

Log P-256

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: June 18, 1984.

Forwarded to:

Mr. W. H. Thompson, Jr.  
President  
Mid-America Pipeline System  
1800 South Baltimore Avenue  
Tulsa, Oklahoma 74119

SAFETY RECOMMENDATION(S)  
P-84-19 through -25

About 7:25 p.m., c.s.t., on March 15, 1983, an 8-inch-diameter liquefied petroleum gas (LPG) pipeline operated by the Mid-America Pipeline System (MAPCO) was damaged by a rotating power auger being used to drill holes in rocky terrain to plant trees on Lot 8, Section 5, Block 43 of the Chaparral Estates housing development near West Odessa, Texas. The damaged pipeline ruptured and within 3 minutes, LPG, which was being transported at 1,075 psig, escaped, vaporized, and was ignited by an undetermined source. In the resultant fire, five persons were killed and five persons were seriously injured—one person died 5 days later. Two mobile homes, a small frame house, an auger truck, two cars, and a pickup truck were destroyed; 9,375 barrels of LPG were burned.

When the pipeline was installed in 1960, the area west of Odessa was undeveloped and uncultivated land. The Grant of Easement entered into in 1960 between MAPCO and the former owner of the land now known as Chaparral Estates provided permanent rights for MAPCO to clear and keep clear an area along the route of the pipeline which extended 25 feet on each side of the center of the pipeline. The easement was recorded in Vol. 369, page 1 of the deed records of Ector County. Additionally, the easement precluded the grantor of the easement from building or allowing others to build upon the easement in any way "that will interfere with the normal operation and maintenance" of the pipeline. With the growth of Odessa after 1960, surrounding acreage has been developed into unincorporated residential communities, many of which have been built over existing oil gathering, natural gas transmission, and liquefied petroleum pipelines.

In the late 1970's and early 1980's, the area known as Chaparral Estates was subdivided into residential lots. Many conventional and mobile homes have been placed on the lots. Block 43 of Section 5, the portion of Chaparral Estates in which the rupture occurred, was subdivided in 1981, and 11 of the residential lots overlay MAPCO's LPG pipeline easement. The two mobile homes destroyed in the fire were located on 2 of these 11 lots, and the mobile home on Lot 8 encroached 15 feet into MAPCO's easement and

1/ For more detailed information read Pipeline Accident Report—"Mid-America Pipeline System Liquefied Petroleum Gas Pipeline Rupture, West Odessa, Texas, March 15, 1983" (NTSB/PAR-84/01).

was within 10 feet of the pipeline. Since the development of Block 43 of Chaparral Estates, roads have been graded over the pipeline, and numerous excavations have been made adjacent to the pipeline for installing buried telephone cables, septic tanks, and poles for electric power lines.

When MAPCO learned that land adjacent to its pipeline was being developed for residential lots, additional markers were installed over the pipeline. Even though MAPCO was aware that its pipeline lay only 16 inches below the surface, that roads had been graded over the pipeline, and that the high-pressure pipeline now would be exposed to additional risks which might endanger a significant number of people, no changes were made in the design or operation of the pipeline to increase protection for persons who would live close to the pipeline. No changes were required by 49 CFR Part 195 (Federal requirements for liquid pipelines).

The Safety Board recognizes that under existing law, MAPCO has limited or no ability to prevent land development adjacent to pipelines which were constructed years ago in open fields and pastures. However, MAPCO and the other operators of high-pressure pipelines throughout the nation should work with officials responsible for land use and planning to reduce the risks to persons which would result if communities are allowed to be developed adjacent to or over high-pressure pipelines. Moreover, these operators should encourage changes in local zoning and land use laws to preclude the development of residential lots where the plats indicate that construction will necessarily encroach on pipeline easements which lie within the boundaries of individual residential lots. Until such changes in local land use and planning laws are implemented, the Safety Board believes that operators of pipelines must consider making modifications to their pipelines as necessary to provide a reasonable level of safety for the public.

When MAPCO became aware of the development adjacent to its pipeline, the adequacy of the safety factors used in the design of the pipeline should have been reevaluated. Had this been done, the Safety Board believes that MAPCO might well have increased the burial depth for the pipeline and either would have reduced the operating pressure of the pipeline or replaced the pipeline with a pipeline having a heavier wall thickness so that the margin for safety would have been increased substantially, or both. Moreover, prudent management would have suggested that MAPCO contact the developer concerning the increased risks and the danger to prospective residents and, conceivably, modifications might have been made in the layout of the subdivision so as to reduce the level of risk. Alternatively, MAPCO might have elected to relocate the line.

MAPCO's onsite inspection of the pipeline through the Chaparral Estates development just 10 days before the accident failed to detect that at least one of its pipeline markers was not in place and that others were either not in place or not supported adequately. MAPCO had installed more markers than required by Federal regulations for the purposes of protecting its pipeline and warning residents of the presence of the pipeline, but the inadequate inspections thwarted the accomplishment of these purposes. MAPCO supervisors should perform random checks of the pipeline inspections to determine their accuracy and thoroughness.

