# Atmos Energy Corporation's
# Proposed Findings, Probable Cause, and
# Safety Recommendation to
# the National Transportation Safety Board

**March 18, 2022**

**Docket No. PLD21FR002**
**Relating to Natural Gas-Fueled Explosion**
**During Routine Maintenance**
**Farmersville, Texas**
**June 28, 2021**

## TABLE OF CONTENTS

# PARTY SUBMISSION

Atmos Energy Corporation (Atmos), together with the Pipeline & Hazardous Materials Safety Administration (PHMSA), the Texas Railroad Commission (RRC), the Collin County Sherriff's Office, the City of Farmersville Police Department, FESCO, Ltd. (FESCO), and Bobcat Contracting, L.L.C. (Bobcat) continues to assist with the National Transportation Safety Board (NTSB)'s investigation into the accident that occurred in Farmersville, Texas on June 28, 2021. While this Submission comments only on the NTSB investigation, this narrow focus in no way diminishes the gravity of the tragic accident which claimed the lives of a Bobcat employee and a FESCO employee, and injured two others. We continue to extend our deepest condolences to the families of those who lost their lives on June 28.

Atmos appreciates the work of fire, law enforcement, assisting emergency personnel, and Atmos employees as well as other party members and the NTSB in the investigation of the accident.

Section 49 C.F.R. § 831.14 invites parties to submit written proposed findings drawn from the evidence produced during the investigation, a proposed probable cause, and/or proposed safety recommendation(s) designed to prevent future accidents.

# FACTUAL INFORMATION

## 1. About Atmos Energy

Atmos Energy Corporation, headquartered in Dallas, Texas, is one of the largest natural-gas only distributors in the United States. Its regulated distribution operations deliver natural gas to approximately 3 million residential, commercial, industrial, agricultural and public-authority customers in more than 1,400 communities in eight states. Atmos Energy also manages company-owned natural gas pipeline and storage assets, including one of the largest intrastate natural gas pipeline systems in Texas under its Atmos Pipeline-Texas ("APT") division.

Through its system of approximately 5,750 miles of transmission pipeline, APT provides transportation and storage services to local distribution companies including Atmos Energy's Mid-Tex Division and transportation services to industrial and electric generation customers, gas marketers and producers. As part of its pipeline operations, APT also owns and operates five underground storage reservoirs in Texas.

APT is also subject to state and federal pipeline safety regulations, which are enforced by the Railroad Commission of Texas. Those regulations contain extensive, detailed requirements concerning matters such as pipe design; construction standards; operation and maintenance requirements; training and qualification of pipeline personnel; and transmission integrity management.

## 2. Accident Summary

On Monday, June 28, 2021, at approximately 3:35 p.m., natural gas ignited shortly after an in-line inspection tool (pig) was inserted into a launcher at Atmos Energy's Farmersville station. The pig was ejected from the launcher, fatally injuring one employee of FESCO and one employee of Bobcat, and injuring two others. Both FESCO and Bobcat were independent contractors for Atmos Energy at the time of the accident.

## 3. The Farmersville Site

The accident occurred at a station approximately five miles northwest of Farmersville, Texas at which three active Atmos Energy pipelines interconnect: Lines D17, D17-9, and O13-3. The station contained three pig launchers (Launchers 1, 2, and 3) from which in-line inspections are conducted. Launcher 2, which was involved in the accident, was used to launch in-line inspection tools (pigs) south through Line D17. Line D17 has an outside diameter (OD) of 24" and a maximum allowable operating pressure (MAOP) of 800 psig. At the time of the accident Line D17 was operating at 638 psig. An image of the Farmersville site with Launcher 2 identified is shown in *Figure 1* below.


*Figure 1. Image of the Farmersville station showing the location of Launcher 2.*

Launcher 2 consisted of a barrel (beginning as a 26” pipe that reduced to 24” to match Line D17), a 2” equalizer line that connected the 26” and 24” sections, a Tube Turn hinged closure door (model 400-H) at the end of the section of 26” pipe, and a total of seven valves at various locations on the launcher. Diagrams of Launcher 2 are shown as *Figures 2 and 3* below.

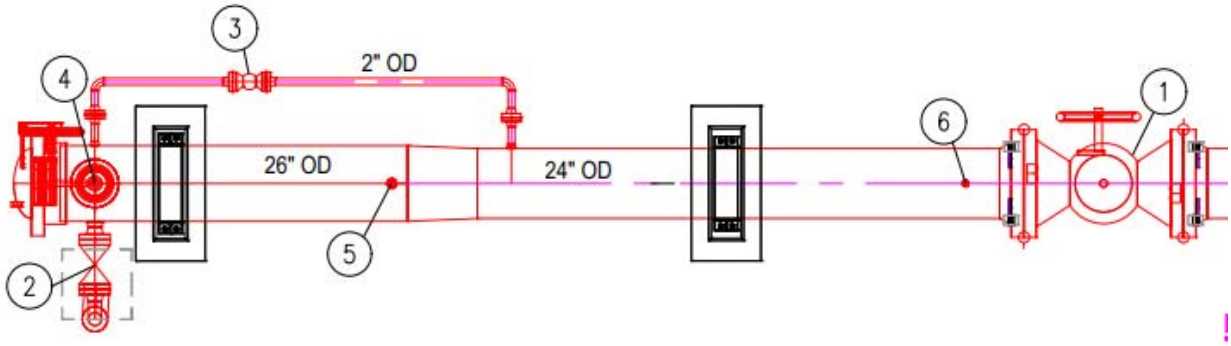


*Figure 2: Overhead diagram of Launcher 2 with valves identified by number*

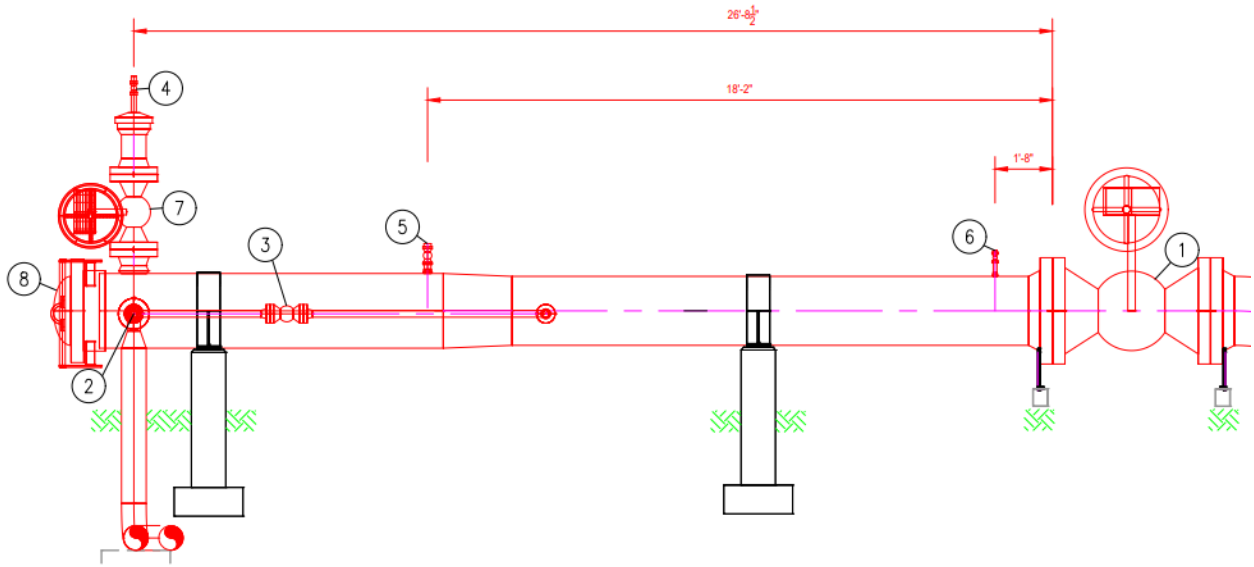


*Figure 3: Side view diagram of Launcher 2 with valves identified by number*

The valves on Launcher 2 were identified as follows:

