Appendix A - Facts

** Denotes Confidential Information **

TABLE OF CONTENTS OF
STAFF'S INVESTIGATION REPORT
APPENDIX A
Spire Missouri Inc. d/b/a Spire
Case No. GS-2024-0137

I. EXECUTIVE SUMMARY

A segment of a natural gas feeder line[1] in Holt, Missouri had become exposed in a creek bank due to soil erosion. Employees of Spire Missouri, Inc. ("Spire") and of a Spire contractor, ** [redacted] ** ("Pipeline Contractor") were installing a new 12-inch steel pipe segment to replace the exposed segment, and retiring the exposed section of feeder line.

On October 5, 2023, the new pipeline segment had been installed and pressure tested. By 2:00 pm on October 5, 2023, Spire employees completed installation of stopple fittings[2], vent stacks and an air hander in order to block the flow of gas into the exposed segment of pipe. When properly seated within a pipeline, a stopple fitting will block the majority of gas flow, however Spire's experience had been that some small amount of gas may escape around the fitting. Vents and an air handler were installed to purge any gas escaping beyond the stopple fitting into the cut end of the pipe. Spire employees cut and removed a short piece of the pipe so that a cap could be welded onto the ends of the pipe by the Pipeline Contractor.

At approximately 2:45 pm, employees of the Pipeline Contractor began installation of a gripper plug[3] into the ends of the cut pipe in preparation for welding on an end cap. The gripper plug was intended to provide an additional measure of safety should gas escape both the stopple device, vents and air handler. However, the gripper plug was not designed or intended to be used for this purpose[4]. Gripper plugs were installed in the open ends of pipe to the north and south of

[1] 20 CSR 4240-40.030(1)(B) defines feeder line as a distribution line that has a maximum allowable operating pressure (MAOP) greater than 100 psi gauge that produces hoop stresses less than twenty percent (20%) of specified minimum yield strength (SMYS).
[2] Stopple fittings are used to temporarily block or isolate the flow of gas in a section of a pipeline so that work can be performed on the isolated section in a non-combustible atmosphere.
[3] Gripper plugs are marketed for use in applications such as testing plumbing drains and vents. The gripper plug in use at this project was a ** [redacted] **, as evidenced by Spire's response to Staff Data Request 11.3 and Spire's Attachment 11.3.
[4] Spire's response to Staff Data Request 0001 stated in part: Following the post incident investigation, the Company believes that the gripper plug should not have been installed in this instance. The gripper plug is not adequately rated for use in pressurized gas lines. Furthermore, gripper plug installation is not outlined in our company procedures.

the opening. The valve on the vent stacks of the air handler was shut off by an unknown party. When an employee of the Pipeline Contractor was preparing to weld on end caps to the pipe, the gripper plug was forcefully ejected from the north end of the pipe opening, injuring the Pipeline Contractor employee.[5]

The injured Pipeline Contractor employee was first taken to Liberty Hospital by ambulance, then air-lifted and admitted to University Hospital in Columbia, Missouri.

The Pipeline Contractor employees completed cap installations at 12:45 am on October 6, 2023.

No Spire or Pipeline Contractor employees were tested for the presence of drugs or alcohol.

Although Spire has acknowledged in its investigation of this incident that gripper plugs should not have been used, the gripper plugs used on this project were supplied by Spire and are shown in Spire design documents for the project. The design documents issued for construction on the Holt Missouri pipeline relocation project were not approved or stamped by a licensed professional engineer.[6]

II. PURPOSE AND SCOPE OF STAFF'S INVESTIGATION

*** Section intentionally blank – no facts to verify ***

III. STAFF ANALYSIS OF INCIDENT

A. Incident Description and Emergency Response

A segment of a natural gas feeder line[7] in Holt, Missouri had become exposed in a creek

[5] Spire's response to Staff Data Request 0011.3
[6] Spire's response to Staff Data Request 0011.3
[7] 20 CSR 4240-40.030(1)(B) defines feeder line as a distribution line that has a maximum allowable operating pressure (MAOP) greater than 100 psi gauge that produces hoop stresses less than twenty percent (20%) of specified minimum yield strength (SMYS).

bank due to soil erosion. Figure 1 of *Appendix B- Figures and Photographs* of this Report shows the approximate location of the feeder line and Figure 2 shows the exposed segment and creek. Spire's intended scope of work for October 5, 2023, included the replacement of the exposed segment with newly installed pipe[8]. This was to be accomplished by installation of stopple fittings[9] and vent stacks, purging[10] of new and replaced pipe segments, blow down (venting) of feeder line segment that was being replaced, and cutting and capping of the abandoned segment of feeder line. The work was being performed by Spire employees and employees of a Spire contractor, ** [redacted] ** ("Pipeline Contractor"). Additionally, an employee of ** [redacted] ** ("Inspection Contractor") was on site to observe and inspect the work on behalf of Spire.

