (12)(I)4.¹⁶ – MGE identified when construction
15 site visits were needed based on a variety of factors, such as 1) mains which are greater than six

¹⁵ MoPSC regulation 4 CSR 240-40.030(12)(I)3.H. states that an operator’s damage prevention program must “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 leak surveys.”

¹⁶ MoPSC regulation 4 CSR 240-40.030(12)(I)4. states that locate requests received by the operator “should be evaluated to determine the need for and the extent of inspections. The following factors should be considered in determining the need for and extent of those inspections:

- A. The type and duration of the excavation activity involved;
- B. The proximity to the operator’s facilities;
- C. The type of excavating equipment involved;
- D. The importance of the operator’s facilities;
- E. The type of area in which the excavation activity is being performed;
- F. The potential for serious incident should damage occur;
- G. The prior history of the excavator with the operator; and
- H. The potential for damage occurring which may not be easily recognized by the excavator.”

1 inches in diameter; 2) mains operating in excess of sixty (60) psig; and 3) all cast iron mains.
2 Facilities in the above-noted categories are defined by MGE as “High Profile Facilities” and,
3 pursuant to 4 CSR 240-40.30 (12)(I)3.H¹⁷. and (12)(I)4., require periodic on-site inspections by
4 MGE personnel when MGE has prior notice that a contractor plans to excavate near these types
5 of facilities.

6 Prior to the incident, MGE had designated mains in downtown Kansas City and the
7 Country Club Plaza as “High Profile Mains” regardless of whether they meet the above-noted
8 criteria.

9 The location of the damage to MGE’s 2-inch diameter gas main on W. 48th Street was not
10 within the Plaza area designated as “High Profile Mains”. Since the natural gas main on W. 48th
11 Street did not meet the above-noted criteria and was not designated as a “High Profile Main”, on-
12 site inspections by MGE personnel were not required as a result of MGE’s knowledge that
13 directional drilling would be used around its facilities. MGE did not conduct any on-site
14 inspections of Heartland Midwest’s directional drilling activity near 910 W. 48th Street prior to
15 and on February 19, 2013.

16 **H. MGE Response to Facility Locate Request**

17 On February 6, 2013, Heartland Midwest contacted MO One Call to request facility locates
18 in Kansas City, Missouri. Heartland Midwest made locate requests for numerous addresses for
19 the proposed excavation path in the alley adjacent to the east side of JJ’s Restaurant. Each
20 separate locate request included the same information as follows:

¹⁷ MoPSC regulation 4 CSR 240-40.030(12)(I)3.H. states that an operator’s damage prevention program must
“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 leak surveys.”

- 1) A CA TV Main would be installed for Time Warner Cable.
- 2) The work involved boring using horizontal bore equipment and backhoe.
- 3) Start date of February 9, 2013.
- 4) The general location of work and a request to mark all service mains and lines using paint and flags.

The marking of the natural gas facilities in response to the numerous facility locate requests by Heartland Midwest was conducted by USIC, commencing on February 9, 2013 and continuing into February 15, 2013. The natural gas mains and service lines were located and marked on February 9, 2013. USIC marked the natural gas lines, communication lines, electric lines, water lines and sanitary sewer lines along the project route from the north end of the alley adjacent to the east side of JJ's Restaurant, south through the alley into W. 48th Street and on W. 48th Street between Bellevue Avenue and Roanoke Parkway, with paint on the surface above their respective buried locations. The natural gas main and service lines were marked with yellow paint, the telephone lines were marked with orange paint, the electric lines were marked with red paint, the water lines were marked with blue paint and the sewer lines were marked with green paint.¹⁸

MGE did not schedule inspections of this excavation project which involved the use of boring equipment in the alley adjacent to the east side of JJ's Restaurant and across W. 48th Street. As noted in the **MGE's Damage Prevention Program** section of this report, MGE schedules inspections when boring projects are planned near "High Profile Mains". The location

¹⁸ Facilities must be marked according to specific guidelines and color codes. RSMo Chapter 319.015(3) requires that facilities must be marked in accordance with the color code standard of the American Public Works Association.

1 of the damage to MGE's 2-inch diameter PE gas main on W. 48th Street was not within an area
2 designated as "High Profile Mains".

3 **I. Leakage Surveys and Leaks**

4 MGE conducted leak surveys¹⁹ over the natural gas mains in the area surrounding 910 W.
5 48th Street on March 9, 2012, May 15, 2012 and September 27, 2012. The May 15, 2012 and
6 September 27, 2012 leak surveys also included the service lines in the area surrounding 910. W.
7 48th Street. These two leak surveys included the 2-inch diameter PE main that was damaged in
8 the incident and the 1-inch diameter and ½-inch diameter PE service lines serving 910 W. 48th
9 Street. MGE did not detect any leak indications during these three surveys. MGE performed a
10 service line leakage survey in the area surrounding 910 W. 48th Street during February 2010,
11 March 2011 and March 2012. These service line leakage surveys included the 1-inch diameter
12 and ½-inch diameter PE service lines serving 910 W. 48th Street. No leak indications were
13 detected during these three service line leakage surveys.

14 MGE's records showed that no known active leaks existed within a two-block radius of
15 910 W. 48th Street at the time of the incident. In the six months prior to the incident, one leak
16 was detected within a two-block radius of 910 W. 48th Street. This leak was caused by third-
17 party damage during water system work and was detected on December 22, 2012. The leak was
18 repaired upon discovery. There are no recorded leak repairs on the main in the 900 block of W.
19 48th Street since installation.

20 **J. Odorization Records**

21 MGE conducted monthly odorant concentration tests in the distribution system that
22 included the area surrounding 910 W. 48th Street. The results of these tests indicated that the

¹⁹ MoPSC regulation 4 CSR 240-40.030(13)(M)2.A., requires leakage surveys to be conducted in business districts using a leak detection instrument at intervals not exceeding 15 months, but at least once each year for all pipelines.

1 natural gas was adequately odorized and readily detectable at an average concentration of
2 approximately 0.28 percent (%) gas-in-air.²⁰

3 **K. “Emergency” Valve Inspections**

4 The four (4) valves (each located at a different district regulator station), which MGE had
5 designated as “emergency” valves that would have isolated the 2-inch diameter PE natural gas
6 main in the 900 block of W. 48th Street, were last inspected in conjunction with each regulator
7 station inspection on June 5, 2012, July 17, 2012 and October 18, 2012.²¹ The inspection records
8 indicated that the valves were found to be operational and in good working order. (MGE
9 reported to Staff that closure of these valves would have affected approximately 2,115 services
10 and 2,990 meters, and, after restoration of system pressure, would have taken less than eight
11 hours to re-establish gas service to these customers.)

12 There were two valves in the distribution system located in the vicinity of 910 W. 48th
13 Street that were not designated by MGE as “emergency” valves that would have isolated the 2-
14 inch diameter PE natural gas main in the 900 block of W. 48th Street. These valves will be
15 discussed further in this report.

16 **L. MGE Notification and Actions**

17 **Initial Notification and Response to Third-Party Damage**

18 At approximately 4:55 p.m. on February 19, 2013, an MGE dispatcher received a report
19 from the Kansas City Fire Department (KCFD) of a natural gas main hit near W. 48th Street and
20 Belleview Avenue. An MGE dispatcher notified an MGE specialty person of the hit at about

²⁰ MoPSC regulation 4 CSR 240-40.030(12)(P)1., requires the odorant in natural gas to be readily detectable at a concentration of less than 0.90% gas-in-air, based upon a lower explosive limit at 4.5% gas-in-air.

²¹ MoPSC regulation 4 CSR 240-40.030(13)(V), requires that distribution line valves, the use of which may be necessary for the safe operation of a distribution system, shall be inspected for accessibility at intervals not exceeding 15 months but at least once each calendar year.

1 4:56 p.m. and notified a duty supervisor of the hit at about 4:58 p.m. The MGE duty supervisor
2 instructed the dispatcher to send a Construction and Maintenance (C&M) crew to the location of
3 the natural gas main hit. The C&M crew was dispatched to the location of the damaged main at
4 approximately 4:59 p.m. At approximately 5:00 p.m., Heartland Midwest informed MGE it had
5 hit a natural gas main. MGE received a dig up notification²² regarding the natural gas main
6 damaged by Heartland Midwest from MO One Call at about 5:06 p.m. A dispatcher from MGE
7 called MO One Call at about 5:11 p.m. for emergency locates in response to the dig up
8 notification.

9 KCFD Pumper 19 arrived on the scene at approximately 5:04 p.m. The KCFD met with
10 Heartland Midwest personnel upon arrival. Heartland personnel told the KCFD the natural gas
11 main was punctured and leaking. The KCFD personnel entered the structure at 910 W. 48th
12 Street (JJ's Restaurant) and immediately noticed a natural gas odor. The KCFD Incident Report
13 states that the KCFD "told management to put out all ignition sources in the kitchen and
14 throughout the establishment"²³. KCFD personnel propped open the door of JJ's Restaurant, but
15 did not tell the occupants to evacuate the building. The KCFD Pumper 19 left the scene around
16 5:17 p.m.

17 The first responder for MGE (referred to as the "specialty person") arrived at
18 approximately 5:16 p.m. Three minutes later, the MGE specialty person called MGE dispatch
19 asking for additional personnel. The specialty person then went over to the alley just east of JJ's
20 Restaurant to evaluate the situation. The specialty person reports there was a pothole near the
21 location of the damaged natural gas main. The specialty person confirmed that natural gas was

²² In the event of any damage to an underground facility, the responsible party must immediately report the damage to MO One Call (RSMo 319.045).

²³ KCFD Incident Report, Incident number 3013795, page 2.

1 blowing based on both hissing noise and bubbling of the backfill material observed in the
2 pothole located between the red and yellow utility markings on the ground. Around 5:25 p.m.,
3 the specialty person called dispatch a second time to again request additional personnel be sent to
4 the scene.

5 At approximately 5:16 p.m., MGE service tech #1²⁴ proceeded from another location to a
6 natural gas odor call at 4746 Bellevue Avenue and arrived at the scene at approximately 5:31
7 p.m. Before investigating the odor call, service tech #1 helped the C&M foreman, who arrived at
8 about 5:32 p.m., and the C&M crew truck, which arrived at about 5:37 p.m., gain access to the
9 location of the third-party damage. Service tech #1 then proceeded back to 4746 Bellevue
10 Avenue to respond to the odor call.

11 Service tech #1 indicated no natural gas was detected either inside 4746 Bellevue
12 Avenue or in the bar holes made near the natural gas meter and near the curb. The service tech
13 called the duty supervisor to relay this information and to request permission to forego a shut-in
14 test at 4746 Bellevue Avenue²⁵. Detecting no traces of natural gas, service tech #1 proceeded to
15 910 W. 48th Street around 5:48 p.m. to provide assistance. Service tech #1 met with the specialty
16 person to discuss the situation. Service tech #1 entered JJ's Restaurant to check for natural gas.
17 The combustible gas indicator (CGI) registered a reading of 2-3% gas-in-air, causing the CGI to
18 audibly alarm. Then another alarm on the CGI, separate from the alarm caused by the 2-3% gas-
19 in-air reading, warned service tech #1 of a low battery condition. Between approximately 5:48
20 p.m. and 5:51 p.m. service tech #1 told the manager of JJ's Restaurant to evacuate the building,

²⁴ A total of nine (9) service techs were involved with this incident. Service tech #1 was the first to arrive to the scene, followed by service tech #2. These were the only service techs on site prior to the explosion. The remaining service techs either arrived to the site after the explosion or were being dispatched to various odor calls that are presumed to be associated with the third-party damage.

²⁵ According to MGE's inside leak investigation procedures, "Once it has been determined that a hazardous condition does not exist, response shall be in accordance with the following: A shut-in test or instrument test should be performed. A supervisor may be consulted to determine when a shut-in test may not be required."

1 indicating to that manager that MGE policy is to evacuate occupants in a building when 1% or
2 more natural gas-in-air is detected. Service tech #1 left JJ's Restaurant to get new batteries for
3 the CGI.

4 An MGE dispatcher sent MGE personnel to respond to a report of a natural gas odor at
5 4809 Roanoke Parkway. Service tech #3 arrived at approximately 5:38 p.m. No leaks were
6 found at this address.

7 Service tech #2 arrived at 910 W. 48th Street at approximately 5:47 p.m. and was in his
8 vehicle when service tech #1 walked out of JJ's Restaurant to get batteries for the CGI. While
9 service tech #1 was replacing the batteries in his CGI, service tech #2 entered JJ's Restaurant to
10 take gas-in-air readings. Readings of 3.5-4% gas-in-air were detected on service tech #2's CGI,
11 causing the CGI to audibly alarm. Between approximately 5:47 p.m. and 5:52 p.m. service tech
12 #2 told the manager of JJ's Restaurant to evacuate. Service tech #1 re-entered the building after
13 service tech #2 and obtained gas-in-air readings between 3.5-4%. After service tech #2 told the
14 manager of JJ's Restaurant to evacuate the building, both service techs left JJ's Restaurant.

15 At approximately 5:51 p.m., service tech #1 called the duty supervisor to report that the
16 manager of JJ's Restaurant was told to evacuate and to report findings from the leak
17 investigation at JJ's Restaurant. One minute later, service tech #2 called the duty supervisor to
18 relay the same information from the leak investigation. While service tech #2 was talking to the
19 duty supervisor on the phone, service tech #1 went to check for natural gas inside the House of
20 Elan, located east of JJ's Restaurant across the alley. The doors were locked, but service tech #1
21 obtained a reading of approximately 1.1% gas-in-air at the first set of doors east of the alley.
22 Looking through a window, service tech #1 saw someone sitting at the receptionist desk and
23 knocked on the window in an attempt to gain entrance to the building. Service tech #1 was

1 directed to what appeared to be the owner. Service tech #1 explained there was natural gas
2 detected in the building and instructed the owner to get everyone out.

3 After service tech #2 made the phone call to the duty supervisor, but while service tech
4 #1 was investigating possible natural gas migration into the House of Elan, service tech #2
5 helped a patron of JJ's Restaurant leave the scene by moving cones on W. 48th Street and
6 temporarily blocking traffic on Bellevue Avenue. Before assisting the patron to move his
7 vehicle away from JJ's Restaurant, service tech #2 consulted with the specialty person to make
8 sure it would be safe to allow the patron to move the vehicle.

9 Both service techs #1 and #2 proceeded to the Plazaview Building, a multistory building
10 north of and adjacent to JJ's Restaurant, to investigate the report of natural gas odor on the third
11 floor. As soon as the service techs walked into the stairwell of the Plazaview Building, the
12 explosion occurred in JJ's Restaurant, at approximately 6:02 p.m.

13 Meanwhile, prior to the explosion, the C&M foreman was briefed by the specialty person
14 about what happened and went to the pothole near the damaged gas main to assess the situation.
15 The C&M foreman confirmed hearing the blowing gas in the pothole near the location of the
16 damaged main as described by the specialty person.

17 At approximately 5:37 p.m., a C&M crew truck arrived with a backhoe. Two crew
18 members of the arriving C&M truck began unloading the backhoe and other equipment. At
19 about the same time the C&M crew foreman photographed the site near the southeast corner of
20 JJ's Restaurant.

21 After the C&M foreman finished taking pictures, a representative from USIC began
22 taking photographs while the C&M crew foreman marked a small area of pavement, over the

1 suspected location of the damaged gas main, for the backhoe operator to remove.²⁶ The USIC
2 representative continued taking pictures while the C&M crew began excavating. (MGE MPSC
3 1082). The backhoe operator used a breaker attachment to break the pavement into smaller
4 pieces. A bucket attachment was used to scoop the chunks of pavement out of the excavation.
5 The C&M crew foreman put on a fire suit and commenced hand digging the backfill material
6 with a shovel. The explosion occurred at approximately 6:02 p.m. while the C&M crew foreman
7 was hand digging in the excavation.

8 **M. MGE Response to the Explosion**

9 **Leak Investigations**

10 At approximately 6:02 p.m., an explosion and subsequent fire occurred at 910 W. 48th
11 Street. At the time of the explosion and fire, four MGE personnel were at the site attempting to
12 excavate to the depth of the natural gas main to vent the leaking gas to atmosphere and to either
13 install a full circle clamp around the pipe or pinch off the leak on either side of the damaged area
14 to stop the leak. Two other MGE personnel, service tech #1 and service tech #2, were in the
15 vicinity of the explosion investigating a natural gas odor reported on the third floor of an
16 adjacent building to the north. Immediately following the explosion, multiple MGE employees
17 on-site made calls to the MGE dispatcher to report the incident.

18 Shortly after the explosion, service tech #3 parked on W. 48th Street west of Bellevue
19 Avenue and attempted to control traffic to make the scene more accessible for the KCFD.
20 Several fire fighters accompanied service tech #3 to the Plaza Vista Building (south of JJ's
21 Restaurant across W. 48th Street) to determine if natural gas had migrated into the structure. A
22 gas-in-air reading of 0.25% was found near broken windows on the first floor of the Plaza Vista

²⁶ MGE personnel indicated the plan was to excavate down to the damaged natural gas main to vent the gas to atmosphere and then either install a full circle clamp over the damaged main or pinch off the main on either side of the damaged area to stop the leak.

1 Building, but no other readings of natural gas were detected. The investigation did not progress
2 above the first floor. Outside, near the Plaza Vista Building, service tech #3 checked a water
3 valve in the sidewalk for indications of natural gas and found 5% gas-in-air. At the intersection
4 of Bellevue Avenue and W. 48th Street service tech #3 detected 45% gas-in-air in a sanitary
5 sewer manhole. Service tech #3 removed the lid from the manhole to allow natural gas to vent to
6 the atmosphere. One block to the east, a storm water cover was checked by service tech #3, but
7 no natural gas was detected. Service tech #3 then assisted with shutting off natural gas meters in
8 the area.

9 There were several service techs from MGE's Installation and Service Department (I&S)
10 dispatched to respond to natural gas odor reports at several locations in the area including 4809
11 Roanoke Parkway, 4821 Roanoke Parkway, 4401 State Line Road, Washington Irving
12 Apartments located at 4746 Roanoke Parkway, 4806 Jarboe Street, Pembroke Hill School
13 located at 400 W. 51st Street, 4800 Mercier Street, 770 W. 47th Street, a garage at 46th Street and
14 Madison Avenue, and apartments on Jarboe Street near 48th Street. No natural gas was detected
15 at these sites using natural gas detection equipment.

16 MGE personnel discovered natural gas while investigating odor calls at various areas
17 surrounding the incident site. An odor call was dispatched around 6:17 p.m. for 1121 W. 47th
18 Street. Upon arrival at approximately 6:43 p.m., an MGE I&S employee found 0.25% gas-in-air
19 at floor drains and a toilet, while 0.15% gas-in-air was found inside the structure. The I&S
20 employee shut off gas to a four meter header outside of the building, cutting off gas service to
21 1121, 1119, 1117, and 1115 W. 47th Street. No gas was detected in a nearby sanitary sewer
22 manhole.

