Issued: May 27, 2026 Pipeline Investigation Report: PIR-26-03

Atmos Energy Corporation Natural Gas–Fueled Home Explosion

Location	Avondale, Louisiana
Date	December 2, 2024
Accident type	Leak/explosion/fire
Pipeline	Distribution pipeline 2-inch coated steel main carrying natural gas
Fatalities	1
Injuries	5

Factual Information

1.1 The Accident

On December 2, 2024, about 6:26 a.m., a natural gas explosion and fire destroyed a single-family residence (the accident home) at 535 Avondale Garden Road in Avondale, Louisiana.[1] (See figure 1.) One person was fatally injured, and five other people sustained injuries. A neighboring residence was damaged, and its residents were displaced. At the time of the explosion, the weather was clear with winds of 11 mph; the weather was 50°F with no precipitation.

[1] (a) Visit ntsb.gov to find additional information in the public docket for this NTSB accident investigation (case number PLD25FR002), including detailed factual reports about the circumstances of the accident. (b) All times in this report are local.

Figure 1. Accident home after the explosion and fire. (Source: Atmos.)

The pipeline involved in this accident was owned and operated by the Atmos Energy Corporation. The pipeline consisted of 2-inch coated (wrapped) steel main running under an unpaved area near the western edge of Avondale Garden Road.[2]

On the morning of the explosion, work was underway on a construction site on the west side of Avondale Garden Road south of the accident home. About 5:00 a.m., the construction superintendent called Atmos and reported that a gas valve at the construction site had been run over by a cement truck, and that he could hear a hissing noise and smell a strong gas odor.[3] The superintendent called 9-1-1 about 5:09 a.m. and provided the same information to Jefferson Parish dispatch.

The gas valve mentioned by the construction superintendent was about 2 feet underground and about 340 feet from the accident home. (See figure 2.) The asset at

[2] A *main* is a pipeline that conveys natural gas to service lines that provide gas to houses or other buildings.

[3] Natural gas is odorless, but operators use additives to give it a distinct rotten-egg smell as a safety measure.

grade-level was a valve box: a lidded, roughly cylindrical steel enclosure extending upward from the valve to the grade to enable access to the valve.

Figure 2. Overhead view of accident site. (Source: Atmos.)

The first emergency responder on the scene was the assistant fire chief of the Herbert Wallace Volunteer Fire Company, who arrived about 5:17 a.m., followed shortly by personnel from the Jefferson Parish Sheriff's Office (JPSO). When interviewed by the National Transportation Safety Board (NTSB), the assistant fire chief said that the superintendent showed him the leak and confirmed that Atmos had been notified. The assistant fire chief and local law enforcement consulted the Emergency Response

Guidebook published by the US Department of Transportation and blocked off nearby intersections to prevent traffic from approaching within 300–350 feet of the leak.[4]

An Atmos senior service technician arrived on the scene about 5:35 a.m., tested for gas in storm drains near the leak, and performed bar-hole testing between the valve box and 4th Street.[5] These tests did not detect natural gas in the ground or drains. When interviewed by the NTSB, the senior service technician said that these test results indicated that there was "not a threat to life or property at the time." He still attempted to persuade the construction workers at the site to cease work for their own safety, but they did not leave the scene. During the same period, he obtained a license plate number for the truck that ran over the valve box, viewed a photograph of the driver's license, and collected contact information for the driver's supervisor for billing purposes. During his interview, the senior service technician stated that he was planning to check the sewers for gas after recording the billing-related information; he said he had not been able to find a sewer manhole when he first arrived.[6]

Between 6:00 a.m. and 6:15 a.m. an Atmos crew leader and an Atmos field construction coordinator arrived on the scene. At 6:17 a.m., the crew leader submitted an emergency locate ticket to the 811 call center and retrieved locating equipment from his vehicle to verify the locations of underground assets and support emergency repairs.[7]

About 6:26 a.m., the accident home exploded and began to burn. Emergency responders on scene responded to the fire, and Jefferson Parish dispatched personnel from additional agencies to provide aid, including the Avondale Volunteer Fire Department (VFD), Bridge City VFD, Nine Mile Point VFD, and Live Oak Manor VFD. The Herbert Wallace Volunteer Fire Company assistant fire chief served as the incident commander. Over the next 30 minutes, emergency responders applied water to the fire

[4] The 2024 Emergency Response Guidebook recommends an isolation distance of at least 100 meters (330 feet) for flammable gas spills or leaks.

[5] *Bar-hole testing* describes a gas measurement technique in which a small-diameter hole is made in the ground and a gas detection probe is inserted into the hole.

