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Pipeline Investigation Report: PIR-26-05

ONE Gas, Inc. (Kansas Gas Service) Natural Gas–Fueled Commercial Building Explosion

Location	Hutchinson, Kansas
Date	February 22, 2025
Accident type	Leak/Explosion/Fire
Pipeline	Distribution pipeline 10-inch diameter steel main carrying natural gas
Fatalities	0
Injuries	0
Property Damage	\$875,000

1 Factual Information

1.1 The Accident

On February 22, 2025, about 10:05 a.m. local time, an explosion and subsequent fire occurred at the Steffens Auto Parts commercial building in Hutchinson, Kansas.¹ (See figure 1.) The event resulted in the evacuation of about 16 businesses and 51 residences and destruction of the building. There were no injuries or fatalities. Property damages were about \$875,000. Weather conditions at the time of the accident were clear, with a temperature of 20°F and 9-mph southwest winds.

¹ (a) All times in this report are local. (b) Visit [nts.gov](https://www.nts.gov) to find additional information in the [public docket](#) for this NTSB accident investigation (case number [PLD25FR003](#)), including detailed factual reports about the circumstances of the accident.



Figure 1. Steffens Auto Parts commercial building after the natural gas leak and explosion.
(Source: Hutchinson Fire Department.)

About 9:26 a.m. on February 22, 2025, a member of the public called 911 and reported smelling gas odorant about a quarter mile north of Steffens Auto Parts. Shortly afterward, about 9:33 a.m., Hutchinson Fire Department (HFD) personnel arrived at the scene and at 9:47 a.m. confirmed the presence of natural gas near the Steffens Auto Parts building. When HFD personnel entered the Steffens Auto Parts building, their gas monitors immediately sounded an alarm, prompting evacuation of the sole occupant and the HFD personnel. Seconds after the evacuation, about 10:05 a.m., the building exploded.

About 10:26 a.m., responders from ONE Gas, Inc.'s Kansas Gas Service Division (ONE Gas) arrived onsite.² ONE Gas crews conducted continuous monitoring for gas accumulation, initiated leak investigations to identify migration pathways, and ventilated affected infrastructure, including buildings, vaults, and sewer systems. Leak identification efforts were complicated by severe winter weather conditions, which hindered

² ONE Gas, Inc. owned and operated natural gas distribution assets in the affected community and performed some of these functions through their Kansas Gas Service Division. This report uses ONE Gas throughout.

excavation and leak detection. The region experienced prolonged freezing temperatures during the week preceding the accident, with snow and ice cover.

The 10-inch diameter main involved in this accident was a loop line that supplied gas to multiple regulator stations serving much of Hutchinson's gas distribution system north of the Arkansas River.³ This configuration necessitated employing an isolation plan focused on safely securing the leak location while minimizing service disruptions. About 3:15 p.m., ONE Gas crews began isolating the affected pipeline segment by closing selected valves. The final valve required for complete isolation was closed about 3:34 p.m.; the fire was fully extinguished at 8:51 p.m.

1.2 Postaccident Examinations

The day following the accident, February 23, 2025, a ONE Gas crewmember excavated the main in the vicinity of the failure and identified the source of the leak on a 10-inch diameter gas main about 2:57 a.m. The main was originally constructed in 1936 and crossed over an 8-inch diameter, 1908 vintage water main near the failure point. ONE Gas observed a girth weld that had separated at the top of the pipe.⁴ As excavation progressed around the weld location, the weld continued to separate until the main was completely severed. (See figure 2.)

³ (a) A *loop line* is a parallel segment of pipe connected to an existing main pipeline, usually constructed to bypass high-congestion areas. This loop line delivered gas to district regulator stations and typically did not directly provide gas service to customers. (b) At the failure location, the operating pressure was 50 pounds per square inch gauge (psig), below the maximum allowable operating pressure of 58 psig.

⁴ A *girth weld* is a full-circumference, end-to-end joint connecting two individual sections of line pipe.



Figure 2. Ten-inch diameter gas main girth weld crossing over the 8-inch vintage water main.
(Source: Baker Risk.)

Examination of the damaged pipe by the National Transportation Safety Board (NTSB) Materials Laboratory determined that the fractured girth weld was consistent with a low ductility overstress fracture.⁵ The weld, completed prior to the establishment of American Petroleum Institute (API) 1104 welding standards and federal pipeline safety regulations, exhibited lack of penetration and a lack of fusion in multiple locations along the fracture surface.⁶ (See figure 3.) Metallurgical examination confirmed that the weld

⁵ *Low ductility overstress fractures* are fractures that exhibit limited or no visually discernable plastic deformation under constraint, with fracture distinct features (such as cleavage) compared ductile fracture features (such as dimpled ruptures).

