MISSOURI PUBLIC SERVICE COMMISSION

STAFF's GAS INCIDENT REPORT

1106 The Paseo
Kansas City, Missouri
July 16, 2018 Natural Gas Incident

Spire Missouri Inc. d/b/a Spire Missouri West

Case No. GS-2019-0015

Commission Staff Division
Safety Engineering Department
July 31, 2019 - Jefferson City, Missouri

** Denotes Confidential Information **

TABLE OF CONTENTS OF
STAFF's GAS INCIDENT REPORT
SPIRE MISSOURI WEST
CASE NO. GS-2019-0015

STAFF's GAS INCIDENT REPORT

SPIRE MISSOURI WEST

CASE NO. GS-2019-0015

I. EXECUTIVE SUMMARY

At approximately 10:23 a.m. Central Daylight Time ("CDT") on July 16, 2018, a natural gas fire occurred in and around an excavation near 1106 The Paseo in Kansas City, Missouri[1] resulting in injuries to two individuals performing work on the natural gas pipeline.[2] The natural gas system in the immediate vicinity of 1106 The Paseo was undergoing abandonments[3], replacements[4], and upgrades[5] during the time immediately before and after this incident. The work being performed in the immediate vicinity of 1106 The Paseo was part of a larger project that included the replacement of the cast iron ("CI") main with a new two-inch diameter polyethylene ("PE") main, and upgrading the existing three-inch PE main's operating pressure. The two-inch diameter steel service line[6] at 1106 The Paseo was to be abandoned and replaced by a new one-inch diameter PE service line.[7] The incident occurred while a three-person work crew was abandoning the existing service line to 1106 The Paseo.[8]

The individuals performing the work were employed by a contractor, ** _____ **, hereafter referred to as "Contractor", working for Spire Missouri West ("Spire" or

[1] Spire response to Staff Data Requests 0051 and 0067.2.

[2] Spire response to Staff Data Request 0013.2.

[3] "Abandoned" means permanently removed from service (4 CSR 240-40.030(1)(B)1.).

[4] The term "replacement" is used in the context of: "a new fixed asset or portion of an asset that takes the place of a discarded one" (Webster's Third New International Dictionary, Unabridged, Copyright 1976 by G. & C. Merriam Co., definition 2.b.). Additionally, there are regulatory requirements regarding replacement of certain pipe materials. General requirements for required replacement programs are addressed in 4 CSR 240-40.030(15).

[5] "Upgrade" is a term used by Spire for a verification procedure used to increase operating pressure in instances where an increase of Maximum Allowable Operating Pressure as defined in 4 CSR 240-40.030(1)(B) is not required. The term "upgrading" is not synonymous with "uprating" as detailed in 4 CSR 240-40.030(11). Spire provided a copy of its verification procedure for this project in response to Staff Data Request 0006.

[6] Service to 1106 The Paseo was provided by a two-inch diameter PE tee from the 3-inch PE main, which utilized a transition fitting to transition to a two-inch diameter steel service. This two-inch diameter steel service ran approximately forty-one (41) feet to the meter located on the northeast corner of 1106 The Paseo.

[7] Spire response to Staff Data Request 0001.

[8] Spire response to Staff Data Request 0001.

"The Company"), formerly known as Missouri Gas Energy ("MGE"), the natural gas service provider in Kansas City, Missouri.[9]

** An _____ ** employed by Spire, observed the fire and called for emergency responders and then called the Spire security center to report the incident.[10] Around the same time, a Kansas City fire battalion chief noticed the incident while driving by and stopped to assist.[11] An ambulance from The University of Kansas Hospital arrived on site at approximately 10:28 a.m. CDT and transported the injured individuals to the hospital.[12] At approximately 10:30 a.m. CDT, a Contractor employee stopped the flow of gas by squeezing-off a 3-inch plastic main[13] at an excavation located near the intersection of East 11th Street and The Paseo. Spire's security center was notified of the incident at approximately 10:30 a.m. CDT and was informed that Kansas City police and fire were already notified. The Spire Construction Supervisor left for the incident site, and arrived at approximately 10:50 a.m. CDT. Two Contractor Managers arrived at the scene at approximately 10:55 and 11:00 a.m. CDT.[14] The Kansas City Fire Department was on site at 11:00 a.m. CDT.[15] A second Contractor crew was later called to the incident site to complete work on the 1100 block of The Paseo.[16]

The Safety Engineering Department Staff ("Staff") was notified of the incident at approximately 1:00 p.m. CDT on July 16, 2018, and started its investigation at that time. On July 19, 2018, Staff filed a motion recommending that the Commission establish a case for purposes of receiving a report resulting from Staff's investigation of the incident, which was granted on July 25, 2018.

During its investigation, Staff learned that one of the Contractor work crew members cut the plastic portion of the existing service line with a ratchet pipe-cutting tool without first

[9] Natural gas service in Kansas City, Missouri is provided by Spire Missouri West ("Spire"), formerly known as Missouri Gas Energy ("MGE").

[10] Spire response to Staff Data Request 0002.

[11] Spire response to Staff Data Request 0013.

[12] Spire response to Staff Data Requests 0002 and 0012.1.

[13] Spire response to Staff Data Request 0004.

[14] Spire response to Staff Data Request 0002.

[15] Spire response to Staff Data Request 0002.

[16] Spire response to Staff Data Request 0002.

stopping the flow of natural gas. Cutting the service line without first stopping the flow of natural gas resulted in natural gas escaping from the open line into the atmosphere.[17] When this Contractor work crew member was unable to insert a fitting into the open line to stop the flow of natural gas, he used an electric reciprocating saw[18] to cut the steel portion of the service line. Within a few seconds, an ignition occurred.[19] Based on Staff's investigation, the electric reciprocating saw was the probable source of ignition in this incident. As a result of the ignition, two of the Contractor work crew members were injured by the fire; one was treated and released, the other required inpatient hospitalization.[20]

In Spire's Pipeline and Hazardous Material Safety Administration ("PHMSA") 7100.1 incident report[21] submitted in compliance with 4 CSR 240-40.020(5), Spire identified the apparent cause of the incident as: "Incorrect Operation", specifically "Failure to follow proper procedure when performing a service line replacement."[22] Based on Staff's investigation, Staff agrees that "Incorrect Operation", specifically failure to follow proper procedures, was the probable cause of this incident.

For more detailed information of the incident, see Appendix A. (Note: Before Staff's Incident Report was finalized, Appendices A to D, "Detailed Discussion Of Facts And Staff's Investigation", "Figures", "Photographs", and "Lessons Learned", were provided to Spire for Spire's review and submission of corrections by Spire to Staff regarding the factual content and the identification of confidential information in Appendices A to D. Spire reviewed Staff's transmittal of Appendices A to D and provided a response identifying suggested corrections to certain Staff factual statements. Staff considered all of Spire's suggestions before finalizing its Appendices A to D.)

I. Executive Summary Staff Experts: Clinton L. Foster and Kathleen A. McNelis, PE

[17] Attachment to Spire response to Staff Data Request 0025.

[18] In Spire responses and Spire Attachments to responses Staff Data Requests, this device is sometimes referred to as a "Sawzall." See Appendix C, Photographs 1 and 2.

[19] Based on Attachment to Spire response to Staff Data Request 0025.

[20] Spire response to Staff Data Request 0013.2.

[21] Incident reports are required by 4 CSR 240-40.020(6) for federally reportable incidents.

[22] Attachment provided with Spire response to Staff Data Request 0067.2.

A. Violation of Commission Pipeline Safety Rules

As a result of its investigation, Staff found that sufficient facts/information exist to assert the following violations:

1. The use of an electric reciprocating saw in the conditions present at the time of the incident was a violation of 4 CSR 240-40.030(13)(X)1.[23], 4 CSR 240-40.030(13)(X)2.[24] and Spire Missouri West (formerly MGE) Standard 2540D[25], a procedure that was in place to meet the requirements of 4 CSR 240-40.030(13)(X) as required by 4 CSR 240-40.030(12)(C)2.A.[26, 27]

   (See: III.B. *Prevention of Accidental Ignition*: Staff Experts Brian J. Buchanan and Kathleen A. McNelis, PE)

2. Failure to have a working fire extinguisher available at the job site was a violation of 4 CSR 240-40.030(13)(X)1.,[28] and Spire Missouri West (formerly MGE) Standard 2540D, a procedure that was in place to meet the requirements of 4 CSR 240-40.030(13)(X) as required by 4 CSR 240-40.030(12)(C)2.A.[29]

   (See: III.B. *Prevention of Accidental Ignition*: Staff Experts Brian J. Buchanan and Kathleen A. McNelis, PE)

[23] 4 CSR 240-40.030(13)(X)1. requires that when a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.

[24] 4 CSR 240-40.030(13)(X)2. states that gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas in the area of work.

[25] Construction Standard 2540D addresses prevention of accidental ignition and was provided to Staff in response to Staff Data Request 0009.

[26] 4 CSR 240-40.030(12)(C)2.A. requires that the manual required by paragraph 4 CSR 240-40.030(12)(C)1. must include procedures for safety during normal operating, maintaining and repairing the pipeline in accordance with each of the requirements of sections (12), (13) and (14).

[27] Since 4 CSR 240-40.030(12)(C)2.A. requires that a procedure must be included, if applicable, in the manual required by paragraph 4 CSR 240-40.030(12)(C)1. to provide safety during maintenance and normal operations, failing to follow that procedure is also a violation of 4 CSR 240-40.030(12)(C)1., which requires that each operator follow its manual of written procedures. Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

[28] 4 CSR 240-40.030(13)(X)1. requires that when a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.

[29] Since 4 CSR 240-40.030(12)(C)2.A. requires that a procedure must be included, if applicable, in the manual required by paragraph 4 CSR 240-40.030(12)(C)1. to provide safety during maintenance and normal operations, failing to follow that procedure is also a violation of 4 CSR 240-40.030(12)(C)1., which requires that each operator follow its manual of written procedures. Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

3. Instances of failure to follow Spire Missouri West (formerly MGE) Standard 3545D[30], a procedure necessary to meet the requirements of 4 CSR 240-40.030(12)(C)2.J.[31] to protect workers in a hazardous atmosphere, were violations of 4 CSR 240-40.030(12)(C)1.[32, 33]

(See: III.C. *Protection of Personnel*: Staff Experts Brian J. Buchanan and John D. Kottwitz)

More specifically:

a. Failure to have a working fire extinguisher in an emergency was a failure to follow Spire Missouri West (formerly MGE) Standard 3545D, a procedure necessary to meet the requirements of 4 CSR 240-0.030(12)(C)2.J. to protect workers in a hazardous atmosphere, which was a violation of 4 CSR 240-40.030(12)(C)1.

(See: III.C. *Protection of Personnel*: Staff Experts Brian J. Buchanan and John D Kottwitz)

b. Failure to test the excavation with a combustible gas indicator ("CGI") when there was reason to suspect the presence of a flammable gas was a failure to follow Spire Missouri West (formerly MGE) Standard 3545D, a procedure necessary to meet the requirements of 4 CSR 240-40.030(12)(C)2.J. to protect workers in a hazardous atmosphere, which was a violation of 4 CSR 240-40.030(12)(C)1.

