



National Transportation Safety Board

Washington, DC 20594

Pipeline Accident Brief

Accident No.: DCA-10-FP-004
Type of System: Natural gas transmission pipeline
Accident Type: Rupture and fire
Location: Cleburne, Texas
Date: June 7, 2010
Time: 2:40 p.m. central daylight time¹
Owner/Operator: Enterprise Products Operating, LLC
Fatalities/Injuries: 1 fatality, 6 injuries
Damage/Clean-up Cost: \$1,029,000
Material Released: Natural gas
Quantity Released: 172 million cubic feet
Pipeline Pressure: 950 pounds per square inch, gauge
Maximum Allowable Operating Pressure: 1,051 pounds per square inch, gauge
Component Affected: 36-inch steel transmission pipeline

The Accident

On June 7, 2010, at 2:40 p.m., a truck-mounted power auger (auger truck) operated by C&H Power Line Construction (C&H) struck and punctured a 36-inch-diameter natural gas transmission pipeline operated by Enterprise Products Operating, LLC² (Enterprise). C&H, a contractor working for Brazos Electric (Brazos), was using the auger truck to dig holes for the installation of new electric service utility poles. The accident occurred about 45 miles southwest of Fort Worth, Texas, near the town of Cleburne. The natural gas ignited and killed the auger operator and burned six workers, who were transported to a nearby hospital for treatment. The pipeline had a maximum allowable operating pressure (MAOP)³ of 1,051 pounds per square inch, gauge (psig) and was operating at 950 psig at the time of the accident. Total property damage and clean-up costs were estimated to be \$1,029,000.

Accident Narrative

The C&H auger operator was preparing to bore a hole for an electric utility pole to be installed near a pipeline right-of-way. Temporary pipeline markers identified the location of what

¹ All times in this brief are central daylight time.

² Enterprise Products Operating, LLC is a subsidiary of Enterprise Products Partners, LP.

³ The MAOP is the highest pressure at which a pipeline may be operated under federal regulations.

the C&H and Brazos crews believed to be the only underground pipeline, a 36-inch-diameter, high-pressure, natural gas transmission pipeline operated by Energy Transfer (ET). Before digging the hole, a Brazos worker moved the dig location marker to increase the distance between the pole location and the marked underground pipeline to ensure that the power auger would not come close to the pipeline. Unknown to the workers, the new dig marker location was placed directly above a second, unmarked underground natural gas transmission pipeline owned by Enterprise.

After the C&H auger operator bored to a depth of about 4 feet, the auger punctured the Enterprise pipeline. The eruption of high-pressure gas threw the 60-ton auger truck more than 100 feet and violently ignited. (See figure 1.) The C&H auger truck operator was killed. Six other workers sustained non-life threatening burns from the intense fire. The ET natural gas transmission pipeline was not damaged.

A pipeline controller at Devon Energy Corporation (Devon), a natural gas supplier to Enterprise, made the first call to the Enterprise gas control center after the pipeline ruptured. The Devon controller noticed a rapid decrease in the pipeline system operating pressure and called the Enterprise gas control center to inquire if a pressure drop had occurred on its North Texas Johnson County 36-inch-diameter pipeline, which was connected to the Devon system.



Figure 1. Natural gas burning from 36-inch-diameter Enterprise pipeline

At 2:49 p.m., Enterprise gas control center personnel determined that the supervisory control and data acquisition (SCADA) system had automatically closed a main line block valve (MLBV 15) about 2 miles upstream of the rupture. The Enterprise head of gas control was notified that field personnel working near the pipeline saw a large fire in the pipeline right-of-way. He then directed field technicians to close MLBV 14, 7.8 miles downstream from

the rupture, to stop the gas flow. The Enterprise SCADA records showed the valve was closed at 2:55 p.m. Manual isolation block valves on several branch lines were closed to isolate the rupture and allow the fire to self-extinguish.

Emergency Response

The Cleburne Fire Department (CFD) was dispatched to the scene at 2:57 p.m. While en route, the CFD confirmed that six workers with burn injuries had been transported to a nearby hospital in private vehicles. The CFD chief arrived at the scene at 3:09 p.m. and established the incident command. Volunteer fire departments from Johnson, Somervell, and Hood counties assisted the CFD with extinguishing the brush fires, search and rescue operations, and medical support. The incident commander declared the area safe to enter at 5:45 p.m.

After arriving at the scene, the incident commander accounted for all of the workers except for the auger operator. Emergency responders recovered his body 2 hours later, after the gas flow was stopped and the fire was extinguished.