[6] The nearest sewer manhole was about 45 feet south of the valve box on the west side of Avondale Garden Road.

[7] (a) 811 call centers relay information about planned excavations to local utilities to help prevent damage; in Louisiana, this service is provided by Louisiana 811. (b) *Locating equipment* is used to identify and mark the horizontal and vertical position of buried pipelines and other utilities to prevent excavation damage.

and searched the accident home for survivors. The Jefferson Parish Sheriff's Office transported four victims with burn injuries to local hospitals, the last at 6:58 a.m.

At 7:01 a.m., the assistant fire chief informed dispatch that the fire was under control. Emergency responders conducted another search of the accident home and found a deceased victim in the kitchen.

After the fire was under control, emergency responders continued to smell natural gas odorant in the air. Another Atmos senior service technician arrived on the scene about 7:25 a.m. and used a combustible gas indicator (CGI) to measure the concentration of natural gas in a house adjacent to the accident home and in the accident home's sewer cleanout.[8] The readings indicated 100% gas in the sewer cleanout and 1% in the neighboring house.[9] Subsequently, Atmos employees removed nearby sewer manhole covers to vent the gas from the sewer.

During the emergency response to the fire and natural gas monitoring, other Atmos personnel continued working to shut off the flow of gas. They isolated the leak at 7:58 a.m. by closing two valves on a connected 4-inch main and squeezing off the damaged 2-inch main north of the leak.[10] They later restored gas service to much of the area by squeezing off the 2-inch main south of the leak and reopening the valves on the 4-inch main. By 8:10 a.m., the second Atmos senior service technician's CGI readings in the accident home's sewer cleanout and nearby structures all indicated 0% gas.

1.2 Atmos

Atmos is an independent, publicly held natural gas distribution company headquartered in Dallas, Texas. At the time of the accident, it employed about 5,000 people across six regional divisions comprising eight US states. Atmos served more than three million customers in over 1,400 communities and operated about 75,000 miles of distribution pipeline and was the largest natural gas distributor in the states of Louisiana, Mississippi, and Texas.

[8] A *CGI* is a device used to detect and measure natural gas or other inflammable gases in air.

[9] In air, natural gas is explosive only at concentrations between 5% and 15% by volume.

[10] *Squeezing off* a pipe is an emergency procedure in which responders compress a pipe with a manual or hydraulic clamp until gas can no longer flow freely.

1.3 Personnel

The first Atmos employee on the scene, who arrived about 5:35 a.m., was a senior service technician. He had 17 years of experience with Atmos, including 11 years in construction and 5 years in distribution service. His typical daily work involved reading meters and completing service calls.

The Atmos crew leader, who arrived on-scene about 6:10 a.m., had 10 years of natural gas experience, 4 of them in construction with Atmos. His typical daily work involved planning and leading construction activities like service installation, main installation, and leak repairs in the field.

The second Atmos senior service technician, who arrived on-scene about 7:25 a.m., had 14 years of experience, including 2 years in construction and 12 years in distribution service. His typical daily work involved reading meters, responding to leak emergencies, and service orders.

1.4 Pipeline, Valve, and Valve Box

The pipeline involved in this accident was originally installed by another utility in 1952 and 1960. Atmos acquired it in 2001 along with its other Louisiana assets. The maximum allowable operating pressure in the area was 100 pounds per square inch gauge (psig).[11] The system pressure was 80 psig at 5:02 a.m. on December 2, 2024, according to Atmos records. No Atmos assets were connected to the accident home, which did not have natural gas service.

The valve near the leak was a 2-inch threaded valve. The valve box positioned over the valve was a cast iron cylinder 24.75 inches long and varying in diameter along its length. At its base, it had a diameter of 8.375 inches, and its wall was flared to create a rim about 0.95 inches wide. (See figure 3.) Its date of original installation is unknown.

The infrastructure was last excavated on October 9, 2024, when Atmos completed a project to offset the main to accommodate a storm drain for a new library under construction. During this work, Atmos employees unearthed a section of main, greased and turned the valve, and removed and reinstalled the valve box over the valve. According to the Atmos senior field construction coordinator involved in the project, the top of the valve box was level with the surrounding grade and marked to identify the gas valve when the work was completed. (See figure 3.)

[11] *Pounds per square inch gauge*, or *psig*, indicates the pressure difference between the inside a container, like a pipeline or tank, and the ambient environment.

Figure 3. Valve box after the accident (left) and October 2024 Google Street View image of valve box cover (right).