Employees of Spire and the Pipeline Contractor were installing a 12-inch steel pipe segment and retiring the exposed section of feeder line, isolated between two stopple fittings. The stopple fittings were in position to shut off the flow of gas. The pipe had been cut between the stopple fittings and blown down (vented). The Maximum Allowable Operating Pressure (MAOP)[11] of the feeder line is 150 pounds per square inch gauge (psig). At the time of the incident, Spire estimated the pressure in the pipeline at this location to be 125 psig[12]. An

[8] See Pages 5-7 of Attachment 11.3 in Appendix C of this Report.
[9] Stopple fittings are size on size split tees for high-pressure pipeline isolation and hot tapping. They are specialized devices designed to fit stopple hot tapping machines and are used to temporarily block or isolate the flow in a section of a pipeline.
[10] Purging to activate a new pipeline segment involves injecting natural gas into one end of the segment in a controlled manner until all air is displaced and 100% gas is verified at the other end of the pipe segment. Purging to deactivate an existing pipe segment involves venting natural gas out of the pipe segment to the atmosphere or to an active system, and then injecting air (or inert gas) into one end of the segment in a controlled manner until all gas is displaced and 0% gas is verified at the other end of the pipe segment.
[11] 20 CSR 4240-40.030(1)(B) defines Maximum Allowable Operating Pressure as the maximum pressure at which a pipeline or segment of a pipeline may be operated under this rule.
[12] Spire's initial Form PHMSA F 7100.1 report completed for this incident and submitted on November 6, 2023, reported an operating pressure of 56 psig at the time of the incident. This was revised to 125 psig in a supplemental Form PHMSA F-7200.1 report submitted on October 29, 2024. Attachment 17-C provided in response to Staff Data Request 0017 is a chart recording of pressure at SE PP Highway and SE Cannonball Road and shows approximately 125 psig at the time of the incident.

employee of the Pipeline Contractor was preparing to cap downstream of one stopple. Two vent stacks were installed downstream of the stopple with a valve and air handler on the vent nearest the stopple fitting. Figure 3 of Appendix B shows a close up of the vent stack that was used at the incident location. Confidential Figure 4 shows the configuration of the vent stacks and stopple fittings at the incident location. The Pipeline Contractor employee inserted a gripper plug in the 12-inch pipe up to the V1 vent stack location. Gas was bleeding past the stopple fitting. The valve on V1 vent stack was closed, preventing gas from venting through the vent stack to the atmosphere. This resulted in a pressure build-up between the stopple fitting and the gripper plug and caused the gripper plug to be ejected from the open-cut end of the 12-inch steel pipe. Confidential Figures 4 and 5 of Appendix B of this Report show the gripper plug. The gripper plug hit the Pipeline Contractor employee's hand, and he was admitted to a hospital for treatment.

TABLE 1: SUMMARY OF EVENTS

Date and Time	Activity
9/18/2023	Right-of-way was cleared, and new pipe delivered to the job site.
9/21/2023	Pipeline installation started; 500' of 12" steel pipe bored under the creek.
Prior to 10/5/2023	Three-way tees and valves installed at tie-in points. Tie-ins and pipe coating completed.
10/5/2023; prior to 9:45 a.m.	Pressure test of new pipe segment completed.
10/5/2023; 9:45 a.m.	New pipe segment blown down from pressure test; Spire tap crew began setting up the tap and purge.
10/5/2023; 10:00 a.m.	Vent stacks and air handler placed by the Spire tap crew.
10/5/2023; 1:45 p.m.	Stopple placed by the Spire tap crew; gaseous atmosphere air monitoring began.
10/5/2023; 2:00 p.m.	The existing pipe segment was purged.

TABLE 1: SUMMARY OF EVENTS	
Date and Time	Activity
10/5/2023; 2:30 p.m.	Spire crew cut and removed a short piece of the pipe so that a cap could be installed. Spire crew moved piece of pipe out of excavation hole, exited the hole, and began putting away tools.
10/5/2023; 2:45 p.m.	In preparation for welding two caps, Pipeline Contractor crew began installation of a gripper plug into the north-side of the cut pipe.
10/5/2023; 3:00 p.m.	Gripper plug ejected from pipe, injury occurred.
10/5/2023; 3:09 p.m.	Spire employee calls 911. After calling 911, Spire employee opens valve on vent stack of air handler that was in closed position.
10/5/2023; 3:18 p.m.	Injured Pipeline Contractor employee taken to Liberty Hospital emergency room by ambulance.
10/5/2023; 5:00 p.m.	Pipeline Contractor crew began welding a cap on the north-side of the project, then moved to the south-side of the project and welded on the second cap.
10/5/2023; 6:20 p.m.	Injured Pipeline Contractor employee air-lifted and admitted to University Hospital in Columbia, Missouri.
10/6/2023: 12:45 a.m.	Work on the pipe segment replacement was completed.