Texas 811 Underground Utility Marking

Texas Excavation Safety System, Inc. (Texas 811) is a private nonprofit corporation that operates a notification center in accordance with Texas Utilities Code Title 5, Chapter 251. Excavators, that is, requestors,⁴ are required to call Texas 811 at least 48 hours in advance of any planned excavation to provide information about the work, the location, and “all necessary instructions to make sure the right area gets marked” before proceeding with any mechanized digging. Texas 811 issues a locate ticket to all documented utility companies having underground equipment in the surrounding area. Each utility is required to (1) survey and mark the underground utilities within 2 working days after receiving the locate ticket and (2) notify Texas 811 when the marking work is complete. Texas 811 notifies the requestor that the underground utilities have been located and marked. Mechanized digging tools are prohibited within the marked areas until the underground utilities have been exposed using hand digging techniques. A new locate request must be submitted if the excavation work is not completed within 14 days from the date the utilities were temporarily marked.

The Texas 811 system uses the same procedure to locate and mark underground utilities as part of construction planning. The power line upgrade work involved two locate ticket requests: one in November 2009 for the power line route planning work and another in June 2010 for the power line installation.

November 2009 Power Line Route Planning

Brazos contracted with Power Engineers to install a 138-kilovolt transmission power line that crossed the right-of-way for the Enterprise and the ET transmission pipelines. (See figure 2.) The right-of-way contained two 36-inch-diameter high-pressure transmission pipelines running

⁴ A *requestor* is the person or company that contacts Texas 811 before excavation work to request that locations of underground utilities be marked.

parallel about 30 feet apart. Power Engineers issued a subcontract to Surveying and Mapping, Inc. (SAM) to develop the detailed route map for the new power line.

On November 3, 2009, the SAM foreman submitted a locate request to Texas 811 to identify all underground utilities along the power line route. Texas 811 issued locate tickets to the Enterprise and the ET underground utility locators to survey the area and mark the locations of the underground pipelines. Following the driving directions on the tickets, the locator would have passed the electric substation access road, where the crews were installing the power lines, and continued about one-half mile to a location near the right-of-way. The work location was a few hundred feet from the electric substation, which was at the end of the one-quarter mile long access road.