MAPCO's area operators who perform the required periodic inspections of the pipeline crossing Chaparral Estates must pass in front of the West Odessa Volunteer Fire Department building, yet MAPCO's personnel who provide training for fire departments and others were not aware of the existence of this fire department. In its report on an August 4, 1978, MAPCO LPG pipeline accident, 2/ the Safety Board found that the four

2/ Pipeline Accident Report—"Mid-America Pipeline System Liquefied Petroleum Gas Pipeline Rupture and Fire, Donnellson, Iowa, August 4, 1978" (NTSB-PAR-79-1).

volunteer fire departments which responded to the accident had not received instructions or educational materials on the hazards of LPG and the actions to take in response to a pipeline emergency. Since that time, MAPCO has increased its efforts to provide necessary information to fire departments, as demonstrated by the training session which recently had been conducted in the Odessa area. Even with this increased commitment by MAPCO, the company may still be unaware of all fire departments along the routes of its pipelines which need information concerning the handling of emergencies involving LPG pipelines. MAPCO should provide its area operators with a listing of the fire departments known to MAPCO within each operator's area of responsibility and should require its area operators to report to management any differences noted during their travels through an area. The area operators also should be assigned the independent responsibility of promptly informing MAPCO of the establishment or termination of fire protection services in areas near the pipeline as they come to the area operator's attention.

The alarm on the dispatcher's console announcing a rapid drop in pressure in the Snyder Blue Lateral did not raise immediately in the dispatcher's mind the possibility that a major rupture of the line had occurred. When the dispatcher sighted the visual alarm, he viewed it to be an indication of one of several possible operational problems, a number of which he had encountered in the past. The information on the operating conditions at various points on the pipeline provided insufficient information for him to discriminate between changes in operations and emergency conditions such as a major release of product from the pipeline. Also complicating the dispatcher's task of determining the reason for the alarm was the fact that changes in operations sometimes took place without the Tulsa center being notified and that previous malfunctions had occurred in MAPCO's data transmission system. MAPCO should determine the cause(s) of the malfunctions in electronic transmitters on its system for communicating the status of the pipeline system and make corrections required for assuring reliable operation. Also, MAPCO should improve its communication system so as to provide to dispatchers sufficient information for the safe operation of its pipeline system.

Within minutes of the release of LPG from the pipeline, the LPG ignited and all the major damage occurred. The dispatcher could not have taken any action to reduce this damage, but rapid shutdown could have greatly reduced or prevented injury and property losses under different circumstances. However, the dispatcher and other MAPCO personnel did not know this fact at the time nor did they know the extent of the populace at risk. Without such knowledge, they should have expeditiously taken emergency action to hold to a minimum the danger posed to public safety. Because sufficient information was not immediately available to the dispatcher and because the reliability of available information was in question, 12 minutes elapsed before a decision was made to begin shutting down the Snyder Blue Lateral. Even then, the dispatcher was not certain that the lateral was involved in the large fire which had been reported in the Odessa area.

To begin the shutdown of the pipeline, the dispatcher took the correct action to remotely isolate the pipeline by closing the valve at the TXL Pump Station. However, he then failed to employ the most expeditious means developed by MAPCO for closing off valves along the route of the pipeline. Rather than calling one of the noncompany personnel located near the pipeline valves who had been trained to operate them in the event of an emergency, the dispatcher called upon MAPCO personnel who were located farther from the valves. This action resulted in the first manually operated valve not being closed until 54 minutes after the rupture. The Foster Plant employee located near MP 80.5 could have closed the valve at MP 80.5 within 10 minutes had the MAPCO dispatcher requested him to do so. Additionally, other valves on the pipeline could have been closed soon after the rupture had the dispatcher elected to use those non-MAPCO

employees designated by MAPCO to operate selected valves. MAPCO dispatchers need additional training, beyond on-the-job training, in the actions they should take during emergencies.

Therefore, the National Transportation Safety Board recommends that the Mid-America Pipeline System:

Institute a more aggressive program for the removal or accommodation of identified encroachments on pipeline easements which involve added risks of damage to pipelines. (Class II, Priority Action) (P-84-19)

Provide to the Tulsa Dispatch Control Center sufficient information on operating conditions along the pipeline system to enable dispatchers to identify the reason for any actuation of an operating console alarm. (Class II, Priority Action) (P-84-20)

Establish, in addition to on-the-job training, a formal dispatcher training program for identifying and responding to emergency conditions. (Class II, Priority Action) (P-84-21)

Enforce company requirements for inspections of pipeline markers by its area operators to assure accuracy, thoroughness, and early correction of identified deficiencies. (Class II, Priority Action) (P-84-22)

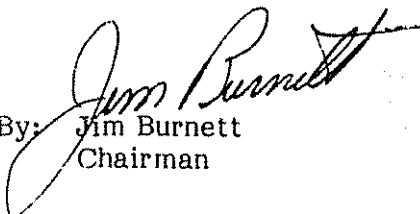
Validate the inventory of fire and other emergency services in the vicinity of its pipelines and establish procedures to update changes. (Class II, Priority Action) (P-84-23)

Determine periodically the stress level, burial depth, protection at road crossings, and other factors affecting the safety of its pipelines carrying highly volatile liquids; correlate these factors with the numbers of people at risk; and establish a ranked order of risks that includes appropriate preventive actions that will be initiated to preclude unacceptable threats to public safety. (Class II, Priority Action) (P-84-24)

Provide, by remotely operable valves or other means, a capability to rapidly isolate failed sections, and evaluate the need for reducing the separation of remotely operable valves or other closure devices. (Class II, Priority Action) (P-84-25)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "...to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (P.L. 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter.

BURNETT, Chairman, and BURSLEY and GROSE, Members, concurred in these recommendations. GOLDMAN, Vice Chairman, did not participate.

By:   
Jim Burnett  
Chairman