Spire provided a copy of its plan, ** [redacted] ** ("Emergency Plan") that was effective at the time of the incident.

The incident occurred at approximately 3:00 p.m. on October 5, 2023. At 3:09 p.m., a call was made to 911 and the Spire's Supervisor of Maintenance was notified of the incident. At 3:18 p.m., the injured Pipeline Contractor employee was taken to the hospital by ambulance. Spire's Working Foreman noticed that a valve on vent stack with air handler was in the closed position and after calling 911, he opened the valve to vent natural gas that was escaping past the stopple fitting seal through the vent stack into the atmosphere.

After emergency personnel left the scene, the jobsite was evaluated by Spire and the Pipeline Contractor for any further safety concerns. Spire personnel met and developed a plan to

continue forward with capping the pipe at the tie-in points on both sides of the creek. The Pipeline Contractor installed and welded the two caps to secure the feeder line system at the incident location.

B. Investigation of Failures and Incidents

Spire provided its written procedure to investigate and analyze incidents that was in place on October 5, 2023, ** [redacted] **.[13]

Spire's procedure requires ** [redacted] **

Additionally, Spire's procedure requires ** [redacted] **.

Spire provided its October 12, 2023 Post Incident Review (PIR) for the Holt incident[14], which included a narrative of the incident, a brief analysis of the incident, lessons learned, and corrective action items to be taken by Spire. Staff has included a confidential copy of the PIR in Appendix C. In the PIR, Spire described the apparent cause of the incident to be ** [redacted] ** and Spire described one lesson learned from the incident to be, ** [redacted] ** Additionally, on the PIR, Spire included seven corrective action items to be completed by Spire:

[13] Spire's response to Staff data request 0011, and Spire's Attachment 11A.
[14] Spire's response to Staff data request 0011.3 and Spire's Attachment 11.3.

**

[redacted]

**

Spire indicated that ** [redacted] .[15] ** Spire stated that for ** [redacted] . **[16]

As part of its documentation for its post incident investigation Spire provided its lessons learned document, which is included in Table 2 as ** [redacted] **.[17] The lessons learned document provided Spire's reasoning why the incident occurred:

[15] Spire's response to Staff data request 0011.4.
[16] Spire's response to Staff data request 0011.4.
[17] Spire's response to Staff data request 0011, and Spire's Attachment 11D.

** [redacted] **

The lessons learned document additionally provided Spire's description on how to prevent recurrence:

** [redacted] **

Spire stated that for ** [redacted] **[18]

Spire provided ** [redacted] **[19]

[18] Spire's response to Staff data request 0011.4.
[19] Spire's response to Staff data request 0011.4 and Spire's Attachment 11.4.B.

Spire provided the results of its root cause analysis (RCA) of the incident[20], which is in Appendix C of this Report. The root cause analysis document includes a number of potential corrective actions that could be taken by Spire to prevent recurrence of the incident, including but not limited to ** [redacted] **

Spire stated, "the group that participated in the RCA reviewed all of the possible solutions in Confidential Attachment 12 and decided that all of the possible solutions required corrective actions."[21] Spire indicated that a number of these corrective actions have been completed, and that some are still in progress.

As part of its identified corrective actions following Spire's investigation of the incident, Spire updated procedures ** [redacted] **[22] Further discussion of these procedures is included in *Section III. E. Hot Tapping and Stopping* below. Spire additionally provided the Pipeline Contractor's investigation summary.[23] The investigation summary provided the Pipeline Contractor's reasoning why the incident occurred:

[20] Spire's response to Staff data request 0012 and Spire's Attachment 12.
[21] Spire's response to Staff data request 0012.2.
[22] Spire's response to Staff data request 0012.2 and Spire's Attachment 12.2.B., Spire also provided the previous versions of these procedures that were in effect on October 5, 2023 in response to Staff data request 0030.
[23] Spire's response to Staff data request 0011 and Spire's Attachment 11C.

** [redacted] [24] [redacted] **

The investigation summary additionally provided the Pipeline Contractor's lessons learned:

** [redacted]

[24] Staff's understanding is that as used in this context, ** [redacted] **.

