National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: November 18, 1998

In reply refer to: P-98-34 through -38

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Administrator
Research and Special Programs Administration
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Washington, D.C. 20590

On Saturday, August 24, 1996, about 3:26 p.m., an 8-inch-diameter steel LPG (liquefied petroleum gas) pipeline transporting liquid butane, operated by Koch Pipeline Company, LP (Koch), ruptured near Lively, Texas, sending a butane vapor cloud into a surrounding residential area.[1] The butane vapor ignited as two area residents in a pickup truck drove into the vapor cloud. The two people died at the accident site from thermal injuries. About 25 families were evacuated from the affected area. Koch estimated its direct pipeline losses, including the loss of product from the line, to be about $217,000. Other property losses included damage to the roadway under which the rupture occurred and damage to a pickup truck, a mobile home, several outbuildings, and adjacent woodlands.

The National Transportation Safety Board determined that the probable cause of this accident was the failure of Koch to adequately protect its pipeline from corrosion.

A catastrophic corrosion failure occurred in an area of the pipeline where significantly less corrosion had been identified by an internal inspection tool about 15 months earlier. When buried pipe was exposed in 1995 after this internal inspection, Koch recorded low pipe-to-soil potentials, many of which were below the company standard for cathodic protection. In addition, stress cracking and disbonded coating were observed at numerous locations and recorded in the field reports. Because cathodic protection levels were inadequate, the stress cracks that existed in the coating created areas in which rapid corrosion could occur. In addition, disbonded tape coating most likely created locally shielded areas on the pipe that prevented adequate cathodic protection current from reaching its surface, creating other areas in which rapid corrosion could occur. Despite these indications, Koch did not ensure that cathodic protection levels were restored to the company standard. The Safety Board concluded that although Koch's records

[1] For more detailed information, read Pipeline Accident Summary Report—*Pipeline Rupture, Liquid Butane Release, and Fire, Lively, Texas, August 24, 1996* (NTSB/PAR-98/02/SUM).

contained information that cathodic protection levels were inadequate and that active corrosion was occurring on its pipeline system before the accident, the conditions went uncorrected. In addition, excavations made as a result of the accident and during the 1996 internal inspection performed after the accident indicated that active corrosion was continuing on the pipeline.

Following the accident, the Office of Pipeline Safety (OPS) issued a hazardous facility order (HFO) directing Koch to prepare a written plan for a program of tests and studies to identify the extent of the external corrosion problem and proposals for correcting the problem. Koch took a number of actions to improve corrosion protection on its pipeline. The company also indicated that it was evaluating alternatives for ensuring the integrity of the pipeline section between the Nevada and the Corsicana pump stations, which represents about 70 miles of its 570-mile pipeline system. Koch's field reports, however, indicate that the corrosion problem extends beyond the 70-mile section proposed for repair or replacement. In addition, the HFO does not contain a specific requirement to evaluate coating condition. The Safety Board concluded that the tape coating on Koch's entire 8-inch pipeline may have stress cracking and disbondment.

Koch informed the Safety Board that as of September 1998, the company was expanding the distribution of its field reports and notifying corrosion technicians when specific conditions were detected so that a field inspection could be made. The Safety Board believes, however, that Koch needs to take more comprehensive action to evaluate data so that it can promptly provide adequate corrosion protection to its pipeline.

In the course of its investigation of the Lively accident, the Safety Board determined that Federal regulations do not contain requirements for determining and subsequently evaluating the coating condition on pipelines. The Board concluded that because no overall requirement exists for operators to evaluate pipeline coating condition, problems similar to those that occurred on Koch's pipeline could occur on other pipelines.

The lack of performance measures for adequate cathodic protection on liquid pipelines has been an ongoing problem. The OPS merely requires that pipeline operators conduct tests annually (not to exceed 15 months between tests) for pipelines under cathodic protection to determine that the protection is adequate (49 CFR 195.416). The regulation does not provide performance measures for "adequate cathodic protection" for liquid pipelines. However, performance measures for cathodic protection can be found in appendix D of the gas pipeline safety regulations, 49 CFR 192. The Safety Board, as a result of its investigation of a 1986 accident[2] involving a liquid pipeline, recommended that RSPA provide cathodic protection criteria for liquid pipelines:

[2] For more detailed information, read Pipeline Accident Report—*Williams Pipe Line Company Liquid Pipeline Rupture and Fire, Mounds View, Minnesota, July 8, 1986* (NTSB/PAR-87/02).