1 MGE personnel, along with several individuals from the KCFD, entered the Plazaview
2 Building prior to crews shutting off the flow of natural gas to the area. Upon entry, MGE
3 personnel detected natural gas-in-air readings in the building, with 0.10% gas-in-air found at the
4 west door and 0.25% gas-in-air found on the east side of the building. MGE personnel continued
5 the leak investigation, beginning at the top floor of the Plazaview Building and working down to
6 the ground floor. The natural gas-in-air readings decreased each time MGE personnel went
7 down a floor and upon reaching the ground floor, there were no longer any readings of natural
8 gas.

9 In response to an odor call at 4725 Mercier Street, MGE personnel obtained a reading of
10 no more than 0.50% gas-in-air in floor drains located in the basement. Further investigation
11 throughout the structure did not yield any other traces of natural gas.

12 A building on the northwest corner of W. 48th Street and Jarboe Street was checked by
13 MGE personnel. There was 0.5% gas-in-air and 1% gas-in-air at the floor drains. The occupants
14 of the building were evacuated and the natural gas meter was shut off.

15 MGE personnel checked several sanitary sewer manholes for natural gas on W. 48th
16 Street located at the intersections of Jarboe Street, Holly Street and Mercier Street and found
17 between 14% and 17% gas-in-air readings.

18 An odor complaint was received around 6:36 p.m. from 4716 Jarboe Street. An MGE
19 I&S employee arrived at approximately 6:43 p.m. and found a gas-in-air concentration of 0.06%
20 in the living room. Floor drains were also checked, but no gas was found. The I&S employee
21 waited for the house to air out and rechecked the house at approximately 8:22 p.m. to confirm
22 the natural gas had completely vented out of the house.

1 At approximately 8:22 p.m., MGE I&S personnel arrived at 4802 Jarboe Street in
2 response to a natural gas odor call. On the north side of the building outside of a window, 0.03%
3 gas-in-air was found. I&S personnel checked the sanitary sewer manhole and storm box at W.
4 48th Street and Jarboe Street, but no gas was found²⁷.

5 Originally, MGE I&S personnel were dispatched to investigate a natural gas odor
6 reported at 4714 Holly Street at about 5:56 p.m. MGE personnel responding to this call had just
7 arrived at this address when the explosion occurred. MGE personnel went to the incident at W.
8 48th Street and Bellevue Avenue to provide assistance to the other personnel already at the site.
9 At approximately 8:22 p.m., MGE personnel returned to 4714 Holly Street and began
10 investigating the odor call. No natural gas was detected.

11 **MGE Actions to Stop the Flow of Natural Gas**

12 Due to the intense fire, MGE personnel abandoned the original plan of excavating down
13 to the natural gas main near the southeast corner of JJ's Restaurant to vent and stop the leak.
14 MGE personnel switched the locations chosen for shutting off the main by moving
15 approximately half of a block in either direction from the location of the third-party damage, near
16 the intersection of Roanoke Parkway and W. 48th Street and the intersection of Bellevue
17 Avenue and W. 48th Street (See Appendix B, Figure 5). MGE personnel turned off a 2-inch
18 valve at the northwest corner of Roanoke Parkway and W. 48th Street at approximately 7:20 p.m.
19 MGE personnel reported that when they were turning the valve off, the operating nut was turned
20 too far and came off. The valve remained in the closed position. The fire at JJ's Restaurant
21 appeared to decrease in size when the valve was closed. To confirm the valve was closed, MGE
22 personnel excavated to the valve to visually confirm the closure of the valve. Even though the

²⁷ The sanitary sewer manhole and storm box were checked after the natural gas main was capped off at W. 48th Street and Bellevue Avenue.

1 flow of gas was shut-off at the location, the crew continued to work at W. 48th Street and
2 Roanoke Parkway to cut and cap the main just west of the 2-inch closed valve. Staff confirmed
3 the valve was closed during an on-site investigation in July, 2013.

4 Turning off the 2-inch valve at W. 48th Street and Roanoke Parkway stopped the flow of
5 natural gas to the damaged portion of the main from the east; however, natural gas was still
6 flowing from the west side of the damaged portion of main. An MGE crew worked at the
7 intersection of W. 48th Street and Bellevue Avenue to stop the flow of natural gas from the west
8 side of the third-party damage. At approximately 8:00 p.m. a squeeze-off tool was used at
9 Bellevue Avenue just south of W. 48th Street (See Appendix B, Figure 5, Point 3) to stop the
10 flow of natural gas from the main on Bellevue Avenue to the damaged main. The MGE crew
11 then cut and capped the main on W. 48th Street at point 4 (See Appendix B, Figure 5).

12 After the MGE crew isolated the damaged portion of natural gas main from the rest of the
13 system, gas was re-established in the main on Bellevue Avenue north of W. 48th Street and
14 MGE began re-establishing service to customers who had been shut off on Bellevue Avenue
15 north of W. 48th Street.

16 **Odorant Readings**

17 The day following the incident, February 20, 2013, at approximately 9:13 a.m., MGE
18 personnel and Staff administered an odorant intensity test at 4746 Bellevue Avenue using an
19 odorometer. The gas-in-air reading obtained was 0.20%²⁸.

20 **N. MoPSC Reporting Requirements**

21 The incident reporting requirements in 4 CSR 240-40.020(3), (4) and (5) were completed as
22 follows:

²⁸ MoPSC regulation 4 CSR 240-40.030(12)(P)1. requires the odorant in natural gas to be readily detectable at a concentration of less than 0.90% gas-in-air, based upon a lower explosive limit at 4.5% gas-in-air.

- 1 1. The initial telephone notification of a possible natural gas incident was made to the
2 Commission's 24-hour answering service at approximately 6:32 p.m. on February 19,
3 2013.²⁹ The answering service contacted a Staff member and the Staff member contacted
4 MGE at approximately 6:48 p.m.
- 5 2. MGE notified the United States Department of Transportation-Pipeline and Hazardous
6 Materials Safety Administration (DOT-PHMSA) of a natural gas incident on February
7 19, 2013. (NRC Report Number 1038907).
- 8 3. DOT-PHMSA form PHMSA F 7100.1 titled "Incident Report – Gas Distribution
9 System" was completed by MGE and submitted to Staff on March 21, 2013. MGE also
10 submitted the form to PHMSA electronically.

11 **O. Missouri Public Service Commission Staff Investigation**

12 **MGE Notification to Staff**

13 Staff was notified by the Commission's answering service at approximately 6:43 p.m. on
14 February 19, 2013. Answering service personnel stated that MGE personnel had called the
15 answering service at 6:32 p.m. on February 19, 2013 to report a hit natural gas line, an explosion
16 and fire at 48th Street and Bellevue Avenue in Kansas City. The answering service provided
17 Staff with the name and telephone number of the MGE on-call supervisor that reported the
18 incident to the answering service. The Staff's Pipeline Safety Program Manager contacted the
19 MGE on-call supervisor at 6:48 p.m. and was provided detailed information about the incident
20 and MGE's actions. At the direction of the Pipeline Safety Program Manager, three Staff
21 members departed from Jefferson City and arrived at the incident site at approximately 11:00

²⁹ MoPSC regulation 4 CSR 240-40.020(4)(A), requires the operator to notify designated commission personnel by telephone within two hours following discovery, unless efforts to protect life and property would be hindered, for each event which meets the natural gas incident reporting requirements of this section. Making the call to the answering service fulfills the operator's responsibility to notify designated Commission personnel within two (2) hours as required in 4 CSR 240-40.020(4)(A)

1 p.m. on February 19, 2013. Two additional Staff members departed from Jefferson City and
2 arrived at the incident site at approximately 8:30 a.m. on February 20, 2013.

3 **Initial Incident Site Investigation (February 19-20, 2013)**

4 Upon arrival at the incident site on February 19, 2013, Staff observed that the structure
5 located at W. 48th Street (JJ's Restaurant) had been completely destroyed and debris was strewn
6 into W. 48th Street and into the alley adjacent to the east side of 910 W. 48th Street. Fire damage
7 was evident and other structures adjacent to and across from 910 W. 48th Street and along
8 Belleview Avenue exhibited varying degrees of damage, but darkness and recovery efforts
9 prevented a more thorough examination. An MGE truck was parked on the south side of the
10 street in front of 910 W. 48th Street and appeared to have been damaged by flying debris and
11 radiant heat. W. 48th Street between Belleview Avenue and Roanoke Parkway was cordoned off
12 and a security perimeter was set up by the Kansas City Police Department (KCPD) or KCFD
13 around the incident site. Upon entering the incident site area, Staff observed numerous
14 emergency personnel, including the KCFD, KCPD and Alcohol, Tobacco, Firearms and
15 Explosives (ATFE), performing various activities. Staff also observed numerous MGE
16 personnel involved in various leak investigation procedures and restoration of gas service. Staff
17 was able to make contact with MGE supervisory personnel who presented Staff with a
18 description of events that had occurred and the actions taken to that point. Staff was also
19 informed of the severity of injuries sustained by MGE's employees. Due to darkness and
20 continuing recovery efforts by the KCFD, Staff delayed further investigation until the next
21 morning and left the incident site at approximately 1:00 a.m., February 20, 2013.

22 The following morning, February 20, 2013, at approximately 7:00 a.m., upon arrival at
23 the incident site, Staff observed that the effects of the explosion and fire were much more

1 evident. Since recovery efforts were continuing, having resumed from the night before, the
2 incident site was only accessible to certain emergency personnel. As a result, Staff made
3 preliminary observations from the intersection of W. 48th Street and Bellevue Avenue.

4 The structure located at 910 W. 48th Street and its contents were destroyed as a result of
5 the explosion and subsequent fire (See Appendix C, Photograph 8). The entire roof had collapsed
6 onto the building's concrete slab floor. The south wall had collapsed onto the sidewalk and into
7 W. 48th Street. The east wall had collapsed into the alley adjacent to the east side of the structure
8 and onto the west wall of the east adjacent building. The north wall of the structure remained
9 attached to the south wall of the building to the north. A portion of the west wall of the structure
10 remained intact with that portion of the roof collapsed into the building. Most of the debris was
11 strewn to the east and south. Staff observed heavy burning of the remains of the structure that
12 had fallen onto the concrete slab floor.

13 The structure immediately to the east of 910 W. 48th Street received extensive damage to
14 the west wall on both the first and second floors (See Appendix C, Photograph 9). The twelve-
15 story building, which was under construction, located south across W. 48th Street from the
16 involved structure had numerous windows broken out and/or cracked (See Appendix C,
17 Photograph 10). The five-story Plazaview Building located immediately to the north of the
18 involved structure sustained heavy fire damage to the upper exterior wall with the windows
19 broken out and fire damage extending into the interior of the south side of the building (See
20 Appendix C, Photograph 11). The building located to the southwest across Bellevue Avenue, at
21 W. 48th Street and Bellevue Avenue, had some window and door panes broken out as did
22 several businesses adjoining this building to the south from W. 48th Street and Bellevue Avenue
23 (See Appendix C, Photographs 12 and 13).

1 At the northeast corner of W. 48th Street and Bellevue Avenue, Staff observed a large
2 steel plate covering a portion of the asphalt pavement. Staff learned the plate was covering an
3 excavation made by MGE on February 19, 2013, for the purpose of exposing the connection
4 between the 2-inch diameter PE gas main on W. 48th Street and the 2-inch diameter PE gas main
5 on Bellevue Avenue. Staff also learned that the 2-inch diameter PE gas main along W. 48th
6 Street had been disconnected from the gas main on Bellevue Avenue in this excavation and the
7 piping, which had fed natural gas going east on W. 48th Street toward the damaged section of
8 main, was capped. This excavation will be further discussed in the **Incident Site Investigation**
9 **(March 14-16, 2013)** section of this report.

10 After the KCFD completed its recovery efforts on the afternoon of February 20, 2013,
11 Staff was able to access and enter W. 48th Street to make more detailed observations of the
12 incident site.

13 Staff observed an MGE truck parked on the south side of W. 48th Street facing east across
14 from the approximate middle of the destroyed structure at 910 W. 48th Street. The truck
15 sustained damage from thrown debris and radiant heat. The truck was removed from the site
16 later in the day by a private towing service. Staff also observed a MGE backhoe sitting on W.
17 48th Street at the approximate location where the alley adjacent to the east side of 910 W. 48th
18 Street intersects with W. 48th Street. The backhoe's cab windows were broken out and the right
19 side tires (facing the destroyed structure) were burned off of the rims. The backhoe's boom and
20 rear bucket were extended to the north with the bucket in contact with the ground.

21 Staff observed an irregular shaped excavation located at the northwest corner of W. 48th
22 Street and the alley adjacent to the east side of 910 W. 48th Street (See Appendix C, Photograph
23 14). The excavation contained bricks from the collapsed south wall of JJ's Restaurant. Because

1 of the amount of debris surrounding the excavation and because the excavation was full of
2 bricks, Staff was unable to determine the depth and size of the excavation. Staff learned the
3 excavation was made by MGE the day of the incident in an attempt to vent the escaping gas to
4 atmosphere, expose the damaged gas main and make repairs.

5 Approximately eight feet south of and in-line with this excavation, Staff observed two
6 potholes in W. 48th Street. Staff learned the potholes had been made by Heartland Midwest
7 personnel to expose underground facilities in the planned bore path of the horizontal directional
8 drilling (HDD) project. One of the potholes had only been drilled through the asphalt and not
9 into the dirt below the asphalt. The other pothole exposed multiple underground PVC conduits
10 that contained communication cables. At the east edge of the excavation, Staff observed a
11 yellow paint mark on the surface of the asphalt. The yellow paint mark had been made by the
12 contract locater (USIC) to mark the approximate location of the underground natural gas line
13 prior to the start of the directional boring project. The yellow paint mark was encircled with
14 white paint marks. Staff also observed other yellow paint marks encircled with green and white
15 paint marks (See Appendix C, Photograph 15). Staff learned that the green and white paint
16 marks had been made by USIC on February 19, 2013, prior to the explosion in response to a Dig
17 Up³⁰ ticket made by Heartland Midwest personnel, to verify that the previously marked location
18 of the buried natural gas line was accurate and correct.

19 Staff also observed yellow, red, and orange paint marks extending from the northeast
20 curb line of W. 48th Street and the alley adjacent to the east side of 910 W. 48th Street to the east
21 toward Roanoke Parkway. The paint marks were made by USIC to mark the approximate
22 locations of the underground natural gas, electric and communication lines. East of the east curb

³⁰ A Dig Up ticket is required to be made to the MOCS notification center when an excavator damages an underground facility (Section 319.040 RSMo).

1 of the alley, a single line of yellow paint marks, that signify natural gas, was located
2 approximately three feet north of the north curb line of W. 48th Street. Also, east of the east curb
3 of the alley two parallel lines of red paint marks (See Appendix C, Photograph 15) were located
4 approximately three feet ten inches north of the north curb line of W. 48th Street and the single
5 line of orange paint marks (communication lines) were located approximately four feet north of
6 the north curb line of W. 48th Street. There was a single line of yellow paint marks extending
7 north up the east side of the alley from the north curb line of W. 48th Street. A single line of
8 green paint marks extended east from the alley and W. 48th Street toward Roanoke Parkway.
9 The green paint marks were made by USIC to mark the approximate location of the underground
10 sanitary sewer main. After some of the debris had been removed from the north side of W. 48th
11 Street, Staff observed a single line of yellow paint marks located at the north curb line extending
12 west to Belleview Avenue.

13 At the north end of the alley adjacent to the east side of 910 W. 48th Street, Staff observed
14 a mini excavator belonging to Heartland Midwest located over an excavation, which was the
15 entrance pit for the drilling rod (See Appendix C, Photograph 16). Protruding from the
16 excavation was approximately three (3) feet of 1¼-inch diameter steel drilling rod. The drilling
17 machine would have been sitting at approximately the same location as the mini excavator and
18 attached to the end of this rod during the drilling process. The mini excavator was parked over
19 the excavation to cover it and to make the area safe after the drilling machine had been removed
20 by Heartland personnel from the site at approximately 10:00 p.m. on February 19, 2013. The
21 mini excavator was removed later in the day on February 20, 2013 by a private towing service.

22 There were red, orange and green paint marks on the asphalt in the alley. The paint
23 marks were made by USIC prior to the start of the HDD project to mark the approximate

1 location of the underground electric lines, communication lines and sewer lines. There were also
2 white paint marks (dots) extending south from the entrance pit toward W. 48th Street (See
3 Appendix C, Photograph 4). The white paint marks had been made by Heartland Midwest
4 personnel to mark the location of the drilling rod as it progressed south down the alley toward W.
5 48th Street.

6 Approximately half-way down the alley south from the entrance pit toward W. 48th
7 Street, Staff observed a small, round steel plate that had been placed over a pothole made by
8 Heartland Midwest personnel. Staff removed this plate and observed the 1¼-inch diameter steel
9 drilling rod traversing north and south through the bottom of the pothole at a depth of
10 approximately 24 inches.

11 Due to darkness and forecasted heavy snow for the area, Staff left the site and returned to
12 Jefferson City. Prior to Staff's departure from the site, MGE personnel placed plywood sheets
13 over the MGE excavation at the location of the damage to the natural gas main at the intersection
14 of the alley and W. 48th Street. A plywood sheet was also placed over the potholes made by
15 Heartland Midwest personnel just south of this excavation. The plywood sheets were then
16 covered with a tarp and secured with sand bags. Staff departed the site at approximately 7:00
17 p.m. on February 20, 2013.

18 **Incident Site Investigation (March 14-16, 2013)**

19 Staff returned to the site at approximately 7:30 a.m., March 14, 2013. The incident site
20 had been secured by fencing and under 24-hour security since February 20, 2013. This phase of
21 Staff's investigation concentrated on exposing and examining the drilling appurtenance and
22 damage to the 2-inch diameter PE natural gas main, conducting a flow test of the damaged main,

1 examining more of the site after additional debris removal, examining the receiving pit and
2 examining the natural gas valve at the northwest corner of W. 48th Street and Roanoke Parkway.

3 A private contractor with a skid loader removed more of the debris from W. 48th Street
4 and from the alley adjacent to the east side of 910 W. 48th Street. The debris removal allowed
5 for total access to the potholes and excavations made by Heartland Midwest and MGE personnel.
6 After some of the debris was removed, the MGE backhoe which was damaged the day of the
7 incident was transported from the site by a private towing service. With the backhoe removed
8 and removal of additional debris, Staff observed a sanitary sewer manhole located approximately
9 6 feet southeast of the excavation over the damaged natural gas main (See Appendix C,
10 Photograph 7).