[redacted] **

C. Incident Reporting Requirements

The ejection of the gripper plug, which caused the personal injury, occurred at approximately 3:00pm on October 5, 2023[25].

Spire employee ** [redacted] ** notified 911 of the incident at 3:09pm.[26]

Spire stated that it had confirmed discovery that a reportable incident occurred at 6:20pm on October 5, 2023, when Spire was notified that the injured contract employee had been airlifted to a hospital in Columbia, Missouri and admitted overnight.[27]

Spire notified Staff of the incident by telephone at 6:35pm on October 5, 2023[28].

At 6:49pm on October 5, 2023, Spire provided initial notification to the NRC.[29] On October 6, 2023 at 4:14pm Spire provided the 48-hour update to NRC.[30]

[25] Spire's response to Staff Data Request 0004.
[26] According to the interview with Kendrick Rodgers on November 28, 2023.
[27] Spire's response to Staff Data Request 0004.1.
[28] Time documented by Staff as initial notification in its *Gas Incident Notification* record.
[29] Spire's response to Staff Data Request 0004, verified by Staff's check of Pipeline Data Mart for NRC Report No. 1380998
[30] Spire's response to Staff Data Request 0004, verified by Staff's check of Pipeline Data Mart for NRC Report No. 1381071

Spire provided the 30-day PHMSA F 7100.1 Incident Report to PHMSA on November 6, 2023.

D. Drug and Alcohol Testing

Spire provided copies of its Drug and Alcohol Testing Policy as well as the Drug and Alcohol testing policies of Spire's Pipeline Contractor, and Inspection Contractor.[31]

Spire identified a total of eight individuals who were assigned to the project and on site at the time of the incident: ** [redacted] .**[32]

Pre-Employment Drug Testing:

Spire provided documentation of pre-employment drug testing for three of its four employees on site at the time of the incident: ** [redacted] [33]. Spire has also provided pre-employment drug testing for ** [redacted] .[34] [redacted] .[35]**

[31] Spire's response to Staff Data Request 0002.
[32] Spire's Confidential Attachment 2C to its response to Staff Data Request 0002.
[33] Spire's Confidential supplemental response to Staff Data Request 0026.2
[34] Spire's Confidential Attachment 26 to its response to Staff Data Request 0026.
[35] Spire's Confidential response to Staff Data Request 0026.3.

Random Drug Testing:

Spire provided documentation of the number of random drug testing performed during calendar year 2022 for Spire and the testing pools for its contractors: ** [redacted] .**[36] The percentages of random drug tests for covered Spire and Spire's Pipeline Contractor employees respectively in 2022 were **[redacted].**

Post Incident Drug Testing:

Spire initially stated that following the incident: ** "[redacted] **[37] Spire later supplemented this response to say: ** "[redacted]."[38] [redacted] **

In response to a Staff data request inquiring why no individuals were tested, Spire stated that: ** [redacted] **[39]

[36] Spire's Confidential Attachment 27C provided in response to Staff Data Request 0027.
[37] Spire's initial response to Staff Data Request 0002 was provided on January 8, 2024.
[38] Spire's supplemental response to Staff Data Request 0002 was provided on January 16, 2024.
[39] Spire's response to Staff Data Request 0025.

In response to a Staff data request for the basis that Spire used to determine that the performance of individual's working at the project site could be completely discounted as a contributing factor to the incident, Spire stated:

"** [redacted] **"[40]

E. Hot Tapping

The Spire tapping crew that performed work on the Holt, Missouri project had successfully performed numerous hot taps on Spire's pipelines prior to the incident. As discussed further in *Section III. G. Operator Qualification* below, Spire personnel who made the hot tap were qualified individuals per Spire's operator qualification program.

As described in *Section III. B. Investigation of Failures and Incidents* above, Spire has two procedures that are put into effect to complete hot tapping and stopping on its pipelines, both of which were updated by Spire following the incident: ** [redacted]

[40] Spire's response to part 2 of Staff Data Request 0025.

[redacted]. ** [41] A confidential copy of each of these procedures is included in Appendix D of this report. Updates to ** [redacted] ** include the following additions related to "air-jacking":

** [redacted] **

Spire's ** [redacted]

[redacted] [42]

[redacted]

[41] Spire's response to Staff data request 0012.2 and Spire's Attachment 12.2.B., Spire also provided the previous versions of these procedures that were in effect on October 5, 2023 in response to Staff data request 0030.