(See: III.C. *Protection of Personnel*: Staff Experts Brian J. Buchanan and John D. Kottwitz.)

---

[30] O&M Standard 3545 D addresses hazardous atmospheres and was provided to Staff in response to Staff Data Request 0010.

[31] 4 CSR 240-40.030(12)(C)2.J. requires that the manual of written procedures required by 4 CSR 240-40.030(12)(C)1. must include procedures to take adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making available, when needed at the excavation, emergency rescue equipment including a breathing apparatus and a rescue harness and line.

[32] 4 CSR 240-40.030(12)(C)1. requires that each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response. O&M Standard 3545 D is one of these written procedures.

[33] Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

c. Failure to assign an additional person to observe work in a hazardous environment was a failure to follow Spire Missouri West (formerly MGE) Standard 3545D, a procedure necessary to meet the requirements of 4 CSR 240-40.030(12)(C)2.J. to protect workers in a hazardous atmosphere, which was a violation of 4 CSR 240-40.030(12)(C)1.

(See: III.C. *Protection of Personnel*: Staff Experts Brian J. Buchanan and John D. Kottwitz.)

d. Although a fire-resistant suit, fire-resistant hood, and a supplied air respirator were available at the construction site at the time of the incident, the Contractor work crew did not utilize this equipment.[34] The Contractor work crew did not have a safety retrieval harness and life lines available at the site.[35] Failure to use required personal protective equipment or respiratory protection or have available rescue equipment was a failure to follow Spire Missouri West (formerly MGE) Standard 3545D, a procedure necessary to meet the requirements of 4 CSR 240-40.030(12)(C)2.J. to protect workers in a hazardous atmosphere, which was a violation of 4 CSR 240-40.030(12)(C)1.

(See: III.C. *Protection of Personnel*: Staff Experts Brian J. Buchanan and John D. Kottwitz.)

4. Failure to follow Spire Missouri West (formerly MGE) Standard 2240E for mechanical joining was a violation of 4 CSR 240-40.030(6)(B)2., a requirement that each joint must be made in accordance with written procedures that have been proved by test or experience to produce a strong gastight joint (because the flow of gas was not terminated as required in Spire's written procedure).[36]

(See: III.D. *Mechanical Joining*: Staff Experts Clinton L. Foster and Kathleen A. McNelis, PE)

[34] Spire response to Staff Data Request 0025.

[35] Spire response to Staff Data Request 0010.3.

[36] Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

5. ** _____.
_____ ** was a violation of 49 CFR 199.105(b)1.[37] as adopted by the Commission by promulgation of 4 CSR 240-40.080.
(See: III.G. *Drug and Alcohol Testing*: Staff Expert Kathleen A. McNelis, PE)
6. ** _____
_____ ** was a violation of 49 CFR 199.225(a)1.[38] as adopted by the Commission by promulgation of 4 CSR 240-40.080.
(See: III.G. *Drug and Alcohol Testing*: Staff Expert Kathleen A. McNelis, PE)
7. Failure to ensure that all work completed on its pipelines by its contractor complies with 4 CSR 240-40.030 was a violation of 4 CSR 240-40.030(12)(B)3.
(See: III.H. *Spire Oversight of Contractor*: Staff Expert John D. Kottwitz)
8. Failure to include procedures for the contractor oversight requirements of 4 CSR 240-40.030(12)(B)3. in Spire's procedural manual as required by 4 CSR 240-40.030(12)(C)1.[39] was a violation of 4 CSR 240-40.030(12)(C)2.A.[40, 41]
(See: III.H. *Spire Oversight of Contractor*: Staff Expert John D. Kottwitz)

Staff will pursue the appropriate actions related to its assertions that rules were violated.

[37] 49 CFR 199.105(b)1. Requires post-accident testing as soon as possible but no later than 32 hours after an accident, an operator must drug test each surviving covered employee whose performance of a covered function either contributed to the accident or cannot be completely discounted as a contributing factor to the accident. An operator may decide not to test under this paragraph but such a decision must be based on specific information that the covered employee's performance had no role in the cause(s) or severity of the accident.

[38] 49 CFR 199.225(a)1. Requires that as soon as practicable following an accident, each operator must test each surviving covered employee for alcohol if that employee's performance of a covered function either contributed to the accident or cannot be completely discounted as a contributing factor to the accident. The decision not to administer a test under this section must be based on specific information that the covered employee's performance had no role in the cause(s) or severity of the accident.

[39] 4 CSR 240-40.030(12)(C)1. requires that each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response.

[40] 4 CSR 240-40.030(12)(C)2.A. requires that the manual required by paragraph 4 CSR 240-40.030(12)(C)1. must include procedures for operating, maintaining and repairing the pipeline in accordance with each of the requirements of sections 4 CSR 240-40.030(12), (13) and (14).

[41] Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to have this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

B. Staff Recommendations for Areas Needing Improvement

Staff also asserts that sufficient facts/information exist to recommend various areas of improvement for Spire in an effort to minimize the possibility of recurrence of the events that caused or contributed to this incident. In Section IV of this Report, Staff delineates its various recommendations, and recommends the Commission require Spire to file an action plan to address Staff's recommendations.

Staff Experts: Kathleen A. McNelis, PE, John D. Kottwitz, Clinton L. Foster and Brian J. Buchanan

II. PURPOSE AND SCOPE OF STAFF'S INVESTIGATION

The purpose and scope of Staff's investigation was to:

- Identify the probable cause(s) of the incident,
- Investigate, analyze and determine if there have been violations of Commission Rules related to:
  - Incident Reporting Requirements in 4 CSR 240-40.020;
  - Missouri Pipeline Safety Standards in 4 CSR 240-40.030, including but not limited to the operator's[42] emergency response and failure investigation, and
  - Drug and Alcohol Testing requirements in 4 CSR 240-40.080; and
- Make recommendations, as applicable to Spire with an objective of minimizing the possibility of recurrence.

II. Purpose and Scope of Staff's Investigation Staff Expert: Kathleen A. McNelis, PE

[42] "Operator" is defined in 4 CSR 240-40.030(1)(B)26 as "a person who engages in the transportation of gas." "Person" is defined in 4 CSR 240-40.030(1)(B)27 as "any individual, firm, joint venture, partnership, corporation, association, county, state, municipality, political subdivision, cooperative association, or joint stock association, and including any trustee, receiver, assignee, or personal representative of them." Transportation of gas" is defined in 4 CSR 240-40.030(1)(B)27 as "the gathering, transmission, or distribution of gas by pipeline or the storage of gas in Missouri."

III. STAFF'S INVESTIGATION - ANALYSIS OF INCIDENT AND CONCLUSIONS

A. Natural Gas Escape and Ignition

Analysis:

At approximately 10:23 a.m. CDT on July 16, 2018, a natural gas fire occurred in and around an excavation near 1106 The Paseo in Kansas City, Missouri.[43] The approximate location is shown in Appendix B, Figure 1. At the time of the incident, a three-person Contractor work crew was assigned to tie-in[44] three new service lines to the natural gas main running parallel to The Paseo, and to abandon the existing services lines to 1100, 1106 and 1116 The Paseo.[45] The incident occurred while the Contractor work crew was abandoning the existing service line to 1106 The Paseo.[46]

An approximately 3-foot by 5-foot working space was excavated to a depth of about 3 feet to provide access to the service line and main[47] (See Appendix B, Figure 2 and Appendix C, Photograph 1). When the incident occurred, a member of the Contractor work crew ** _____ **, ("Contractor Employee A") was in the excavation working to abandon the service line, a contractor ** _____ **, ("Contractor Employee B") was standing nearby, and a contractor ** _____ **, ("Contractor Employee C") was in his company truck.[48] Two additional Contractor personnel were also working in the vicinity of 1106 The Paseo at the time of the incident: ** _____ ** ("Contractor Employee D") and ** _____ ** ("Contractor Employee E"). Contractor Employee D was walking back to 1106 The Paseo from his truck at the time of the incident.[49] Prior to the incident, Contractor Employee D was working on the meter set for 1106 The Paseo.[50]

[43] Spire response to Staff Data Requests 0051 and 0067.2.

[44] "Tie-in" means to attach a new service line to the main and allowing natural gas to flow through the new service line, thereby "tying-in" the service line to natural gas service.

[45] Spire response to Staff Data Request 0025.

[46] Spire response to Staff Data Request 0001.

[47] Spire response to Staff Data Request 0010.1 and Spire Attachment to response to Staff Data Request 0002.

[48] Spire response to Staff Data Requests 0003, 0003.1 and 0013.1.

[49] Spire response to Staff Data Request 0003.

[50] Spire response to Staff Data Request 0003.1.

Contractor Employee A cut the plastic portion of the existing service line with a ratchet pipe-cutting tool without stopping the flow of natural gas to the main or service line, which resulted in natural gas escaping from the open line into the atmosphere.[51] When Contractor Employee A was unable to insert a fitting into the open line to stop the flow of natural gas, he used an electric reciprocating saw[52] (See Appendix C, Photographs 1 and 2) to cut the steel portion of the service line. Within a few seconds (at around 10:23 a.m. CDT), an ignition occurred and the natural gas fire began resulting in serious burns to both Contractor Employee A and Contractor Employee B.[53]

Conclusion:

Natural gas escaped because the service line was cut without first stopping the flow of natural gas. The fire and resulting injuries occurred during the use of the electric reciprocating saw in a combustible atmosphere.

III. A. Natural Gas Escape and Ignition Staff Expert: Clinton L. Foster

B. Prevention of Accidental Ignition

Analysis:

4 CSR 240-40.030(13)(X) requires that each operator shall take steps to minimize the danger of accidental ignition of gas in any structure or area where the presence of gas constitutes a hazard of fire or explosion, including the following:

> 1. When a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided;
>
> 2. Gas or electric welding or cutting may not be performed on any pipe or pipe components that contain a combustible mixture of gas and air in the area of work; and
>
> 3. Warning signs shall be posted, where appropriate.

[51] Spire Attachment to response to Staff Data Request 0025.

[52] In Spire responses and Attachments to Spire responses to Staff Data Requests, this tool is sometimes referred to as a "Sawzall."

[53] Based on Attachment to Spire response to Staff Data Request 0025.

Additionally, 4 CSR 240-40.030(12)(C)1. requires each operator to prepare and follow a manual of written procedures for conducting operations and maintenance activities[54] and for emergency response, and 4 CSR 240-40.030(1)(G)3. requires each operator to maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under 4 CSR 240-40.030. 4 CSR 240-40.030(12)(C)2.A. requires, among other things, that the procedural manual required by 4 CSR 240-40.030(12)(C)1. must include procedures for each applicable requirement in 4 CSR 240-40.030(13) to provide safety during maintenance and normal operations. This would include the requirements of 4 CSR 240-40.030(13)(X). Failure to follow a procedure that was written to comply with the requirements of 4 CSR 240-40.030(12)(C) is therefore a violation of 4 CSR 240-40.030(12)(C)1. and 4 CSR 240-40.030(1)(G)3.