- Valve 1 was a 24” mainline ball valve, manufactured by Cameron (a Schlumberger Limited company) that allowed the launcher to be isolated from Line D17.
- Valve 2 was a 4” “kicker” plug valve, manufactured by Flowserve Corporation, which allowed for gas to flow into the launcher near the closure door.
- Valve 3 was a 2” ball valve that opened or closed the equalizer line between the 26” and 24” sections of the launcher.

- Valves 4 and 7 were located atop the launcher and could be used to vent the launcher barrel.
- Valve 5 was a 2” plug valve that was inoperable at the time of the accident.
- Valve 6 was a 1” valve which could be used vent the launcher and which was connected to the flare system owned and operated by FESCO at the time of the accident.

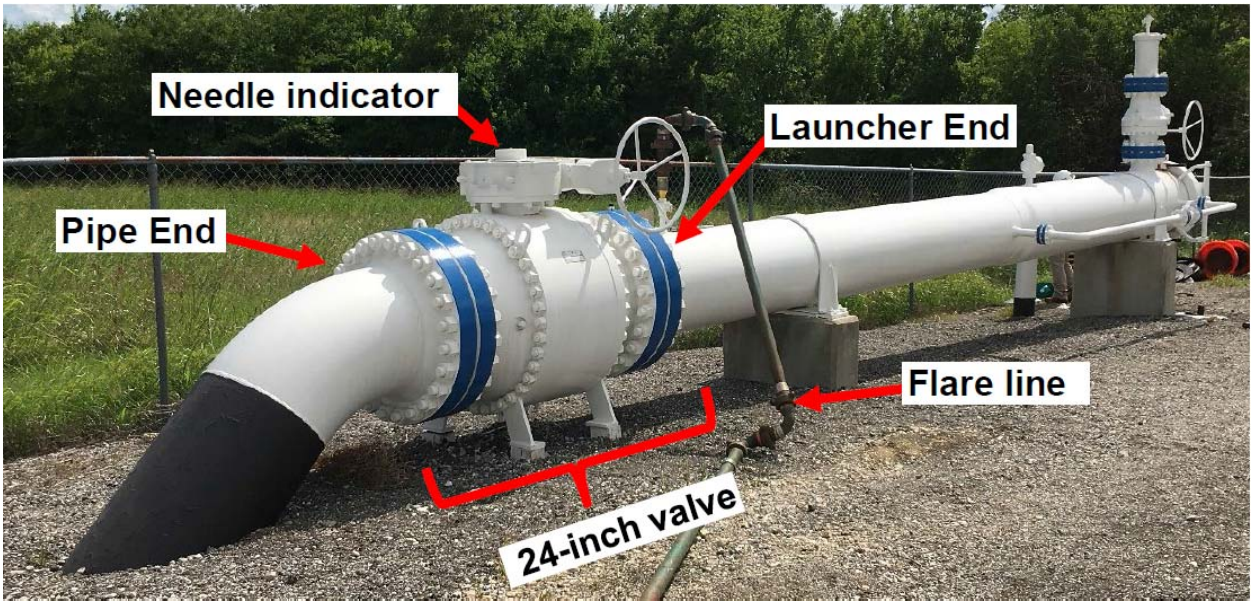


*Figure 4. Photo of the launcher with the 24” mainline valve (Valve 1) and the flare line connected to Valve 6. The equalizer line is shown on the right-hand side of the photo which connected the 26” diameter and the 24” diameter sections of the launcher. Photo from NTSB Materials Laboratory Factual Report No. 21-094.*

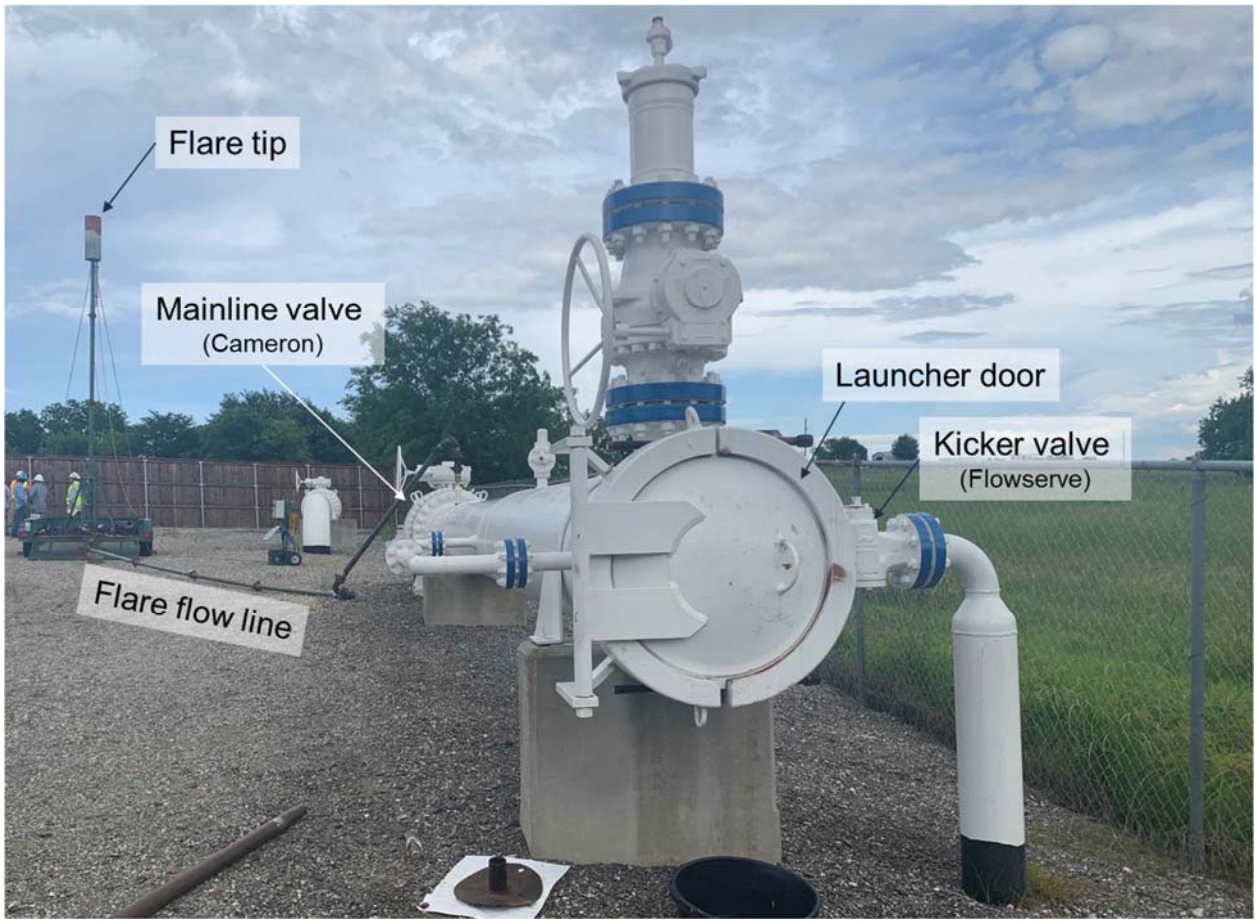


*Figure 5. Photo of the launcher with the door and 4" kicker line valve (Valve 2) shown in the foreground, and the flare line and flare stack shown in the background (from NTSB Pipeline Operations Group Factual Report PLD21FR002).*