[42] In comments Spire provided to Staff on October 29, 2024, Spire stated: ** [redacted] *

[redacted] **

F. Prevention of Accidental Ignition

Spire provided a copy of its ** [redacted] ** procedure that was in effect at the time of the incident. For purging of natural gas from the existing pipeline segment that was being replaced, natural gas was vented out of the excavation and to the atmosphere using vent stacks. Spire verified there were no overhead utilities at the vent stacks and a fire extinguisher was provided.

Gas was seeping past the stopple fitting to the pipe that was to be cut and capped. Two vent stacks were installed near the stopple fitting, and the closest vent stack used what Spire calls

an "air handler"[43] to create a vacuum from the 12-inch pipe and vent the natural gas out of the excavation and to the atmosphere. A fire extinguisher was provided near the location of the vent stacks.

After cutting the pipe and removing a cylinder of pipe, a "gripper plug" was inserted into the open pipe in preparation for welding a cap on the open pipe. Prior to welding the cap, the "gripper plug" ejected from the open pipe and released gas out the open pipe and into the excavation. This gas release from the open pipe was unintentional and unplanned, and no accidental ignition occurred. After the gas release, a valve in the vent stack below the "air handler" was found in the closed position and was opened. The closed valve had stopped natural gas from venting out the vent stack and gas pressurized in the 12-inch pipe behind the "gripper plug" until the "gripper plug" was ejected.

G. Operator Qualification

Spire provided ** [redacted] **, the written operator qualification (OQ) program that was applicable to all Spire and contractor personnel performing work on the project where the incident occurred in Holt, Missouri on October 5, 2023.[44]

Spire identified the following covered tasks that were expected to be performed by Spire Missouri West Employees for the project in Holt, Missouri, where the incident occurred[45]:

**

[43] The "air handler" involves injecting compressed air into the vent stack and is pointed upward, creating a venturi effect that pulls a vacuum from the pipe below that is connected to the vent stack.
[44] Spire response to Staff data requests 0005 and 0006.
[45] Spire response to Staff data request 0005

**

Spire stated that a tap crew consisting of four Spire employees were performing the work identified in Table 3 above. Spire provided records showing all four of these employees were each currently qualified to perform all the covered tasks listed in Table 3 above.[46]

Spire identified the following covered tasks that were expected to be performed by contractor employees for the project in Holt, Missouri, where the incident occurred[47]:

**

[46] Spire response to Staff data request 0007 and Spire's Attachment 7
[47] Spire response to Staff data request 0006

**

Spire stated that a contractor crew consisting of three individuals was present to perform work at the project in Holt, Missouri, where the incident occurred, however only one of these individuals was responsible for performing the covered tasks identified in Table 4 above. Spire provided records showing the contract employee responsible for performing covered tasks was currently qualified to perform both covered tasks identified in Table 4 above[48].

Spire further stated: ** [redacted] **[49]

Spire's ** [redacted] ** includes ** [redacted] ** which states:

** [redacted]

[48] Spire response to Staff data request 0008 and Spire Attachment 8.
[49] Spire response to Staff data requests 0005 and 0006.

[redacted] **

Spire has stated that it believes the use of a gripper plug on this project was contrary to Spire procedures.[50] Spire identified ** [redacted] ** in its root cause investigation of this incident.[51] On the Holt, Missouri project, Spire's ** [redacted].[52] ** These drawings were included in a work order package that was sent to the following Spire departments for review for consistency with the standards and/or procedures of the departments: ROW, Environmental, Pipeline Safety and Compliance, Field Ops, System Planning, Pressure and Measurement, Gas Control, Pipeline Management, Supply Chain, Safety Management Systems and Workload Planning. When asked to describe the actions Spire took to communicate the change to Spire's standard as it relates to allowing/disallowing the use of

[50] Spire's response to Staff Data Request 0001.1.
[51] Spire's response to Staff Data Request 0012.
[52] Spire's response to Staff Data Request 0014. Attachment 14D provides the design documents, Spire's response to Staff Data Request 0001.2 confirms that the purse of these documents was for use during construction.

gripper plugs to those individuals who were qualified to perform the covered tasks related to the standard, and their supervisors, Spire stated, "Spire is not able to locate any documentation of the actions that communicated the change but will supplement this response if any such documentation is located." No supplemental responses were provided.