Spire's procedures addressing the requirements of 4 CSR 240-40.030(13)(X) are in Spire Missouri West (formerly MGE) Construction Standard 2540D, Prevention of Accidental Ignition.[55]

Spire Missouri West (formerly MGE) Construction Standard 2540D requires, among other things that:

- Whenever it is necessary to perform any work in an area which might contain a gas-air mixture, certain precautionary steps shall be taken, including securing the immediate area from the general public (Standard 2540D, paragraph 2.7.1.1), and the use of signs and barricades at the job site (Standard 2540D, paragraph 2.7.1.2).
- Whenever it is necessary to perform any work in an area which might contain a gas-air mixture, a fire extinguisher shall be placed upwind and in close proximity to the job site so as to readily accessible in an emergency. In some cases, it may be prudent to request the fire department stand by at the location (Standard 2540D, paragraph 2.7.1.3).

[54] This manual is frequently referred to as an Operations and Maintenance ("O&M") Manual.

[55] A copy was provided by Spire in response to Staff Data Request 0009.

- When gas is being vented into the open air, potential sources of ignition shall be removed from the area (Standard 2540D, Section 2.3).

At the time of the incident, a fire extinguisher was at the jobsite in the vicinity of the excavation. The fire extinguisher was not used or attempted to be used to extinguish the fire.[56] However, during the Contractor's investigation of the failure, it was determined that the fire extinguisher was not properly charged at the time of the fire.[57] Spire stated in response to Staff Data Request 0037.1: "One day before the incident, [Contractor Employee C] told the [Contractor] general foreman that he needed to go to the yard to get a replacement fire extinguisher, but he failed to do so."[58]

Staff reviewed Spire Missouri West (formerly MGE) Construction Standard 2540D and found that it met the minimum requirements with respect to 4 CSR 240-40.030(12)(C)2.A. and 4 CSR 240-40.030(13)(X).

Staff investigated the actions taken during this incident. In Staff's opinion[59], the following actions were not in compliance with the requirements of 4 CSR 240-40.030(13)(X), or with Spire Missouri West (formerly MGE) Construction Standard 2540D procedures to ensure compliance with regulatory requirements.

1. Use of Electric Saw in a Hazardous Atmosphere

Once Contractor Employee A cut the plastic portion of the existing service line with a ratchet pipe-cutting tool, natural gas was escaping from the open line into the atmosphere. When this occurred, ignition sources should have been removed from the area and no electric cutting should have been performed. The use of an electric reciprocating saw in this environment was a violation of 4 CSR 240-40.030(13)(X)1., which requires that each potential source of ignition be removed from the area when a hazardous amount of gas is being vented into open air, and 4 CSR 240-40.030(13)(X)2., which prohibits electric cutting on any pipe or pipe components that contain a combustible mixture of gas and air in the area of work.

[56] Spire response to Staff Data Request 0033.

[57] Spire response to Staff Data Request 0037.

[58] Spire response to Staff Data Request 0037.1.

[59] As supported by Spire's responses to Staff Data Requests 0031, 0037.2, 0038, 0040.1, 0049, and 0055, and the Exhibit Spire provided in response to Staff Data Request 0067.2.

2. Failure to Provide a Working Fire Extinguisher

4 CSR 240-40.030(13)(X)1. requires that a fire extinguisher must be provided when a hazardous amount of gas is being vented into open air. Paragraph 2.7.1.3 of Spire Missouri West (formerly MGE) Construction Standard 2540D requires that whenever it is necessary to perform any work in an area which might contain a gas-air mixture, a fire extinguisher shall be placed upwind and in close proximity to the job site so as to be readily accessible in an emergency. Staff's position is that to comply with these requirements, the fire extinguisher must be properly charged, and available for use. Failure to provide a working fire extinguisher was a violation of 4 CSR 240-40.030(13)(X)1.

Staff also investigated if Spire had furnished its procedures to the Contractor, and whether Contractor employees had been provided with training and the equipment necessary to implement the procedures.

Spire stated that it provided the Contractor with the entire O&M manual[60], including the Emergency Plan on December 15, 2016, and has provided the Contractor with updated Standards, as changes are made, since that time.[61]

At the time of the incident, Spire required the Contractor's employees to follow both the Spire Missouri West Operator Qualification ("OQ") Program and the Contractor's own Operator Qualification Program.[62] According to Spire, the Contractor is responsible for providing training on Spire procedures to its employees.[63] The Spire individuals who conducted the initial review of the Contractor's OQ program are no longer with Spire, and therefore the scope of those individuals' study is not known.[64]

According to information provided by Spire, each member of the Contractor work crew was trained on the operation of a fire extinguisher and was trained to verify full charge.[65]

[60] 4 CSR 240-40.030(12)(C)1. requires each operator to prepare and follow a manual of written procedures for conducting operations and maintenance activities. This manual is frequently referred to as an operations and maintenance ("O&M") manual.

[61] Spire responses to Staff Data Requests 0022 and 0023.

[62] Spire response to Staff Data Request 0039.1.

[63] Spire response to Staff Data Request 0022.

[64] Spire response to Staff Data Request 0040.

[65] Spire response to Staff Data Request 0010.2.

According to the Contractor, the fire extinguisher was not retained following the incident,[66] therefore no testing of the fire extinguisher could be performed after the incident.

Conclusion:

1. The electric reciprocating saw was the probable source of ignition in this incident.
2. The use of an electric reciprocating saw in the conditions present at the time of the incident was a violation of 4 CSR 240-40.030(13)(X)1.,[67] 4 CSR 240-40.030(13)(X)2.[68] and Spire Missouri West (formerly MGE) Standard 2540D, a procedure that is in place to meet the requirements of 4 CSR 240-40.030(13)(X) as required by 4 CSR 240-40.030(12)(C)2.A.[69]
3. Failure to have a working fire extinguisher available at the job site was a violation of 4 CSR 240-40.030(13)(X)1.,[70] and Spire Missouri West (formerly MGE) Standard 2540D, a procedure that is in place to meet the requirements of 4 CSR 240-40.030(13)(X) as required by 4 CSR 240-40.030(12)(C)2.A.[71]

III. B. Prevention of Accidental Ignition Staff Experts: Brian J. Buchanan and Kathleen A. McNelis, PE

[66] Spire response to Staff Data Request 0010.2.

[67] 4 CSR 240-40.030(13)(X)1. requires that when a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.

[68] 4 CSR 240-40.030(12)(X)2. states that gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas in are in the area of work.

[69] Since 4 CSR 240-40.030(12)(C)2.A. requires that a procedure must be included, if applicable, in the manual required by paragraph 4 CSR 240-40.030(12)(C)1. to provide safety during maintenance and normal operations, failing to follow that procedure is also a violation of 4 CSR 240-40.030(12)(C)1., which requires that each operator follow its manual of written procedures. Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

[70] 4 CSR 240-40.030(13)(X)1. requires that when a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.

[71] Since 4 CSR 240-40.030(12)(C)2.A. requires that a procedure must be included, if applicable, in the manual required by paragraph 4 CSR 240-40.030(12)(C)1. to provide safety during maintenance and normal operations, failing to follow that procedure is also a violation of 4 CSR 240-40.030(12)(C)1., which requires that each operator follow its manual of written procedures. Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow this procedure is a violation of 4 CSR 240-40.030(1)(G)3.

C. Protection of Personnel

Analysis:

- 4 CSR 240-40.030(12)(C)1. requires each operator to prepare and follow a manual of written procedures for conducting operations and maintenance activities and for emergency response.
- 4 CSR 240-40.030(1)(G)3. requires each operator to maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under 4 CSR 240-40.030.
- One of the required procedures (4 CSR 240-40.030(12)(C)2.J.) is for taking adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making available, when needed at the excavation, emergency rescue equipment including a breathing apparatus and a rescue harness and line.

Spire's procedures addressing the requirements of 4 CSR 240-40.030(12)(C)2.J. are in Spire Missouri West (formerly MGE) O&M Standard 3545D, Hazardous Atmospheres.[72]

These procedures require among other things:

- Atmospheres where a hazardous atmosphere exist or could reasonably be expected to exist, such as in or around excavations and confined spaces, shall be tested before employees enter (Standard 3545D, Section 3.0);
- In all excavations where there is reason to suspect the presence of a flammable gas (e.g., leak repair), the atmospheric environment in and around the excavation shall be tested with a combustible gas indicator ("CGI") before personnel are allowed access (Standard 3545D, Section 5.2);
- When workers are required to be within the hazardous environment there must be an additional person assigned to observe the workers' activities and warn about changes in conditions or initiate rescue activities if necessary (Standard 3545D, Section 5.4);

[72] A copy was provided in response to Staff Data Request 0010.

- In atmospheres that have been identified as hazardous additional Personal Protective Equipment ("PPE") shall include, but may not be limited to, fire retardant suit and hood, respiratory protection and rescue equipment in addition to the Personal Protective Equipment items normally required for the tasks being performed (Standard 3545D, Section 6.0); and
- A fire extinguisher shall be placed at a location upwind of the excavation and shall be staffed by an employee trained in the operation of a fire extinguisher (Standard 3545D, Section 7.2).

In response to a Staff data request asking for an explanation of how the hazardous atmosphere testing was conducted for the excavation at 1106 The Paseo, Spire responded: "Based on the [Spire] incident investigation, proper procedures were not followed at this location; therefore, hazardous atmosphere testing was not conducted but ** _____ _____ ** were trained on these procedures."[73]

Although a fire extinguisher was provided, Spire stated that it was not properly charged at the time of the fire, and that Contractor Employee C was aware that it was not ready for use.[74]

Spire's response to Staff Data Request 0010.3 indicated that Contractor Employee C failed to assign an additional person to observe the worker's activities and warn about changes in conditions.

Although a fire-resistant suit, fire-resistant hood, and an Allergo Model A-300 supplied air respirator were available at the construction site at the time of the incident, the Contractor work crew did not utilize this equipment.[75] The Contractor work crew did not have a safety retrieval harness and life lines available at the site.[76]

According to information provided by Spire, all members of the Contractor work crew were trained in the operation of a fire extinguisher and were trained to verify full charge and proper visual inspection on a daily basis and a monthly documented inspection.[77] Annual fire

[73] Spire response to Staff Data Request 0010.2.
[74] Spire response to Staff Data Request 0037.
[75] Spire response to Staff Data Request 0025.
[76] Spire response to Staff Data Request 0010.3.
[77] Spire response to Staff Data Request 0010.2.

extinguisher inspections by a third-party are maintained on the inspection tag for each fire extinguisher. The monthly inspections are also documented on the inspection tag.[78]

Since the acquisition of Missouri Gas Energy by Spire, Spire has reviewed Spire Missouri West (formerly MGE) policies and procedures with all contractors through training and has provided them with an electronic copy of all applicable procedures.[79]

Staff reviewed Spire Missouri West (formerly MGE) O&M Standard 3545D and found that it met the minimum requirements with respect to 4 CSR 240-40.030(12)(C)2.J.