The valves in the Farmersville site had received regular maintenance by Atmos Energy's contractors.[1] There had been no reports of potential issues with either the 24" mainline valve or the 4" kicker valve in the 10 years prior to the accident, which are the only two valves through which natural gas can enter the launcher. These two valves were also the subject of the NTSB's Materials Laboratory Factual Reports No. 21-094 and 21-093, respectively, discussed in greater detail below.

## 4. The Pigging Operation

### A. Atmos' Comprehensive Transmission Integrity Program Complied with Regulatory Requirements.

Integrity management programs require a comprehensive assessment of pipeline infrastructure, and federal and state rules require pipeline operators to assess threats to their system,

[1] *See* AEC-APT-NTSB 000058-000059 and 000645-000646

apply risk analysis of those threats and take both preventative and mitigative actions for the continued safe operation of pipelines. The Pipeline Safety Improvement Act of 2002 introduced new requirements for pipeline operators, including those specifically addressing integrity management for natural gas transmission lines.[2] Atmos Energy developed a Transmission Integrity Management Plan[3] to address those requirements and in the year preceding the accident (2020), Atmos Energy's APT division assessed 1,497 miles of transmission lines through the use of inline inspection tools.[4] This does not include the miles of pipeline that were pigged annually for routine maintenance, as part of commissioning a new pipeline, or for decommissioning an existing pipeline. Atmos Energy has never had a DOT reportable incident involving pigging.

### B. Atmos Hired Two Experienced Independent Contractors to Perform the Pigging and Flaring Operations.

The pigging operation at the Farmersville station was scheduled to begin on June 21, 2021 and conclude on July 2, 2021 and cover approximately 21 miles of Line D17.[5] A series of runs with cleaning and gauge tools were planned prior to the assessment with the inline inspection tool. Atmos Energy hired Bobcat as an independent contractor to perform the hands-on portions of the pigging operation, including opening the launcher door, utilizing grounding equipment, and loading the pigs, under the terms of a Master Services Agreement which had been in place since 2016.[6]

In response to the new mandate for operators to minimize releases of natural gas from pipeline facilities under the Protecting Our Infrastructure of Pipelines and Enhancing Safety Act of 2020 (the PIPES Act of 2020), Atmos Energy sought opportunities to further reduce methane emissions from its transmission and distribution systems, and extended the practice of flaring to pig loading and launching activities.[7] FESCO had, for many years safely and successfully conducted flaring operations in other Atmos Energy pipeline applications such as blow-downs, tie-ins, reducing pressure to facilitate the movement of in-line inspection tools, and evacuating odorant tanks and separators. Atmos Energy hired FESCO as an independent contractor to install

---

[2] *See* 49 CFR 192 Subpart O and Subpart M (192.710), and 16 Tex. Admin. Code §8.101)

[3] *See* AEC-APT-NTSB 000343-000356 – excerpt of Pipeline Integrity Management Plan

[4] *See* U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Annual Reports for Calendar Year 2020 (Natural Gas Transmission and Gathering Systems) for Atmos Pipeline-Texas

[5] Pigging operations on Line D17 included maintenance runs in 2017 with brush and foam pigs, and inline inspection in 2015.

[6] *See* Bobcat MSA - AEC-APT-NTSB 000183-000212

[7] The Protecting Our Infrastructure of Pipelines and Enhancing Safety Act of 2020 (the PIPES Act of 2020) contains a self-executing mandate requiring operators to update their Operations and Maintenance plans by December 27, 2021 to adequately consider: "…(ii)…minimizing releases of natural gas from pipeline facilities; and (iii) the protection of the environment." On June 10, 2021, PHMSA published an Advisory Bulletin to remind operators that the PIPES Act of 2020 contains these mandates.

and operate a portable flare system to evacuate gas from the launcher under the terms of a Master Services Agreement which had been in place since 2020.[8]

### C. Atmos Prepared Documentation and Conducted an "All-Hands" Stakeholder Meeting in Advance of the Pigging Operation.

In preparation for the pigging operation, Atmos Energy reviewed systems data and completed an "ILI Project Questionnaire" which included a Technical Questionnaire detailing information on the pipeline, fittings, road crossings, pipeline records, GIS coordinates, the launcher and receiver configurations, and the tools to be used.[9]

A Stakeholders Meeting was then conducted on June 15, 2021 (which included representatives from Bobcat and FESCO) to discuss the pigging operation, assign roles and responsibilities, discuss PPE, COVID protocols, and other operational and safety issues and concerns. Notes from the Stakeholder Meeting were memorialized on Atmos Energy's "ILI and Maintenance Pigging Stakeholder's Meeting Template" and then distributed to the involved parties.[10]

## 5. Procedures and Training

### A. Atmos' Employees were Trained and Qualified

Two Atmos Energy Senior Field Construction Coordinators (referred to as Sr. FCC A and Sr. FCC B) were involved in coordinating the pigging operation and were onsite at the time of the accident. Sr. FCC A was hired by Atmos Energy in 2009, began working on pigging operations in 2012, and was promoted to Sr. FCC in 2015. Sr. FCC B had been with Atmos Energy or its predecessor companies since 1983, began working on pigging operations in 2009, and was promoted Sr. FCC in 2012. Neither employee had faced disciplinary action or had a record of incidents/accidents related to pipeline safety. Both employees successfully completed the required post-accident DOT drug tests.

Atmos Energy required its employees and contractors performing pigging operations to meet minimum operator qualifications based on their roles. The operator qualifications (OQs) required for Atmos Energy's Sr. FCC role included 20 qualifications listed below[11]:

---

[8] *See* FESCO MSA - AEC-APT-NTSB 000214-000290

[9] These forms were found in Appendix P of Atmos Energy's Transmission Integrity Plan. *See* AEC-APT-NTSB 000292-000333.

[10] The Stakeholder Meeting Notes document was also a part of the Appendix P forms in Atmos Energy's Transmission Integrity Plan. *See* AEC-APT-NSB 000039-000043.