H. Distribution Integrity Management Program ("DIMP")

Spire provided a copy of its written DIMP Plan** [redacted] ** published August 31, 2021, that was in effect at the time of the incident.[53]

In its incident report provided to PHMSA[54], Spire lists the apparent cause of the incident as ** [redacted] **. In the DIMP Plan that was effective for Spire at the time of the incident, incorrect operation is identified as a potential threat. Specifically, Spire stated:

** [redacted]

[53] Spire response to Staff data request 0010

[54] 20 CSR 4240-40.020(6)(A) requires that each operator 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 20 CSR 4240-40.020(3). Spire's incident report was provided in response to Staff Data Request 0009

[redacted]

[redacted] **[55]

Staff inquired if Spire had any planned changes to its DIMP with regards to the threat of incorrect operations moving forward and Spire stated:

** [redacted]

[redacted]

[redacted]

[redacted]

[redacted] **[56]

I. Oversight of Contractors

Spire provided a copy of its ** [redacted] ** in response to a Staff data request[57] to provide copies of Spire policies and procedures related to Spire oversight and inspection of contractors working on Spire's pipelines. ** [redacted] **

An employee of the Inspection Contractor on this project, ** [redacted] ** was on site to oversee work performed on the Holt, Missouri pipeline relocation project. At the time

[55] Spire response to Staff data request 0010
[56] Spire response to Staff data request 0010
[57] Staff Data Request 0003.

the incident occurred, Spire's Inspection Contractor was in his truck approximately100 feet away from the incident location[58]. Spire's Inspector Contractor was onsite to provide routine inspection and oversight of the project, and was required to observe tasks that were listed ** [redacted] .**[59]

For the work being performed on October 5, 2024, Spire stated that: ** [redacted] ** Spire also stated that it did not complete a Gas Interruption/Shutdown of Main Procedure in Holt Missouri on October 5, 2023.[60]

J. Project Design

Spire has attributed the apparent cause of the incident to "Incorrect Operation" with the sub-cause "Equipment Not Installed Properly." Spire stated that ** [redacted] **[61] The forceful ejection of the gripper plug from the pipe resulted in the injury to the worker in this incident.

Design documents issued by Spire for construction of the Holt, Missouri pipeline relocation project (See *Confidential Attachment E- Spire Design Documents* of this Report) **

[58] Spire's Attachment 11.3 provided in response to Staff Data Request 11.3.
[59] Spire response to Staff Data Request 3.1
[60] Spire response to Staff Data Request 0031.
[61] Spire's response to Staff Data Request 0001, and CONF_Attachment 12 to Spire's response to Staff Data Request 0012, as clarified by Spire in its comments to Staff on October 29, 2024.

[redacted][62] [redacted].[63] ** However, in response to a Staff data request asking: "Does Spire's statement: "Furthermore gripper plug installation is not outlined in our company procedure" mean that Spire considers the use of gripper plugs on the Holt Missouri project to have been contrary to Spire procedures?", Spire responded "Yes".[64] The design documents issued for construction on the Holt Missouri pipeline relocation project were not approved or stamped by a licensed professional engineer.[65]

The following have been noted by Spire with respect to the design for the Holt, Missouri pipeline relocation project[66]:

- The gripper plugs identified on design drawings for this project are not intended to be used on any pressurized pipe or pipe connected to a pressurized system.
- The use of gripper plugs is not a part of Spire's standard operating procedures and are not intended for gas usage or steel pipes.
- There was a quarter inch cold rolled longitudinal seam on the inside of the pipe. Staff notes that Spire's ** [redacted]. ** Staff further notes that a Williamson Control Fitting

[62] Spire's response to Staff Data Request 0014, Attachment 14D provides the design documents, Spire's response to Staff Data Request 0001.2 confirms that the purpose of the documents was for use during construction.
[63] Spire's response to Staff Data Request 0001.3.
[64] Spire's response to Staff Data Request 0001.1.
[65] Spire response to Staff Data Request 0011.3
[66] Based on Staff's review of Spire's Attachment 11.3 provided in response to Staff Data Request 0011.3

was used on the Holt, Missouri pipeline relocation project, and that Spire has stated that the seam did not appear to be raised.[67]

Spire utilized ventilation equipment ("Air handler and vent stacks"[68]) to help draw out any escaping gas getting past the stopple machine. However, there does not appear to be a Spire procedure that addresses the proper use or sizing of the ventilation equipment that Spire was utilizing at the Holt, Missouri project.

In response to a Staff data request asking if Spire's design standard(s), procedure(s) or other policies require that a licensed professional engineer review, approve and seal engineering plans developed for its pipe installation and replacement projects, Spire responded: "No, engineering plans are sent to applicable managers and directors in engineering and operations for technical review."[69]

In response to a Staff data request asking if Spire has any standard(s), procedures or other policies pertaining specifically to creating, reviewing and approving a project design, Spire responded: "The Company has work processes. The Company doesn't have any other official standards, procedures, or policies for creating, reviewing, and approving project design"[70].