11 **i. Excavations Made by MGE and Heartland Midwest**

12 Staff located and observed an excavation (receiving pit), approximately 20 inches in
13 depth, located approximately four feet north of the south curb line of W. 48th Street and behind a
14 concrete and wood construction barrier that had been erected by the contractors at the Plaza
15 Vista Building. The nearly 2-foot by 3-foot excavation had been hand dug by Heartland
16 Midwest personnel to be used as a receiving pit for the HDD drilling bit when it reached the
17 south pavement edge of W. 48th Street. Heartland Midwest personnel abandoned the pit because
18 the drilling terminated prior to reaching this location.

19 When the debris was removed from the alley, Staff observed three potholes (See
20 Appendix B, Figure 6 - potholes 3, 4, 5) that had been made by Heartland Midwest personnel in
21 the alley at the northeast corner of JJ's Restaurant (See Appendix C, Photograph 5). The
22 potholes were covered with small, round steel plates, were in-line with each other and were
23 approximately three (3) feet apart. Staff observed the drilling rod traversing through the bottom

1 of each pothole at a depth of approximately 24 inches (See Appendix C, Photograph 17). Staff
2 also noted a void under the slab at the interface of the west edge of the alley and east edge of the
3 remaining floor of JJ's Restaurant. Gravel backfill was observed in these potholes.

4 The steel plate covering the MGE excavation at the northeast corner of W. 48th Street and
5 Bellevue Avenue³¹ was removed, exposing portions of the 2-inch diameter PE natural gas main
6 along Bellevue Avenue and the 2-inch diameter PE natural gas main on W. 48th Street. After
7 the steel plate was removed MGE personnel installed a cap on the west open end of the gas main
8 on W. 48th Street to facilitate flow testing and pressure testing of the remainder of the natural gas
9 main on W. 48th Street between Bellevue Avenue and Roanoke Parkway.

10 Plywood sheets covering the MGE excavation at the northwest corner of W. 48th Street
11 and Roanoke Parkway³² were removed by MGE personnel, exposing a 2-inch PE valve and a
12 portion of the 2-inch diameter PE natural gas main on W. 48th Street. Staff noted the valve was
13 in the off position and the operating nut was missing. Staff also observed that a squeeze-off tool
14 was installed on the gas main just west of the valve. The squeeze-off tool had been adjusted in a
15 manner so that the natural gas main was clamped shut.

16 The tarp covering the excavation³³ over the damaged natural gas main was removed by
17 MGE personnel and the bricks that had collapsed into the excavation were removed by MGE
18 personnel. After the bricks were removed, Staff observed that the excavation was approximately

³¹ This excavation was made on the evening of February 19, 2013 after the explosion to facilitate MGE cutting and capping the gas main going east on W. 48th Street from Bellevue Avenue.

³² This excavation was made on the evening of February 19, 2013 after the explosion to facilitate MGE verifying that the natural gas valve used to control the flow of gas west on W. 48th Street from Roanoke Parkway was in the off position.

³³ This excavation was made by MGE on the evening of February 19, 2013 prior to the explosion in an attempt to expose the damaged gas main, to vent the escaping natural gas to atmosphere and to make repairs.

1 3½-feet by 5½-feet and approximately 20 inches in depth. The bottom of the excavation did not
2 reach the depth of the gas main.

3 Prior to additional excavating over the damaged natural gas main, a consultant for MGE
4 mapped the area of the damage to the natural gas main using 3D laser scans³⁴ to document the
5 current condition of the scene. The 3D laser scans produced an underground side view image of
6 the area around the damaged gas main (See Appendix B, Figure 7).

7 **ii. Flow Testing**

8 MGE personnel conducted flow testing on March 15, 2013, in order to simulate the
9 natural gas leaking from the damaged main, measure the flow rate, and possibly discover
10 migration paths of the escaping natural gas that would have occurred after the drilling bit hit the
11 main on February 19, 2013.

12 To help seal the excavation and simulate the conditions that existed between the time the
13 gas main was damaged and the explosion, a tarp was placed over the excavation, dirt was piled
14 on top of the tarp at the excavation, and bricks were placed on the tarp around the excavation.

15 MGE personnel assembled an apparatus at W. 48th Street and Roanoke Parkway to inject
16 air, at varying pressures, into the natural gas main on W. 48th Street between Roanoke Parkway
17 and Belview Avenue (See Appendix C, Photograph 18). The apparatus also measured the air
18 flow in cubic feet per hour (CFH) through the gas piping. An air compressor was used to supply
19 air to the apparatus and the outlet of the apparatus was attached to the gas piping at the northwest
20 corner of W. 48th Street and Roanoke Parkway. Air was introduced into the gas piping
21 beginning at 3:20 p.m. and at 3:45 p.m. the air pressure in the piping had reached 25 psig (the
22 natural gas pressure at the time of the gas main damage). At 25 psig the flow rate was

³⁴ This is a method of underground mapping using a laser beam to map underground physical features with a very high resolution.

1 approximately 14,400 CFH. An inert gas (helium) was injected into the air flow at
2 approximately 4:30 p.m. so that any air escaping from the damaged gas pipe could be detected
3 with a leak detection instrument calibrated to detect helium. Using a leak detection instrument,
4 traces of helium were detected in a floor drain at the northeast corner of JJ's Restaurant, in the
5 three potholes in the alley at the north wall of JJ's Restaurant and at the southeast corner of JJ's
6 Restaurant. Staff observed all of these activities.

7 The lid on the sanitary sewer manhole located approximately 6 feet southeast of the
8 excavation over the damaged gas main was removed by MGE personnel and Staff observed that
9 a rubber gasket, separating the top metal frame of the manhole from the brick portion of the
10 manhole, was being pushed outward into the manhole by air pressure. A soap solution was
11 applied around the gasket between the metal frame and brick, and the soap solution readily
12 bubbled by the air pressure escaping into the manhole (See Appendix C, Photograph 19). The air
13 entering the manhole produced a blowing sound that was audible to Staff. The dirt and tarp
14 covering the excavation over the damaged gas main was removed and Staff could hear air
15 blowing and could see dirt being blown out of a void in the bottom of the excavation over the
16 damaged gas main.

17 Because it was late in the day and darkness was approaching, site work terminated, to be
18 resumed the next morning. Before leaving for the day, MGE personnel covered the excavation
19 over the damaged gas main with plywood sheets.

20 **iii. Excavating and Exposing the Damaged Natural Gas Main and Drilling** 21 **Appurtenance**

22 Staff resumed its investigation the next morning, March 16, 2013, at approximately 7:30
23 a.m. During the morning of March 16, Staff observed as MGE personnel began excavating over

1 the natural gas main, at the location where an excavation had been started by MGE personnel on
2 February 19, 2013 prior to the explosion, to expose the damage to the pipe and expose the
3 drilling bit and drilling rod. The excavation included only hand digging. During the excavating,
4 soil samples were taken from selected levels and locations in the excavation. These soil samples
5 were retained and preserved to be analyzed at a later date. After the natural gas main and drilling
6 appurtenance were exposed, the damage to the pipe was apparent. The drilling bit had bored
7 through the top half of the natural gas main and the transmitter housing was in contact with the
8 pipe. The top of the natural gas main was measured by Staff to be approximately 37½ inches
9 below the alley pavement surface. The top of the transmitter housing over the damage to the
10 main was measured by Staff to be 36 inches below the alley pavement surface. The horizontal
11 distance between the 2-inch diameter PE natural gas main and the yellow locate paint marks on
12 the pavement was approximately 6 inches at the damage location. The damage to the gas main
13 was located approximately 12 feet southeast of the southeast corner of JJ's Restaurant and
14 approximately 5½ feet northwest of a nearby sanitary sewer manhole.

15 The excavation was expanded to expose the drilling bit, more of the transmitter housing,
16 more of the damaged 2-inch diameter PE natural gas piping and two electric conduits (See
17 Appendix C, Photograph 20). The tip of the drilling bit was approximately 15 inches past the
18 natural gas main. A ¾-inch diameter plastic electric conduit was located approximately 9½
19 inches north of and parallel to the damaged gas main at a depth of approximately 26½ inches. A
20 2-inch diameter plastic electric conduit was located approximately 11½ inches north of and
21 parallel to the damaged gas main at a depth of approximately 25 inches. The ¾-inch electric
22 conduit was south of and in contact with the 2-inch electric conduit. The horizontal distance
23 between the ¾-inch diameter plastic electric conduit and the red locate paint mark on the

1 pavement was approximately 3 inches at the damage location. The horizontal distance between
2 the 2-inch diameter plastic electric conduit and the red locate paint mark was approximately 4¼
3 inches at the damage location.

4 Staff verified that the single line of yellow paint marks on the pavement surface at the
5 location of the natural gas main damage accurately marked the approximate location of the
6 natural gas main. Staff also verified that the single line of red paint marks marked the
7 approximate location of the electric lines near the location of the gas main damage.

8 Due to approaching darkness, the on-site investigation for this phase was terminated
9 around 6:00 p.m. on March 16, 2013 to be resumed at a later date. Prior to Staff leaving the site,
10 MGE personnel placed plywood sheets over the excavation, a steel plate over the plywood sheets
11 and sealed the perimeter of the plywood sheets and steel plate with sand bags.

12 **Incident Site Investigation (April 2-5, 2013)**

13 Staff returned to the site at approximately 7:30 a.m. on April 2, 2013. During this phase
14 of Staff's investigation, Staff observed expanding of the excavation over the damaged gas main,
15 removing the drilling appurtenance, removing and examining a segment of gas piping containing
16 the damage, drilling soil core samples, removing asphalt paving over potholes, pressure testing
17 the remaining 2-inch diameter PE natural gas main on W. 48th Street and removal of the entire
18 boring rod in the alley adjacent to the east side of JJ's Restaurant.

19 Also, during this phase, a contractor was utilized to inspect the interior of the surrounding
20 sanitary system using a motorized video camera to view and record any lateral entries and
21 possible damage. No problems (damages or breaks) were observed in the sanitary sewer system.
22

1 **i. Expanding Excavation and Removal of the Drilling Appurtenance**

2 MGE personnel expanded the excavation over the damaged gas main by hand digging to
3 the north to expose the connection of the drilling appurtenance³⁵ to the drilling rod (See
4 Appendix C, Photograph 21). The drilling appurtenance was approximately 4½ feet long and
5 consisted of the drilling bit, transmitter housing and section of drilling rod. The drilling bit was
6 11 inches long and 4¾ inches wide with a 12-degree angle.³⁶ The transmitter housing contains a
7 beacon that transmits a signal that can be tracked with an electronic locating device. The
8 excavation was also expanded approximately two feet east and 2 feet west of the damaged area
9 of the gas main. During the excavation, loose soil samples were taken by engineering consultant
10 personnel working for MGE to be analyzed at a later date. The drilling appurtenance was
11 disconnected from the drilling rod by MGE personnel, examined by Staff and all interested
12 parties and transported to the secured storage for safe keeping for later testing.

13 The excavation was also expanded to the east exposing more of the ¾-inch and 2-inch
14 black plastic conduits (now confirmed by Staff to be electric conduits). The excavation was
15 expanded further to the east exposing a 2-inch white PVC conduit containing two black cables
16 (assumed at the time of this investigation to be electric cables) traversing north on the east side
17 of the alley adjacent to the east side of JJ's Restaurant.

18 **ii. Removal and Examination of Damaged Segment of Gas Piping**

19 An approximate 2-foot segment of the 2-inch diameter PE natural gas piping containing
20 the damage was removed by engineering consultant personnel working for MGE to be examined
21 by Staff (See Appendix C, Photograph 22). The open ends of the piping remaining in the ground

³⁵ For the purpose of this Report, the "drilling appurtenance" consists of the drilling bit, transmitter housing and a 1½ foot section of drilling rod.

³⁶ The drilling bit is a flat steel blade with carbide tips. The curve of the bit is what allows the machine operator to change the direction of the bore path.

1 were capped east and west³⁷ of where the damaged section of pipe was removed. Staff
2 transported the damaged section of gas piping into an enclosed and secure area and proceeded
3 with an examination. There was a gouge approximately 5 inches long and 1½ inches deep in the
4 top of the pipe. At the east end of the gouge, looking north, there was an approximate 2-inch by
5 2-inch hole. It appeared to Staff that the gouge and hole had been caused by impact of the
6 drilling bit. It also appeared to Staff that the drilling bit was turning upon impact with the gas
7 piping. Upon completion of examination of the damaged segment of piping by Staff and all
8 interested parties, the piping was transported to the secured storage for safe keeping.

9 **iii. Pressure Testing of 2-inch Diameter PE Natural Gas Main on W.48th Street**

10 To test the integrity of the remaining natural gas main on W. 48th Street, pressure testing
11 was conducted on the piping by MGE personnel. After the damaged segment of piping was
12 removed, the east and west open ends of the remaining natural gas main were capped. A test of
13 the portion of gas main between Bellevue Avenue and the west cap was conducted first. A
14 digital pressure gauge and appurtenances for injecting compressed air into the piping was
15 attached to an abandoned natural gas riser pipe located in front of JJ's Restaurant. Air was then
16 introduced into the gas piping and when the air pressure in the piping reached 25 psig (the
17 natural gas pressure at the time of the gas main damage and explosion) the air flow into the
18 piping was discontinued. The digital pressure gauge was observed by MGE personnel and Staff
19 at 25 psig for approximately 10 minutes with no drop in pressure, indicating no gas leakage on
20 the segment of main.

21 In a similar manner, a test of the portion of gas main between Roanoke Parkway and the
22 east cap was conducted; however, air was introduced into the piping at the northwest corner of
23 W. 48th Street and Roanoke Parkway. The digital pressure gauge was observed by MGE

³⁷ Orientations provided in this section represent the orientations of the pipe prior to removal.

1 personnel and Staff at 25 psig for approximately 10 minutes with no drop in pressure, indicating
2 no gas leakage in this segment of main.

3 Except for the removed 2-foot section of piping with the damage, these two pressure tests
4 successfully tested the 2-inch diameter PE natural gas main on W. 48th Street between Belleview
5 Avenue and Roanoke Parkway.

6 **iv. Inspection of Void below Alley Pavement**

7 An approximate 4-foot by 7-foot section of pavement was removed by MGE personnel to
8 expose the open space below the three potholes in the alley near the north wall of JJ's
9 Restaurant. The open space mostly contained ¼-inch crushed limestone, but there was a large
10 void between the top of the crushed limestone and the bottom of the pavement. Heartland
11 Midwest personnel indicated to Staff that vacuum excavation equipment had been used in the
12 potholes to remove the crushed limestone. An examination also revealed a void under the slab of
13 JJ's Restaurant near this location (See Appendix C, Photograph 6). Soil samples from selected
14 areas in the open space below the potholes were taken by engineering consultant personnel
15 working for MGE. The soil samples were taken to a laboratory for testing.

16 **v. Removal of Drilling Rod**

17 In order to examine the drilling rods for any damage or bending, plans were made to
18 remove the entire drilling rod in the alley between the original entrance pit and the excavation
19 area at the intersection of the alley and W. 48th Street. To complete this action, Heartland
20 Midwest brought back the directional drilling machine that it used on February 19, 2013 to make
21 the original HDD. The drilling machine was placed at the original entrance pit and the drilling
22 rod was attached to the machine. A tracer wire was attached to the downstream end of the
23 drilling rod so as the drilling rods were removed, the tracer wire could be pulled through the bore

1 path to leave a permanent marker to mark the bore path. The drilling rods were then removed.
2 Staff observed no damaged or bent rods.

3 The on-site investigation for this phase was terminated around 5:00 p.m. on April 5, 2013
4 to be resumed at a later date. Prior to Staff leaving the site all excavations were covered with
5 steel plates by MGE personnel.

6 **Incident Site Investigation (July 8-9, 2013)**

7 Staff returned to the site at approximately 7:30 a.m., July 8, 2013. During this phase of
8 Staff's investigation, Staff observed further expanding of the excavation where the damaged gas
9 main had been located, excavating and removing the natural gas valve at the northwest corner of
10 W. 48th Street and Roanoke Parkway, excavating and making accessible a natural gas valve at
11 Belleview Avenue and Ward Parkway, testing the operation of the boring head transmitter and
12 locating device and examining more of the void under the east edge of the floor slab of JJ's
13 Restaurant.

14 A contractor with a video camera was used to examine floor drains and sewer clean-outs
15 in the floor of JJ's Restaurant. Due to debris in the floor drains and sewer clean-outs the
16 contractor was unable to conduct any meaningful examinations with his video equipment.

17 **i. Expanding Excavation near the Intersection of Alley and W. 48th Street**

18 The excavation in which the damaged natural gas main was located was expanded further
19 by MGE personnel to the east curb line of the alley at W. 48th Street exposing more of the ¾-inch
20 and 2-inch black electric conduits. The two conduits continued side-by-side until they reached
21 the east curb line of the alley at which point the 2-inch conduit ended and a cable inside the 2-
22 inch black conduit turned 90 degrees to the north up the alley. A single conduit (the ¾-inch
23 conduit) continued east toward Roanoke Parkway (See Appendix C, Photograph 23).

1 **ii. Removal and Examination of Natural Gas Valve at W. 48th Street and Roanoke**
2 **Parkway**

3 The 2-inch diameter PE natural gas valve located at the northwest corner of W. 48th
4 Street and Roanoke Parkway was excavated and removed from the gas main by MGE personnel
5 (See Appendix C, Photograph 24). This valve controlled the flow of gas to the west on W. 48th
6 Street from the gas main on Roanoke Parkway. This valve was shut off by MGE personnel on
7 February 19, 2013 to stop the flow of gas from the east after the explosion occurred. Upon
8 removal, Staff observed that the operating nut on top of the valve was missing and the valve was
9 in the closed position. MGE reported that the operating nut broke off at the time MGE personnel
10 shut off the valve on February 19, 2013.

11 **iii. Excavation over Natural Gas Valve at Belleview Avenue and Ward Parkway**

12 Asphalt paving covering the lid and top of the valve box over the buried 2-inch diameter
13 PE natural gas valve at the northeast corner of Belleview Avenue and Ward Parkway was
14 removed by MGE personnel allowing access to the valve using a valve wrench. Staff observed
15 that the valve was in the open position. MGE personnel partially operated the valve with the
16 wrench and the valve operated properly. This 2-inch diameter PE natural gas valve controlled
17 the flow of gas to the north on Belleview Avenue from Ward Parkway. MGE personnel had
18 attempted to locate and close this valve on February 19, 2013 after the explosion occurred;
19 however, the valve box lid could not be located and was presumed to be covered over with
20 asphalt paving.