[11] *See* AEC-APT-NTSB 000828

- G03 Installation / Excavation of Pipeline
- I01 Conducting Pipe to Soil Measurements
- I07 Inspecting for External Corrosion and Repairing Pipe Coating
- I09 Internal Corrosion Control
- I10 Atmospheric Corrosion
- L02 Activating and Purging / Blowdown Pipelines
- L04 Tapping Pipelines Under Pressure with Self-tapping Tee
- M02 Conducting Pipeline Patrolling Surveys
- M03 Locating and Marking lines
- M04 Testing Service Lines (New and Reinstating)
- M05 Testing Mains or Transmission Lines
- M08 Preventing Accidental Ignition
- M11 Abandoning / Deactivating or Shutting Down Gas Facilities
- M13 Emergency Response
- M14 Damage Prevention during Excavation or Encroachment
- M15 Leak Classification
- M16 Recognize and React to Generic Abnormal Operating Conditions
- M17 Installing / Maintaining Pipeline Markers
- M20 Operating Within Established MAOP
- M22 Performing By-pass operations on Regulator Stations and Meters

Atmos Energy expects its contractors to report any potential safety concerns to Atmos personnel immediately. The Master Services Agreements for Bobcat and FESCO require that contractors advise any person who may become involved in the work of any hazards relating to the work, and to ensure that person fully understands the nature of the hazards and safety precautions that can be taken to eliminate or minimize those dangers. Bobcat and FESCO employees engaged in pigging activities were required to hold the M08 (Preventing Accidental Ignition) and M16 (Recognize and React to Abnormal Operating Conditions) operator qualifications. These contractors used the services of an independent OQ provider to administer and manage their training, qualifications, certification, and record keeping requirements. NTSB investigators reviewed training records for all workers onsite at the time of the accident (i.e., Atmos, Bobcat, and FESCO), and determined that they had completed all assigned training, no expirations were indicated, and each had the OQs required by Atmos Energy.

### B. Atmos Developed Launching and Receiving Procedures Memorializing Existing Practices

Atmos Energy had a comprehensive Pipeline Integrity Management Plan (subsequently renamed the Transmission Integrity Management Plan) ("TIMP"), which was in place in June 2021 at the time of the accident and which covered, among other topics, pigging operations. The TIMP has been periodically reviewed and approved by regulators, most recently in May 2021. Many of the specific sections of the TIMP addressing pigging operations were included in appendices, such

as Appendix P (containing the templates for the ILI Questionnaire and the ILI and Maintenance Pigging Stakeholder's Meeting notes described above) and Appendix R (containing procedures for loading and launching a pig).[12] In addition to Appendices P and R to the TIMP, Atmos Energy policies and procedures applicable to pigging operations included guidance on safety set forth in Atmos Energy's Safety Manual and Operations and Maintenance Manual.

For years, Atmos Energy has been safely conducting pigging operations. As set forth above, well-trained and qualified Atmos Energy employees have been on site during pigging operations and have worked with contractors responsible for loading and launching the pigs. Atmos Energy employees involved in pigging operations have had extensive experience in conducting safe pigging operations; they have received consistent on-the-job training in accepted and well understood practices for safe pigging operations.

Appendix R was developed to formally document those accepted practices on which Atmos Energy employees had consistent safe experience. A team involving subject matter experts documented those practices in Appendix R through a Management of Change Approval Form in July 2019.[13] A Procedure Change Communication followed which acknowledged that Appendix R memorialized pigging practices already in place and on which Atmos Energy employees had previously been trained; accordingly this Change Communication noted that while further training on the processes described in Appendix R would not be required, communication of Appendix R was expected.[14] Thereafter, Atmos Energy's Integrity Management group engaged with employees concerning the adoption of Appendix R, and Atmos Energy integrated discussion of Appendix R into its processes for preparing for a pigging operation. For example, after adoption of Appendix R, the Safety Meeting section of all Stakeholder Meeting Agendas for pigging operations included a procedures review of Appendix R.[15]

### C. Atmos Provided Training for Emergency Responders and Public Outreach on General Safety Awareness

Atmos Energy conducts safety training and public awareness outreach for various stakeholder groups, including the emergency response organizations in Collin County, Texas where the accident occurred. For example, the fire chief for the Farmersville Fire Department stated during his NTSB interview that natural gas training is provided by Atmos Energy "[a]t least once a year" and had last been provided year prior to the accident.[16] Atmos Energy offers an option of providing this training remotely, or at Atmos' Charles K. Vaughan Center which opened in late 2010. This industry leading facility serves as a technical training location for Atmos' front-line employees, and contains a small-scale community with houses, apartments, commercial

[12] *See* AEC-APT-NTSB 000702-000712.
[13] *See* AEC-APT-NTSB 000914.
[14] *See* AEC-APT-NTSB 000915.
[15] *See* AEC-APT-NTSB 000039-000043.
[16] Interview of Fire Chief, Farmersville Fire Department (6.30.21) at pg. 6

buildings, and city streets as well as natural gas distribution pipelines and other utility infrastructure.

Atmos Energy also provides written safety information to its customers and the public on a variety of schedules and topics including:

- Bill Inserts / On-Bill Messaging to Customers
- Information Packets for New Customers
- Excavator-Specific Safety and Damage Prevention Communication
- ROW Mailings to Customers within 1000' of Transmission and Storage Fields

On an annual basis Atmos Energy conducts liaison activities with fire, police, and other appropriate public emergency response officials as required by Rule 8.235 of Title 16 of the Texas Administrative Code and 49 CFR §192.615(c). Additionally, every 3 years Atmos Energy conducts a mailing of Pipeline Safety materials to public officials (such as city council members and county commissioners). The most recent mailings were conducted in 2018 and 2021.

## 6. Events leading up to the Accident

Onsite work for the pigging operation began on Monday, June 21, 2021 with representatives of Atmos Energy, Bobcat, and FESCO present. FESCO was responsible for installing and operating a portable flaring system which was connected to Valve 6 to evacuate gas from the launcher. Bobcat was responsible for loading the first pig (a foam brush pig) into the launcher. As work began on June 21, 2021 (one week prior to the accident) to evacuate gas from the launcher, the workers noticed the flare did not extinguish as expected after the mainline valve (Valve 1) was closed. Sr. FCC B and a Bobcat employee adjusted the valve and the flare extinguished after a few minutes. They marked the position of the valve and were able to successfully open the trap door, load the pig, close the trap door, and subsequently launch the pig without issue. In each of the four subsequent pig runs in the days leading up to the accident, workers were able to successfully de-pressurize the launcher via the flare, open the trap door, load the pig, close the trap door, and launch the pig. There were no further issues with the valve.[17] The flare line valve (Valve 6) was always left open after the flame extinguished to allow any residual gas to vent into the atmosphere through the flare line. Atmos' Sr. FCC A commented that once the launcher door was opened, it also acted as a "secondary check" for continued venting of the launcher.[18]

During the first two pig runs on June 22 and 23, workers monitored pressure by visually confirming when the flare extinguished, listening for the pressure to equalize, and also using Valve 4, which was located atop the barrel of the launcher.[19] Workers continued to monitor pressure by

[17] Interview of Foreman, Bobcat (6.30.21) at pg. 34-35
[18] Interview of Sr FCC A, Atmos Energy (7.1.21) at pg. 51
[19] Interview of Sr. FCC B, Atmos Energy, (7.1.21) at pgs. 35-36

visually confirming when the flare extinguished and also listening for the pressure to equalize and did not use Valve 4 after the first two runs.