Spire stated that its Construction Engineering department is responsible for ensuring that design documents for the type of work being performed in Holt, Missouri to relocate the pipeline are consistent with Spire procedures. After construction engineering has reviewed and completed all documents for a project, the work order is sent out for 5-day review to the

[67] Spire's Response to Staff Data Request 0001.6.
[68] From Attachment 11.3 to Spire's response to Staff Data Request 0011.3.
[69] Spire response to Staff Data Request 0037.
[70] Spire response to Staff Data Request 0037.

following departments for consistency with their respective department's standards and/or procedures: ROW, Environmental, Pipeline Safety and Compliance, Field Ops, System Planning, Pressure and Measurement, Gas Control, Pipeline Management, Supply Chain, Safety Management Systems and Workload Planning.[71]

[71] Spire's response to Staff Data Request 0037.1.

Appendix B – Figures and Photographs

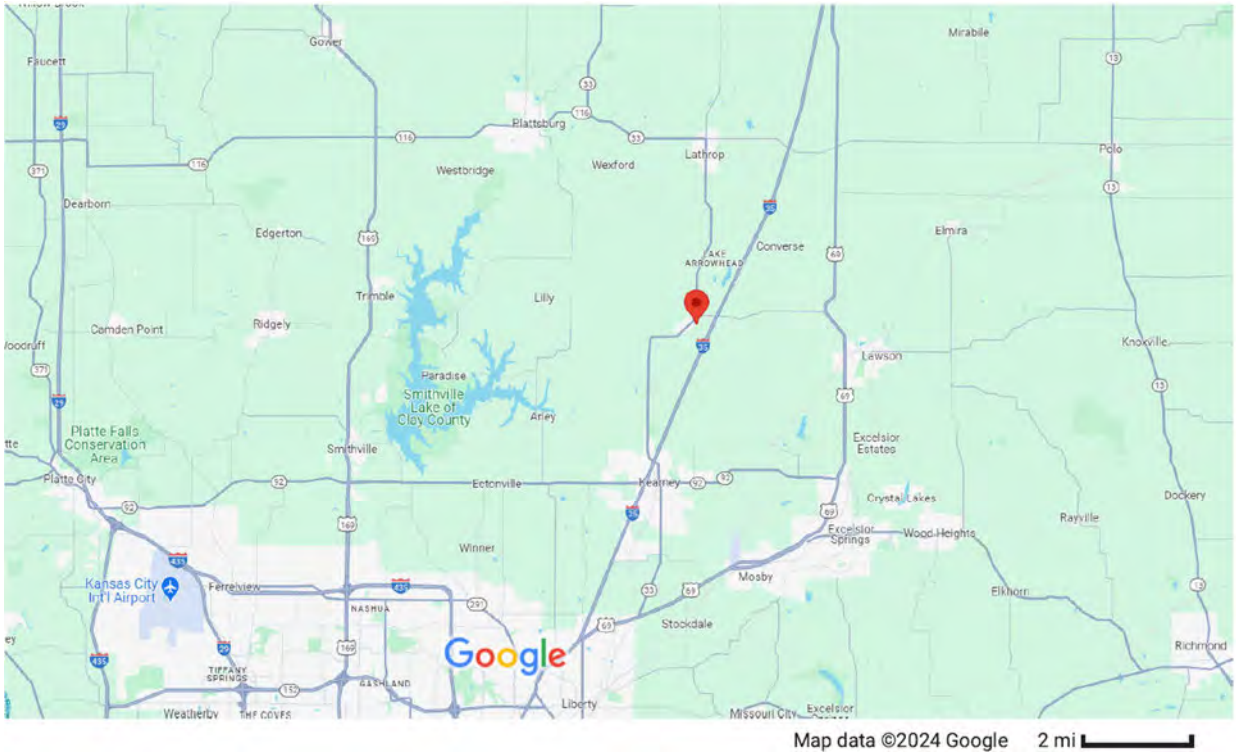

Figure 1 - Approximate Location of Incident
(Source: Google)

Figure 2 – Photograph showing Segment of Pipeline Exposed in Creek Bank (Source: Staff Photograph)

Figure 3 – Photograph of vent stack that was used at the incident location showing air hose connection for air handler, pipe extending diagonally into the vent stack with open end inside the vent stack, and valve used to allow the flow of air from a compressor into the vent stack. The venturi-effect of the air flowing upward and out of the vent stack to the atmosphere creates a vacuum from the vent stack below this location and from the pipe segment connected to the bottom of the vent stack. (Source: Staff Photograph)

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*Confidential Figure 4 – ***