In Staff's opinion, the following actions or failures to act were not in compliance with Spire's procedures in Spire Missouri West (formerly MGE) O&M Standard 3545D that are required to be followed by 4 CSR 240-40.030(12)(C)1.:

1. *Failure to Test the Atmosphere for Combustible Mixture of Gas*

Section 5.2 of Spire Missouri West (formerly MGE) O&M Standard 3545D, Hazardous Atmospheres (Spire's procedure to comply with the requirements of 4 CSR 240-40.030(12)(C)2.J.) requires that in all excavations where there is reason to suspect the presence of a flammable gas (e.g., leak repair), the atmospheric environment in and around the excavation shall be tested with a CGI before personnel are allowed access.

Since natural gas was escaping from the open line into the atmosphere of the excavation, there was reason to suspect the presence of a flammable gas. In response to a Staff data request asking for an explanation of how the hazardous atmosphere testing was conducted for the excavation at 1106 The Paseo, Spire responded: "Based on the incident investigation, proper procedures were not followed at this location; therefore, hazardous atmosphere testing was not conducted."[80]

The atmosphere in the excavation was hazardous as demonstrated by the ignition and fire. Based on Staff's investigation, the hazardous atmosphere was not tested with a CGI as required by Spire's procedure. Failure to follow this procedure is a violation of 4 CSR 240-40.030(12)(C)1.

[78] Spire response to Staff Data Request 0036.3.
[79] Spire response to Staff Data Request 0040.
[80] Spire response to Staff Data Request 0010.2.

2. Failure to Provide a Working Fire Extinguisher

Section 7.2 of Spire Missouri West (formerly MGE) O&M Standard 3545D, Hazardous Atmospheres (Spire's procedure to comply with the requirements of 4 CSR 240-40.030(12)(C)2.J.) requires that a fire extinguisher shall be placed at a location upwind of the excavation and shall be staffed by an employee trained in the operation of a fire extinguisher.

Since gas was escaping from the open line into the atmosphere of the excavation, it would be reasonable to expect that a hazardous atmosphere could exist. Although a fire extinguisher was provided, Spire stated that it was not properly charged at the time of the fire, and that Contractor Employee C was aware that it was not ready for use.[81] Thus it appears that a working fire extinguisher was not provided at the excavation as required by Spire's procedure. Failure to follow this procedure is a violation of 4 CSR 240-40.030(12)(C)1.

3. Failure to Assign Additional Person to Observe Work in Hazardous Environment.

Section 5.4 of Spire Missouri West (formerly MGE) O&M Standard 3545D, Hazardous Atmospheres (Spire's procedure to comply with the requirements of 4 CSR 240-40.030(12)(C)2.J.) requires that when workers are required to be within a hazardous environment there must be an additional person assigned to observe the workers' activities and warn about changes in conditions or initiate rescue activities if necessary.

Since gas was escaping from the open line into the atmosphere of the excavation, it would be reasonable to expect that a hazardous environment could exist. Based on Staff's investigation, no additional person was assigned to observe the worker's activities and warn about changes in conditions as required by Spire's procedure. Failure to follow this procedure is a violation of 4 CSR 240-40.030(12)(C)1.

4. Failure to Use Required Personal Protective Equipment

Section 6.0 of Spire Missouri West (formerly MGE) O&M Standard 3545D, Hazardous Atmospheres (Spire's procedure to comply with the requirements of 4 CSR 240-40.030(12)(C)2.J.) requires that in atmospheres that have been identified as hazardous, additional Personal Protective Equipment ("PPE") shall include, but may not be limited to, fire

[81] Spire response to Staff Data Request 0037.

retardant suit and hood, respiratory protection and rescue equipment in addition to the PPE items normally required for the tasks being performed.

Although the Contractor work crew did not conduct the appropriate testing to identify the atmosphere as hazardous (See above III.B. *Prevention of Accidental Ignition*), the presence of blowing natural gas in an excavation could reasonably be assumed to be a hazardous atmosphere in the absence of testing. The ignition that resulted in this incident confirmed that a hazardous atmosphere was present. A fire-resistant suit, fire-resistant hood, and an Allergo Model A-300 supplied air respirator were available at the construction site at the time of the incident,[82] but the Contractor work crew did not use this equipment[83] as required by Spire's procedure. The Contractor work crew did not have a safety retrieval harness and life lines available at the site[84] as required by Spire's procedure. Failure to follow this procedure is a violation of 4 CSR 240-40.030(12)(C)1.

Staff also investigated if Spire had furnished its procedures to the Contractor, and whether Contractor employees had been provided with training and the equipment necessary to implement the procedures. According to information provided by Spire, Spire provided the Contractor with the entire O&M manual, including the Emergency Plan on December 15, 2016, and has provided the Contractor with updated Standards, as changes are made, since that time.[85]

According to information provided by Spire, each member of the Contractor work crew was trained on:

a. Procedures to test for hazardous atmospheres.[86]
b. Use of PPE.[87]
c. The operation of a fire extinguisher and to verify full charge and proper visual inspection on a daily basis with a monthly documented inspection and annual third-party inspection.[88]

[82] Spire response to Staff Data Request 0010.3.
[83] Spire response to Staff Data Request 0025.
[84] Spire response to Staff Data Request 0010.3.
[85] Spire responses to Staff Data Requests 0022 and 0023.
[86] Spire responses to Staff Data Requests 0010, 0010.1 and 0010.2.
[87] Spire response to Staff Data Request 0010.3, 0010.4 and 0031.2.
[88] Spire response to Staff Data Request 0010.2.

According to information provided by Spire, at the time of the incident, the Contractor work crew was provided with the following equipment:

a. A Bascom-Turner, Gas Sentry CGI-201[89] for testing hazardous atmospheres.
b. A fire-resistant suit, a fire-resistant hood, and an Allergo Model A-300 supplied air respirator available to them at the construction site at the time of the incident.[90]
c. A fire extinguisher.

However, it was determined during the investigation that the fire extinguisher was not properly charged at the time of the fire.[91] Further, according to information provided by Spire, the Contractor work crew did not have a safety retrieval harness and life lines available at the site at the time of the incident.[92]

Conclusion:

1. Failure to follow Spire Missouri West (formerly MGE) O&M Standard 3545D, that was written for compliance with the requirements of 4 CSR 240-40.030(12)(C)2.J., was a likely contributing factor to the incident. If the required procedures had been followed to protect personnel working in trenches from the hazards of unsafe accumulations of natural gas, injuries from the fire could have been avoided or been less severe.
2. Failure to follow Spire Missouri West (formerly MGE) O&M Standard 3545D that was written for compliance with the requirements of 4 CSR 240-40.030(12)(C)2.J. was a violation of 4 CSR 240-40.030(12)(C)1.[93]

III. C. Protection of Personnel Staff Experts: Brian J. Buchanan and John D. Kottwitz

[89] Spire response to Staff Data Request 0010.3.

[90] Spire response to Staff Data Request 0010.3.

[91] Spire response to Staff Data Request 0037.

[92] Spire response to Staff Data Request 0010.3.

[93] Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow the procedure is additionally a violation of 4 CSR 240-40.030(1)(G)3.

D. Mechanical Joining

Analysis:

4 CSR 240-40.030(6)(B)2. requires that each joint must be made in accordance with written procedures that have been proved by test or experience to produce strong gastight joints. Specific requirements for joining plastic pipe are provided in 4 CSR 240-40.030(6)(F). Specific requirements related to joining plastic pipe with mechanical joints are provided in 4 CSR 240-40.030(6)(F)4. Additionally, the general requirements for connections to main piping are provided in 4 CSR 240-40.030(8)(J).

4 CSR 240-40.030(1)(G)3. requires that each operator shall maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule. Spire's procedure to comply with the requirements of 4 CSR 240-40.030(6)(B) General, (6)(F) Plastic Pipe, and (8)(J) Service Lines is provided in Spire Missouri West (formerly MGE) Construction Standard 2240E. Paragraph 7.3.1[94] of Spire Missouri West (formerly MGE) Construction Standard 2240E, Mechanical Joining, requires that the flow of gas be terminated when PE pipe size ½-inch CTS[95] ("Copper Tube Size") through 2-inch IPS[96] ("Iron Pipe Size") are to be joined using a Permasert™ coupling[97].

Based on the response to Staff Data Request 0025, at the time of the incident, the Contractor employee completing the abandonment of the existing service line to 1106 The Paseo was attempting to install a Permasert™ coupling as a cap for the 2-inch diameter plastic stub remaining on the main from the existing service line.

Spire's procedure (Spire Missouri West (formerly MGE) Construction Standard 2240E) requires that when using a Permasert™ coupling to join pipe of this size, the flow of gas must be terminated. The method employed by the Contractor work crew to install the Permasert™

[94] In response to Staff Data Request 0063, Spire indicated that the sections of Spire Missouri West (formerly MGE) Construction Standard 2240E that were applicable to the work being completed at 1106 The Paseo were Section 2.0-General and Section 7.0-Mechanical Joints for Plastic.

[95] CTS means Copper Tube Size. CTS polyethylene pipe is sized like copper pipe and is also manufactured with the Outside Diameter (OD) as the controlling dimension. Copper Tube Size or CTS pipe is commonly referred to as tubing.

[96] IPS means Iron Pipe Size. Polyethylene pipe sizes identified by IPS diameters designate the nominal inside diameter for 12-inch and smaller IPS pipe, and outside diameter for 14-inch and larger IPS pipe.

[97] Permasert™ is a registered trademark for a type of mechanical coupling manufactured by Elster Perfection.

coupling did not include terminating the flow of natural gas and was therefore inconsistent with Spire's procedure established to comply with the requirements of 4 CSR 240-40.030(6)(B)2.

Conclusion:

At the time the incident occurred, the Contractor was attempting to install a mechanical joint in a manner that violated Spire Missouri West (formerly MGE) Construction Standard 2240E, a procedure in place to comply with the requirements of 4 CSR 240-40.030(6)(B)2.,[98] which requires that each joint must be made in accordance with written procedures that have been proved by test or experience to produce strong gastight joints.

III. D. Mechanical Joining Staff Experts: Clinton L. Foster and Kathleen A. McNelis, PE

E. Operator Qualifications ("OQ")

Analysis:

4 CSR 240-40.030(12)(D) Qualification of Pipeline Personnel prescribes the minimum requirements for operator qualification of individuals performing covered tasks on a pipeline facility including contractors acting on behalf of the operator.[99] A summary of the relevant requirements and definitions in 4 CSR 240-40.030(12)(D) can be found in Appendix E of this Report. Spire provided copies of ** _____ _____ ** and ** _____ ____ ** in response to Staff Data Request 0039. These documents are the standards used by Spire and ** _____ ** to comply with the requirements of 4 CSR 240-40.030(12)(D).

Contractor employees were required to follow ** _____ _____ ** and were expected to follow ** _____ **.[100] ** _____

[98] Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to follow the procedure is additionally a violation of 4 CSR 240-40.030(1)(G)3.