## 7. The Day of the Accident

On-site work for loading the gauge pig and commencing the sixth run began around 3:00 p.m. on Monday, June 28, 2021. It was raining intermittently that afternoon at varying intensities. Atmos FCC A conducted individual meetings with FESCO and Bobcat employees to discuss roles and responsibilities for the upcoming work. Atmos Sr. FCC A stated that everyone on the jobsite had the ability to stop work and confirmed that no one had expressed safety concerns.[20] Atmos Sr. FCC B stated that he did not notice anything out of the ordinary or that would give him concern that afternoon[21]. The Bobcat foreman stated that it was a routine day, and he had no concerns about the site, the equipment, the pig, the weather, the people he worked with, or the people he was supervising.[22] He also stated that if there was a problem that he felt needed to be addressed, he would have raised it with Atmos and that he had the authority to stop work.[23] Finally, the FESCO technician said that he felt comfortable in the safety measures that he took and that others took.[24]

FESCO began flaring gas from the launcher through the line connected to Valve 6 until the flame extinguished. Valve 6 was then left fully open to vent any residual gas through the flare line. The launcher door was then opened without issue approximately three to five minutes after the flare had extinguished.[25]

There were no indications of pressure in the launcher as the door was being opened, nor were there indications of gas (vapors, odorant, or sounds of gas escaping) in the launcher after the door was opened[26]. Atmos Sr. FCC B stated that if gas had been leaking out of the launcher door, fumes would have been visible and the odorant noticeable.[27] Atmos Sr. FCC A and B estimated the launcher door remained open for approximately 10 minutes while the pig was loaded into the launcher before the accident occurred.[28]

---

[20] Interview of Sr. FCCA, Atmos Energy (7.1.21) at pg. 35

[21] Interview of Sr. FCC B, Atmos Energy, (7.1.21) at pgs. 23-24

[22] Interview of Foreman, Bobcat (6.30.21) at pg 30 and 45

[23] Interview of Foreman, Bobcat (6.30.21) at pg. 66-67

[24] Interview of Pipeline Technician, FESCO (7.14.21) at pg 34)

[25] Interview of Sr. FCCA, Atmos Energy (7.1.21) at pg. 45

[26] Interview of Foreman, Bobcat (6.30.21) at pg 45 "There's nothing out of the ordinary that I recall once the door was open."

[27] Interview of Sr. FCC B, Atmos Energy, (7.1.21) at pg 18

[28] Interview of Sr FCC A, Atmos Energy (7.1.21) at pg. 46 "…I would just estimate maybe seven to ten minutes for all of that to take place with the door fully open" and Interview of Sr. FCC B, Atmos Energy, (7.1.21) at pg 23: "Q. Do you recall -- can you estimate how long the door was open until the time of the incident? A. It would just be an estimate of time. You know, before the blast, and by, you know, I'm -- 10 to 15 minutes. Just an estimate."

After the launcher was depressurized and the launcher door was opened by Bobcat employees, the pig was then lifted and carried by a mechanical excavator to the launcher by Bobcat employees. A Bobcat employee attached a grounding cable to a metal push rod which was connected to the exterior of the launcher. The Bobcat employees, with the assistance of FESCO employees, first used the push rod manually to insert the pig into the launcher, and then brought the mechanical excavator to assist pushing the rod to move the pig further in the launcher.

After the pig was seated in the launcher (where the pipe reduces from 26" to 24"), Bobcat and FESCO employees began manually removing the push rod from the launcher. As the rod was pulled away from the pig, it fell to the bottom of the launcher barrel. The Bobcat and FESCO employees were continuing to remove the rod when a flash occurred, accompanied by a loud boom. The pig was ejected from the launcher, fatally injuring a FESCO employee and a Bobcat employee. Another FESCO employee and another Bobcat employee also sustained injuries.

## 8. Atmos' Emergency Response

Atmos' Sr. FCC B called 911 at 3:34 p.m. to report the accident and provide directions to emergency responders while Sr. FCC A rendered aid to the injured employees. The Collin County Assistant Fire Marshal was the first emergency responder to arrive on site at 3:41 p.m. and asked if natural gas was present. Atmos' Sr. FCC A then instructed Sr. FCC B and another Bobcat employee to close and secure the launcher door and ensure that the flare line was still open and venting (which it was). Atmos' Sr. FCC A then informed the Assistant Fire Marshal the area was safe.

After reporting the accident to operational leadership, Atmos Energy notified the National Response Center by phone at 4:40 p.m. and the Railroad Commission of Texas (RRC) at 4:44 p.m.[29] Atmos Energy mobilized two operations supervisors (one of which was designated as the Incident Commander) and a compliance supervisor to respond. The Atmos Incident Commander arrived on site at 4:30 p.m. and identified himself to law enforcement and fire department personnel. An Atmos survey technician arrived about an hour later, at 5:35 p.m. However, because law enforcement was conducting their investigation, Atmos Energy personnel were restricted from entering the site until the RRC arrived at 6:55 p.m. In collaboration with the RRC, the Atmos survey technician was then allowed to perform an initial leak survey with a remote methane leak detector (RMLD). A second leak survey was conducted later in the evening. Both times the site was determined to be free of a hazardous gaseous atmosphere. Atmos Energy also performed an odorant test on nearby aboveground piping which was observed by the RRC. The odorant test showed the gas was properly odorized and met regulatory criteria.

[29] The PHMSA 30-day Incident Report (Form 7100.2) was subsequently submitted on July 28, 2021.

## 9. NTSB Investigation and Testing

The NTSB conducted an initial assessment of the site on June 29, 2021. Investigative field work followed, which included conducting an orifice flow test of the flare line which revealed natural gas was flowing from the launcher through the flare line at a rate of approximately 1,590 cubic feet per day.[30] Several reports and studies followed the field work, including the following:

- Three Materials Laboratory Factual Reports involving examination and/or testing of the following: (i) the 4" kicker valve[31], (ii) the 24" mainline valve,[32] and (iii) the pig transmitter/transducer.[33]

- Two Specialists' Factual Reports involving examination of: (i) meteorological conditions,[34] and (ii) mobile phone records of seven on-site personnel.[35]

- A Materials Laboratory Study Report modeling gas concentrations and venting within the launcher under a variety of scenarios.[36]

Examination and testing of the 4" kicker valve confirmed it was not leaking.[37] Examination and testing of the 24" mainline valve revealed the inner and outer seat rings (including the soft sealing areas of the O-ring between the inner and outer seat rings) contained multiple scratches on both sides of the valve (*i.e.*, the pipeline side and the launcher side). Metallic debris of an unknown source was found embedded in the O-ring. The ball also contained metallic scratches in areas that corresponded to those found at the seat face sealing surfaces. A disassembly report prepared by the valve manufacturer concluded the scratch damage was consistent with foreign debris entering the valve from an external unidentified source during operation of the valve, and that foreign debris including metallic particles can cause damage to the seat rings and ball sealing surfaces creating a leakage path through the valve.[38]

---

[30] No determination was made as to whether the leak was occurring at this same rate prior to the accident.