⁶ (a) The API 1104 *Welding of Pipelines and Related Facilities* standard was first published in 1953. (b) The weld was constructed using an oxy-acetylene welding process and coated with an applied bituminous material.

characteristics were consistent with a manual oxy-acetylene torch weld performed by rolling the pipe during fabrication prior to installation in the ditch.

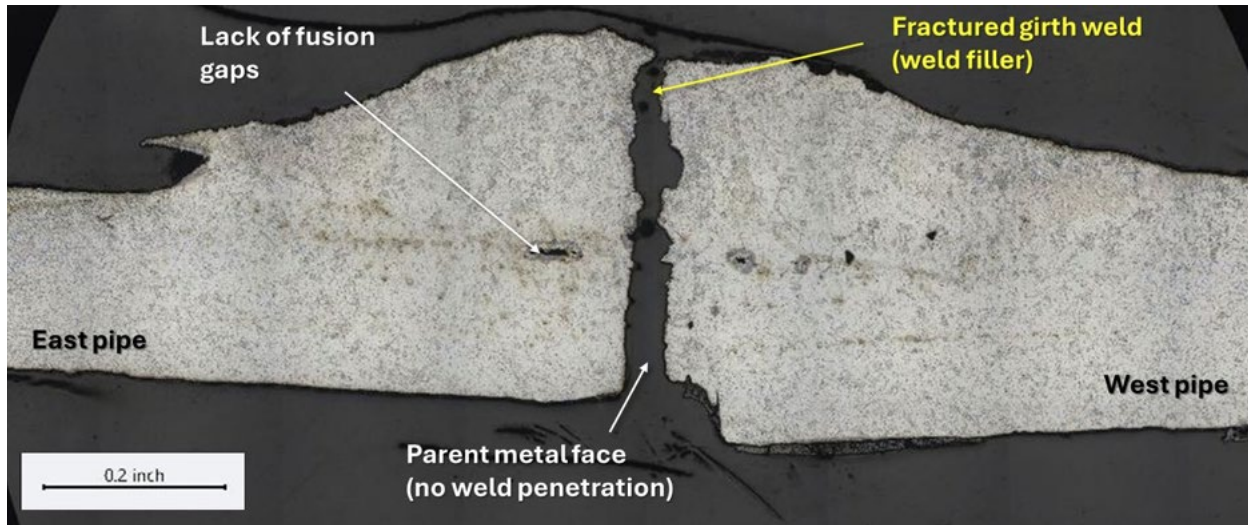


Figure 3. Weld cross section through the mating surfaces showing a lack fusion and lack of weld penetration.

1.3 Threat Identification Requirements and Practices

Pipeline and Hazardous Materials Safety Administration regulations require pipeline operators to prepare and implement a Distribution Integrity Management Program (DIMP) that evaluates the risks associated with their distribution pipelines, including identifying applicable threats, estimating likelihood of failures, and assessing potential consequences.⁷ The ONE Gas DIMP included “accelerated actions,” or measures designed to reduce the likelihood and consequences of known threats. Industry guidance identified oxy-acetylene welds as known threats when subjected to external forces such as those resulting from heavy rains, floods, and earth movements.⁸

⁷ Federal regulations in 49 *Code of Federal Regulations* Part 192 Subpart P provide minimum standards for pipeline operator distribution integrity management programs and include seven required elements. Operators are required by 49 *Code of Federal Regulations* 192.1007(b) to consider specific threat categories in their DIMPs.

⁸ *Integrity Characteristics of Vintage Pipeline*, by Battelle and prepared for the INGAA Foundation, Inc., 2005.

ONE Gas used a probabilistic risk model to identify the likelihood and consequences of failure for any threat identified in the development of their DIMP.⁹ ONE Gas used this risk model to identify assets for replacement and risk mitigation projects. Before the failure, ONE Gas determined the threat associated with oxy-acetylene welds were stable and not an actionable threat within its system. ONE Gas had no prior failures associated with oxy-acetylene welds before this accident.

2 Analysis

On February 22, 2025, a natural gas-fueled explosion and fire occurred at a commercial building in Hutchinson, Kansas. A girth weld on a 10-inch-diameter natural gas main failed near the Steffens Auto Parts commercial building, allowing gas to migrate underground into the structure, where it ignited.

The NTSB determined that the girth weld exhibited severe lack of penetration and fusion, meaning the molten weld metal failed to penetrate the joint root and failed to fully bond with the parent material. The pipeline was installed in 1936, prior to the development of API 1104 and the establishment of federal pipeline safety standards governing weld quality. Welds constructed during this period may exhibit manufacturing and construction deficiencies, such as porosity, incomplete penetration, and lack of fusion, that would not meet modern welding standards.