At the time of the last excavation near the accident valve, Atmos was no longer installing new cast iron valve boxes and had adopted plastic valve boxes sandwiched between two pads: a support pad installed below the main and a concrete "base pad" at the grade. The new valve box design has a cutout at the lower edge and rests on the support pad. Atmos did not have a process or rule for replacing existing cast iron valve boxes with the newer design or a written procedure for reinstalling cast iron valve boxes. During a meeting with the NTSB, the Atmos Vice President of Operations for the Louisiana Division Eastern Region said that installing valve boxes in contact with mains was a common practice across Atmos' Louisiana Division. Later emails from Atmos said that Atmos expected the box structure, rim, and soil to bear loads whenever a valve box was installed level with the surrounding grade. See figure 4 for a comparison of valve box installations.

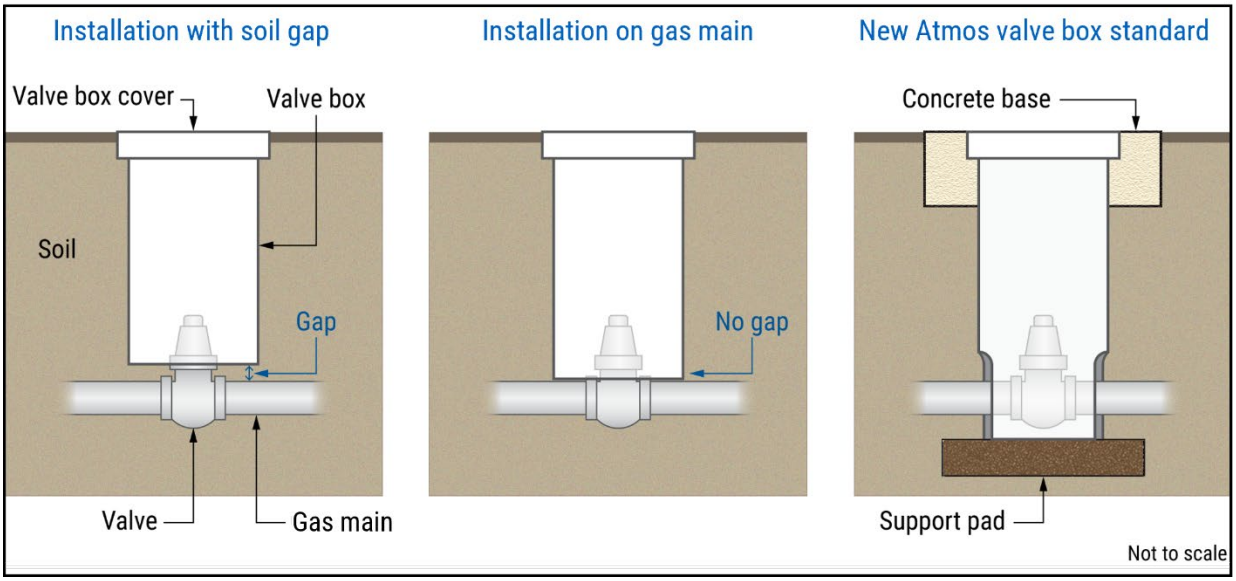

Figure 4. Valve box installations.

Federal regulations at Title 49 *Code of Federal Regulations* (*CFR*) Part 192.181(c)(3) require that when a box or enclosure is installed over a valve, "the box or enclosure must be installed so as to avoid transmitting external loads to the main."

1.5 Examinations and Tests

1.5.1 Excavation

Atmos's on-scene excavation on December 2, 2025, identified a fracture in the Avondale Garden Road main near a valve at the eastern edge of the construction site. The main was fractured around most of its circumference, with a thin strip of metal remaining at the 12 o'clock position (the top of the pipe) just south of where the main threaded into the valve body. (See figure 5.) Two leak surveys conducted by Atmos along Avondale Garden Road and several nearby streets on December 2 did not identify additional sources of gas.