21 **iv. Operation and Testing of the Transmitter and Receiver**

22 Using the locating system, Heartland Midwest personnel measured the depth of the
23 transmitter (located in the transmitter housing) at 37 inches at the location of the gas main

1 damage on February 19, 2013. This measurement was marked on the pavement by Heartland
2 Midwest at the site of the damage. As mentioned previously in this Report, while remaining
3 buried in the ground at the location of the pipe damage, the top of the housing containing the
4 transmitter was measured by Staff on March 16, 2013, at approximately 36 inches under the
5 alley pavement surface. Because the transmitter was located inside the housing, the transmitter
6 would have been approximately 37 inches below the alley pavement surface, matching the depth
7 reading indicated by the locating device.

8 The transmitter housing contained a transmitter which allowed it to be located and
9 tracked aboveground for depth and direction with an electronic locating device (receiver).
10 Because the transmitter housing and transmitter had been removed from the excavation during
11 the April 2-5, 2013, investigation, the first test of the transmitter and receiver was conducted
12 with the transmitter housing on the ground surface. A depth reading was taken with the locating
13 device 36 inches above the transmitter housing and compared to a tape measurement when
14 measuring the depth to the center (as seen in the vertical plane) of the boring head. The locating
15 device indicated a depth of 35 inches and the tape measure indicated 36 inches. Next, a tape
16 measure was used to measure points 3 feet and 8 feet horizontal to the transmitter (horizontal
17 measurements are equivalent to vertical measurements for testing depth). The locating device
18 was used to take depth measurements at each horizontal point. At the 3-foot point, the locating
19 device indicated 36 inches. At the 8-foot point, the locating device indicated 96 inches.

20 For the next test, the transmitter housing was placed in the ground at approximately the
21 same position as it was at the damage location on February 19, 2013. To confirm that the
22 transmitter housing was in the same position as it was on February 19, 2013, a tape measure was
23 used to position the housing at a depth of 37 inches. The locating device was positioned at

1 ground level over the transmitter housing and the locating device indicated a reading of 37
2 inches.

3 An additional test was performed to compare the readings on the locating device with a
4 remote display on the drilling machine. This test showed that the readings on the locating device
5 and the readings on the remote display on the drilling machine were the same. Personnel from
6 the locating device manufacturer performed the above-noted tests as Staff observed.

7 **v. Examination of Void under the East Edge of JJ's Restaurant Floor Slab**

8 Bricks and cinder blocks were removed by engineering consultant personnel working for
9 MGE for the entire length of the slab at the interface of the floor slab of JJ's Restaurant with the
10 west edge of the alley (See Appendix C, Photograph 25). After removal of the bricks and cinder
11 blocks, Staff observed voids under the slab that were continuous with the west edge of the alley.

12 **Other Staff Investigations and Actions**

13 **i. Examination of the Directional Drilling Machine**

14 On April 1, 2013, Staff traveled to Heartland Midwest's facilities in Olathe, Kansas to
15 inspect the Vermeer® drilling machine and locating device used for the boring project at JJ's
16 Restaurant on February 19, 2013. To verify machine functionality, all machine operational
17 activities and safety systems were checked and were performed in accordance with the Vermeer
18 Horizontal Directional Drilling Operations and Safety Guidelines. All of the machine's
19 functions and safety systems operated properly and to the standards established by Vermeer.

20 **ii. Other Odor Reports**

21 During the course of its investigation, Staff became aware of several individuals who
22 reported smelling gas as early as 2:00 p.m. on February 19, 2013. Staff was able to speak with
23 these individuals, but was unable to determine the location or a firm time they smelled gas. A

1 record search of MGE's odor call and response actions did not reveal any earlier odor calls prior
2 to the odor call for the damaged natural gas main.

3 **iii. USIC Information**

4 In response to excavation notifications made by Heartland Midwest in conjunction with
5 the horizontal directional drilling project near JJ's Restaurant, USIC commenced locating and
6 marking underground facilities on February 9, 2013, which continued into February 15, 2013.
7 The natural gas lines and service lines were located and marked by USIC on February 9, 2013.
8 In addition to the natural gas lines, USIC also marked the communication lines, electric lines,
9 water lines and sanitary sewer lines along the project route from the north end of the alley
10 adjacent to the east side of JJ's Restaurant, south through the alley into W. 48th Street and on W.
11 48th Street between Bellevue Avenue and Roanoke Parkway, with paint on the pavement and
12 ground. On the pavement surface at the intersection of the alley and W. 48th Street at the
13 location of the damage to the natural gas main, USIC marked a single line of yellow paint marks
14 and a single line of red paint marks representing gas and electric lines.

15 According to a USIC spokesperson, the primary information a locator uses is the tones³⁸
16 he/she receives while actually doing the markings. He/she also has the information provided
17 from the particular excavation notification ticket as well as a print from the respective utility
18 company depicting the approximate locations of its underground facilities. In response to
19 questions from Staff, the USIC spokesperson stated that the electric markings were for street
20 light cables and that the two lines of red markings going east of the alley could be because the
21 tone was wider there than the tone going west at the location of the single line of red paint marks.
22 The spokesperson stated that when the locator's tone produced a wider signal going east, it was

³⁸ Locating equipment consists of a transmitter and a receiver. The transmitter is attached to the metallic facility to be located and produces a signal that is transmitted from the facility. This signal is "received" and produces an audible signal or tone on the receiver.

1 an indication that there could be more than one utility; hence the two lines of red paint marks. In
2 addition, the spokesperson stated that east of the alley, it was believed that there was a “feed
3 line” and a “distribution line”, which were both going east and where there was a more narrow
4 tone going west it was believed to be just a distribution line.

5 The USIC spokesperson stated that there are many factors which affect accuracy and the
6 ability to predict exactly what is buried and out of sight. The USIC spokesperson indicated the
7 tone could have been “pulled” (affected) by something else in the ground, soil type, condition of
8 the soil, grounding of the utility, etc. that caused the wider tone.

9 **iv. Time Warner Information**

10 Time Warner uses independent contractors to install new fiber optic cable by horizontal
11 directional drilling or other underground installation methods. Time Warner contracted with
12 Heartland Midwest to install a new fiber optic cable to the Plaza Vista Building, which was
13 located on the south side of W. 48th Street directly across from JJ’s Restaurant. Time Warner
14 representatives stated to Staff that it required Heartland Midwest to be responsible for proper
15 installation and to be compliant with all applicable regulations to include the damage prevention
16 statutes in RSMo Chapter 319 and the safety standards as set forth in 4 CSR 240-18.010
17 concerning installation of electric and communication lines (see the **Commission Safety**
18 **Requirements for Electric and Telecommunications Cables** section of this report).

19 Following the incident, Heartland Midwest provided Time Warner a summary of the
20 incident in a ‘Hit Line & Incident Report’ (HL&I Report). According to the HL&I Report,
21 Heartland Midwest said it hit a gas line at W. 48th Street and Bellevue Avenue, gas was blowing
22 and it was calling 911. The HL&I Report also stated that Heartland Midwest employees onsite
23 said they “had spotted the gas line and this gas line was unmarked and off locates.”

1 Around 4:55 p.m. on February 19, 2013, someone from the Heartland Midwest office
2 called the MGE Emergency Dispatch to report the hit line. The HL&I Report indicates that
3 MGE said that it already knew about the gas leak and that MGE employees were already on their
4 way to the site. Around 4:57 p.m. a Heartland Midwest office employee contacted MO One Call
5 to report a damaged line. The Heartland Midwest office employee also reported to MO One Call
6 that “the gas line was not located and it was quite a ways off the original gas marks.”

7 **v. Heartland Midwest Information**

8 During the period of April 26, 2013 through June 4, 2013, Staff discussed the incident
9 with the Heartland Midwest employees involved with the boring project at JJ’s Restaurant on
10 February 19, 2013. Staff also discussed the incident with Heartland Midwest’s safety manager
11 and managing member. Although not explicitly noted with each statement, the following
12 narrative is entirely a summary of statements these Heartland Midwest employees made to Staff
13 during these discussions.

14 In anticipation of installing fiber optic cable into the Plaza Vista Building, under a
15 contract with Time Warner Cable, Heartland Midwest called the MO One Call on February 6,
16 2013 to request locates for the project. The responses to the numerous facility locate requests by
17 Heartland Midwest were conducted by a contract locator (USIC). USIC marked underground
18 facilities for MGE and other underground facility owners commencing on February 9, 2013 and
19 continuing into February 15, 2013. The natural gas lines and service lines were located and
20 marked on February 9, 2013. USIC marked the natural gas lines, communication lines, electric
21 lines, water lines and sanitary sewer lines along the project route from the north end of the alley
22 adjacent to the east side of JJ’s Restaurant, south through the alley into W. 48th Street and on W.
23 48th Street between Bellevue Avenue and Roanoke Parkway. USIC marked the underground

1 facilities with painted lines on the surface. The natural gas main and service lines were marked
2 with yellow paint, the telephone lines were marked with orange paint, the electric lines were
3 marked with red paint, the water lines were marked with blue paint and the sewer lines were
4 marked with green paint.

5 On February 18, 2013, the Heartland Midwest crew began potholing over marked
6 underground facilities along the projected bore path starting at the north end of the alley and
7 continuing south down the alley (See Appendix B, Figure 1 - potholes 1 through 8). Heartland
8 Midwest indicated that it always digs potholes over marked underground facilities along the
9 projected bore path. According to Heartland Midwest, the intended bore path would cross a
10 single line of red paint marks (marking the underground location of an electric line) and a single
11 line of yellow paint marks (marking the underground location of a natural gas line) near the
12 intersection of the alley and W. 48th Street. The Heartland Midwest crew said the single line of
13 yellow marks and the single line of red marks indicated to them there was one natural gas line
14 and one electric line below the surface of these marks at approximately the alley and W. 48th
15 Street. Because the line of red and yellow paint marks were parallel and close to each other
16 (approximately 9 inches apart), Heartland Midwest decided to make one pothole (See Appendix
17 C, Photograph 3 - pothole 6) between the two lines of painted marks in an attempt to expose both
18 the marked electric line and the marked natural gas line.

19 During this potholing, the Heartland Midwest crew uncovered a ¾-inch diameter black
20 line and a 2-inch diameter black line next to each other at a depth of approximately 25 inches
21 (See Appendix C, Photograph 26). Because there was just a single line of red paint marks and a
22 single line of yellow paint marks, the crew assumed that the ¾-inch black line was identified by
23 the marked electric line and that the 2-inch black line was identified by the marked natural gas

1 line. The Heartland Midwest crew indicated it was not provided with any additional information
2 regarding the natural gas line, such as size, color or depth. The line of yellow paint marks was
3 located further to the south within 24 inches of the two black lines that were exposed in the
4 pothole and the Heartland Midwest crew believed it had potholed and identified the two
5 underground facilities marked by USIC.

6 Potholing continued part of the day on February 19, 2013 and boring started that
7 afternoon. Times reported by the Heartland Midwest crew members varied slightly, but
8 generally the crew agreed that the drilling machine was set up and the boring process
9 commenced sometime between 2:00 p.m. and 3:00 p.m. The projected bore depth was to be 36
10 to 37 inches below the asphalt alley and street surface. The HDD path was intended to end in a
11 receiving hole located at a point south across W. 48th Street on the Plaza Vista Building property.
12 The HDD machine uses drilling rods to push and rotate a drilling bit through the ground (fluid
13 can also be injected at the drill bit to assist with the drilling process). As mentioned in the
14 **Incident Site Investigation (April 2-5, 2013)** section of this Report, the drilling appurtenance
15 was approximately 4½ feet long and consisted of the drilling bit, transmitter housing and section
16 of drilling rod. The drilling bit was 11 inches long and 4¾ inches wide with a 12-degree angle.
17 The transmitter housing contains a beacon that transmits a signal that can be tracked
18 aboveground with an electronic locating device. The direction and depth of the bore can be
19 adjusted by turning the drilling bit to the right, left, up or down and pushing the drilling bit at the
20 selected direction and depth. Once the desired direction and depth is achieved, the drilling bit is
21 rotated to maintain the desired direction and depth. Prior to boring, the Heartland Midwest crew
22 checked the batteries in the transmitter and performed a test to ensure that the transmitter and
23 locating device were communicating properly and accurately.

1 The Heartland Midwest crew initially made two attempts to bore south, down the alley.
2 Both attempts ended approximately 30 feet down range from the entrance pit. The crew
3 speculated that the drilling bit had come in contact with hard material, such as rock or concrete.
4 After making some minor adjustments to direction and depth the boring preceded south down the
5 alley toward W. 48th Street. As the boring progressed, the Heartland Midwest crew marked the
6 location and depth of the drilling rod, as indicated by the locating device, with white dots on the
7 asphalt surface. As the boring continued south, the crew observed the drilling rod traverse
8 through the bottom of potholes 3, 4, and 5 in the alley at the north wall of JJ's Restaurant to
9 avoid the marked utilities at these locations. The depth of the rod in the potholes was
10 approximately 24 inches as measured by the Heartland Midwest crew. Because the depth of the
11 rod in the potholes was 24 inches, which was approximately the same depth of the 2 black lines
12 in pothole 6 that the Heartland Midwest crew believed to be one natural gas line and one electric
13 line, the crew steered the drilling bit down to a depth of 37 inches so that it would pass under the
14 two black lines in pothole 6.

15 The Heartland Midwest crewmembers reported times that varied slightly, but generally
16 the crew believed that the drilling bit reached the pothole with the 2 black lines (pothole 6) after
17 4:30 p.m. on February 19, 2013. According to the Heartland Midwest crew, they stopped drilling
18 at that point and, using the locating device, measured the depth of the transmitter housing at 37
19 inches. Around that same time, the crew reported that someone from JJ's Restaurant came out
20 and said they smelled gas in the building. The Heartland Midwest crew reported to Staff that
21 they could also smell gas and heard a hissing noise emanating from the pothole with the 2 black
22 lines (See Appendix B, Figure 6 and Appendix C, Photograph 26 - pothole 6). The crew could
23 also see dirt movement in the bottom of the pothole. The Heartland Midwest crew called 911

1 and Heartland Midwest headquarters between 4:45 p.m. and 5:00 p.m. informing them that the
2 crew believed they had hit a gas line. An employee at the Heartland Midwest offices then called
3 MGE to report the gas line hit and notified other Heartland Midwest employees of the
4 occurrence. The crew blocked off W. 48th Street to through traffic around 5:00 p.m. and then
5 called in a Dig Up³⁹ ticket to MO One Call around 5:03 p.m.

6 The Heartland Midwest crewmembers interacted with both the KCFD and MGE
7 employees upon their respective arrivals. The Heartland Midwest crew reported that MGE told
8 them that everything was “under control.” The Heartland Midwest crew also reported that the
9 KCFD told them that they did not need any additional help from them. A number of the
10 Heartland Midwest crewmembers were on-site when the explosion occurred and several of the
11 crewmembers sustained serious injuries.

12 **vi. Kansas City Fire Department Information**

13 The following sections were derived entirely from the KCFD Incident Reports (Incident
14 Numbers 3013795 and 3013812) describing its response and actions to the damaged natural gas
15 line and explosion at JJ’s Restaurant on February 19, 2013.

16 **vii. KCFD Response to Damaged Gas Main**

17 In response to a 911 call from Heartland Midwest employees working near JJ’s
18 Restaurant on February 19, 2013, a KCFD pumper was dispatched at 4:54 p.m. and arrived on
19 the scene at 5:04 p.m. Upon arrival the firemen met Heartland Midwest employees who
20 informed them that they had punctured a gas line causing a steady leak. The firemen then
21 entered JJ’s Restaurant to warn management of the gas leak outside. Once inside the restaurant
22 the firemen could smell gas and told JJ’s Restaurant management to put out all ignition sources

³⁹ An excavator is required to notify MOCS when damage to facilities has occurred. If damage involves pipeline or natural gas facilities, both 911 and the affected utility must also be notified.

1 in the kitchen and throughout the restaurant. The firemen reported that JJ's Restaurant staff
2 started to extinguish all candles on the tables and the JJ's manager told them they were shutting
3 down the kitchen and all ignition sources.

4 The KCFD Incident Report reported that MGE personnel arrived on the scene and that
5 MGE personnel inspected the gas leak and informed firemen that equipment was on the way.
6 The firemen asked an MGE employee what he needed them to do and the MGE employee told
7 the firemen that equipment was coming from Raymore and that he had the situation under
8 control. The KCFD Incident Report reports that the MGE employee advised the firemen that the
9 KCFD could leave the scene with him. The firemen entered JJ's Restaurant a second time to
10 notify restaurant management that "gas service" had equipment on the way, but it may be a little
11 while before the leak would be fixed. The firemen stressed again that JJ's management should
12 keep all ignition sources off and should wait for MGE to notify them of an all clear. The KCFD
13 reports that they left the scene at 5:17 p.m., leaving it with MGE.

14 **viii. KCFD Response to Explosion and Fire**

15 In response to the explosion and fire at JJ's Restaurant on February 19, 2013, numerous
16 KCFD units were dispatched starting at 6:05 p.m. The first units started arriving on the scene at
17 6:08 p.m. Upon their arrival, firemen reported there was evidence of an apparent explosion with
18 a large body of fire and very little of the original building (JJ's Restaurant) standing. Firemen
19 also reported that occasionally "blue flames" were visible emanating from the ground on the
20 west side of the building (House of Elan), indicating to them that natural gas was leaking from
21 the ground at that location. Firemen responding to the explosion and fire reported that they made
22 contact with the JJ's Restaurant manager and asked him if they got all of the "flames" (candles
23 and pilot lights) out and the manager reported that restaurant employees put out the candles and

1 turned off the stove, but did not turn off the pilot lights for the stove or water heater. The KCFD
2 Report reported that command was terminated at approximately 2:00 a.m. on February 20, 2013
3 and all fire crews were back in service, leaving the Kansas City Police Department (KCPD)
4 guarding the perimeter.

5 **Commission Safety Requirements for Electric and Telecommunications Cables**

6 Missouri Public Service Commission rule 4 CSR 240-18.010 prescribes minimum safety
7 standards relating to the operation of electric utilities, telecommunications companies and rural
8 electric cooperatives. Section (1) adopts portions of the 2002 Edition of the National Electric
9 Safety Code (NESC), including Part 3 that contains safety rules for underground electric and
10 communication lines. Rule 320B5 in the NESC for underground conduit systems states that
11 “Conduit should have sufficient separation from gas and other fuel lines to permit the use of pipe
12 maintenance equipment.” Rule 351A4 in the NESC for direct-buried cable states that “The
13 location of structures in the path of the projected cable route shall, as far as practical, be
14 determined prior to trenching, plowing, or boring operations.” Rule 354A2 in the NESC for
15 direct-buried cable states that “Radial separation of supply and communications cables and
16 conductors from steam lines, gas, and other fuel lines shall be not less than 300 mm (12 in) and
17 shall meet Rule 353.” Additional standards for the design, construction and operation of
18 telecommunications facilities are prescribed in 4 CSR 240-32.060, although this rule is among
19 the rules included in the standard list of waivers for telecommunications providers as allowed by
20 provisions of Section 392 RSMo. The excavator who is installing underground electric or
21 telecommunications cables is required to follow the underground damage prevention law in
22 RSMo 319.010 through 319.050.