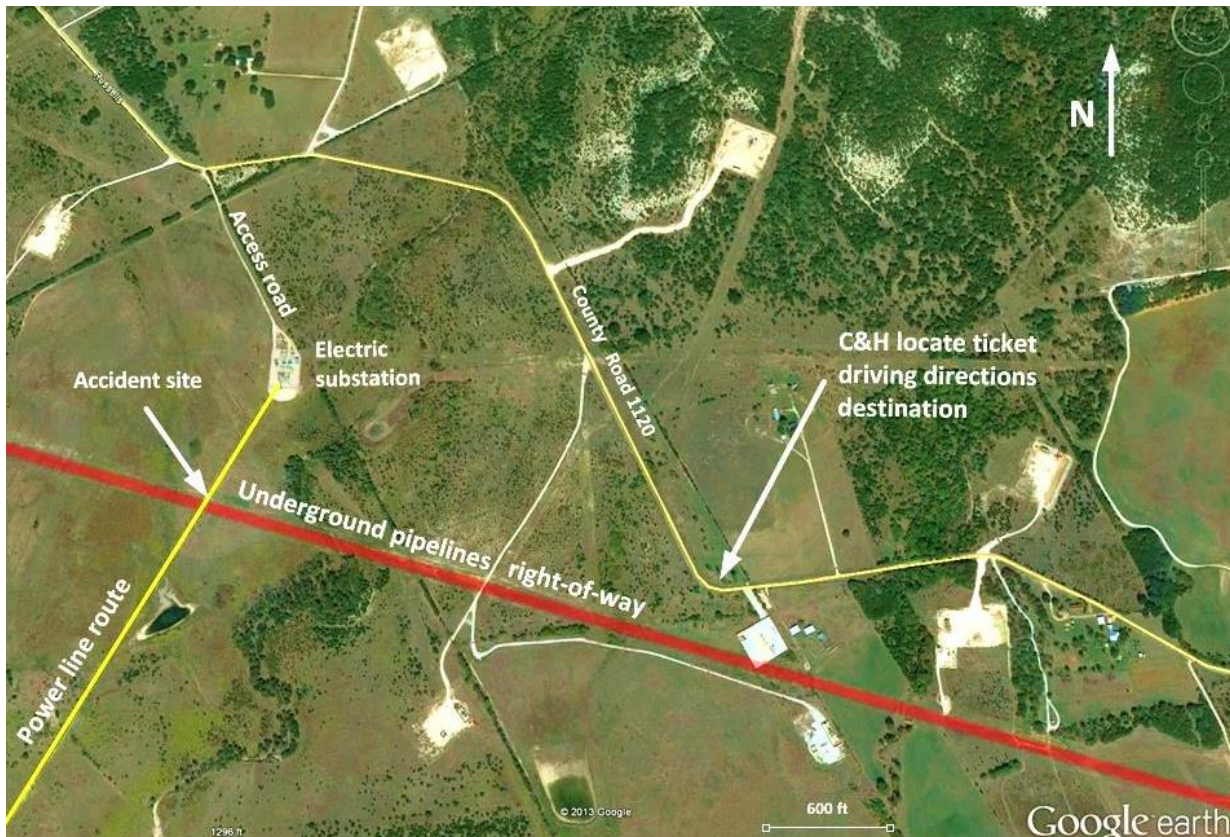


Figure 2. Map showing electric power line route, accident location, pipeline right-of-way, and endpoint of the driving directions on the locate ticket

The ET line locator went to the substation, located and marked the underground ET pipeline, and notified Texas 811 that the locate work was complete. The SAM foreman was notified that the ET pipeline had been marked. Unknown to the foreman, the Enterprise line locator had not yet processed his locate ticket. The Enterprise pipeline remained unmarked.

On November 5, 2009, the SAM senior technician and survey party chief conducted a work area walkdown to identify the paint marks and utility flags used to mark the location of the underground ET pipeline. The SAM crew also examined the right-of-way but did not see surface

conditions that would suggest other underground utilities, including permanent or temporary pipeline markers for the Enterprise pipeline. The survey chief recorded the location of the ET underground pipeline markers using a global positioning system (GPS) device and a portable data logger. The information was used to finalize the new power line pole placement map.

On November 9, 2009, 4 days after the SAM crew had completed the walkdown, and 2 days after the Texas 811 processing deadline, the Enterprise line locator finally opened his locate ticket and called the SAM foreman to schedule a site visit to mark the location of the Enterprise pipeline.⁵ However, the SAM foreman told the line locator that they had completed their route map survey work for the area listed on the locate ticket. Unaware that their brief discussion incorrectly identified the work location, they agreed that the Enterprise line locator did not need to travel to the site and mark the underground pipeline.

The final routing map developed by SAM showed the ET pipeline but did not show the Enterprise pipeline in the right-of-way. Had the Enterprise line locator marked the pipeline, it would have been shown on the route map. An accurate route map would have alerted the Brazos and C&H work crews that two underground pipelines crossed the power line route and that both pipelines would have to be marked before they could install the electric power line pole in the pipeline right-of-way.

June 2010 Power Line Construction

Brazos hired C&H to install the power line using the detailed route map produced by SAM. On June 1, 2010, in preparation for power pole installation, the C&H foreman responsible for the installation work submitted a locate request to Texas 811. The request included the foreman's name and telephone number. The foreman provided driving directions, as well as latitude and longitude coordinates, to destinations near the work location. Texas 811 sent locate tickets to ET and Enterprise.

On June 2, 2010, the same Enterprise line locator who processed the November 2009 locate ticket, and who was familiar with the pipeline right-of-way and the area where the work was being performed, used his laptop computer to retrieve the locate ticket for the work near the substation. He drove to the indicated work location using the driving directions provided on the locate ticket, but he did not use the latitude and longitude coordinates. He told National Transportation Safety Board (NTSB) investigators:

I was there approximately an hour to an hour and a half, driving and on foot, trying to find a work crew or equipment or just some sign that that was where they were working, following the [driving] directions they gave me on the E-Call ticket. I didn't find anything.

⁵ The Enterprise line locator attended training on November 5 and 6. November 7 and 8 (Saturday and Sunday) were his scheduled days off. Enterprise procedures at the time allowed a delay for a ticket that was classified "routine" rather than "emergency." The ticket was not reassigned to a different line locator.

He did not see any evidence of the power line installation work, nor did he call the C&H foreman to clarify where the work was being performed. He left the area without marking the Enterprise pipeline.

The next day, June 3, the Enterprise line locator returned to the location he had visited the day before to, again, look for the work crew or evidence of any construction activity near the pipeline right-of-way. As on the day before, he found no activity, and he did not call the C&H foreman or mark the pipeline.

The Enterprise line locator returned to the location a third time on June 4, again following the driving directions on the C&H locate ticket. The Enterprise line locator told NTSB investigators that because he did not find any evidence of power pole installation activities at the location described on the locate ticket, he decided to close the ticket without placing any temporary pipeline markers. He annotated the ticket with a code K, meaning the “line locator has knowledge that there is no conflict with an Enterprise pipeline,” then returned the ticket to the Texas 811 office. Later that day, the C&H main office in Dewey, Oklahoma, received an electronic notification from Texas 811 reporting, “all clear/no conflict.” The C&H office forwarded the notification to the C&H foreman at the job site.