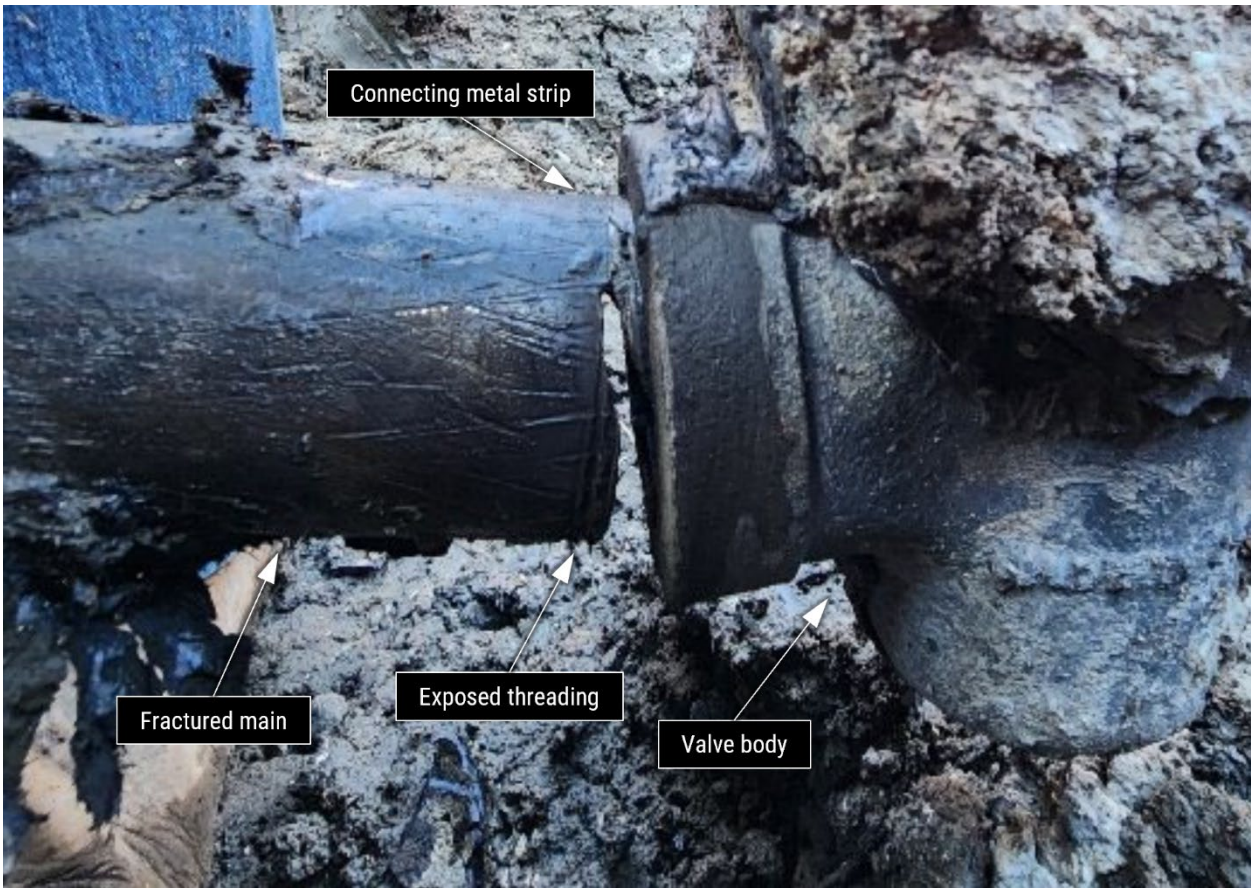

Figure 5. Excavated gas main.

The excavation also unearthed the end of an uncapped, 6-inch plastic pipe about 8 inches from the fracture. (See figure 6.) Investigators sent inspection cameras through this pipe and found that it was a sewer lateral connected to the main sewer system in the area but not to any other structure, like a house or business. A series of camera inspections identified a continuous path between this uncapped pipe and the accident home.

Figure 6. Uncapped pipe near gas main fracture.

1.5.2 Postaccident Examinations

The NTSB recovered the valve box and three sections of main near the fracture for examination in the Materials Laboratory. (See figure 7.) The thin strip of metal shown in figure 5 broke during recovery.