P-87-24
Revise 49 CFR Part 195 to include criteria, similar to those found in Part 192, against which liquid pipeline operators can evaluate their cathodic protection systems.

Because RSPA failed to take meaningful action to address this recommendation, the Safety Board classified Safety Recommendation P-87-24 "Closed—Unacceptable Action" on January 23, 1996. However, the Safety Board finds that the Lively accident illustrates the continuing need for performance measures for adequate cathodic protection on liquid pipelines.

Another area that the Safety Board examined in its investigation of this accident was the effectiveness of Koch's public education program, to include distribution, content, and program evaluation. In 1991 and 1992, public education materials were hand-distributed door to door by company representatives. In 1992, Koch produced a report that included tabulations of the total number of material packets issued and the response cards returned to the company. From 1993 through early 1996, Koch distributed its public education materials by annual mailings, using addresses compiled from returned response cards, from lists developed by company representatives canvassing the area, and from property right-of-way records.

Before the accident, Koch developed its mailing list through door-to-door canvassing and then used response card returns to verify the accuracy of coverage in the accident area. However, during the 1996 mailing, only 5 of the 45 residences near the accident site were sent Koch's educational materials. Significantly, Koch's 1996 mailing list did not include the two families that suffered fatalities in the accident. In all, Koch's mailing on the dangers of a pipeline release and actions to take during a pipeline emergency reached only a limited number of people living near the accident location. The Safety Board therefore concluded that Koch's distribution program for its public education materials before the accident was inadequate.

The content of the 1996 bulletin sent by Koch as part of its public education package before the accident had two important shortcomings. The bulletin's first shortcoming was that key information on recognizing a leak and taking appropriate action lacked clarity and was not formatted to alert readers to its importance. In addition, the complex language used in the bulletin diluted the warning. The bulletin's second shortcoming was that the warning was not specific enough. It omitted crucial information such as warning people not to operate switches, equipment, machinery, or motor vehicles in or near a vapor cloud; not to light a match or smoke; and not to drive into or go back into the vapor cloud. Furthermore, the bulletin failed to urge readers to inform others in the household of the warning, which is a way to disseminate crucial safety information beyond the initial reader. Because of these shortcomings, the Safety Board concluded that the format and content of the public education bulletin mailed by Koch before the accident did not effectively convey important safety information to the public.

Examination of existing pipeline safety regulations indicates that they do not provide clear and specific requirements for the content and distribution of a pipeline operator's public education program. Further, existing safety regulations do not require pipeline companies to evaluate the effectiveness of their public education programs. Without such evaluations, operators may not realize that a program is not achieving its objectives. Based on its

investigation, the Safety Board concluded that requirements for periodic evaluation of public education programs can help pipeline operators ensure that their programs are effective.

The National Transportation Safety Board therefore recommends that the Research and Special Programs Administration:

> Require that Koch Pipeline Company, LP, evaluate the integrity of the remainder of its HVL (highly volatile liquid) pipeline, including the condition of the coating, and rehabilitate the pipeline as necessary. (P-98-34)
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> Revise 49 *Code of Federal Regulations* Part 195 to require pipeline operators to determine the condition of pipeline coating whenever pipe is exposed and, if degradation is found, to evaluate the coating condition of the pipeline. (P-98-35)
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> Revise 49 *Code of Federal Regulations* Part 195 to include performance measures for the adequate cathodic protection of liquid pipelines. (P-98-36)
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> Revise 49 *Code of Federal Regulations* Part 195 to include requirements for the content and distribution of liquid pipeline operators' public education programs. (P-98-37)
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> Revise 49 *Code of Federal Regulations* Part 195 to require that pipeline operators periodically evaluate the effectiveness of their public education programs using scientific techniques. (P-98-38)

Also, the Safety Board issued Safety Recommendations P-98-39 to Koch Pipeline Company, LP, and P-98-40 to NACE International. Please refer to Safety Recommendations P-98-34 through -38 in your reply.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

[original signed]

By: Jim Hall
Chairman