[99] 4 CSR 240-40.030(12)(D)1.A.states, "This subsection applies to all individuals who perform covered tasks, regardless of whether they are employed by the operator, a contractor, a subcontractor, or any other entity performing covered tasks on behalf of the operator."

[100] Spire response to Staff Data Request 0039.1.

_____
_____[101] _____
_____[102] _____
_____ **[103]

Spire indicated that a review of the Contractor's operator qualification program, ** _____ **, was completed by Spire at some point prior to the Contractor performing any work on Spire's pipeline facilities, but the individuals who conducted the initial review are no longer with Spire, and the scope of these individuals' examination is unknown.[104] Spire has not conducted a subsequent review of the Contractor's operator qualification program.[105]

Spire stated that in order to ensure through evaluation that Contractor employees are qualified and have the necessary knowledge and skills to perform tasks in a manner that ensures the safe operation of pipeline facilities; Spire has reviewed Spire policies and procedures with all contractors through training and has provided them with an electronic copy of all applicable Spire procedures.

4 CSR 240-40.030(12)(D)8.A.(II) requires that qualification records shall include identification of the covered tasks the individual is qualified to perform. Staff requested from Spire the identification of the covered tasks each Contractor employee working at the project at the 1100 block of The Paseo was qualified to perform.[106] In response, Spire provided qualification records of the individuals performing the covered tasks at the project at the 1100 block of The Paseo.[107] The records indicated that Contractor Employee A completed qualification evaluations through ENERGY WorldNet, Inc. ("EWN"), and Contractor

[101] 4 CSR 240-40.030(12)(D)1.B. defines covered task as an activity, identified by the operator, that: (I) Is performed on a pipeline facility; (II) Is an operations, maintenance or emergency-response task; (III) Is performed as a requirement of 4 CSR 240-40.030; and (IV) Affects the operation or integrity of the pipeline.

[102] The Attachment to the Spire response to Staff Data Request 0039 indicates that any reference to Missouri Gas Energy in the Attachment now refers to Spire Missouri West.

[103] Attachment to Spire response to Staff Data Request 0039.

[104] Spire response to Staff Data Request 0040.

[105] Spire response to Staff Data Request 0040.1.

[106] Spire response to Staff Data Request 0026.5.

[107] Spire response to Staff Data Requests 0026, 0026.1, 0026.2, 0026.3, 0026.4.

Employee C completed qualification evaluations through MEA Energy Association ("MEA")[108]. The records indicated that Contractor Employee E completed qualification evaluations through EWN and MEA. Spire stated that Contractor Employee B and Contractor Employee D had not yet been qualified to perform any covered tasks.[109]

A detailed description of the operator qualification records for each Contractor employee as well as that of the Spire Contract Inspector assigned to the project can be found in Appendix A, Section K Operator Qualification [4 CSR 240-40.030(12)(D)] of this Report.

In response to Staff Data Request 0041, Spire stated that it expected the covered tasks of squeeze-off of main pipe,[110] service abandonment, service installation, and an increase in operating pressure of existing plastic main to be performed during the project at the 1100 block of The Paseo. Spire expected these covered tasks to be performed based on a verbal discussion between the Spire Contract Inspector and the Contractor, however Spire also stated that the Contractor may deviate from the discussed plan at its discretion provided proper Spire procedures are followed.[111] Spire indicated that no documentation of Spire's expectations of which covered tasks the Contractor will perform was provided to the Contractor.[112] Spire also stated that the covered tasks of service abandonment, live gas work, squeeze off of main pipe, and service installation were actually performed during the project at the 1100 block of The Paseo.[113]

Spire indicated that an investigation was conducted to determine if the performance of any covered task(s) caused or contributed to this incident.[114] Spire stated, "The Company's and Contractor's investigation determined that the cause of the incident was that proper procedures were not followed in that the covered task was performed using a Sawzall. The individuals

[108] EWN and MEA are third party providers of operator qualification evaluations, each with differing training methods and evaluations. The difference in the two means that, although an individual can be qualified to perform the same covered task under each provider, the evaluations required will be different for that same covered task.

[109] Spire response to Staff Data Requests 0026.2 and 0026.4.

[110] A squeeze-off of pipe utilizes a clamping tool to constrict the pipe so that natural gas can no longer freely flow past the tool.

[111] Spire response to Staff Data Request 0058.

[112] Spire response to Staff Data Request 0058.

[113] Spire response to Staff Data Request 0041.

[114] Spire response to Staff Data Request 0043.

involved were either terminated or suspended from further work until requalification was completed under the OQ program requirements."[115] Spire also stated with respect to Contractor Employee A, "The training and qualification of this individual were sufficient at the time he was trained and qualified. It is the Company's [Spire's] policy to revoke the qualifications of any individual who is found to have not followed Company [Spire] procedures in the field. Such employees must be re-trained and re-qualified prior to returning to the performance or supervision of field work."[116]

4 CSR 240-40.030(12)(D)4.B. requires that personnel to whom 4 CSR 240-40.030(12)(D) applies must possess the knowledge and skills necessary to carry out the procedures in the procedural manual for operations, maintenance and emergencies established under 4 CSR 240-40.030(12)(C)[117] that relate to the covered tasks they perform.

In order to ensure that the Contractor employees working at 1106 The Paseo possessed the knowledge and skills necessary to carry out the procedures in the procedural manual for operations, maintenance and emergencies, Spire stated, "The Company inspector[118] verifies OQ records[119] for all individuals assigned to a project prior to commencement of work. As part of operator qualification, contractor personnel were evaluated on the knowledge and skills necessary to carry out the procedures in the procedural manual for operations, maintenance and emergencies established by the Company that relate to the covered tasks they perform."[120] In addition to the responsibility of verifying OQ records concerning the individuals assigned to a project, the Spire Contract Inspector is responsible for ensuring that qualified individuals possess the knowledge and skills necessary to recognize and react to abnormal operating conditions, to recognize potential ignition sources, to recognize conditions that would likely cause emergencies, including equipment or facility malfunctions or failure and gas leaks, in order to predict the potential consequence of these conditions and take appropriate corrective

[115] Spire response to Staff Data Request 0043.

[116] Spire response to Staff Data Requests 0025 and 0038.4.

[117] 4 CSR 240-40.030(12)(C) requires that, among other things, an operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response.

[118] "Company inspector" is the same Spire Contract Inspector mentioned above.

[119] Spire response to Staff Data Request 0026.

[120] Spire response to Staff Data Request 0044.

action, and to take steps necessary to control any accidental release of gas and to minimize the potential for fire or explosion.[121]

Spire indicated that the Contractor work crew had been trained to utilize instruments and equipment that relate to the covered tasks they perform in accordance with manufacturer's instructions.[122] Spire further stated that, in order to ensure that the Contractor individuals working at 1106 The Paseo possessed the knowledge and skills necessary to know the proper use of firefighting procedures and equipment, fire suits, and breathing apparatus, ** _____ ** new hire safety orientation discusses the general principles of fire extinguisher operation, and the natural gas presentation in the orientation discusses controlling ignition sources in an emergency situation.[123]

Spire provided documentation pertaining to the new hire safety orientation of the three individuals working on the Contractor work crew at 1106 The Paseo in response to Staff Data Request 0048.2.

** _____
_____
_____
_____
_____
_____
_____
_____
_____ **[124]

Staff reviewed the ** _____
_____ ** and determined that it complied with the program requirements of 4 CSR 240-40.030(12)(D)3. The ** _____

[121] As stated in Spire responses to Staff Data Requests 0015, 0042, 0045, 0046, and 0047.

[122] Spire response to Staff Data Request 0010.3. Instruments and equipment included in this response are a Bascom-Turner, Gas Sentry CGI-201 (Combustible Gas Indicator), fire-resistant suit and hood, and an Allegro Model A-300 supplied air respirator.

[123] Stated in Spire response to Staff Data Request 0048.

[124] Attachment to Spire response to Staff Data Request 0039.

____ ** provided to Staff does not adequately meet all the program requirements of 4 CSR 240-40.030(12)(D)3.; however, in response to Staff Data Request 0039.1, Spire stated that ** _____ ** employees were required to follow the ** _____ _____ ** and were expected to follow ** _____ **. Since Contractor Employees A, B, C, D, and E were required to follow Spire Missouri West (formerly MGE) Administrative Standard 4150E, in Staff's opinion, the requirements of 4 CSR 240-40.030(12)(D)3 were met.

Staff also reviewed the following documents provided by Spire:

- A list of the covered tasks Spire expected to be performed by the Contractor work crew at the project at the 1100 block of The Paseo,
- A list of the covered tasks that were actually performed by the Contractor work crew at the project at the 1100 block of The Paseo,
- Spire required evaluations for an individual to be considered qualified for each of the covered tasks expected to be performed and those actually performed, and
- The documented training and evaluations completed by Contractor Employees A, B, C, D and E and Spire's Contractor Inspector.

Based on Staff's review of the provided records, at the time of the incident, Contractor Employee A was qualified to perform the covered tasks of squeeze-off of main pipe for plastic pipe, service abandonment, increase in operating pressure of existing plastic main, and live gas work. Contractor Employee A was not qualified to perform the covered task of service installation based on the records provided by Spire, but Spire stated that Contractor Employee A did not perform the covered task of service installation during the project at the 1100 block of The Paseo.

Contractor Employee C was qualified to perform the covered tasks of squeeze-off of main pipe for plastic pipe, service abandonment, service installation, increase in operating pressure of existing plastic main, and live gas work.

Contractor Employee E came to the aid of Contractor Employee A to perform the covered task of squeeze-off of main pipe on a plastic pipe; however, Contractor Employee E

was not qualified to perform the covered task of squeeze-off of main pipe on a plastic pipe based on records provided by Spire.

4 CSR 240-40.030(12)(D)3.C. says that each operator's operator qualification program shall include provisions to allow individuals that are not qualified to perform a covered task to do so, if directed and observed by a qualified individual. Staff concludes that although Contractor Employee E was not qualified to perform the covered task of squeeze-off of main pipe on a plastic pipe, Contractor Employee A was qualified to perform this task, was nearby to Contractor Employee E while he was performing this covered task, and could direct and observe him.

Spire indicated that Contractor Employees B and D had not completed qualification evaluations and were working under the span of control[125] of qualified individuals. Staff found no evidence to the contrary.

Staff did not find any violations of training and evaluation requirements of 4 CSR 240-40.030(12)(D)4. with respect to the individuals performing the covered tasks to which they were assigned.

Spire also provided operator qualification requirements for an individual to be considered qualified to perform the work required of Spire Contract Inspectors. Spire also provided the qualification records for the Spire Contract Inspector assigned to the project at the 1100 block of The Paseo. Staff found that, at the time of the incident, the Spire Contract Inspector assigned to the project at the 1100 block of The Paseo was qualified to perform the work required of Spire Contract Inspectors.

Staff was provided qualification records related to the covered tasks.[126] Staff did not find violations of the record keeping requirements of 4 CSR 240-40.030(12)(D)8.; however, it was not abundantly clear in the records provided to Staff as to the identification of the covered

[125] Span of control is a term used to indicate that someone was being directed and observed by another individual. 4 CSR 240-40.030(12)(D)3.D. is relevant in that it requires that each operator's written qualification program include provisions to allow individuals that are not qualified pursuant to 4 CSR 240-40.030(12)(D) to perform a covered task if directed and observed by an individual that is qualified.