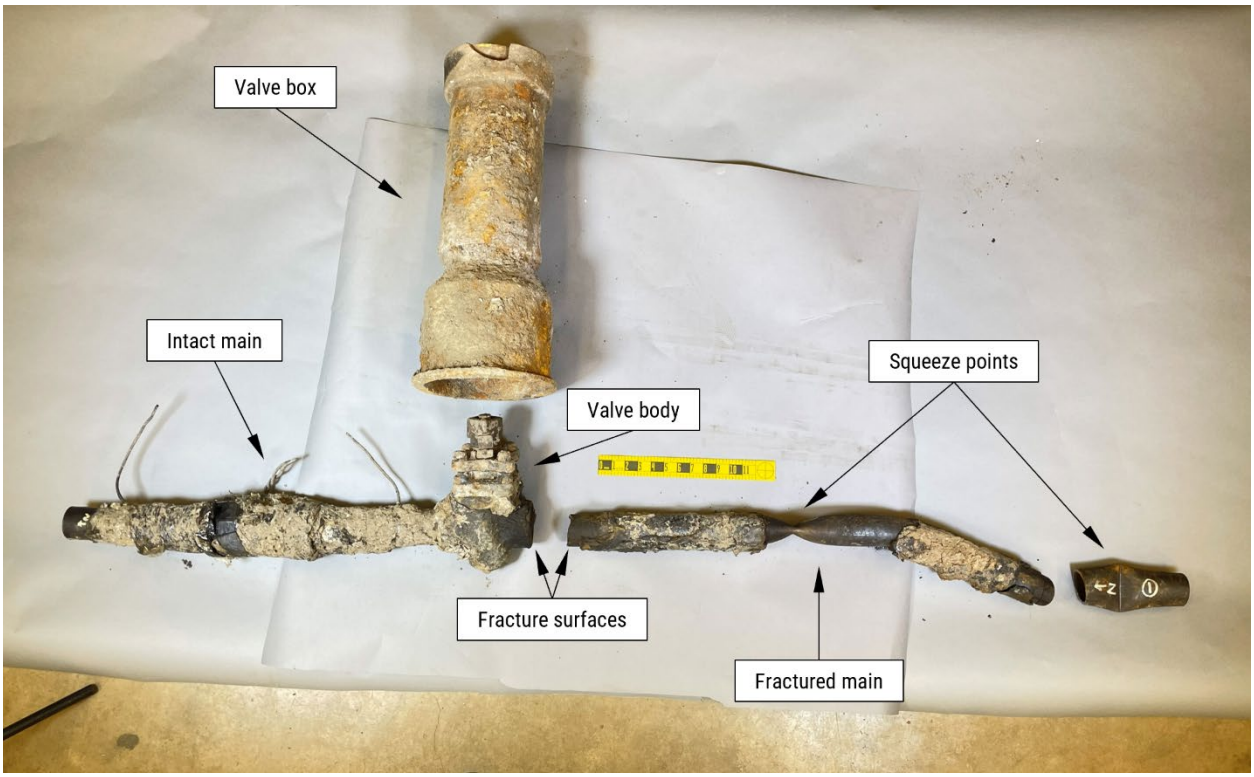

Figure 7. Recovered assets.

The valve was mostly cylindrical in shape with threaded joints on the north and south end. The fractured main was threaded about 0.5 inches into the south end of the valve. The outside of the main was coated with coal tar. The geometries of the fracture surfaces appeared to mirror each other, with no missing sections.

Measurements of the main's inside and outside diameter near the fracture found an average wall thickness of 0.156 ± 0.005 inches, with a total range (difference between greatest and least measurement) of 0.015 inches. The examination did not find signs of significant wall thinning. The hardness of the steel near the fracture surface was consistent with carbon steel.

The Materials Laboratory removed a section of the fractured main by making a cut about 0.75 inches from the fracture. There was a slight outward bend in the fracture surface near the 12 o'clock position where the thin strip of metal had connected pieces of the fractured main before recovery from the scene. (See figure 8.) No other significant deformation was noted in the main near the fracture surface.