The lack of penetration and lack of fusion identified in the failed girth weld in this accident created a significant internal stress concentration that had likely been present since the pipe's installation in 1936.¹⁰ NTSB investigators considered changes in loading conditions that could have exerted a force on the pipe at the girth weld sufficient to result in an eventual overstress fracture. However, there was no indication of a recent overpressure event, and the in-service gas pressures were too low for internal gas pressure to have played a role in the fracture. There were no visual signs of erosion, settlement, or recent construction, and the NTSB could not determine which external force led to this failure. Because the gas pipe was immediately above and in contact with the water main since construction, the gas pipe would have been supported by the water main, limiting movement at that location. The failure was likely initiated by changes

⁹ A *probabilistic risk model* is a quantitative framework to calculate the risk of loss of containment in pressurized equipment by multiplying the probability of failure by the consequence of failure.

¹⁰ A *stress concentration* is a localized stress considerably higher than average. Stress concentrations can occur where there are irregularities in the geometry of the weld, such as internal flaws. High local stresses can accelerate material failure.

in external forces acting on the pipe and weld, such as soil freezing and thawing cycles, surface loading changes, or soil movement.

Historic construction anomalies from oxy-acetylene girth welds are a known threat to the industry for pipe constructed between about 1915 and 1940 when landslides, settlement, and earthquakes are an issue. In the development of their DIMP, ONE Gas used this guidance and evaluated environmental conditions at the oxy-acetylene girth weld location, concluding the welds were not an actionable integrity threat. Similarly, NTSB investigators found no evidence of erosion, settlement, or recent construction, and did not identify any discernable integrity threats as described by the industry guidance. Postaccident, ONE Gas reviewed utility crossings of oxy-acetylene girth welds, enhanced data collection practices and developed a new field material failure report to improve data quality and timeliness of threat evaluation to reduce the risk of damage to girth welds.

The explosion at the Steffens Auto Parts building was consistent with natural gas escaping from a crack in the gas main weld and then migrating through the surrounding subsurface soils before entering the commercial building. Although the NTSB did not identify the specific pathway through which the gas entered the building, the accident demonstrated the risks of underground gas migration. Natural gas released below ground can travel laterally through permeable soils and enter nearby structures through foundation cracks, floor penetrations, utility conduits, or other openings, even when those structures are not directly connected to the gas distribution system. As a result, the hazard area associated with a subsurface gas release may extend beyond the immediate vicinity of the leak location.

Following the explosion, first responders evacuated personnel, isolated the affected area, and continued monitoring gas concentrations. Atmospheric monitoring of nearby manholes, utility vaults, and other subsurface structures was conducted to identify areas where hazardous gas levels could accumulate. These actions were critical to prevent additional ignitions in adjacent structures or confined spaces. The first responders' actions reduced public exposure to the hazards and supported efforts to prevent further consequences from the ongoing gas release.

Natural gas alarms are not required in residential or commercial buildings such as the Steffens Auto Parts store. Natural gas alarms can provide an early warning detection when odorant added to the gas is ineffective. The NTSB has open recommendations to all 50 states, Puerto Rico, and the District of Columbia to require the installation of natural gas alarms, and to the International Code Council and the National Fire Protection Association to revise their codes to provide for natural gas emergency

procedures and revise the fuel gas codes to provide for the required installation of natural gas alarms.¹¹ These recommendations have not yet been implemented.

3 Probable Cause

The National Transportation Safety Board determines that the probable cause of the commercial building explosion in Hutchinson, Kansas, was the failure of a ONE Gas, Inc. (Kansas Gas Service) 1936-vintage 10-inch-diameter natural gas main at an oxy-acetylene girth weld that exhibited lack of penetration and fusion from original construction that decreased the strength of the weld; the weld failed when undetermined external forces induced an overstress fracture, allowing natural gas to migrate underground and accumulate within a commercial building, where it ignited.

4 Lessons Learned

According to pipeline industry guidance, vintage oxy-acetylene welds are at increased risk of failure under external forces, such as ones that produce earth movement. In this accident, a vintage oxy-acetylene weld failed without any indication of external forces. Careful monitoring of all external loading conditions can help identify areas where oxy-acetylene welds may have an increased risk of failure. Following the accident, ONE Gas implemented several safety actions designed to improve future safety performance. To better evaluate system integrity for all possible external forces, ONE Gas enhanced data collection practices, including review of utility crossings near vintage welds, to reduce the risk of damage to pipe welds. Additionally, ONE Gas developed a new field material failure report allowing failure data reporting in real time, improving data quality and timeliness for integrity management analysis.

This accident also underscores the value of natural gas alarms in buildings located near natural gas assets. Natural gas alarms provide both early warnings of dangerous gas concentrations and are 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](#).

¹¹ See Safety Recommendations [P-25-005](#), [P-25-013](#), [P-25-014](#), [P-25-015](#), and [P-25-016](#).

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For more detailed background information on this report, visit the [NTSB Case Analysis and Reporting Online \(CAROL\) website](#) and search for NTSB accident ID PLD25FR003. 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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