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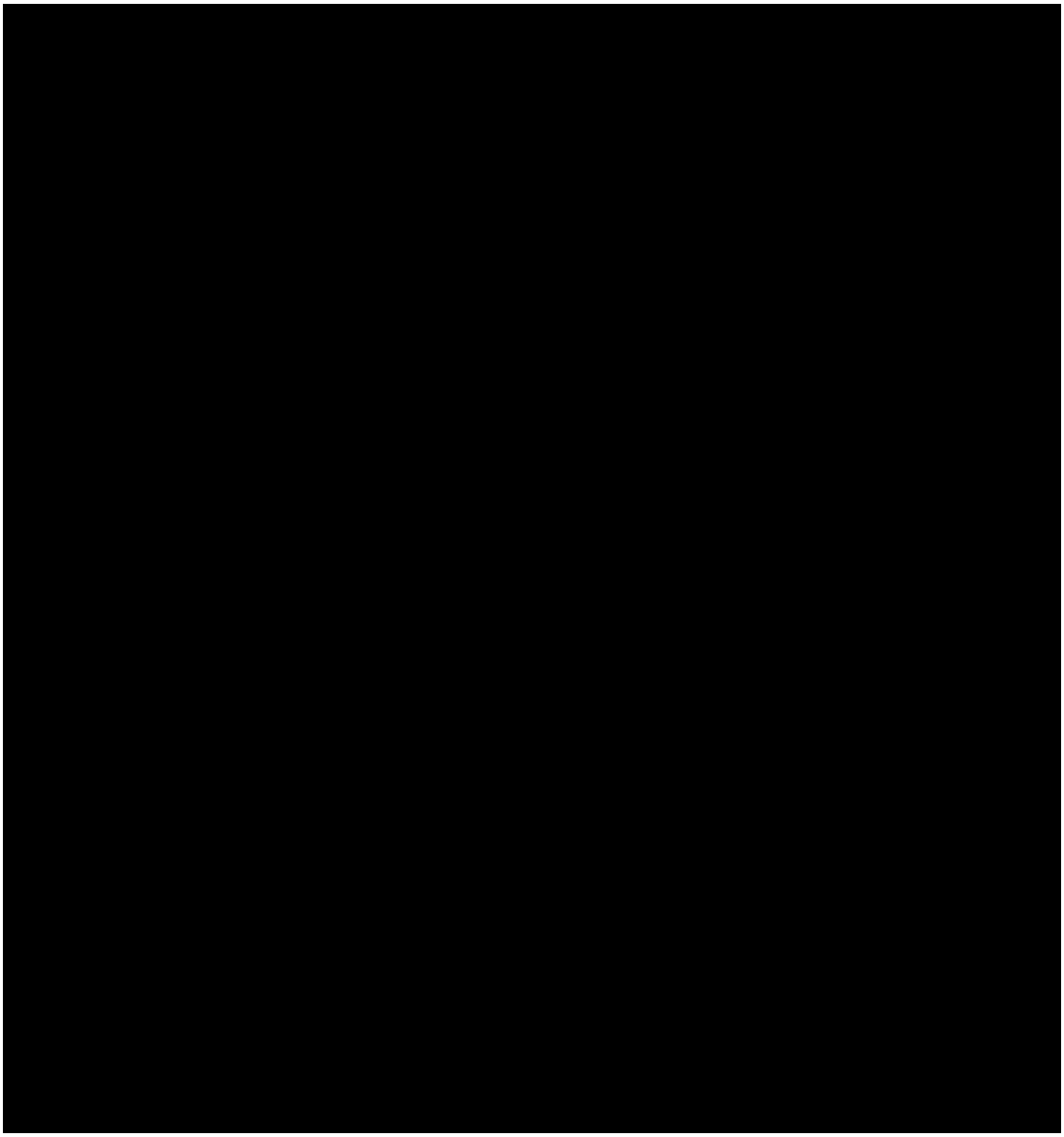

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Confidential Figure 5 – Photograph showing gripper plug that ejected out of the open pipe and was damaged.
(Source: Spire, from Confidential Attachment 11.3 provided in response to Staff Data Request No. 0011.3.)

CASE NO. GS-2024-0137

APPENDIX C

HAS BEEN DEEMED

CONFIDENTIAL

IN ITS ENTIRETY

CASE NO. GS-2024-0137

APPENDIX D

HAS BEEN DEEMED

CONFIDENTIAL

IN ITS ENTIRETY

CASE NO. GS-2024-0137

APPENDIX E

HAS BEEN DEEMED

CONFIDENTIAL

IN ITS ENTIRETY