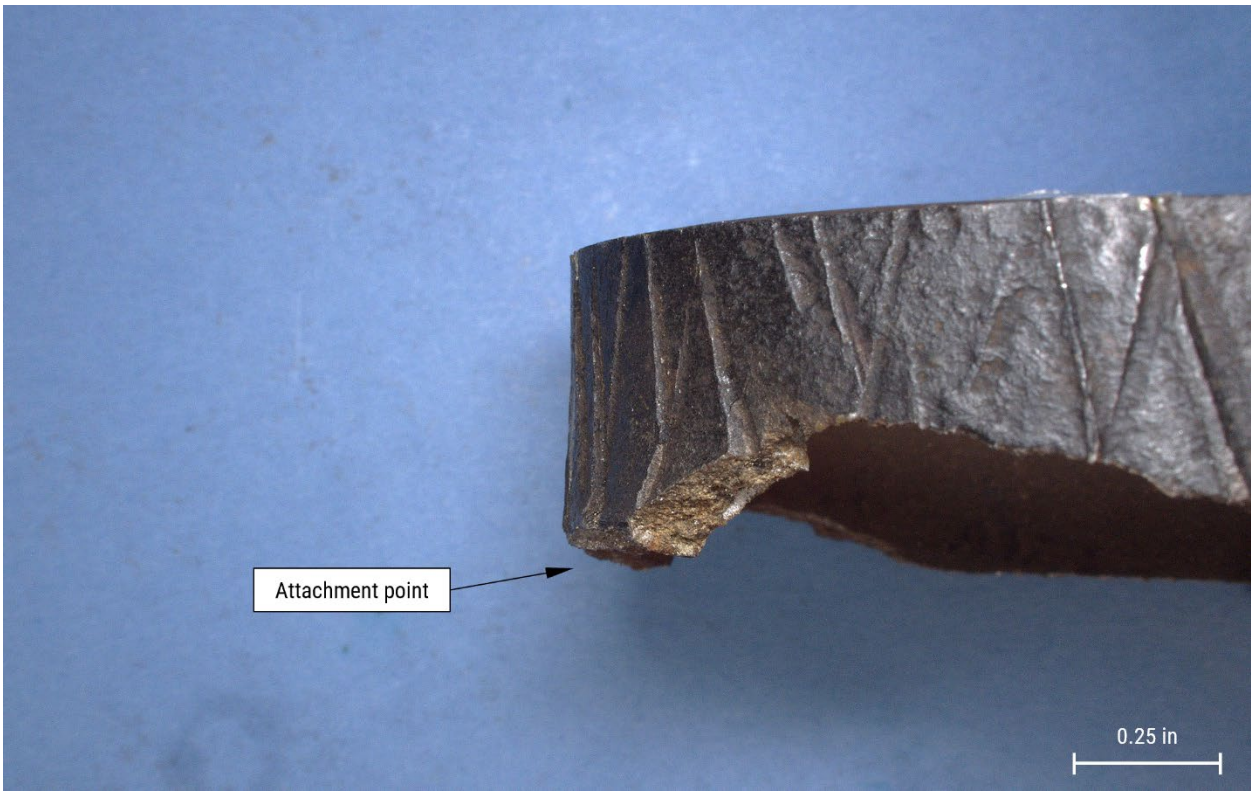

Figure 8. Sectioned main with fracture surface and outward bend.

The Materials Laboratory examined the fracture surface with a field-emission scanning electron microscope. The examination identified angled facets associated with transgranular brittle failure: crack growth through the grains of material rather than along boundaries between grains. These angled facets are typical of fast crack growth through steel.

Examination of the valve box found hard black deposits of material at two locations on the bottom rim. (See figure 9.) The deposits were 180° apart around the rim of the valve box and resembled the coating on the pipeline itself. Spectroscopic examination of the material identified it as coal tar.