MGE's Emergency Procedures, Training and Liaison with Emergency Responders

i. Emergency Procedures

MGE has written procedures (MGE O&M Standard 3110R with an effective date of October 24, 2011) to comply with 4 CSR 240-40.030(12)(J)1.⁴⁰

MGE's emergency plan defines an emergency as any situation involving MGE facilities or operations which may endanger human life or property, or which may have an unplanned effect on normal service to customers. Procedures to handle emergency situations, such as major gas leaks, fires or explosions are listed in MGE's Emergency Plan (Plan). The Plan states that causes for emergency situations include, but are not limited to, third-party disturbances, such as contractor excavation.

The Plan identifies the primary considerations of the responding MGE employee on the site of the emergency as follows:

1. Determine if a Hazard exists;
2. Determine the Extent;
3. Protect Life; and
4. Protect Property.

Various procedures on emergency situations are contained in the Plan and include "Incident Response" procedures. These procedures list the steps to consider to guard against injury and property damage. These steps include, but are not limited to: evacuating occupants when gas readings found in the structure are at, or in excess of 1% gas-in-air; establishing a restricted zone; eliminating sources of ignition; removing valve, valve box and/or manhole covers, as appropriate; ventilating affected buildings; stopping or reducing the flow of gas by

⁴⁰ MoPSC regulation 4 CSR 240-40.030(12)(J)1., requires that each operator establish written procedures to minimize the hazard resulting from a gas pipeline emergency.

1 appropriate methods to include turning off the gas supply to the involved structure and stopping
2 the gas flow in the immediate area of the emergency; and, digging vent holes to prevent gas from
3 entering buildings.

4 **ii. Personnel Training**

5 MGE is required by 4 CSR 240-40.030(12)(D) to have and follow a written
6 training/qualification program for its employees that perform tasks on a pipeline. This program
7 includes topics such as: (1) recognizing potential ignition sources; (2) recognizing conditions
8 that are likely to cause emergencies; (3) taking steps to control the release of natural gas and
9 minimize the potential for fire or explosion (in the event of an accidental release of gas, the
10 training emphasizes that saving lives, preventing injuries, and protecting property shall be the top
11 priorities); (4) responding to gas leak calls and emergency situations; (5) inside leak
12 investigation; (6) inside/outside leak investigation & classification; (7) abnormal operations; (8)
13 emergency response; (9) emergency plan; and, (10) Operations & Maintenance (O&M)
14 procedures. MGE employees re-qualify at least every three years on all of their assigned covered
15 tasks under the MGE Operator Qualification Plan. Annual reviews of the emergency plan are
16 conducted as required.⁴¹

17 Staff reviewed MGE records and determined that the various MGE crews and personnel
18 who were at the incident site at the time of the explosion and after the explosion were all current
19 with their training/qualifications (including appropriate written testing) and annual reviews of
20 MGE emergency procedures.

⁴¹ MoPSC regulation 4 CSR 240-40.030(12)(J)2.B., requires the operator to train the appropriate operating personnel and conduct an annual review to assure that they are knowledgeable of the emergency procedures and verify that the training is effective.

1 **iii. Liaison with Emergency Responders**

2 Liaison⁴² with public officials is maintained through an annual mailing to all public
3 officials and emergency responders within MGE’s service territory. Through that mailing, MGE
4 provides a booklet titled “Natural Gas Hazards and the First Responder “ (this booklet provides
5 general instructions about what public safety officials should do during a natural gas emergency)
6 and invites the agencies and officials to contact MGE for training and assistance. Staff’s review
7 of MGE records indicated that the most current mailing was made in November 2012 and
8 included the Kansas City Fire Department. MGE also provides a training program specifically
9 designed for fire departments for natural gas safety. Annual letters are mailed to area fire
10 departments, including the Kansas City Fire Department, offering free training concerning
11 natural gas safety. The training includes general procedures for emergency responders during a
12 natural gas emergency. Staffs review of MGE records indicated the most current letter mailed
13 prior to the incident was sent to area fire departments, including KCFD, on December 31, 2012.

14 **Excerpts from Witness Interviews**

15 **i. Patron #1**

16 Of the patrons interviewed by Staff patron #1 was the first patron to arrive to JJ’s
17 Restaurant. Patron #1 reports the following events. As patron #1 walked toward JJ’s Restaurant,
18 there were several workers outside, but patron #1 is unsure about the exact number of workers.
19 The smell of natural gas was noticeable and JJ’s Restaurant staff was talking about it. The odor
20 seemed to get worse each time the door opened as more patrons came into JJ’s Restaurant.

⁴² MoPSC regulation 4 CSR 240-40.030(12)(J)3., requires that each gas operator establish and maintain liaison with appropriate fire, police and other public officials to learn the responsibilities and resources of each organization that may respond to a pipeline emergency. As well as, acquainting the officials with the operator’s ability in responding to a gas pipeline emergency; identifying the types of gas pipeline emergencies of which the operator notifies the officials, and plan how the operator and officials can engage in mutual assistance to minimize hazards to life or property.

1 When KCFD entered JJ's Restaurant, patron #1 heard KCFD talk about turning off stoves and
2 burners. The patio heaters were already turned off. Patron #1 heard one of the other patrons
3 talked to the KCFD and they said the patrons did not have to leave. The door was propped open
4 to vent the natural gas odor outside. The door was closed by the manager of JJ's Restaurant
5 shortly after being propped open because it was getting cold inside. MGE personnel entered JJ's
6 Restaurant with a device and said, without any sense of urgency, that everyone needed to leave.
7 Patron #1 was the last patron to leave JJ's Restaurant. MGE personnel helped patron #1 leave
8 since the patron's vehicle was parked in front of JJ's Restaurant on W. 48th Street. Patron #1 did
9 not leave any sooner because there were crews present trying to repair the natural gas leak and
10 patron #1 assumed the leak would be fixed quickly.

11 **ii. Patron #2**

12 Patron #2 reports the following events. W. 48th Street at Bellevue Avenue was blocked
13 when patron #2 arrived. The odor of natural gas was present, but it became much stronger as
14 time progressed. Patron #2 said an employee from JJ's Restaurant went outside to ask the
15 workers if it was safe to be there and was told there was no need to evacuate. Patron #2 walked
16 over to the backhoe near the alley to determine whether or not patron #1 would be able to leave
17 because patron #1 had parked in front of JJ's Restaurant on W. 48th Street. When patron #2 was
18 in the alley, there was a man who had some sort of official-looking zip-up type suit, and patron
19 #2 overheard the man say, "Who marked this?" Patron #2 went back inside of JJ's Restaurant
20 and told patron #1 it did not seem like the vehicle was going to be able to be moved. Patron #2
21 said nobody came in JJ's Restaurant to check for gas, indicating that if someone had come in to
22 check for natural gas it would have been very noticeable since patron #2 was sitting near the
23 main door used to enter and leave JJ's Restaurant on W. 48th Street. Patron #2 left JJ's

1 Restaurant between 5:45-5:50 p.m. KCFD was not present for the entire duration patron #2 was
2 at JJ's restaurant.

3 **iii. Patron #3**

4 Patron #3 reports the following events. Patron #3 parked in the parking lot north of JJ's
5 Restaurant. The odor of natural gas was prevalent, but not dominant. As patron #3 proceeded
6 south down the alley towards JJ's Restaurant, the odor became stronger. After entering through
7 the main door on W. 48th Street, patron #3 expressed to friends that the natural gas odor was too
8 strong to tolerate and left JJ's Restaurant at approximately 5:37 p.m.

9 **iv. Patron #4**

10 Patron #4 reports the following events. Patron #4 was outside in the area of Bellevue
11 Avenue and W. 48th Street and did not smell gas prior to 5:15 p.m. Patron #4 arrived at JJ's
12 Restaurant around 5:15 p.m. and smelled gas inside. Patron #4 observed a KCFD pumper in
13 front of JJ's Restaurant. He did not see any MGE personnel inside JJ's Restaurant when he
14 arrived. Patron #4 observed MGE personnel unload a backhoe around 5:30 p.m. He stated that
15 around 5:30 p.m. to 5:35 p.m. there were no MGE personnel inside of JJ's Restaurant and he
16 could hear a jackhammer operating outside of the JJ's Restaurant. Patron #4 observed an MGE
17 employee with a leak detection instrument inside of JJ's Restaurant around 5:40 p.m. At around
18 5:42 p.m., patron #4 overheard an MGE employee tell the JJ's Restaurant manager and hostess
19 that they better shut down or close. Patron #4 also stated there was no fire equipment outside
20 JJ's Restaurant at this time. Patron #4 left JJ's Restaurant approximately 10 minutes before the
21 explosion and could smell the strong odor of natural gas.
22

1 **v. JJ's Employee #1**

2 Employee #1 reports the following events. Upon arrival to work, Employee #1 saw
3 approximately 5-6 workers in the alley with excavation equipment. Employee #1 walked into
4 JJ's Restaurant through the main door on W. 48th Street. This was the only time employee #1
5 was outside before the explosion occurred. Line up⁴³ began at approximately 4:45 p.m. and at
6 this time, the odor of natural gas was noticeable according to employee #1. KCFD entered JJ's
7 Restaurant shortly after 5:00 p.m. Employee #1 said that employee #4 asked the firefighter if the
8 candles should be blown out and the equipment be turned off. The firefighter said that would be
9 a good idea. MGE personnel were first seen outside around the time KCFD left. Employee #1
10 said MGE personnel spoke with the manager of JJ's Restaurant, but employee #1 did not hear
11 the conversation. The patrons were complaining about the smell of natural gas. According to
12 employee #1, at one time, there were approximately ten patrons in JJ's Restaurant, but the
13 patrons began leaving as the odor of natural gas became stronger. Just before 6:00 p.m., MGE
14 personnel told the manager of JJ's Restaurant to wrap things up. Employee #1 said there was no
15 sense of urgency during this conversation nor was the word "evacuate" overheard during
16 conversations.

17 **vi. JJ's Employee #2**

18 Employee #2 reports the following events. Employee #2 arrived to JJ's Restaurant
19 between 4:00-4:15 p.m. through the main entrance on W. 48th Street. Employee #2 reports the
20 following events. Natural gas was not noticeable until approximately 4:45 p.m. KCFD arrived
21 at approximately 5:00 p.m. One of the patrons asked KCFD if it was safe to be in JJ's
22 Restaurant. The KCFD said it was safe and they were going to prop the door open to allow the

⁴³ Line up is where the manager and employees of JJ's Restaurant have a short meeting in preparation for the dinner rush. Line up was held in the east dining room.

1 natural gas to vent outside. KCFD left after MGE personnel arrived. MGE personnel and the
2 KCFD were talking at the corner of the alley. MGE personnel came into JJ's Restaurant with a
3 wand and walked through the bar and dining room. Employee #2 believes the same MGE
4 employee came in again with the wand a little before 6:00 p.m. Employee #2 overheard MGE
5 personnel tell JJ's Restaurant employees to close it up.

6 **vii. JJ's Employee #3**

7 Employee #3 reports the following events. Employee #3 arrived to JJ's Restaurant at
8 approximately 4:00 p.m. through the main entrance on W. 48th Street. Employee #3 reports the
9 following events. The natural gas odor became very strong at 4:45 p.m. and a few employees
10 were complaining about headaches. When KCFD arrived, KCFD personnel it entered JJ's
11 Restaurant and propped open the door for ventilation. KCFD did not tell anyone to leave and did
12 not talk to any of the patrons. Approximately 10-15 minutes after KCFD arrived, MGE
13 personnel and KCFD talked before KCFD left. At approximately 5:30 p.m., employee #3
14 overheard a conversation outside. MGE personnel said everything was under control and there
15 were 2 trucks outside at this time. Between 5:30-5:45 p.m., MGE personnel entered JJ's
16 Restaurant, but employee #3 did not have any interactions with MGE personnel. Around 6:00
17 p.m. MGE personnel entered JJ's Restaurant again with some type of instrument. The word
18 evacuate was never heard by employee #3 and employee #3 indicates there was no sense of panic
19 or danger.

20 **viii. JJ's Employee #4**

21 Employee #4 reports the following events. Employee #4 arrived to JJ's Restaurant at
22 approximately 3:20 p.m. through the main entrance on W. 48th Street. Employee #4 reports the
23 following events. The natural gas odor became apparent around 4:30 p.m. KCFD arrived at

1 approximately 5:00 p.m. KCFD propped the door open to vent the natural gas odor outside.
2 Employee #4 asked KCFD if the grill should be turned off. KCFD said to turn off the grill and
3 recommended the candles be blown out as well. MGE personnel arrived and then KCFD left
4 shortly after. Employee #4 asked MGE personnel several times if they needed to leave JJ's
5 Restaurant. MGE personnel said no, indicated it was fine and that everything was ok. The
6 natural gas odor seemed to be a little stronger inside than it was outside. During one of the times
7 employee #4 asked MGE personnel about the safety of the situation, MGE personnel said more
8 MGE personnel were coming from Raymore. Employee #4 overheard arguing about the
9 markings on the ground during one of the times employee #4 went outside to speak with MGE
10 personnel regarding the safety of the situation. Employee #4 specifically heard somebody say,
11 "Who marked this?" MGE personnel entered JJ's Restaurant, and employee #4 thinks they took
12 a gas-in-air reading near the hostess stand. Employee #4 heard beeping from the device that was
13 taking the gas-in-air reading. At approximately 5:55 p.m., MGE personnel said JJ's Restaurant
14 needed to close down and everyone needed to leave because it was not going to air out. There
15 was no urgency when order to leave was given. To employee #4's knowledge, MGE personnel
16 had not told anyone to turn off appliances or pilot lights. Employee #4 heard the backhoe
17 excavating shortly before the explosion occurred.

18 **ix. JJ's Employee #5**

19 Employee #5 reports the following events. Employee #5 arrived at JJ's Restaurant at
20 approximately 4:00 p.m. through the main entrance on W. 48th Street. Upon arrival, employee
21 #5 saw 3 holes in the alley at the northeast corner of JJ's Restaurant into which workers were
22 looking. Employee #5 started smelling natural gas around 4:30 p.m. The odor was stronger in
23 the dining room on the east side of JJ's Restaurant. KCFD came into JJ's Restaurant around

1 5:15 p.m., but only for a few minutes. Employee #5 overheard employee #4 asking KCFD if
2 anything needed to be shut off. Employee #4 told the other JJ's Restaurant employees that
3 KCFD said MGE personnel had it under control. Around 5:30 p.m., employee #5 went outside
4 to see what was going on. Employee #5 saw MGE personnel working in the alley. There was a
5 strong odor outside at this time. At approximately 5:55 p.m., MGE personnel entered JJ's
6 Restaurant and told the employees not to serve food for a while because it was going to take a
7 while to fix the leak. Employee #5 said that several minutes before the explosion, MGE
8 personnel were taking readings. MGE told the JJ's Restaurant employees to close down.

9 **x. JJ's Employee #6**

10 Employee #6 reports the following events. Employee #6 arrived at JJ's Restaurant at
11 4:00 p.m., entering through the door on the east side of the building in the alley. According to
12 employee #6, there were workers in the alley and the plugs were pulled out of the potholes
13 located near the door. The natural gas odor became strong around 4:45 p.m., with the odor being
14 stronger near the dining room and alley on the east side of JJ's Restaurant. Employee #6 never
15 spoke directly to MGE personnel or KCFD, but employee #6 was told it was safe from
16 coworkers. Employee #6 worked in the private kitchen on the west side of JJ's Restaurant where
17 a ventilation unit was turned on to reduce the natural gas odor. Employee #6 was told to close up
18 and leave a few minutes prior to the explosion.

19 **xi. Witness #1**

20 Witness #1 reports the following events. On February 18, 2013, the day prior to the
21 explosion, witness #1 saw the alley blocked with a truck that contained excavation equipment
22 and there were markings on the ground. The following day (February 19, 2013), witness #1
23 parked in the parking lot north of JJ's Restaurant, sometime between 12:00-12:40 p.m., near

1 where the boring rig was located. Witness #1 did not smell any natural gas and the boring rig
2 remained on the trailer. There was no excavation activity during this time frame. Witness #1
3 came back at approximately 5:00 p.m. and parked in the same parking lot north of JJ's
4 Restaurant; however, witness #1 did not leave the vehicle. Witness #1 observed MGE personnel
5 and recalls looking down W. 48th Street and seeing two MGE trucks parked. No fire trucks or
6 firefighters were observed at this time. Witness #1 did not smell any natural gas.

7 **xii. Witness #2**

8 Witness #2 reports the following events. Witness #2 arrived with witness #1 at the
9 parking lot just north of JJ's Restaurant at approximately 12:15 p.m. on February 19, 2013, to
10 meet with a client at JJ's Restaurant. Witness #2 was inside of JJ's Restaurant for approximately
11 30 minutes. While walking from the parking lot down the alley to JJ's Restaurant, the east side
12 of the alley was blocked with some type of heavy equipment. Witness #2 left JJ's Restaurant at
13 approximately 1:00 p.m. and did not smell natural gas at any time. Witness #2 returned to the
14 north parking lot around 5:15 p.m. Witness #2 was told by a construction worker not to drive
15 down the alley because equipment was blocking it. Witness #2 was not sure what company the
16 construction worker represented. The construction worker did not mention anything regarding a
17 natural gas leak to witness #2. Witness #2 did not smell any natural gas in the parking lot from
18 arrival at 5:15 p.m. to departure at 5:34 p.m.

19 **xiii. Witness #3**

20 Witness #3 reports the following events. At approximately 5:02 p.m., an employee from
21 witness #3's business left the building at the northwest corner of Bellevue Avenue and W. 48th
22 Street and smelled a strong odor of natural gas. MGE was called by witness #3's spouse to
23 report a strong natural gas odor. Witness #3 went outside to the back of the building and smelled

1 a strong odor of natural gas. Witness #3 reported at approximately 5:20 p.m., an individual
2 entering the building mentioned there was a strong odor of natural gas in the air. MGE personnel
3 entered the building at approximately 5:30 p.m. in response to the odor complaint. An
4 instrument was used to detect natural gas-in-air by MGE personnel, but no gas-in-air readings
5 were found inside of the building. Witness #3 asked MGE personnel if everyone should
6 evacuate because of the strong odor of natural gas outside. MGE personnel stated evacuation
7 was not necessary since the instrument did not detect any natural gas inside of the building.
8 Witness #3 made a decision to escort individuals out of the building. An individual left witness
9 #3's business at 5:57 p.m. and shortly after leaving, the explosion occurred across the street at
10 JJ's Restaurant. There were two individuals in witness #3's business when the explosion
11 occurred at JJ's Restaurant.