[126] As required by 4 CSR 240-40.030(12)(D)8.

tasks the individuals involved were qualified to perform.[127] Staff was able to ascertain this information through analysis of these records and through follow-up data requests to Spire.

Staff attempted to compare a list of the minimum required training and qualifications that individuals were expected to have in order to perform the covered tasks to the actual training and qualifications of the individuals who performed or were expected by Spire to perform these tasks. Staff discovered:

1. The covered task list in Section 9.0 of ** _____ _____ _____ _____ _____ **
2. For the individuals involved in this incident, training and evaluations were performed by two different recognized training providers: EWN and MEA.
3. ** _____ _____ _____ _____ **

Conclusion:

During its investigation, Staff reviewed the Company's lists of required training and qualifications as set forth in ** _____ _____ ** for the covered tasks that Spire expected to be performed, or were actually performed by the Contractor work crew at the project at the 1100 block of The Paseo.

Staff did not find any violation with respect to Spire's actions to comply with the requirements of 4 CSR 240-40.030(12)(D), or its procedures in ** _____ _____ **. However, since the Spire Contract Inspectors are tasked with determining the qualifications of

[127] As required by 4 CSR 240-40.030(12)(D)8.A.(II).

contractor field crews, it would be beneficial to have a straightforward method for the Contract Inspectors to determine what specific written and performance evaluations are required for each applicable recognized training provider to qualify individuals to perform covered tasks. Staff has recommendations that are aimed at clarification of the covered task list (See Section IV STAFF RECOMMENDATIONS).

III. E. Operator Qualifications ("OQ") Staff Expert: Clinton L. Foster

F. Emergency Plans and Actions Required

Analysis:

4 CSR 240-40.030(12)(J)1. requires each operator to establish written procedures to minimize the hazard resulting from a gas pipeline emergency. The procedures must provide for the following:

A. Receiving, identifying, and classifying notices of events which require immediate response by the operator;

B. Establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials;

C. Responding promptly and effectively to a notice of each type of emergency, including the following:

(I) Gas detected inside or near a building;

(II) Fire located near or directly involving a pipeline facility;

(III) Explosion occurring near or directly involving a pipeline facility; and

(IV) Natural disaster;

D. Making available personnel, equipment, tools, and materials, as needed at the scene of an emergency;

E. Taking actions directed toward protecting people first and then property;

F. Causing an emergency shutdown and pressure reduction in any section of the operator's pipeline system necessary to minimize hazards to life or property;

G. Making safe any actual or potential hazard to life or property;

H. Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency;

I. Safely restoring any service outage;

J. Beginning action under subsection (12)(L) [Investigation of Failures] (192.617), if applicable, as soon after the end of the emergency as possible; and

K. Actions required to be taken by a controller during an emergency in accordance with subsection (12)(T) [Control Room Management].

Spire stated that it provided the Contractor with the entire O&M manual, including the Emergency Plan on December 15, 2016, and has provided the Contractor with updated Standards since that time as changes are made.[128]

The Contractor was required to follow the Spire Missouri West (formerly MGE) O&M Standard 3110V.[129] Spire currently effective Emergency Plan, Spire Missouri West (formerly MGE) O&M Standard 3110V effective date 3-24-2017, was provided as an attachment to Spire's response to Staff Data Request 0022. Staff reviewed Spire Missouri West (formerly MGE) O&M Standard 3110V and found that it meets the minimum requirements of 4 CSR 240-40.030(12)(J)1. Based on Staff's investigation, Spire's actions in response to this incident (See Appendix A, Section I) were consistent with the requirements of 4 CSR 240-40.030(12)(J)1.

Conclusion:

Staff found that Spire's procedures and actions were consistent with the requirements of 4 CSR 240-40.030(12)(J) with respect to its emergency response procedures and actions.

III. F. Emergency Plans and Actions Required Staff Expert: Brian J. Buchanan

G. Drug and Alcohol Testing

Analysis:

Missouri pipeline safety rules adopt the Federal Drug and Alcohol Testing regulations[130] by reference.[131] At the time the incident occurred, the then currently effective Commission

[128] Spire responses to Staff Data Requests 0022 and 0023.

[129] Based on Spire response to Staff Data Request 0022.1.

[130] 49 Code of Federal Regulations ("CFR") parts 40 and 199, effective October 1, 2015, incorporated by reference by the Commission at the time of the incident, July 16, 2018.

[131] Commission Rule 4 CSR 240-40.080(1).

Rules had adopted the Code of Federal Regulations ("CFR") dated October 1, 2015, 49 CFR parts 40 and 199.[132]

49 CFR 199.101 requires each operator to maintain and follow a written anti-drug plan that conforms to Part 199 and the Department of Transportation ("DOT") Procedures.[133] 49 CFR 199.202 requires each operator to maintain and follow a written alcohol misuse plan that conforms to Part 199 and the DOT Procedures.

4 CSR 240-40.080(4)(B) states that the references to "accident" in Section 199.105 and 199.225 should refer to a "federal incident reportable under 4 CSR 240-40.020".

49 CFR 199.3 defines "employee" and "covered employee" to include contractors engaged by operators:

> Covered employee, employee, or individual to be tested means a person who performs a covered function, including persons employed by operators, contractors engaged by operators, and persons employed by such contractors.

49 CFR 199.3 defines "covered function" as follows:

> Covered function means an operations, maintenance, or emergency-response function regulated by part 192, 193, or 195 of this chapter that is performed on a pipeline or on an LNG facility.

With respect to contractor employees, 49 CFR 199.115 and 199.245 provide that an operator may provide by contract that the drug and alcohol testing, education and training required by 49 CFR 199 be carried out by the contractor, provided that the operator remains responsible for ensuring compliance with the requirements of Parts 199 and 40.

Drug tests are required for covered employees: pre-employment, post-accident and at any time during employment as part of a pool of covered employees subject to random selection for testing:

- Pre-employment: 49 CFR 199.105(a) requires that: "No operator may hire or contract for the use of any person as an employee unless that person

[132] Subsequent to the incident, Commission adopted more recent Federal amendments in File No. GX-2018-0279, effective January 30, 2019.

[133] 49 CFR 199.3 defines DOT procedures to mean the Procedures for Transportation Workplace Drug and Alcohol Testing Programs published by the Office of the Secretary of Transportation in part 40 of Title 49.

passes a drug test or is covered by an anti-drug program that conforms to the requirements of this part."

- Randomly during employment: 49 CFR 199.105(c) provides that "except as provided in paragraphs (c)(2) through (4) of this section, the minimum annual percentage rate for random drug testing shall be 50 percent of covered employees."
- Post-Accident: 49 CFR 199.105(b) provides the post-accident[134] drug testing requirements: "As soon as possible but no later than 32 hours after an accident, an operator shall drug test each employee whose performance either contributed to the accident or cannot be completely discounted as a contributing factor to the accident. An operator may decide not to test under this paragraph but such a decision must be based on the best information available immediately after the accident that the employee's performance could not have contributed to the accident or that, because of the time between that performance and the accident, it is not likely that a drug test would reveal whether the performance was affected by drug use."

Additionally, for each large operator having more than 50 covered employees, drug and alcohol test results must be reported annually to PHMSA, in a Management Information System ("MIS") report, no later than March 15 of each year for the previous calendar year.[135] Spire provided copies of the 2018 MIS reports for Spire and ** _____ ** in response to Staff Data Request 0067.

The requirements for post-accident alcohol testing are provided in 49 CFR 199.225(a):

> (a) Post-accident.
>
> (1) As soon as practicable following an accident, each operator shall test each surviving covered employee for alcohol if that employee's performance of a covered function either contributed to the accident or cannot be completely discounted as a contributing factor to the accident. The decision not to administer a test under this section shall be based on

[134] Commission Rule 4 CSR 240-40.080(4)(B) states that the references to "accident" in Sections 199.3, 199.100, 199.105, 199.200, 199.221, 199.225, 199.227 and 199.234 should refer to a "federal incident reportable under 4 CSR 240-40.020" instead.

[135] Required by 49 CFR 199.119 for drug testing, 49 CFR 199.229 for alcohol testing.

> the operator's determination, using the best available information at the time of the determination that the covered employee's performance could not have contributed to the accident.
>
> (2)(i) If a test required by this section is not administered within 2 hours following the accident, the operator shall prepare and maintain on file a record stating the reasons the test was not promptly administered. If a test required by this paragraph is not administered within 8 hours following the accident, the operator shall cease attempts to administer an alcohol test and shall state in the record the reasons for not administering the test. (ii) Reserved

For the employees (including Contractor's employees) performing covered functions at the time of the incident, each would have been required to have passed a pre-employment drug test, and been part of a pool of covered employees to be selected for random drug tests. For employees whose performance either contributed to the incident or could not be completely discounted as a contributing factor to the incident, each should have been tested for drugs within 32 hours after the incident and for alcohol within 2 hours of the incident.

Spire provided copies of the ** _____ _____ _____ ** in response to Staff Data Request 0030.

In response to Staff Data Request 0066, Spire provided documentation that the ** _____ ** employees involved in this incident were drug and alcohol tested pre-employment.

In response to Staff Data Request 0067, Spire provided documentation that ** _____ ** employees were randomly tested at a rate of at least 50% of covered employees.

A Contractor work crew from ** _____ _____ [136] ___ _____ **[137] were assigned to this project. Additionally, ** _____ _____ ** were involved in the emergency response.

[136] Spire confidential response to Staff Data Request 0003.

[137] Spire confidential response to Staff Data Request 0002.

Spire stated in response to Staff Data Request 0066 that ** _____ _____ _____ _____. **

Question 2 in Part F of the PHMSA 7100.1 Incident Report Form[138] asks: "As a result of this Incident, were any Operator contractor employees tested under the post-accident incident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?". ** _____ _____ **[139]

In response to Staff Data Request 0030, Spire stated that "** _____ _____ _____ _____ **"

Based on Spire's response in the PHMSA 7100.1 Incident Report Form[140] and to Staff's Data Request 0030, it appeared initially as though two Contractor employees were tested post-incident as required by 49 CFR 199.225(a) as adopted by 4 CSR 240-40.080. However, the Management Information System ("MIS") reports[141] submitted by ** _____ _____. **[142]

In response to Staff Data Request 0067.1, asking why the Drug and Alcohol Testing MIS Data Collection Form for ** _____ _____ **, Spire responded: ** _____ _____

[138] 4 CSR 240-40.020(6)(A) requires that each operator must submit a federal incident report on Form PHMSA F 7100.1 as soon as practicable but not more than thirty (30) days after detection of an incident required to be reported under 4 CSR 240-40.020(3). Spire's initial incident report was provided in response to Staff Data Request 0051 and its supplemental incident report was provided in response to Staff Data Request 0067.2.

[139] Confidential attachment to Spire's response to Staff Data Request 0051.