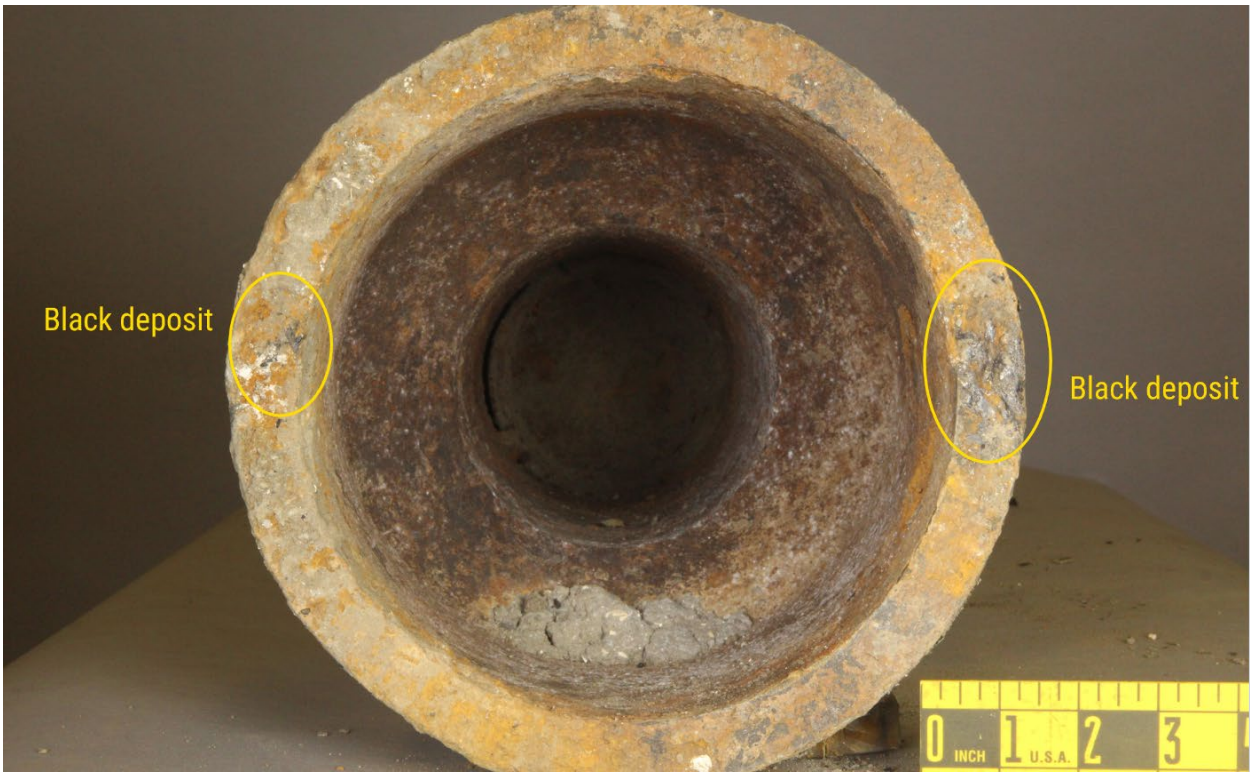

Figure 9. Black deposits on the valve box before cleaning.

1.6 Atmos Leak Response Procedures

Atmos's leak response procedures in place at the time of the accident are documented in the 2023 edition of its Service Procedure Manual.[12] The 2023 procedures direct employees to treat each leak as potentially hazardous until it is determined to be non-hazardous. If employees identify a hazardous condition, they are to undertake "continuing actions" to

- continue with determination of the hazard,
- determine the extent of the hazard, and
- protect life and property.

Specific continuing actions include evacuating occupants of affected structures, shutting off gas, moving to a safe location, calling 9-1-1 and notifying an Atmos supervisor, eliminating sources of ignition, and establishing a perimeter to restrict entry to the affected area. The Service Procedure Manual notes that employees will rely on

[12] The version in place at the time of the accident was dated October 2023. Atmos Energy released an updated version in June 2025.

their "training and experience" when determining the appropriate order for the continuing actions.

For leaks located outside a structure, the Service Procedure Manual directs employees to investigate above ground level first, including the areas over gas lines around nearby structures, along other underground utilities such as water and sewer lines, and at accessible openings into enclosed or underground spaces such as "sewer vents, sewer cleanouts, sewer manholes, storm drains, utility manholes or boxes, crawlspaces, substructures, and the perimeter of potentially involved structures." Detecting gas in or near any of these structures requires taking the continuing actions described above.

After completing the surface investigation, employees are to complete a subsurface investigation, including bar-hole testing and testing within accessible underground utilities and the other infrastructure described as part of the surface investigation, including sewers and storm drains. If gas is detected in any of these locations, employees are to take continuing actions and expand the investigation to include adjacent structures and properties along the street.

1.7 Postaccident Actions

Atmos reported that it provided emergency response training to its own operation managers and supervisors throughout early 2025, who then provided refresher training to employees in their local offices. As of its last update in September 2025, Atmos reported that these trainings were substantially complete. Atmos also reported that it started providing in-person leak response training to the East and West Jefferson Parish Fire Departments in June 2025.

Atmos also replaced the gas main and service lines along Avondale Garden Road and installed a plastic valve box.

Analysis

The explosion and fire occurred after natural gas leaked from a fractured buried main, migrated through an uncapped underground sewer lateral, entered the accident home, and reached an explosive concentration near an unknown ignition source. The investigation did not identify issues with gas pressures in the area of the leak or the timeliness or efficacy of the local emergency response agencies.

Postaccident bar-hole testing and excavations found only one source of natural gas: a leak in the gas main near a valve box on the eastern edge of the construction site. On-site examinations of the main found that it was fractured around most of its circumference with a thin strip of metal at the top (12 o'clock position) joining the

southern section of pipe to the section still threaded into the valve body. This indicates tension—a stretching force—at the bottom of the pipe along its long axis. Tension along the bottom of the pipe is consistent with a bending stress created by an external downward force. Based on information provided to Atmos by the construction superintendent, a cement truck ran over a valve box at the leak's location immediately before he heard and smelled natural gas being released. The investigation did not identify another plausible external force that could have damaged the main.

The Materials Laboratory examination of the main found fracture characteristics typical of fast crack growth and no signs of significant corrosion or preexisting structural damage that could have contributed to the failure. The fracture was therefore consistent with a sudden application of force by the valve box to the main.

Based on the fracture's location, timing, and fast-cracking characteristics, the valve box transmitted part of the cement truck's weight to the gas main, causing the main to fracture and leak. Examination of the gas main and valve box involved in this accident found coal tar coating the main and deposited on the bottom edge of the valve box. This indicates that the valve box was in contact with the main. The presence of coal tar alone does not indicate when the contact occurred, but the evidence is consistent with the valve box being installed in contact with the main and therefore able transmit the cement truck's weight directly to the main near the fracture's location.