12 **xiv. Managing Member of Heartland Midwest**

13 The managing member of Heartland Midwest was notified at about 5:00 p.m that a crew
14 hit the natural gas main at 910 W. 48th Street. Approximately two hours later, the managing
15 member of Heartland Midwest arrived to 910 W. 48th Street. The managing member went to the
16 command post in an effort to account for all the Heartland Midwest employees that were
17 working this particular job. There were no conversations between the managing member and the
18 employees of Heartland Midwest the night of the incident. At approximately 10:30 p.m., the
19 drill rig was removed from the site and taken back to Heartland Midwest offices.

20 During an HDD operation, Heartland Midwest will drill as many potholes as needed to
21 verify the various utilities marked on the ground by a utility locator. Once the initial pothole is
22 drilled, Heartland Midwest personnel will vacuum excavate to the depth of the buried utility to
23 confirm the locate markings on the ground. The managing member does not receive a phone call

1 every time an underground facility is struck, but an excavation incident report is completed each
2 time a facility is damaged. If Heartland Midwest personnel ever have any doubts about the
3 locate markings or lines found by drilling potholes, the Managing Member of Heartland Midwest
4 stated that the utility company should be contacted by Heartland Midwest personnel to clarify
5 any concerns Heartland Midwest personnel may have about the locate marks.

6 **Summary of Information Obtained During Interviews of MGE Personnel**

7 **i. Actions Prior to the Explosion**

8 This section of the Report represents a summary of Staff interviews of MGE personnel
9 regarding actions prior to the explosion.

10 Service tech #1 was the second MGE person to arrive in the general vicinity of the
11 damaged main, after the specialty person. Originally, service tech #1 was dispatched to the area
12 for an odor call at 4746 Bellevue Avenue, but because the damaged gas main was very close,
13 service tech #1 helped the MGE C&M crew (the “C&M crew” includes the foreman, backhoe
14 operator and the compressor person) get their vehicles and equipment on site. Service tech #1
15 then proceeded to respond to the odor call at 4746 Bellevue Avenue. Before going into the
16 building, service tech #1 turned on and calibrated the CGI. Service tech #1 entered the building
17 and performed a leak investigation, but did not obtain any readings of natural gas. Service tech
18 #1 called the duty supervisor to communicate the results of the leak investigation and to request
19 permission to forego a shut-in test at 4746 Bellevue.

20 After the leak investigation was completed at 4746 Bellevue Avenue, service tech #1
21 proceeded to the area of the damaged main. Before entering JJ’s Restaurant to check for natural
22 gas, service tech #1 turned on and calibrated the CGI again. Service tech #1 entered JJ’s
23 Restaurant and obtained gas-in-air readings between 2-3% and the CGI audibly alarmed. Service

1 tech #1 told the manager of JJ's Restaurant to evacuate people from the building, indicating
2 MGE procedure is to evacuate when gas-in-air readings reach 1%. The CGI began beeping due
3 to a low battery. Service tech #1 left JJ's Restaurant to put new batteries in the CGI.

4 Service tech #2 arrived when service tech #1 was putting new batteries in the CGI.
5 Service tech #2 entered JJ's Restaurant and obtained readings of 3.5-4% gas-in-air. Service tech
6 #1 also recorded similar gas-in-air readings after going back inside JJ's Restaurant. Service tech
7 #2 told the manager of JJ's Restaurant to evacuate. Service tech #2 informed the MGE duty
8 supervisor there was between 3.5-4% gas-in-air inside of JJ's Restaurant.

9 While service tech #2 was speaking to the MGE duty supervisor, service tech #1 checked
10 for natural gas at the House of Elan on the east side of the alley across from JJ's Restaurant. The
11 doors of the House of Elan were locked, service tech #1 detected 1.1% gas-in-air at the doors
12 with the CGI. Service tech #1 knocked on the window in an effort to gain entrance to the
13 building. Service tech #1 was granted access to the building and was directed to a doctor.
14 Service tech #1 told the doctor to evacuate the building.

15 Service tech #1 headed back to JJ's Restaurant to meet up with service tech #2. Service
16 tech #2 had just finished helping a patron from JJ's Restaurant leave by directing traffic so that
17 the patron could back out onto Bellevue Avenue from 910 W. 48th Street and drive south on
18 Bellevue Avenue. Continuing their leak investigation, both service techs proceeded to the
19 Plazaview Building to determine whether natural gas had migrated into the building. Shortly
20 after service techs #1 and #2 entered the stairwell of the Plazaview Building, the natural gas
21 explosion occurred at JJ's Restaurant.

22 The MGE C&M foreman arrived at 910 W. 48th Street with guidance from service tech
23 #1. Once on site, the C&M foreman called the C&M crew truck containing the backhoe operator

1 and compressor person to determine when they would arrive with the backhoe and to give them
2 instructions on how to access W. 48th Street. Next, the C&M foreman met with the MGE
3 specialty person to get more information about the damaged natural gas main. MGE personnel
4 indicated there was a pothole that had been drilled between the yellow (gas) and red (electric)
5 paint markings in the alley, and the MGE specialty person was advised by Heartland Midwest
6 personnel that the bore head was still in the ground near the natural gas main. As the C&M
7 foreman went over to look down in the pothole, it was apparent to him that natural gas was
8 leaking due to the hissing noise and odor.

9 At this time, the MGE C&M crew truck arrived with the backhoe, backhoe operator and
10 compressor person. The backhoe was unloaded east of the alley on W. 48th Street. The
11 compressor person helped switch the bucket attachment to the breaker attachment on the
12 backhoe. While the compressor person and backhoe operator were setting up the equipment, the
13 C&M foreman was taking pictures of the site before the excavating began. A representative
14 from USIC also wanted to take pictures of the locate markings before the MGE C&M crew
15 began excavating. The C&M foreman marked out an approximate 3-foot by 5-foot hole on the
16 pavement to let the backhoe operator know where the pavement could be broken and the C&M
17 crew began removing pavement while USIC continued taking photographs. The compressor
18 person gathered tools, including a 2-inch band clamp to stop the leak and a fire extinguisher.
19 The C&M foreman put on a fire suit as a safety measure when the backhoe began excavating.
20 Once the pavement was broken, the bucket attachment was put on the backhoe and the pavement
21 was scooped out. The C&M foreman said he stepped on the backhoe to remind the backhoe
22 operator to be careful and watch out for the underground electrical facility, as indicated by the
23 red marks on the ground. The explosion occurred shortly after the C&M foreman provided the

1 reminder to the backhoe operator and while the C&M foreman was hand digging down to the
2 damaged main.

3 **Summary of Information Obtained Through Interviews of MGE Personnel**

4 **Actions after the Explosion**

5 This section of the Report represents a summary of Staff interviews of MGE personnel
6 regarding actions after the explosion.

7 There were two MGE crews working to shut off the flow of gas to the damaged section
8 of natural gas main. One crew was working at the intersection of Bellevue Avenue and W. 48th
9 Street. MGE personnel included in this crew are Bellevue Avenue foreman #1, Bellevue
10 Avenue foreman #2, and a digging machine operator (DMO). The DMO and Bellevue Avenue
11 foreman #2 arrived before Bellevue Avenue foreman #1. Bellevue Avenue foreman #2
12 discussed with the MGE duty supervisor where to squeeze-off the natural gas main to isolate the
13 damaged section of main. The duty supervisor and Bellevue Avenue foreman #2 decided to
14 push back the location of the squeeze-off since the structure was still on fire. There was a valve
15 not designated as an “emergency” valve at Bellevue Avenue and Ward Parkway, but pavement
16 would need to be broken in order to access the valve. The goal of MGE personnel was to get gas
17 shut off as quickly and safely as possible, while also minimizing the number of customers that
18 needed to be shut off on a winter evening. The Bellevue Avenue crew dug down to the natural
19 gas main on Bellevue Avenue. The natural gas main on Bellevue Avenue was squeezed off to
20 100% just south of W. 48th Street. A high volume tee, as seen in Appendix B, Figure 8, is
21 located at the intersection of W. 48th Street and Bellevue Avenue, connecting the natural gas
22 mains on W. 48th Street and Bellevue Avenue. The natural gas main on W. 48th Street was cut
23 and capped. A plate was placed over the excavation and the crew re-pressurized the main on

1 Bellevue Avenue. A separate MGE crew purged the main at the north end of the main on
2 Bellevue Avenue (approximately a block north of W. 48th Street) at a meter set and began
3 relighting customers.

4 The other MGE crew worked at W. 48th Street and Roanoke Parkway. This crew
5 consisted of Roanoke Parkway foreman #1, Roanoke Parkway foreman #2, a compressor
6 operator, and a DMO. The Roanoke Parkway crew arrived at the site after the Bellevue Avenue
7 crew. There was a valve at the west part of the intersection of Roanoke Parkway and W. 48th
8 Street that the original C&M crew⁴⁴ turned off. The operating nut on the valve was turned too
9 far and came off. The original C&M crew stated they believed the valve was shut off, but
10 decided to hand dig down to the valve to verify that the valve was in the closed position. The
11 Roanoke Parkway crew arrived and took over this hand-dig from the original C&M crew, and
12 did confirm that the valve was closed. Emergency locates were called in for the hand digging. A
13 Permasert® cap was installed west of the valve to isolate the damaged main on W. 48th Street
14 from the remainder of the distribution system.

15 **i. Summary of Information Obtained During the MGE Specialty Person Interview**

16 This section of the Report represents a summary of Staff's interview of the MGE Specialty
17 Person (MGE first responder).

18 The MGE specialty person received a call from dispatch regarding a damaged natural gas
19 main at W. 48th Street and Bellevue Avenue. There were street cones (presumed by the
20 specialty person to belong to Heartland Midwest) placed on W. 48th Street upon arrival. The
21 specialty person stated that the KCFD was not present when he arrived. The specialty person
22 called MGE dispatch asking for assistance from MGE I&S crews before going to the location of

⁴⁴ The "original C&M crew" refers to the C&M foreman, the backhoe operator and the compressor person that responded to the report of the third-party damage before the explosion occurred.

1 the third-party damage to the natural gas main. The specialty person heard natural gas blowing
2 and saw natural gas bubbling in the pothole near where the natural gas main was believed to be
3 damaged. The specialty person called MGE dispatch again to request I&S personnel. As a
4 safety precaution, the specialty person got a fire extinguisher and restricted access to the area
5 near the pothole where gas was venting into the atmosphere. The specialty person gave the
6 C&M foreman driving directions to the location of the third-party damage. When the C&M
7 foreman arrived, the specialty person explained the situation and described what had happened.
8 Service tech #1 was told by the specialty person to check surrounding buildings for natural gas.
9 Service tech #1 told the specialty person that JJ's Restaurant was being evacuated. The specialty
10 person called the MGE duty supervisor to report the evacuation order. The specialty person also
11 spoke with personnel from Heartland Midwest and USIC. Heartland Midwest personnel
12 reported that their safety coordinator was en route. The specialty person told Heartland Midwest
13 personnel to leave the bore head where it was. A representative from USIC wanted to take
14 pictures of the locate markings before the C&M crew began excavating. The specialty person
15 told the USIC representative they could do so, but it would have to be at a safe distance. The
16 C&M crew began breaking pavement. Once the pavement was removed by the backhoe, the
17 C&M foreman began hand digging, using hand tools that were non-sparking. In response to a
18 Staff question, the specialty person stated that neither the backhoe bucket nor the backhoe
19 breaker attachments were made of a non-sparking material. Staff asked the specialty person if
20 the cover on the manhole, located south of the alley on W. 48th Street, was removed. The
21 specialty person stated that removing the manhole cover was not discussed among MGE
22 personnel. The explosion occurred shortly after the hand digging commenced. During the

1 interview the specialty person stated that he had two CGI's and a locating device, but this
2 equipment remained in the truck and was not used.

3 **ii. Summaries of Information Obtained Through Various MGE I&S Personnel** 4 **Interviews**

5 This section of the Report represents a summary of Staff interviews of MGE I&S
6 Personnel.

7 Service tech #3 first arrived at 4809 Roanoke Parkway to respond to a natural gas odor
8 call before the explosion occurred. Service tech #3 did not find any leaks at that location. Service
9 tech #3 received a call from MGE dispatch to respond to a natural gas odor call on Holly Street,
10 approximately two blocks west of the third-party damage. The explosion occurred as service
11 tech #3 arrived at the Holly Street odor call. Service tech #3 left the odor call at Holly Street to
12 respond to the explosion. Service tech #3 tried to get the traffic moved near W. 48th Street and
13 Bellevue Avenue so emergency personnel could arrive on scene. Service tech #3 entered the
14 Plaza Vista Building to check for natural gas but none was detected. Service tech #3 found 45%
15 gas-in-air after checking the manhole on W. 48th Street and Bellevue Avenue for natural gas.
16 The lid was removed from the manhole. Service tech #3 also checked a water valve box at the
17 southeast corner of the Plaza Vista Building and found 5% gas-in-air. No natural gas was found
18 in a storm drain at W. 48th Street and Roanoke Parkway. Service tech #3 helped to shut off
19 meters at the apartments on Bellevue Avenue.

20 Service tech #4 arrived at 4809 Roanoke Parkway in response to an outside natural gas
21 odor call after the explosion. Service tech #4 checked around the perimeter of the building with
22 a Flame Ionization (FI) unit. No natural gas was detected outside. Service tech #4 also checked
23 a storm drain, but did not detect any natural gas. In addition to checking outside for a natural gas

1 leak at 4809 Roanoke Parkway, service tech #4 also performed a leak investigation inside the
2 parking garage, as well as inside the building at 4821 Roanoke. No natural gas was found.

3 The next leak investigation by service tech #4 occurred at 4401 State Line Road where an
4 outside natural gas odor was reported. Service tech #4 did not detect any natural gas around the
5 perimeter of the building. On the southeast corner there was a catch basin that service tech #4
6 also checked for natural gas. No natural gas was found. Service tech #4 was dispatched to assist
7 service tech #5 with an outside leak at 4410 Bellevue Avenue. Two leaks were found on the
8 meter set and the meter set was rebuilt that same day to repair the leaks. After the meter set was
9 rebuilt, the apartments that temporarily lost natural gas service were relit when gas was re-
10 introduced to the meter set. Service tech #4 helped to relight appliances in a different apartment
11 building on Bellevue Avenue supplied by the Bellevue Avenue gas main that was temporarily
12 shut down to isolate the damaged main on W. 48th Street.

13 Service tech #5 heard about the explosion on the radio. Service tech #5 was dispatched
14 to respond to an inside natural gas odor call at 1121 W. 47th Street. Service tech #5 found four
15 meters on the inside of the building with an outside shut-off. Service tech #5 found 0.25% gas-
16 in-air near the floor drain and 0.15% gas-in-air throughout the building. Service tech #5 shut off
17 gas to the building at the outside shut-off point. Service tech #5 also helped with the relights on
18 Bellevue Avenue.

19 Service tech #6 was dispatched to respond to an odor call at Pembroke Hill School at 400
20 West 51st Street prior to the explosion. Service tech #6 did not find any gas leaks. The
21 explosion occurred just as service tech #6 was finishing the leak investigation at the school.
22 Service tech #6 went to W. 48th Street and Bellevue Avenue to provide assistance. Before
23 service tech #6 could check for natural gas at the strip mall at the southwest corner of the

1 intersection of W. 48th Street and Bellevue Avenue, KCFD had to assemble a crew to escort
2 service tech #6 to the strip mall. No natural gas was found at any of the businesses in the strip
3 mall. Service tech #6 checked several residences on Mercier Street and residences north of W.
4 48th Street as well as manholes located on W. 48th Street at the intersections of Holly Street,
5 Jarboe Street and Mercier Street. Gas-in-air readings of 0.5-1% were found in basements and
6 those houses were evacuated and aired out. After all the occupants were evacuated from the
7 houses containing natural gas in the air, service tech #6 helped with shutting off the meters on
8 Bellevue Avenue. The manhole at W. 48th Street and Bellevue Avenue was checked for
9 natural gas sometime after 8 p.m. once the flow of natural gas to the damaged section of main
10 had been stopped and none was found. Service tech #6 assisted with the relights of the
11 customers whose natural gas service was disrupted on Bellevue Avenue.