[140] Confidential attachment to Spire's response to Staff Data Request 0051.

[141] For each large operator having more than 50 covered employees, drug and alcohol test results must be reported annually to the Pipeline and Hazardous Materials Safety Administration ("PHMSA") in the Office of Pipeline Safety of the U.S. Department of Transportation no later than March 15 of each year for the previous calendar year in a Management Information System ("MIS") report.

[142] A copy was provided by Spire in response to Staff Data Request 0067.

_____- _____
_____
_____ **

In response to Staff's Data Request 0067.2 questioning the discrepancy between the number of post-incident drug and alcohol tests reported in the MIS report provided in response to Staff's Data Request 0067.1 ** ____ ** and number of post incident drug and alcohol tests reported in Spires's PHMSA 7100.1 Incident Report Form ** ____ **, Spire responded:

> The Company was originally informed by ** _____ ** that two contract employees had been drug and alcohol tested as a result of the incident… Subsequent discussion with ** _____ ** has revealed that, while drug testing was requested by ** _____ ** from the hospital, ** _____
> _____
> _____ **
> Therefore, the information provided in Part F of the Form PHMSA F7100.1 needs to be updated.

Spire submitted a supplemental Form PHMSA F7100.1 for this incident amending the number of employees tested to ** ___ ** and provided a copy as an attachment to Staff Data Request 0067.2.

Staff inquired through Data Requests why ** _____
_____ **. Spire's response indicated that ** _____
_____
_____ **

Conclusion:

Spire identified three employees whose performance either contributed to the incident or could not be completely discounted as a contributing factor to the incident. Based on the Spire's descriptions of the role each individual played in the incident and subsequent response, Staff agrees with the Spire's identification of these three individuals.

Each of these three individuals should have been tested for drugs (49 CFR 199.105(b) as adopted by 4 CSR 240-40.080) and alcohol (49 CFR 199.225(a) as adopted by 4 CSR 240-40.080). Out of six tests (3 for drugs, 3 for alcohol) required, ** ____ ** were performed.

** _____
_____
_____ **[143] Therefore, based on Staff's analysis:

** _____
_____
_____
_____
_____
_____
_____
_____ **

III. G. Drug and Alcohol Testing Staff Expert: Kathleen A. McNelis, PE

H. Spire Oversight of Contractor

Analysis:

Section (12) of Commission Rule 4 CSR 240-40.030 prescribes the minimum requirements for the operation of pipeline facilities.[144]

- At the time of the incident, paragraph (12)(B)3. stated:

  3. Each operator shall be responsible for ensuring that all work completed by its consultants and contractors complies with this rule.[145]

- 4 CSR 240-40.030(12)(C)1. requires each operator to prepare and follow a manual of written procedures for conducting operations and maintenance activities and for emergency response.

[143] Spire confidential response to Staff Data Requests 0030 and DR 0067.2.
[144] The scope of Section (12) is contained in 4 CSR 240-40.030(12)(A).
[145] Rule means 4 CSR 240-40.030 Safety Standards – Transportation of Gas by Pipeline.

- 4 CSR 240-40.030(12)(C)2.A. requires that the manual required by paragraph (12)(C)1. must include procedures for operating, maintaining, and repairing the pipeline in accordance with each of the applicable requirements of 4 CSR 240-40.030(12), (13), and (14).

There is no Spire-approved written policy or procedure for oversight and inspection of contractors working for Spire; however, Spire is in the process of standardizing policies and procedures across operational areas and will review whether to implement a new construction contractor inspection policy or procedure(s).[146]

Spire has employees who are Contract Inspectors that inspect work performed by contractors. Work at the incident location was part of a large work project to upgrade the distribution system in the area.[147] For the work project at the incident location, Spire explained as follows:

> On the morning of the day of the incident, the Spire contract inspector verbally confirmed the work schedule for that day with the contract crew foreman via phone.[148]

> On the morning of the day of the incident, the Company contract inspector drove by to visit the construction crew near the work location but did not stop or inspect anything at the work site since work had not begun and the supervisor was not present with the crew.[149]

After driving by the Contractor work crew at the incident location, the Spire Contract Inspector proceeded to another work project about four miles to the south. The Spire Contract Inspector continued at that work project and then returned to the Spire office, where he learned the incident had recently occurred. Other than driving by before work started for the day, the Spire Contract Inspector was not present at the incident location on July 16, 2018, prior to the incident occurring.[150]

[146] Spire response to Staff Data Request 0049.
[147] Spire response to Staff Data Request 0005.
[148] Spire response to Staff Data Request 0054.1.
[149] Spire response to Staff Data Request 0054.1.
[150] Spire response to Staff Data Requests 0011 and 0053.

The Contractor work crew also had a Contractor superintendent, Contractor general foreman, and Spire supervisor assigned to it.[151] None of these assigned persons were at the incident location during work by the Contractor work crew on July 16, 2018, prior to the incident and were not present at the time of the incident.[152]

Staff requested a list of contractor work tasks that require a Spire Contract Inspector to be present during the work task, and specifically if a Spire Contract Inspector is required to be present when a Contractor project involves working with escaping gas and/or cutting a pipeline containing gas. Spire answered as follows:

> There are no work tasks that the Company requires a Company contract inspector to be present during. The Company only hires contractors that are qualified to perform all tasks required for a particular project.[153]

> The Company does not require a contractor [sic] inspector to be present when a contractor project involves working with escaping gas and/or cutting a pipeline containing gas.[154]

Conclusion:

4 CSR 240-40.030(12)(B)3. requires that Spire shall be responsible for ensuring that all work completed by its contractors complies with 4 CSR 240-40.030. Report Sections III.B. *Prevention of Accidental Ignition*, III.C. *Protection of Personnel*, and III.D. *Mechanical Joining* describe how work by Spire's Contractor did not comply with 4 CSR 240-40.030(13)(X) and did not follow several Spire procedures as required by 4 CSR 240-40.030(1)(G)3., (6)(B)2., and (12)(C)1.

4 CSR 240-40.030(12)(C)2.A. requires that Spire's procedural manual, which is required by 4 CSR 240-40.030(12)(C)1., must include procedures for operating, maintaining, and repairing its pipelines in accordance with each applicable requirement of 4 CSR 240-40.030(12), (13), and (14).

[151] Spire response to Staff Data Requests 0053f and 0054d.
[152] Spire response to Staff Data Requests 0054.2.
[153] Spire response to Staff Data Request 0055.
[154] Spire response to Staff Data Request 0055.

More specifically,

1. Violations of 4 CSR 240-40.030 by Spire's Contractor found in the Conclusions of Report Sections III. B., C., and D. demonstrate that Spire did not ensure its Contractor complied with 4 CSR 240-40.030 while working on Spire pipelines at the incident location. As further discussed in the Report Sections III. B., C., and D., many of these non-compliances by Spire's Contractor contributed to the incident.
2. Failure to ensure that the work completed by Spire's Contractor complied with 4 CSR 240-40.030 was a violation of 4 CSR 240-40.030(12)(B)3.
3. Failure to include procedures for the contractor oversight requirements of 4 CSR 240-40.030(12)(B)3. in Spire's procedural manual, which is required by 4 CSR 240-40.030(12)(C)1., was a violation of 4 CSR 240-40.030(12)(C)2.A.[155] Spire must add procedures for the requirements of 4 CSR 240-40.030(12)(B)3. to its procedural manual since Spire does not have policies or procedures for oversight and inspection of contractors working for Spire.

III. H. Spire Oversight of Contractor Staff Expert: John D. Kottwitz

I. Investigation of Failures

Analysis:

4 CSR 240-40.030(12)(L) Investigation of Failures requires that each operator shall establish procedures for analyzing accidents and failures for the purposes of determining the causes of the failure and minimizing the possibility of a recurrence.

Spire's failure analysis procedure for reportable incidents is in Spire Missouri West (formerly MGE) O&M Standard 3150. This procedure requires among other things, an investigation and attempt to determine the incident cause (Section 2.3), and recommendations, if any, on corrective action needed to prevent a recurrence (Section 5.2.6).

[155] Additionally, 4 CSR 240-40.030(1)(G)3. requires that each operator maintain, modify as appropriate, and follow the plans, procedures and programs that it is required to establish under this rule ("rule" here meaning 4 CSR 240-40.030), therefore failing to have the procedure is additionally a violation of 4 CSR 240-40.030(1)(G)3.

According to Spire, the results of its failure analysis[156] were as follows:

> The results of the Company's failure analysis were that the Company's training and operator qualifications programs were sufficient with respect to the construction conditions and that the incident resulted from the contract employee's decision to not follow established procedures. In an effort to minimize the possibility of a recurrence, the Company will circulate a 'lessons learned' notification to all internal Field Operations employees concerning the events surrounding this incident by October 31, 2018. ** _____ ** has already circulated a 'lessons learned' notification to all contract crews concerning the events surrounding this incident and has disciplined the responsible employees. Furthermore, the Company will continue to address Company employees or contractor employees according to Company policies who do not follow Company procedures.

Copies of Spire's and Contractor's "lessons learned" notifications are included as Appendix D.

Conclusion:

Staff did not find any violations with respect to Spire's actions to comply with the requirements of 4 CSR 240-40.030(12)(L) or its procedures in Spire Missouri West (formerly MGE) O&M Standard 3150. Staff found that Spire's failure analysis procedure complies with the requirements of 4 CSR 240-40.030(12)(L). Staff found that Spire conducted an investigation of this incident in compliance with its procedures and the requirements of 4 CSR 240-40.030(12)(L).

However, Staff has made additional recommendations based on its investigation that are aimed at minimizing the possibility of a recurrence of such an incident and failure (See Section IV. STAFF RECOMMENDATIONS).

III. I. Investigation of Failures Staff Expert: Kathleen A. McNelis, PE

[156] Spire response to Staff Data Request 0038.

J. Distribution Integrity Management Program ("DIMP")

Analysis:

Regulations for Gas Distribution Integrity Management Program ("DIMP")[157] require that each gas distribution operator develop and implement an integrity management program no later than August 2, 2011. Program elements must include a demonstrated knowledge of the system, identification of threats, evaluation and ranking of risk, identification and implementation of measures to address risks, measurement of performance, monitoring of results and evaluation of effectiveness. Sources of data to be considered in DIMP include incident and leak history. In implementation of DIMP, a baseline is established for threats to monitor the effectiveness of the program.

At a minimum[158], operators must consider the following categories of threats to each gas distribution pipeline:

- Corrosion,
- Natural Forces,
- Excavation Damage,
- Other Outside Force Damage,
- Material or Welds,
- Equipment Failure,
- Incorrect Operation, and
- Other concerns that could threaten the integrity of its pipeline.

In 2011 when the requirements of 4 CSR 240-40.030(17), DIMP, became effective, the company now known as Spire had three DIMP Plans – one for Missouri Gas Energy (at that time, a separate company from Laclede Gas), one for Missouri Natural (a former operating district of Laclede Gas) and one for Laclede Gas (at that time, a separate company from MGE).

[157] 4 CSR 240-40.030(17).