[31] Materials Laboratory Factual Report No. 21-093

[32] Materials Laboratory Factual Report No. 21-094

[33] Materials Laboratory Factual Report No. 21-097

[34] Specialist's Factual Report: Meteorology PLD21FR002

[35] Specialist's Factual Report: Mobile Phone Records PLD21FR002

[36] Materials Laboratory Study Report No. 21-098S

[37] Materials Laboratory Factual Report No. 21-093 at pg 3

[38] Materials Laboratory Factual Report No. 21-094 at pg 8

*Figure 6. Photo of scratches in the outer seat ring and O-ring of the 24" mainline valve (from NTSB Materials Laboratory Factual Report No. 21-094).*

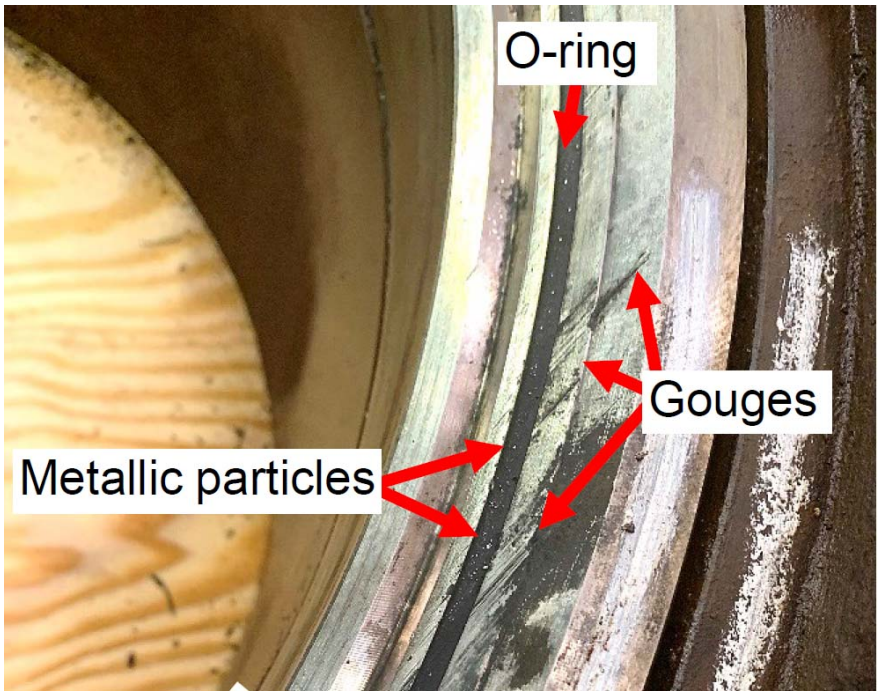


*Figure 7. Photo of metallic particles in the O-ring that divides the inner seat ring from the outer seat ring, as well as gouges in the outer seat ring of the 24" mainline valve (from NTSB Materials Laboratory Factual Report No. 21-094).*

The Materials Laboratory Study Report (21-098S) examined flammability conditions within the launcher during the pig loading procedure using modeling based on the Fire Dynamics Simulator (FDS) computational fluid dynamics software. The study states "[t]he modeling was not intended to provide a temporally exact solution to the gas concentration within the components of the pig launcher barrel but instead was used to provide a qualitative understanding of the flow paths and overall conditions within the launcher."[39] Six different scenarios of venting pathways were studied using various time intervals to approximate gas concentrations within the launcher.

Scenario 5 modeled a venting configuration where both the valve attached to the flare line and the launcher door were open, which represented the venting configuration on the day of the accident prior to insertion of the pig. In this scenario (which did not consider gas leaking from the 24" mainline valve), the launcher was free of flammable gas concentrations after three minutes (180 seconds).[40]

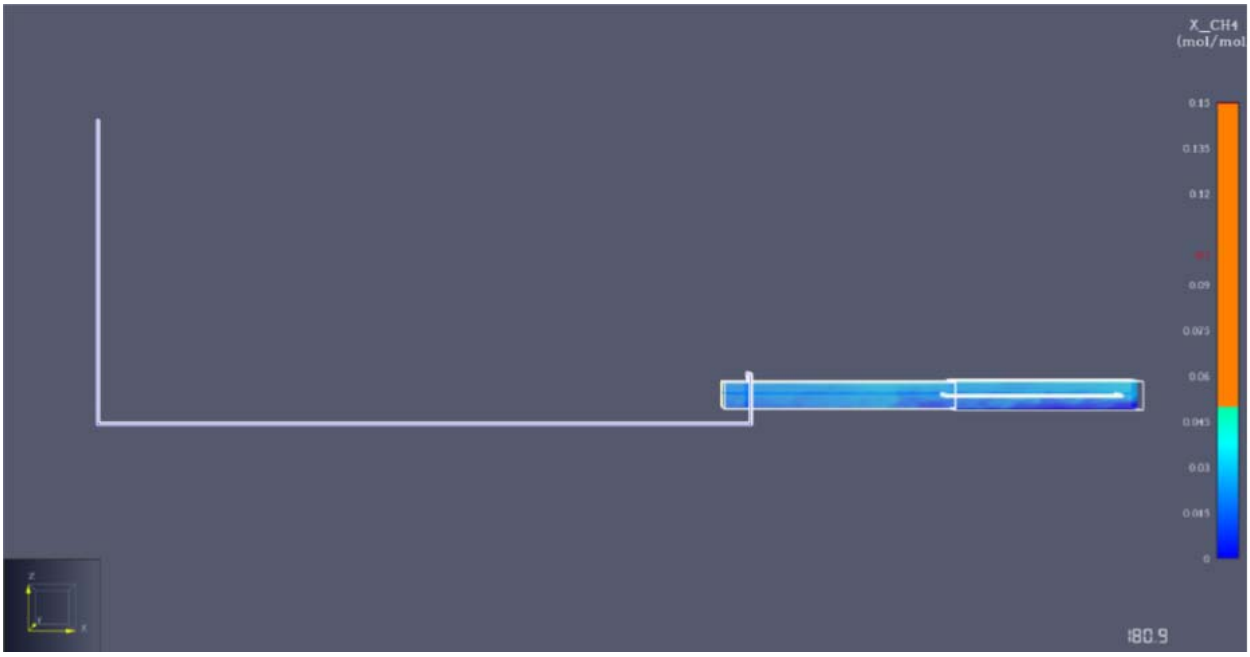


*Figure 8. Modeling of gas concentrations in the launcher at three minutes after launcher door has been opened and the valve to the flare line remained open. There are no flammable regions within the launcher. NTSB Materials Laboratory Study Report No. 21-098S.*

In Scenario 6, the modeling considered both the gas leaking from the 24" mainline valve[41] and the seating of the pig in the reduced 24" diameter section of the launcher, effectively splitting the launcher into two zones. In this scenario, at one minute after the insertion of the pig, the

[39] Materials Laboratory Study Report No. 21-098S at pg 1

[40] At the time of the accident, the launcher door had been open and venting for approximately 10 minutes prior to insertion of the pig.