12 After hearing about the explosion over the radio, service tech #7 headed to the area of the
13 explosion from 38th Street & Baltimore Avenue. Service tech #7 responded to a leak call at 4716
14 Jarboe Street and found less than 0.06% gas-in-air in the house and drains. Service tech #7
15 waited for the house to air out before Service tech #7 left. Service tech #7 also checked
16 manholes along W. 48th Street (west of Bellevue Avenue) and got readings between 14% and
17 17% gas-in-air. At a house at the northwest corner of W. 48th Street and Jarboe Street, service
18 tech #7 detected about 0.5% gas-in-air in the atmosphere and about 1% gas-in-air at the floor
19 drains. Service tech #7 evacuated the building at Jarboe Street and W. 48th Street and shut off
20 the meter. Service tech #7 shut off meters on Bellevue Avenue and helped re-light those meters
21 once the damaged section of main on W. 48th Street was isolated from the rest of the system.
22 Service tech #7 does not know if the manholes on W. 48th Street at Mercier Street and Holly
23 Street were checked for natural gas after the damaged section of main was isolated. Services

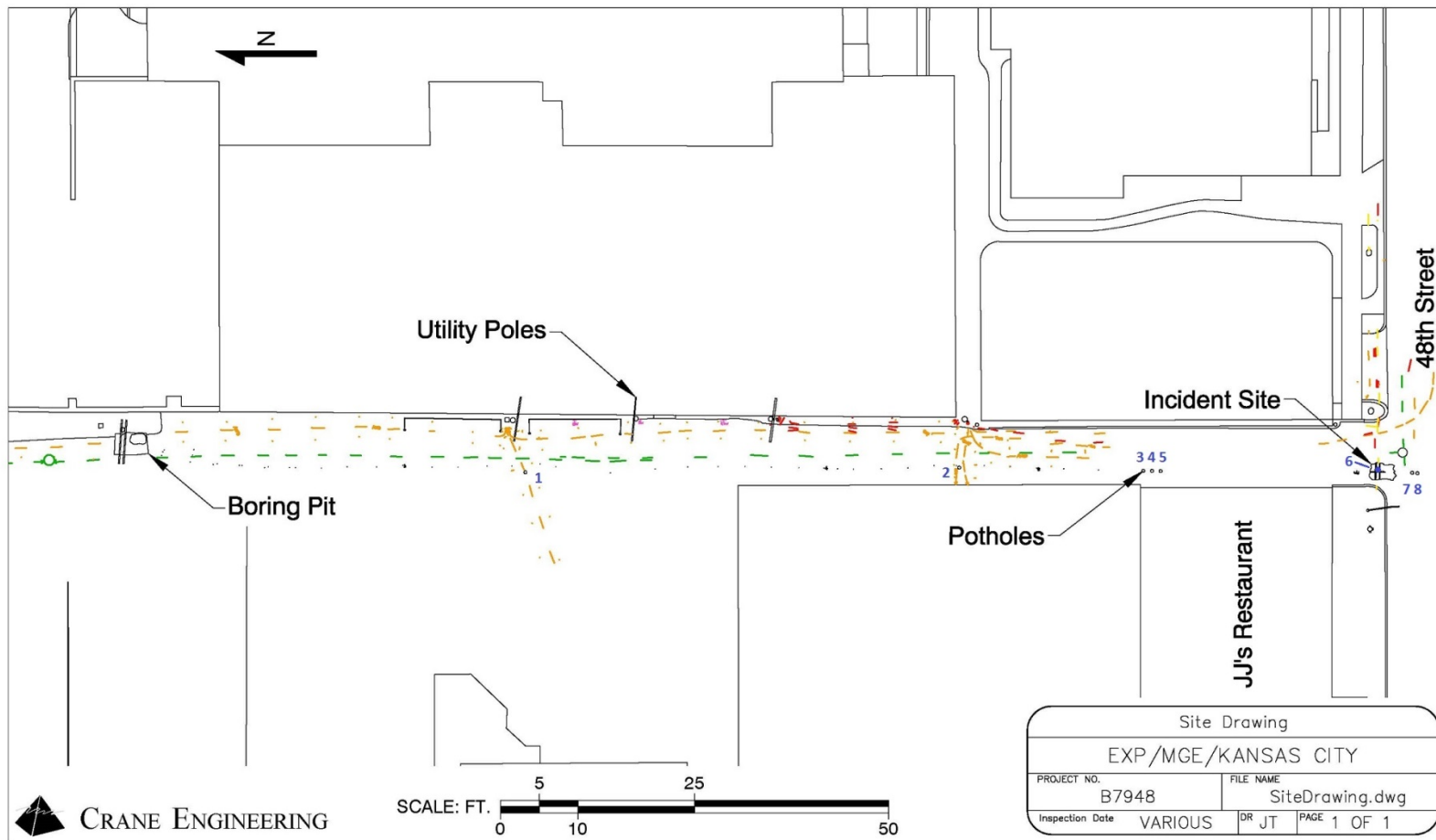
1 located at the northwest corner of W. 48th Street and Jarboe Street were not turned back on until
2 the re-lights were finished on Bellevue Avenue.

3 Service tech #8 was dispatched to an outside odor call at 47th Street and Summit Street
4 (770 W. 47th Street). No traces of natural gas were found during the investigation. Service tech
5 #8 was dispatched to 4802 Jarboe Street to investigate an odor call and found 0.03% gas-in-air
6 outside of a window. Service tech #8 checked for natural gas at 4806 Jarboe Street, but no
7 natural gas was detected. After the flow of natural gas to the damaged main was stopped, service
8 tech #8 checked the manhole at W. 48th Street and Jarboe Street, but found no indications of
9 natural gas. Service tech #8 checked various services with an FI unit. No natural gas was
10 discovered at these various natural gas services.

11 Service tech #9 entered the Plazaview Building with service tech #2 to check for natural
12 gas before MGE crews stopped the flow of natural gas to the damaged portion of main. At the
13 west door, a reading of 0.10% gas-in-air was obtained, a reading of 0.25% was obtained at the
14 east side, and 0% gas-in-air was obtained on both the third floor and the west side of the second
15 floor. Since the Plazaview Building is a multistory building, service tech #9 began the leak
16 investigation on the top floor of the building and went down to the parking garage at the bottom.
17 Service tech #9 is not certain whether or not the Plazaview Building was checked again for
18 natural gas after the natural gas main was shut off. Service tech #9 responded to an odor call at
19 4700 Roanoke Parkway and did not find any indications of natural gas. Service tech #9 found no
20 indications of natural gas at the apartment building at W. 48th Street and Jarboe Street.

APPENDIX B

FIGURES



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MGE-MPSC00000375

Figure 1 – Detailed schematic of the alley from the boring pit to the third party damage (Provided by MGE)

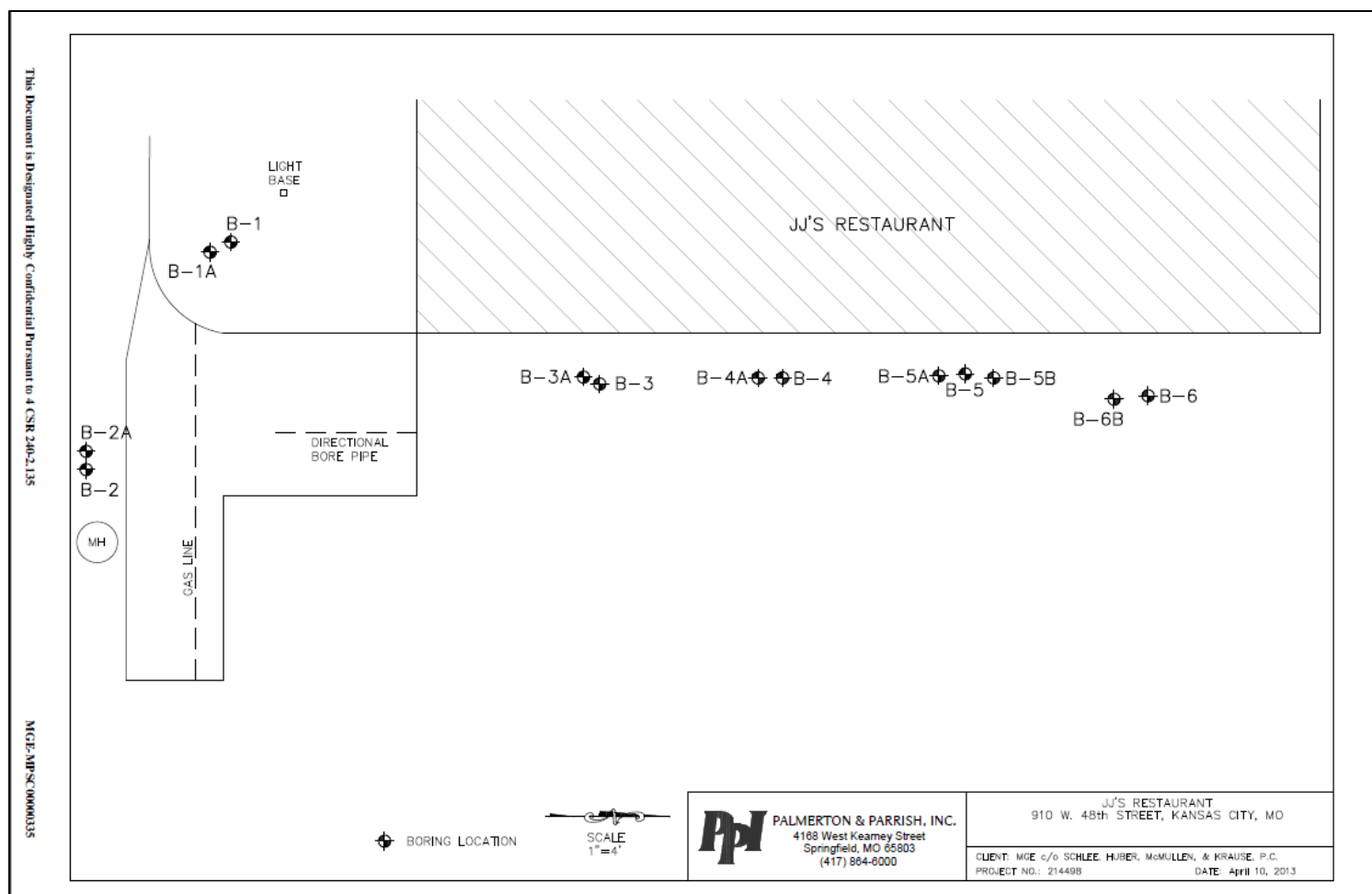


Figure 2 - Various soil samples taken near the manhole and in the alley between JJ's Restaurant and the House of Elan (Provided by MGE)

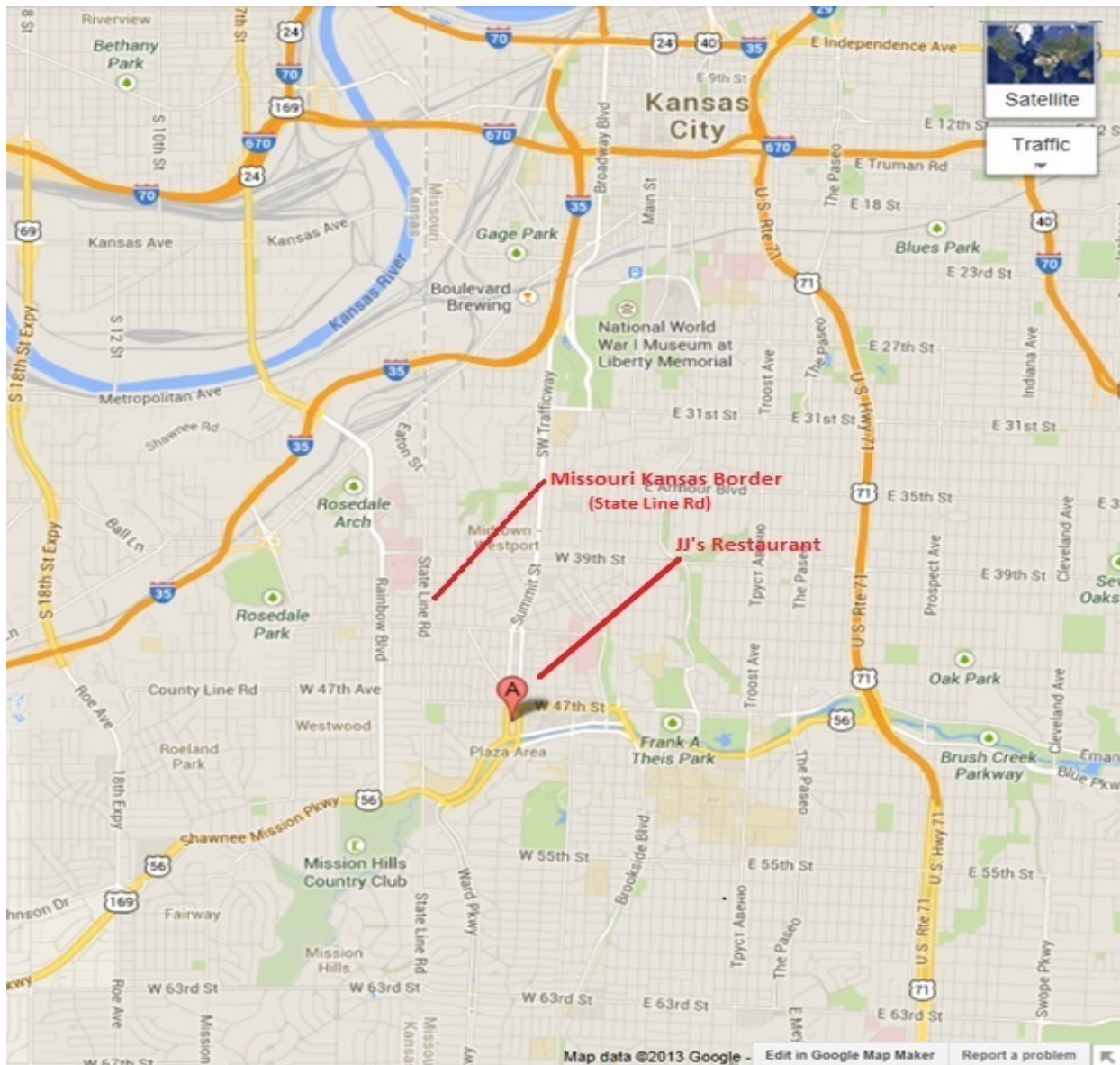


Figure 3 - Overall location of 910 W. 48th Street, as shown at Point A, with respect to Kansas City, Missouri and surrounding highways (Map provided by Google Maps).

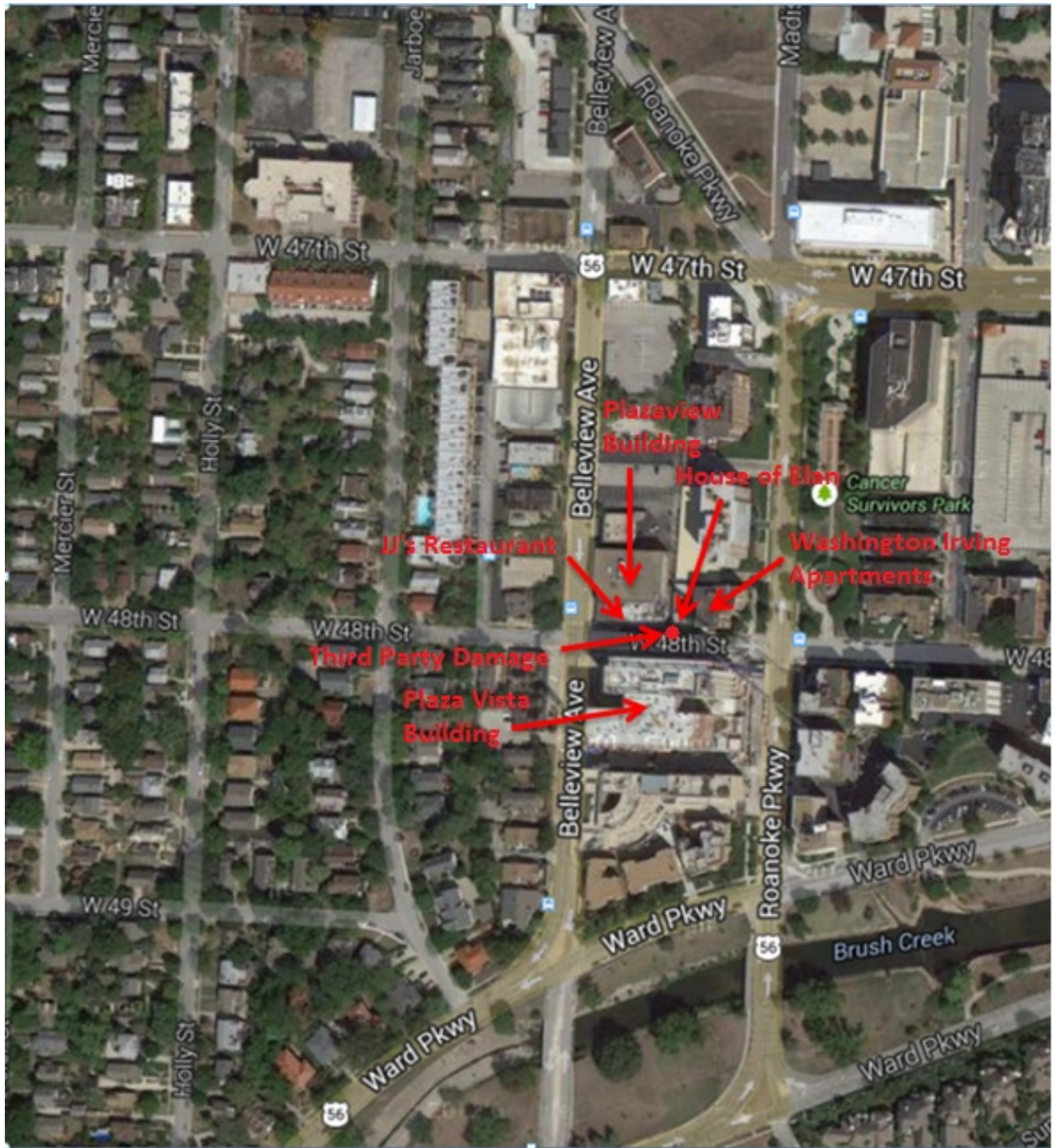


Figure 4 - Incident Site and Buildings Immediately Surrounding the Area (Map provided by Google Maps).