Federal regulations at 49 *CFR* 192.181(c)(3) require that valve boxes not be installed in a manner that transmits external loads to mains, and valve boxes are normally installed with a buffer of soil or other protection between the valve box and the assets immediately below. For example, Atmos's newer valve boxes are installed with support and base pads to prevent load transmission. However, Atmos was not actively replacing cast iron valve boxes with this newer design. Further, the maintenance crew that removed and reinstalled the valve box about 2 months before the accident did not have a specific standard to follow for reinstalling cast iron valve boxes other than an expectation that the top of the valve box be level with the grade. The lack of a standard likely led to the common reinstallation of valve boxes in contact with mains, as described by an Atmos vice president of operations.

If Atmos had adopted either a standard for safely installing cast iron valve boxes or a policy of replacing cast iron valve boxes with the newer design, the protective buffer of soil or support pad would have reduced the load transmitted to the pipe on the day of the accident. There is not enough evidence to determine whether a buffer or pad would have prevented the accident, but it would have made the infrastructure more resilient. Atmos has not reported making changes to its valve box installation practices.

After the main fractured, gas propagated undetected through an uncapped underground sewer lateral into the sewer system and then into the accident home,

where it reached an explosive concentration. The gas in the sewers remained undetected because Atmos personnel did not test the atmosphere in the sewers prior to the explosion. For about 35 minutes, most of the time between the initial leak and the explosion, there was only one Atmos employee on the scene: an experienced senior service technician. He was equipped with a CGI and checked nearby storm drains for the presence of gas, which was one step in Atmos's subsurface leak investigation procedure. During his interview with the NTSB, he described planning to check the sewers, another required step, but said that he had already confirmed that there was no threat to life or property. His activities after checking the storm drains are also consistent with a belief that he had finished assessing the risk posed by the leak: he switched to the non-safety-critical work of recording billing information for the damage.

The investigation did not find evidence of a natural gas alarm in the accident home, which did not have gas service but was still impacted by a leak from a gas main. It is likely that a natural gas alarm would have provided the home's occupants with warning of accumulating natural gas and given them an opportunity to evacuate before the explosion.

The NTSB has advocated wider installation and use of natural gas alarms for nearly 50 years, including following the investigation into a pair of 2024 home explosions in Jackson, Mississippi, that involved Atmos assets. As a result of that investigation, the NTSB reiterated a recommendation to the 50 states, the Commonwealth of Puerto Rico, and the District of Columbia:

> Require the installation of natural gas alarms that meet the specifications of National Fire Protection Association 715 in businesses, residences, and other buildings where people congregate that could be affected by a natural gas leak. (P-25-5)[13]

The NTSB also recommended that Atmos "develop and implement a program that makes natural gas alarms available to members of the public who reside in its distribution areas" (P-26-10).[14]

Probable Cause

The National Transportation Safety Board determines that the probable cause of the Avondale, Louisiana, home explosion was the release and underground migration of natural gas from a gas main that failed when a cement truck drove over a valve box that

[13] See CAROL for the complete history and current status of this recommendation.

[14] See CAROL for the complete history and current status of this recommendation.

the Atmos Energy Corporation installed in contact with the gas main; the valve box transmitted the truck's weight to the main and fractured it. Contributing to the severity of the accident was the Atmos Energy Corporation's failure to identify the underground migration of gas during its leak investigation and to recognize the need to evacuate structures outside the immediate area of the leak.

Lessons Learned

Federal regulations require that valve boxes be installed such that they do not transmit external loads to buried natural gas assets, as occurred in the Avondale accident. Natural gas operators can improve safety by making sure that employees have the tools, knowledge, and clear procedures they need to comply with federal regulations when installing or maintaining valve boxes, and by taking every opportunity to update legacy valve boxes with modern designs and materials.

The unidentified danger of underground gas migration in the Avondale accident illustrates the importance of completing a thorough leak investigation before shifting to non-safety-critical tasks. Operators can protect the quality of leak investigations through means such as oversight, regular training, and work aids to ensure employees know and follow leak response procedures.

This accident also underscores the value of natural gas alarms even in buildings that do not have natural gas service but are located near natural gas assets. Natural gas alarms provide both early warning of dangerous gas concentrations and a last line of defense when a leak investigation fails to identify a hazard. Further information about natural gas alarms is available on the NTSB website.

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in the other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)).

For more detailed background information on this report, visit the NTSB Case Analysis and Reporting Online (CAROL) website and search for NTSB accident ID PLD25FR002. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

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