On the morning of June 7, the Enterprise line locator retrieved a new ticket from Texas 811 containing directions to the same work location.⁶ Knowing that he had made three visits to what he believed was the correct work location based on the driving directions on the ticket without finding evidence of construction activity, he called the C&H foreman listed on the locate ticket. The line locator told investigators that the C&H foreman told him the work in the area had been completed. However, the C&H foreman told NTSB investigators that he was referring to a different power line installation job at another substation that had been completed a few days earlier.⁷

The C&H foreman⁸ told NTSB investigators that he had assumed the Enterprise line locator was at the construction site where the new power poles were being installed. The foreman also told the Enterprise line locator that C&H expected to complete all pole installation work the next day. The C&H foreman did not know that the Enterprise line locator was not at the work location where the underground utility identification was needed before the work could proceed. The foreman told the line locator that the second ticket was “an update ticket” for the ongoing job, which the line locator presumed was for the same work that he had examined 2 days earlier.

⁶ A separate locate ticket is generated for each county near the work location. In this case, tickets were generated for Johnson and Somervell counties. The other information on the tickets was the same.

⁷ The foreman told NTSB that the other substation was about 8 miles away.

⁸ The C&H foreman was at another C&H site when he was talking to the Enterprise line locator, so neither person was at the actual construction site during their conversation.

Based on the conversation, and for the second time, the line locator cleared the locate ticket status on his computer without conducting the required underground survey and pipeline marking. This time he assigned the ticket a code C, “Clear—no possible interference.” Again, the C&H foreman was incorrectly notified that the construction area had no other underground utilities. The closure of the locate tickets meant that C&H was authorized to proceed with using mechanized digging equipment to install the power line poles as long as they remained outside the limits of the markers for the underground utilities.

Bore Hole Relocation and Pipeline Strike

A Brazos employee assigned to assist the C&H crew noticed that one bore hole location was close to the ET pipeline temporary location markers. To ensure the auger would not come close to the ET pipeline, the Brazos employee moved the marker stake 10 feet farther away from the ET pipeline markers,⁹ to a location outside the mowed area¹⁰ that typically indicates the limits of a pipeline right-of-way. Furthermore, he did not see any permanent pipeline markers that would have alerted him to the presence of the Enterprise pipeline. Unknown to the worker, he placed the new pole location directly above the unmarked Enterprise pipeline.

When the C&H boring machine operator proceeded to bore the hole, the auger punctured the Enterprise high-pressure natural gas pipeline. The top of the pipe ruptured and split along a length of about 110 feet. (See figure 3.) The eruption threw the 60-ton auger truck more than 100 feet. (See figure 4.)

⁹ The Brazos procedures allow moving a pole location up to 10 feet without prior approval from the engineering department.

¹⁰ Federal regulations require the pipeline right-of-way to be periodically cleared of tall vegetation by mowing or other methods to maintain clear access.



Figure 3. Ruptured section, about 110 feet long, of 36-inch-diameter Enterprise natural gas pipeline



Figure 4. Upside-down, 60-ton C&H auger truck; exemplar truck shown in lower right

Postaccident Actions

The Texas Railroad Commission cited Enterprise for management deficiencies in its one call program. Enterprise has taken the following corrective actions to resolve the deficiencies:

- Completed remarking its entire onshore pipeline system in Texas with line-of-sight markers by December 31, 2011.
- Revised its written procedures for permanent line markers to reflect the transition to line-of-sight markers. Instituted line-of-sight markers for active regulated pipelines.
- Revised its written procedures for permanent line markers to reflect the requirement to use line of sight markers.
- Purchased new GPS devices for its employees who perform line-locating tasks.
- Developed in-house training for using the GPS devices for line locating and began training employees during the fourth quarter of 2011.
- Provided classroom instruction and hands-on performance training on the equipment used to locate underground pipelines.
- Developed and implemented standardized in-house training on the use of the utility mapping software.

- Implemented a new software application, Internet Retrieval Ticketing Handling (IRTH), for processing locate tickets. Conducted additional IRTH software training. The IRTH system tracks the status of late or incomplete locate tickets. Texas 811 staff works with field personnel, supervisors, managers, and directors to resolve ticket processing delays.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the rupture and fire was a contractor's puncturing the unmarked, underground natural gas pipeline with a power auger. Contributing factors were the lack of permanent markers along the Enterprise Products Operating, LLC, pipeline and the failure of the Enterprise pipeline locator to locate and mark the pipeline before C&H Power Line Construction attempted to install the utility pole in the pipeline right-of-way.

Adopted: September 9, 2013