[158] 4 CSR 240-40.030(17)(D)2. states that these listed threat categories must be considered.

Currently, Spire has one combined DIMP Plan for its Missouri operations, and is in compliance with the requirements of 4 CSR 240-40.030(17).[159]

In its incident report provided to PHMSA,[160] Spire lists the apparent cause of the incident as "Incorrect Operation". "Incorrect Operation" is one of the threat categories that must be considered in an operator's DIMP. In the DIMP Plan that was effective for Spire Missouri West at the time of the incident, incorrect operation is identified as a potential threat to both mains and service lines. In response to a Staff Data Request[161] asking about the status of incorrect operation in Spire's currently effective DIMP Plan, Spire stated:

> The Company already ranks the threat of Incorrect Operations relative to other potential threats to its system. Currently, Incorrect Operations is not identified as a top threat and therefore does not require accelerated action to be taken. In the future, if Incorrect Operations is identified as a top threat the Company will review the drivers of elevated risk and create an accelerated action plan to address them.

In response to a Staff Data Request[162] asking if Spire's currently effective DIMP Plan addressed the possibility/risk of contractors working for Spire with respect to the threat of "incorrect operation", Spire stated:

> The Company's DIMP plan does not specifically address contractor work as a sub-threat of Incorrect Operations.

Conclusion:

In Staff's opinion[163], this incident was a result of incorrect operations by a contractor working for Spire. Spire potentially has less control over the content of contractor training, qualifications and work practices than it does over its own employees. While Spire includes

[159] Staff conducts routine inspections of the DIMP Plans and DIMP implementation by the natural gas operators jurisdictional to the Commission. An inspection of Spire's DIMP was conducted in August of 2018.

[160] 4 CSR 240-40.020(6)(A) requires that each operator must submit a federal incident report on Form PHMSA F 7100.1 as soon as practicable but not more than thirty (30) days after detection of an incident required to be reported under 4 CSR 240-40.020(3). Spire's initial incident report was provided in response to Staff Data Request 0051 and its supplemental incident report was provided in response to Staff Data Request 0067.2.

[161] Spire response to Staff Data Request 0050d.

[162] Spire response to Staff Data Request 0050e.

[163] As supported by Spire's responses to Staff Data Requests 0031, 0037.2, 0038, 0040.1, 0049, and 0055, and the Exhibit Spire provided in response to Staff Data Request 0067.2.

consideration of incorrect operation in its DIMP, it does not differentiate between incorrect operation due to contractor or Spire employees.

Although Staff found no violations with respect to 4 CSR 240-40.030(17), Staff is making a recommendation that going forward, Spire consider contractor work as a sub-threat of Incorrect Operation in its DIMP Plan so that any trends in the frequency (increasing or decreasing) of incorrect operations by contractors may be evaluated.

III. J. Distribution Integrity Management Program ("DIMP")
Staff Expert: Kathleen A. McNelis, PE

IV. STAFF RECOMMENDATIONS

In summary, throughout this Report, Staff has identified several areas that either require improvement or are violations of Commission rules. The specific Commission rule violations are identified in Section I.A. above. Staff will proceed as appropriate related to these violations and recommendations.

In addition, Staff recommends that Spire:

1. Develop and include, in its procedural manual required by 4 CSR 240-40.030(12)(C)1., procedures for the contractor oversight requirements of 4 CSR 240-40.030(12)(B)3. Staff further recommends Spire follow these procedures.

   (See: III.H. *Spire Oversight of Contractor*: Staff Expert John D. Kottwitz)

2. Develop a list of tasks that require Spire oversight when the tasks are to be performed by a contractor, including any task that involves planned work in a hazardous gas atmosphere.

   (See: III.H. *Spire Oversight of Contractor*: Staff Expert John D. Kottwitz)

3. Take a more proactive role in ensuring that its contractors are in compliance not only with the pipeline safety rules that Staff identifies as having been violated in this incident, but in general with all applicable pipeline safety rules.

   Actions to be taken by Spire to ensure contractor compliance with applicable rules should include but not necessarily be limited to:

a. Conducting a review of training materials to ensure that the requirements of applicable pipeline safety rules and Spire procedures to implement these rules are covered in sufficient detail during training,

b. Conducting random and/or routine field evaluations of contractor employees' knowledge, skills and ability to perform assigned tasks,

c. Conducting random and/or routine inspections to ensure that equipment necessary to perform the assigned tasks and respond to abnormal operating conditions (e.g., fire extinguisher, PPE) are available and are in working order at jobsites, and

d. Conducting field verification of contractor employees' qualifications to perform covered tasks. Staff recommends Spire utilize form "PHMSA (OQ) Field Inspection Form 15 (Rev. 3) March 2, 2007" (See Appendix F) or similar information/data form to complete these verifications.

(See: III.B. *Prevention of Accidental Ignition*: Staff Experts Brian J. Buchanan, and Kathleen A. McNelis, PE; III.C. *Protection of Personnel*: Staff Experts Brian J. Buchanan and John D. Kottwitz; III.D. *Mechanical Joining:* Staff Experts Clinton L. Foster and Kathleen A. McNelis, PE; III.E. *Operator Qualifications ("OQ")*: Staff Expert Clinton L. Foster; and III.H. *Spire Oversight of Contractor*: Staff Expert John D. Kottwitz)

4. Take a more proactive role in ensuring that post-incident drug and alcohol tests are performed by its contractors as required by 4 CSR 240-40.080 Drug And Alcohol Testing. In future incidents that involve contractors performing covered functions on Spire's pipelines, Staff recommends that Spire take steps as soon as possible after an incident to notify the administrator of the contractor's anti-drug and alcohol misuse program that the requirements of 49 CFR 199.105(b) and 49 CFR 199.225(a), as adopted by 4 CSR 240-40.080, must be implemented.

(See: III.G. *Drug And Alcohol Testing:* Staff Expert Kathleen A. McNelis, PE)

5. Consider contractor work as a sub-threat of Incorrect Operation in its DIMP Plan so that any trends in the frequency (increasing or decreasing) of incorrect operations by contractors may be evaluated.

(See: III.J. *Distribution Integrity Management Program ("DIMP")*: Staff Expert Kathleen A. McNelis, PE)

6. Modify Spire Missouri West O&M Standard 3545D, *Hazardous Atmospheres* to require that an appropriate level of Spire management review and approve planned work that involves the intentional creation of a hazardous atmosphere.

(See: III.C. *Protection of Personnel:* Staff Experts Brian J. Buchanan, John D. Kottwitz and III.H. *Spire Oversight of Contractor*: Staff Expert John D. Kottwitz)

7. Conduct a comprehensive review of its operator qualification program. As part of this review, Staff recommends Spire complete the following:
   a. Review the program's covered task list to ensure that all covered tasks that are performed on Spire's gas pipelines are included in the covered task list.
   b. Ensure that the evaluations listed for each covered task are those currently required by Spire to be considered qualified to perform each covered task.
   c. For each Spire approved provider of operator qualification evaluations (for example MEA, EWN, etc.), create a list of evaluations required to be considered qualified for each specific covered task listed in Spire's operator qualification program.
   d. Provide the lists from 7c. above to Spire Contract Inspectors so they can better ensure that contractor employees working for Spire are qualified to perform the covered tasks required by their work.

   (See: III.E. *Operator Qualifications ("OQ")*: Staff Expert Clinton L. Foster)

8. Conduct an annual, comprehensive review of the operator qualification program for each of its contractors to ensure that the training and evaluation methods used by each contractor meet the requirements of the operator qualification programs Spire uses for its own employees.

(See: III.E. *Operator Qualifications ("OQ")*: Staff Expert Clinton L. Foster)

Staff recommends that the Commission order Spire to file an action plan, by December 31, 2019, which addresses the recommendations (numbered 1-8 above). Staff further recommends that the Commission order Spire to include in its action plan filing when it will effectuate that action plan. Finally, Staff recommends:

1. The Commission require that the action plan include Spire's proposed resolution for addressing each recommendation and the timeframe for implementing the resolution.
2. The Commission require Spire to file updates every six months as to how the plan has been effectuated.

If for any recommendation Spire believes no action is necessary, Staff recommends the Commission order Spire to explain, and provide supporting documentation as available, the reason(s) Spire believes no action is required.

V. Appendices

Appendix A:	Detailed Discussion of Facts and Staff's Investigation - Confidential
Appendix B:	Figure Images - Location of Incident
Appendix C:	Photographs
Appendix D:	Spire - Lessons Learned Safety Bulletin
Appendix E:	Summary of 4 CSR 240-40.030(12)(D) Operator Qualification Requirements and Definitions
Appendix F:	PHMSA (OQ) Field Inspection Form 15 (Rev. 3) March 2, 2007
Appendix G:	Staff's Credentials and Case Participation

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Spire Missouri Inc. d/b/a Spire Missouri West Concerning a Natural Gas Incident at 1106 Paseo Boulevard in Kansas City, Missouri	))))	**Case No. GS-2019-0015**

AFFIDAVIT OF BRIAN J. BUCHANAN

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

COMES NOW Brian J. Buchanan and on his oath states that he is of sound mind and lawful age; that he contributed to the foregoing *Staff's Gas Incident Report*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

Brian J. Buchanan

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 31st day of July, 2019.

Notary Public

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: December 12, 2020
Commission Number: 12412070

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Spire Missouri Inc. d/b/a Spire Missouri West Concerning a Natural Gas Incident at 1106 Paseo Boulevard in Kansas City, Missouri	))))	**Case No. GS-2019-0015**

AFFIDAVIT OF CLINTON L. FOSTER

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

COMES NOW Clinton L. Foster and on his oath states that he is of sound mind and lawful age; that he contributed to the foregoing *Staff's Gas Incident Report*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

Clinton L. Foster

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 25th day of July, 2019.

.

Notary Public

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: December 12, 2020
Commission Number: 12412070

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Spire Missouri Inc. d/b/a Spire Missouri West Concerning a Natural Gas Incident at 1106 Paseo Boulevard in Kansas City, Missouri	))))	**Case No. GS-2019-0015**

AFFIDAVIT OF JOHN D. KOTTWITZ

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

COMES NOW John D. Kottwitz and on his oath states that he is of sound mind and lawful age; that he contributed to the foregoing *Staff's Gas Incident Report*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

John D. Kottwitz

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 31st day of July, 2019.

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: December 12, 2020
Commission Number: 12412070

Notary Public

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Spire Missouri Inc. d/b/a Spire Missouri West Concerning a Natural Gas Incident at 1106 Paseo Boulevard in Kansas City, Missouri	))))	**Case No. GS-2019-0015**

AFFIDAVIT OF KATHLEEN A. MCNELIS, PE

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

COMES NOW Kathleen A. McNelis, PE and on her oath states that she is of sound mind and lawful age; that she contributed to the foregoing *Staff's Gas Incident Report*; and that the same is true and correct according to her best knowledge and belief.

Further the Affiant sayeth not.

Kathleen A. McNelis, PE

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 31st day of July, 2019.

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: December 12, 2020
Commission Number: 12412070

Notary Public