[41] A leak rate of 1,590 cubic feet per day was used, consistent with the post-accident field testing of the 24" mainline valve. No determination was made as to whether the leak was occurring at this same rate at the time of the accident.

reduced section of the launcher was within the flammable range (5%-15% gas in air) while the section of the launcher between the pig and the open launcher door did not contain any flammable regions.

The study of these various scenarios suggests that venting the launcher through vent valves alone is, at best, a lengthy process (over 20 minutes), while opening the launcher door allows the launcher to vent quickly (within 3 minutes). If the modeling and underlying assumptions are accurate, then at the time of the accident only the reduced 24" section of the launcher would have had a flammable concentration of gas; the 26" section portion of the launcher (between the seated pig and the open launcher door) would not have contained a flammable concentration of gas.

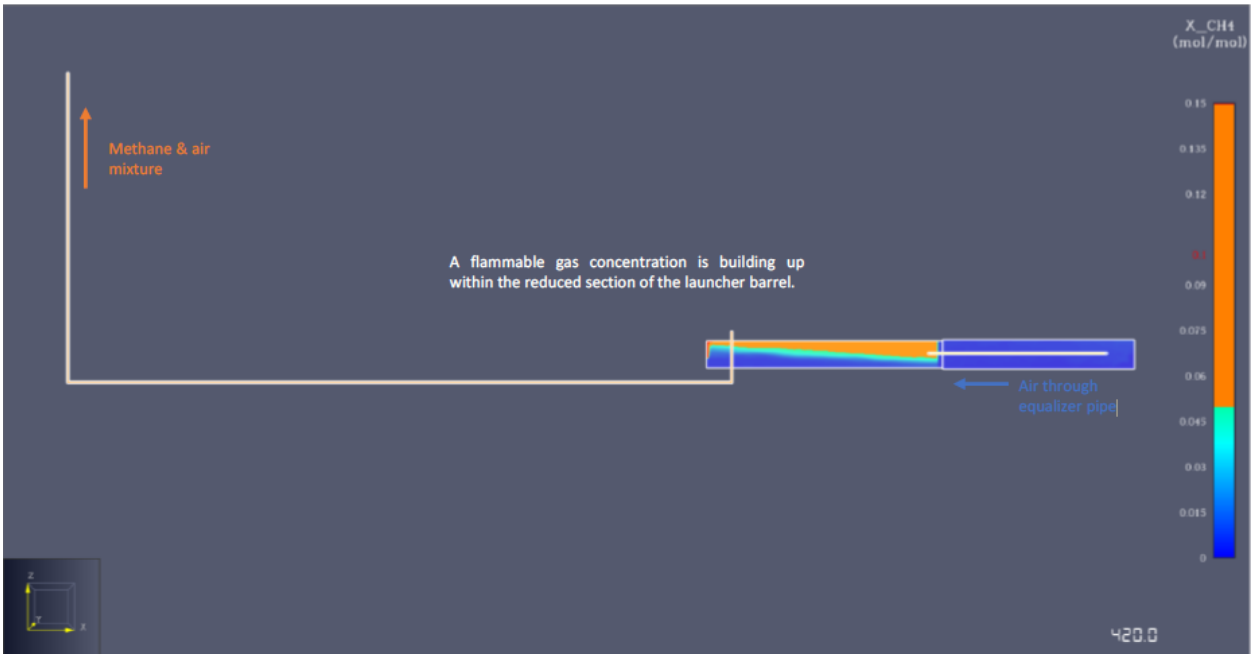


*Figure 9. Modeling of gas concentrations in the launcher at one minute after the pig is inserted while the launcher door has been opened and the valve to the flare line remains open. There are no flammable regions between the open launcher door and the pig seated in the reducer. NTSB Materials Laboratory Study Report No. 21-098S.*

## 10. Safety Initiatives

Atmos Energy's commitment to safety is a core value, reflected in our Vision Statement, and permeates our culture. It is evident in our people, policies, practices, and procedures. We live this safety value; it is part of who we are. Our holistic approach to managing safety involves observing, evaluating, and adapting to changing and challenging conditions. We are committed to continuous improvement as we work to achieve our vision of being the safest provider of natural gas services. Recent safety initiates illustrating this commitment are described below.

### A. Atmos Immediately Suspended Pigging Operations and Began a Comprehensive Review of its Processes and Procedures

Immediately following the accident, we suspended all pigging operations on in-service pipe across our eight-states of operation. We then initiated a review of our processes and procedures related to pigging operations to make recommendations for pipeline safety performance improvement. To that end, we first gathered a core group of internal subject matter experts with transmission pipeline design and operational experience to identify current in-line inspection standards, practices, and procedures and potential areas of risk and/or improvement. We worked with a third-party industry expert to reach out to others in the industry who regularly perform pigging to benchmark our procedures and practices in the following areas:

- Written procedures
- Roles and Responsibilities
- Equipment
- Gas Detection and Monitoring
- Job Safety
- Contractor Oversight

The following summary of our efforts reflects our review of processes and recommendations for pipeline safety performance improvement, including enhancements to our pigging practices and procedures identified as a result of our review with these internal and external stakeholders. We have developed and are implementing the safety improvements listed below:

- Standardized our launcher design (for both new and existing launchers) to ensure consistency of training and operations.
- Requiring existing launchers to be retrofitted prior to operation to conform to the standardized design. The following features are required:
    - Additional ports for venting, gauging, and monitoring on both the upstream and downstream side of the reducer.
    - A grounding lug on the launcher.
    - Double block and bleed valving for the mainline and kicker valves. Existing launchers will be retrofitted as needed to conform to this standard.
- Revised our procedures to reflect the following enhancements related to loading and launching operations:
    - A requirement to develop a site-specific valve sequencing plan before beginning loading and launching operations and that plan will be used when performing such work.
    - Use of Job Safety Analyses (“JSAs”) for both company and contractor personnel. This will be reviewed and approved by a third-party inspector prior to performing work onsite.

- To address the possibility for gas accumulating within the launcher, requiring that prior to opening the launcher door:
    - Pressure and gas concentration readings be taken at ports on both the upstream and downstream side of the reducer as part of launching operations.
    - Purging natural gas from the launcher with nitrogen.
    - Mandatory stabilization periods to determine if gas is accumulating in the launcher. Gas concentrations and pressure will be monitored during and after the stabilization period.
    - Defining the additional steps to be taken if pressure and gas concentration levels rise beyond a defined threshold, including stopping work and escalating the matter to supervisory personnel.
- Requiring an on-site third-party inspector to inspect and document loading and launching operations.
- Requiring the use of checklists that are referenced in Appendix R (Pigging Procedures) of the Transmission Integrity Management Plan ("TIMP"). These checklists include:
    - Pre-Job
    - Daily (each occurrence)
    - Post-Job (Review of work performed, follow up actions, and continuous improvement opportunities under PSMS)
- Included additional details regarding the processes and material requirements associated with onsite tools and grounding to further reduce the chance for accidental ignition from voltage potential differentials.
- Established a new covered task for designated Atmos employees and select contractors under 49 CFR 192, Subpart N for pigging operations (launching and receiving). In addition to the initial testing and evaluation of knowledge, skill and ability, there will be periodic recertification and operator requalification requirements. Prior to performing pigging, training and qualifications by employees and contractors will have to be satisfactorily completed.