Figure 5 – Actions Taken to Isolate the Damaged Section of Main on W. 48th Street (Provided by MGE)

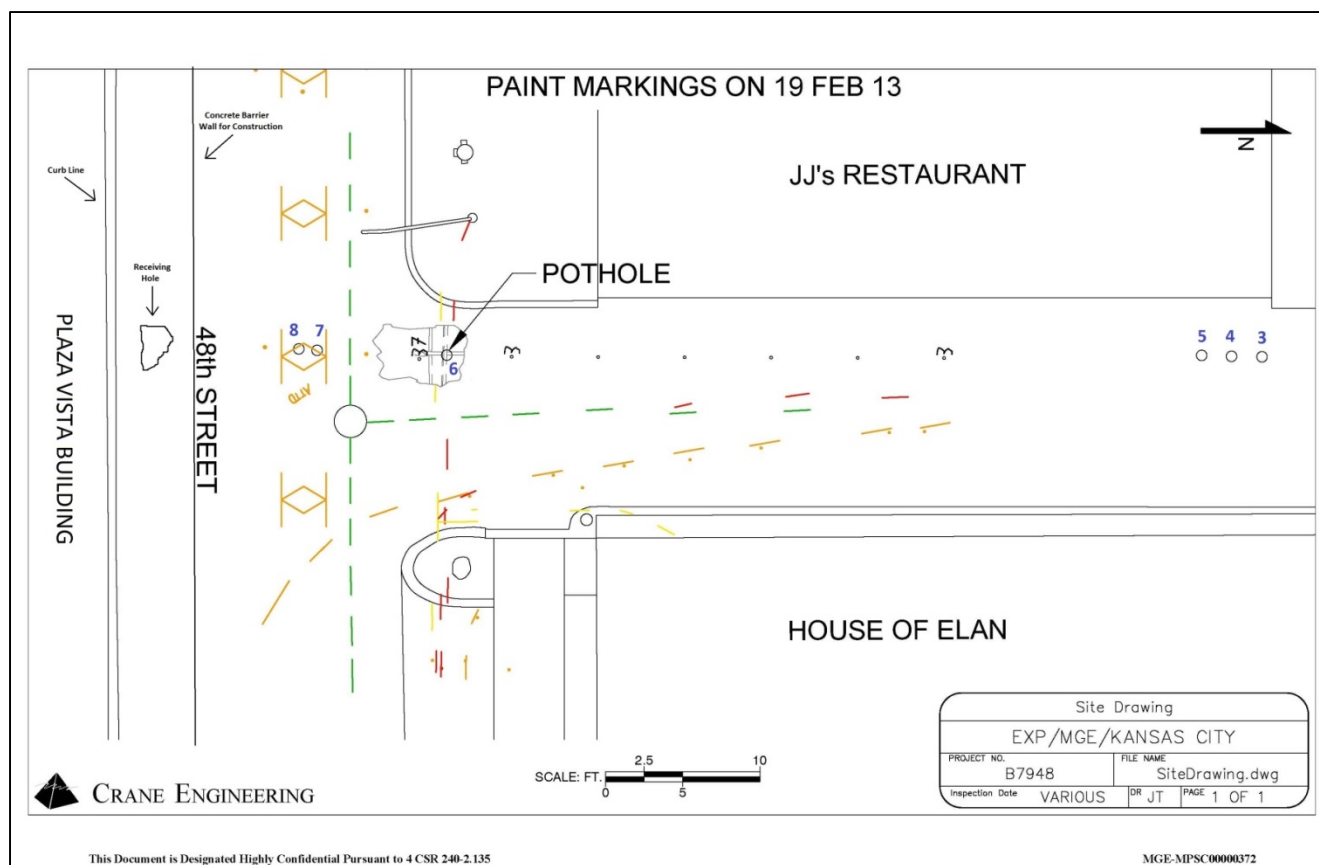


Figure 6 – Schematic of Potholes and Utility Markings around the third party damage (Provided by MGE)

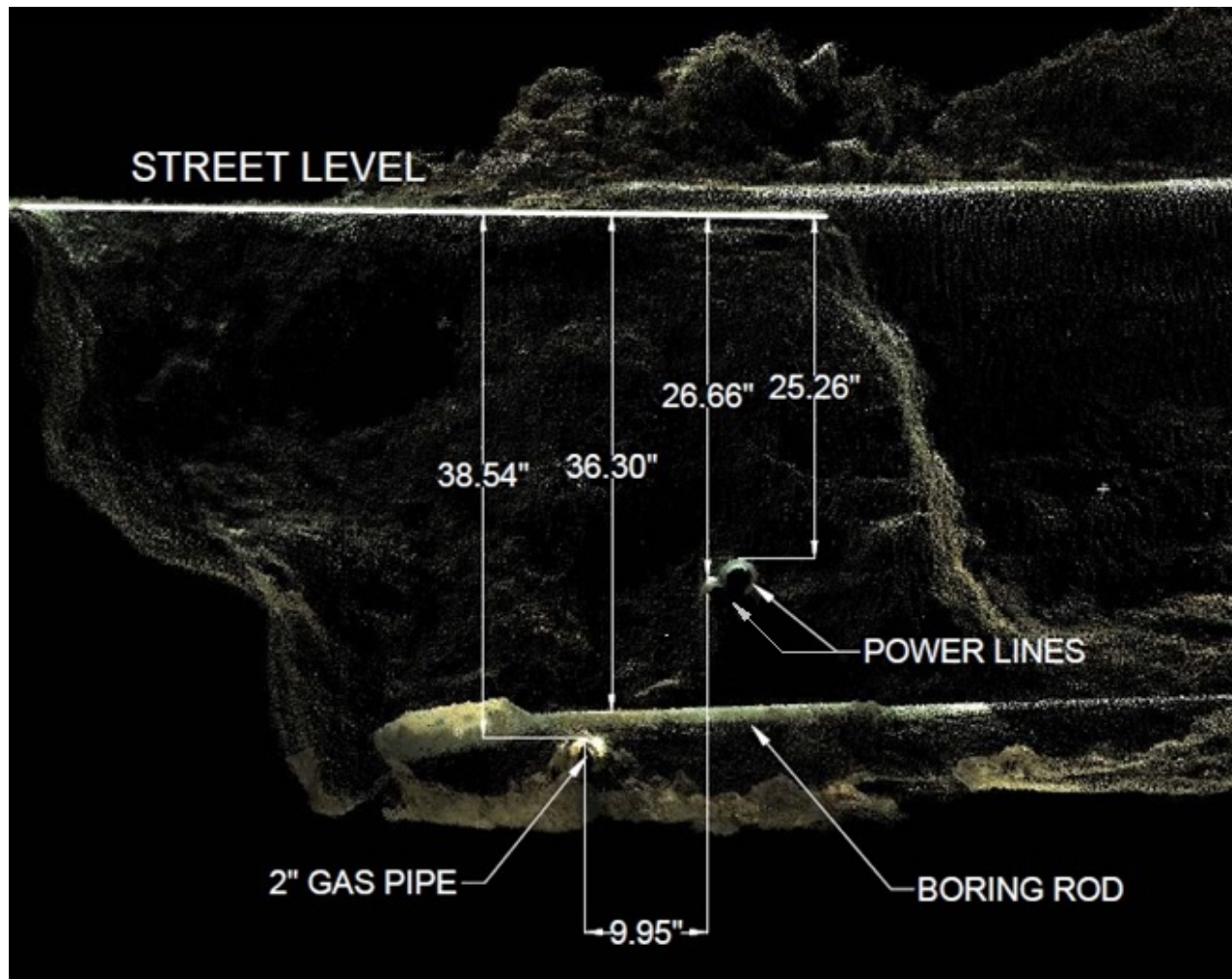


Figure 7 – 3-D Laser scan of third-party damage (Provided by MGE)



Figure 8 – Location of the High Volume Tee Connecting Mains on W. 48th Street and Bellevue Avenue (Provided by MGE)

APPENDIX C

PHOTOGRAPHS



Photograph #1 – Approximate 2-inch wide hole in damaged section of main oriented west (left side) to east (right side) (Staff Photo)



Photograph #2 – Approximate 2 inch wide hole in damaged section of main oriented south (left side) and north (right side) (Staff Photo)



Photograph #3 – Pothole #6 is shown between the line of yellow marks (circled in yellow) and the line of red marks (circled in red) near the approximate area of the damaged main. The white dots represent the bore path. The “37” written to the left (south) of the pothole indicates a drill bit depth of approximately 37 inches, while the “3” on the right (north) side of the pothole represents a drill bit depth of approximately 3 feet. (Provided by MGE)



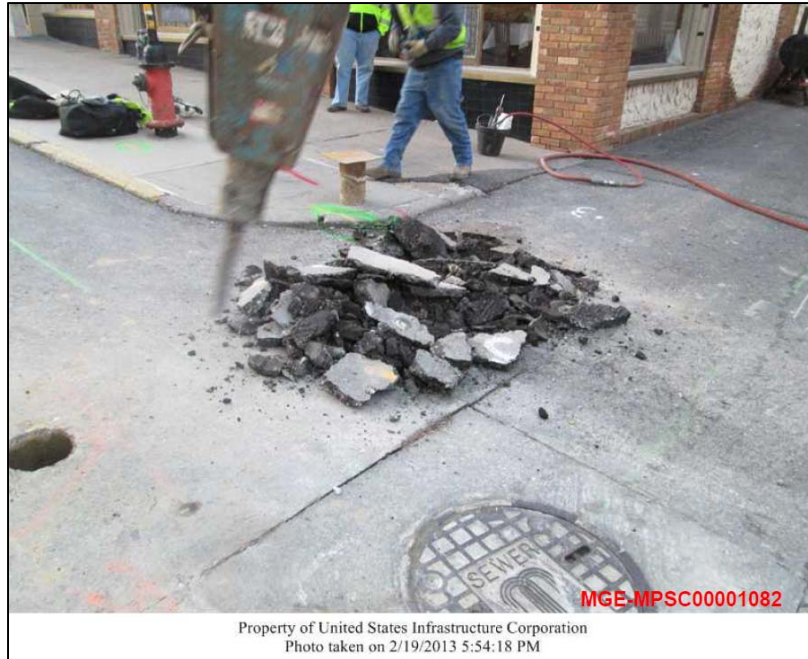
Photograph #4 – Locate markings looking south down the alley just south of the entrance pit. The white dots show the bore path of the drilling rod. (Staff Photo)



Photograph #5 – Slab of pavement to be removed in the alley near the northeast corner of JJ's Restaurant containing potholes 3, 4 and 5 (Staff Photo)



Photograph #6 – Void Space below the floor slab at the northeast corner of JJ's Restaurant where the slab of pavement shown in Photograph 5 was removed (Staff Photo)



Photograph #7 – Broken pavement over the damaged main before the explosion across from the southeast corner of JJ's Restaurant. Also note the sanitary sewer manhole cover near the broken pavement. (Provided by MGE)



Photograph #8 – Damage and debris from what remains of JJ's Restaurant facing west (Staff Photo)



Photograph #9 – The west side of the House of Elan sustained significant damage during the explosion and subsequent fire. Debris from JJ's Restaurant is shown in the foreground. This Photograph was taken looking east down W. 48th Street (Staff Photo).



Photograph #10 – Several windows blown out in the Plaza Vista Building south of JJ's Restaurant (Staff Photo)



Photograph #11 – Damage to the south side of the Plazaview Building looking northwest from W. 48th Street. Debris from JJ's Restaurant is shown in the foreground. (Staff Photo)



Photograph #12 – Damage to various businesses in the strip mall located southeast of the intersection of W. 48th Street and Bellevue Avenue. (Staff Photo)



Photograph #13 – Damage to various businesses in the strip mall located southeast of the intersection of W. 48th Street and Bellevue Avenue. (Staff Photo)



Photograph #14 – Debris in the alley between JJ's Restaurant and the House of Elan facing north (Staff Photo)



Property of United States Infrastructure Corporation
Photo taken on 2/19/2013 5:56:43 PM

Photograph #15 – Locate markings near the third-party damage. This Photograph was taken looking east down W. 48th Street (Provided by MGE).



Photograph #16 – Heartland Midwest’s mini excavator sitting on top of the entrance pit facing south down the alley. The drilling rod is located approximately under the center of the mini excavator. (Staff Photo)



Photograph #17 – Boring rod seen in one of potholes located near the northeast corner of JJ's Restaurant (Staff Photo).



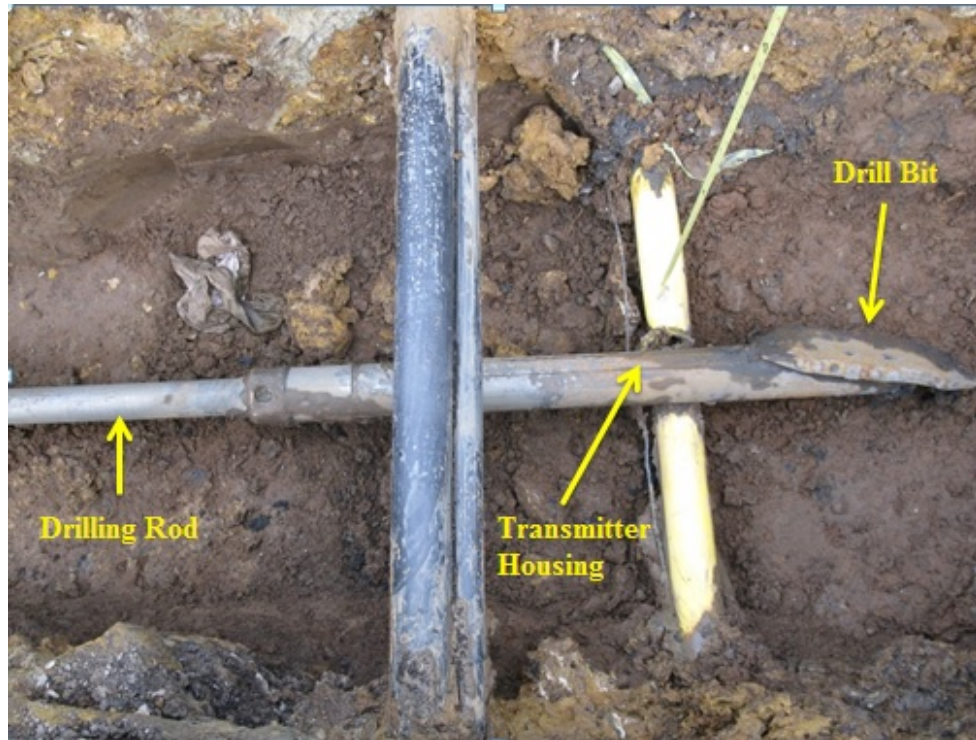
Photograph #18 – Flow testing of the damaged section of main (Staff Photo)



Photograph #19 – Soap test in the sanitary sewer manhole across from the alley between JJ’s Restaurant and the House of Elan near the third-party damage (Staff Photo)



Photograph #20 – Third-party damage exposed showing the drill bit penetrating through the gas main (yellow) in relation to the electrical conduits (2 black lines). The arrows are pointing to the tracer wire used to identify underground plastic natural gas facilities. (Staff Photo)



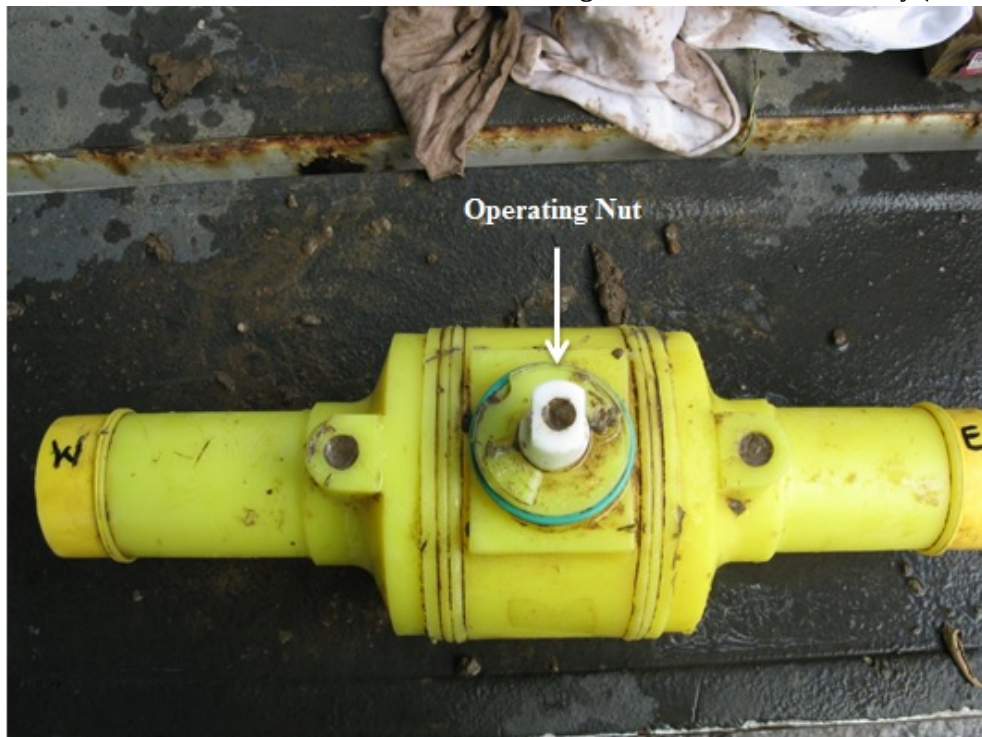
Photograph #21 – The drill bit (facing south) penetrated through the natural gas main in relation to the two electrical facilities (Staff Photo).



Photograph #22 – Section of damaged main that was removed. A quarter was placed on the removed section of main as a reference to the size of the damage. (Staff Photo)



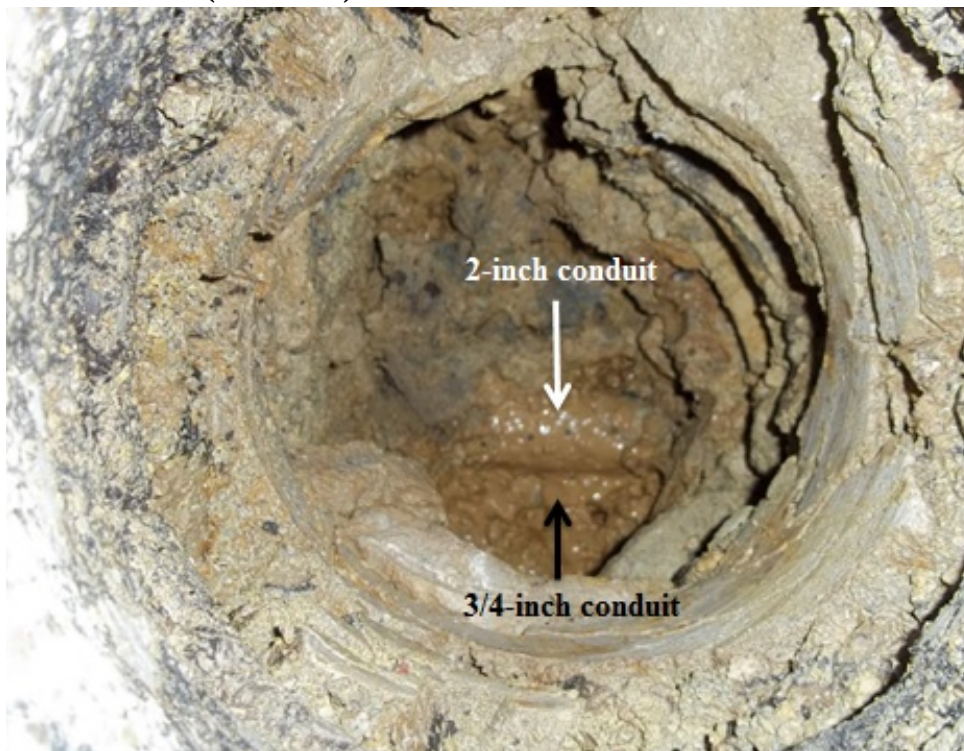
Photograph #23 – One black conduit turning north up the alley from W. 48th Street, one black conduit continuing east down W. 48th Street, and white conduit running north and south in the alley (Staff Photo)



Photograph #24 – 2-inch ball valve removed from service at W. 48th Street and Roanoke Parkway. The valve is in the closed position. (Staff Photo)



Photograph #25 – Cinder blocks and bricks removed from the east wall of JJ's Restaurant to expose void spaces beneath the floor slab. (Staff Photo)



Photograph #26 – Two facilities seen looking down into pothole #6 (Provided by MGE).

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Missouri Gas Energy, a	)	
Division of Southern Union Company,	)	File No. GS-2013-0400
Concerning a Natural Gas Incident at 910	)	
West 48 th Street in Kansas City, Missouri	)	

AFFIDAVIT OF ROBERT R. LEONBERGER

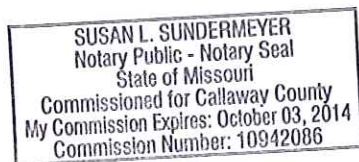
STATE OF MISSOURI)
) ss
COUNTY OF COLE)

Robert R Leonberger, of lawful age, on oath states: that he participated in the preparation of the foregoing Staff Report, to be presented in the above case; that the information in the Staff Report was provided to him; that he has knowledge of the matters set forth in such Staff Report; and that such matters are true to the best of his knowledge and belief.



Robert R Leonberger

Subscribed and sworn to before me this 6th day of February, 2014.





Notary Public


Notary Public