### B. Atmos Continues to Advance RP 1173, Pipeline Safety Management Systems

In 2019, Atmos Energy engaged an industry-leading consultant to conduct an API RP 1173 Pipeline Safety Management System (PSMS) assessment and gap analysis. The purpose of this effort was to assess Atmos' programs, policies, procedures and practices against the requirements of PSMS, and to guide Atmos' continued implementation of PSMS in a structured, prioritized way over an extended timeframe – recognizing that developing and implementing an effective PSMS is a journey, not a project. This effort was a significant enterprise-wide undertaking, involving over twenty (20) functional groups, including operations, integrity management, pressure control, engineering, safety, training, and public awareness, and now forms the basis of our efforts to further implement

and mature our PSMS across the various elements of the plan. We established cross-functional teams to execute on prioritized items, and what follows are examples of our work:

- We conducted additional stakeholder meetings with various workgroups across all operating divisions to discuss PSMS and continue our focus on identifying and mitigating potential risks while continually assessing and improving processes and procedures.

- We established new process controls for work being performed on portions of our distribution operating system, specifically around Management of Change (MoC) and constructability reviews, that will result in work stoppage when deviations from key elements are discovered.

- We have enhanced language in our Safety Manual regarding Stop Work Authority and Hazard Analysis and reinforced these concepts through refresher training and safety huddles. In addition, we are emphasizing these concepts, along with other PSMS elements, in technical training curriculum and new hire training.

- We conduct annual PSMS maturity self-assessments using the API PSMS Maturity Tool.

- We have formalized sharing and lessons learned processes, including information gathered from NTSB reports and significant internal and external events. We have also continued our involvement in industry activities by serving on the AGA PSMS Executive Committee and participating in industry workshops and virtual conferences. We continue to meet with peer companies to discuss PSMS program activities and practices.

These and other efforts in support of PSMS are supported at the highest levels of the organization, with a corporate officer primarily responsible for the design, adoption, and implementation of PSMS. The Corporate Risk Management and Compliance Committee is responsible for ongoing governance and reporting to the Company's Management Committee.

### C. Atmos has Undertaken Company-wide Continuous Improvement Efforts to Proactively Assess and Mitigate Risk

We took actions to further enhance pipeline safety in multiple areas. An overview of those efforts is described below:

- Initiated and completed the Pipeline Safety Excellence Project which included a detailed review of our core pipeline safety programs, practices and procedures with state and federal regulatory requirements. The outputs from this Project included:

- a Pipeline Safety Matrix to document which procedures capture specific regulatory requirements. It contained a detailed breakdown of applicable regulations and the associated Atmos Energy procedures;
- a Reporting Requirements Quick Guide providing a quick reference guide outlining federal reporting requirements and State requirements; and
- a Pipeline Safety Process Summary that outlines the processes used by Atmos Energy to govern and support its core pipeline safety programs and captures the roles and responsibilities of our groups and personnel.

- Building on quality controls already in place, we developed a Quality Assurance Program which will help confirm continuing compliance with regulations, conformance with procedures, and the effectiveness of Atmos' quality controls. The QA Program will also check the sufficiency and consistency of processes and controls and the outputs will support data-based decisions to identify areas of continuous improvement to enhance safety. This proactive effort, along with our other PSMS efforts, will help identify opportunities to further enhance operating procedures and practices. The initial cycle of assessments will begin in 2022 and will be overseen by a newly created leadership position that will report to Atmos Energy's Vice President Pipeline Safety.

- Developed a comprehensive Management of Change (MoC) Procedure which builds on our existing processes to mitigate potential significant safety, health and environmental risk prior to implementing changes to procedures, design, processes and/or operating conditions. The MoC Procedure outlines the expectations and requirements to manage significant change(s) to activities necessary to minimize the risks associated with the change(s) and creates clear roles and responsibilities for managing changes.

# PROPOSED FINDINGS, PROBABLE CAUSE, AND SAFETY RECOMMENDATION

## A. Findings

1. **There was no indication the 24" mainline valve was damaged or leaking at the time of the accident.**

    a. The cause of damage to the 24" mainline valve was metallic debris of an unknown origin which caused gouges in the sealing surfaces of the valve.

    b. A field adjustment to the 24" mainline valve prior to the first pig run on June 21, 2021 identified the correct "closed" position for the valve.

    c. There were no indications the 24" mainline valve was leaking during any of the four prior pig runs or on the day of the accident.

    d. The valves at the Farmersville site had received routine maintenance from Atmos' independent contractor leading up to the accident.

2. **Atmos employees were experienced, trained, and qualified to oversee the pigging operation that was being conducted by Bobcat and FESCO, two experienced independent contractors.**

    a. Sr. FCC A and Sr. FCC B had a combined 50 years of experience working in the natural gas industry, and a combined 20 years of experience conducting safe pigging operations; they had received consistent on-the-job training in accepted and well-understood practices for safe pigging operations memorialized in the Transmission Integrity Management Plan.

    b. The Sr. FCC role required 20 operator qualifications. Both Sr. FCCs were current on their qualifications and related training.

    c. Neither Sr. FCC had faced disciplinary action or had a record of incidents/accidents related to pipeline safety.

    d. FESCO was an independent contractor hired by Atmos to design, install, and operate the flare to evacuate gas from the launcher, and had successfully conducted flaring operations for Atmos in a variety of pipeline applications.

e. Bobcat was an independent contractor hired by Atmos to perform the hands-on portions of the pigging operation, including opening the launcher door, utilizing grounding equipment, and loading the pigs.

3. **Atmos employees assigned roles and responsibilities and addressed safety-related issues before the operation began.**

    a. Atmos employees conducted a Stakeholder Meeting in advance of the pigging operation which included representatives from FESCO and Bobcat.

    b. Prior to work beginning on the afternoon of June 28, Atmos' Sr. FCC A held a bumper meeting with each of the FESCO and Bobcat employees to discuss roles and responsibilities and the work to be performed.

4. **None of the onsite workers expressed safety concerns about the pigging operation, including flaring, on the day of the accident or at any time prior. All workers had stop work authority.**

    a. There were no visible vapors, odors, or sounds that would have indicated the presence of gas in the launcher.

    b. The launcher door was open and venting for approximately 10 minutes prior to the accident.

5. **Atmos' emergency response was timely and followed procedures.**

    a. Following the accident Atmos immediately contacted emergency response officials, ensured the area was safe by closing the launcher door, communicated the accident through its chain of command, reported the accident to both the National Response Center and the RRC, and conducted two leak surveys accompanied by RRC officials once law enforcement allowed access to the site.

6. **Atmos immediately suspended pigging operations after the accident and has since taken significant steps to further enhance its pigging procedures.**

7. **Atmos has also engaged in several enterprise-wide initiatives relating to compliance, quality assurance, and management of change.**

## B. Probable Cause

The probable cause of the accident was the ignition of natural gas that leaked into the launcher through a closed 24" mainline valve as a result of undetected metal gouges in the sealing surfaces of the valve.

## C. Safety Recommendation

Atmos recommends the development of industry best practices for the safe operation of launchers and receivers when inserting and removing tools and devices to perform maintenance activities. Such best practices should seek to mitigate risks of ignition and the inadvertent release of pressure.