

1097 P-288



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: September 9, 1987

In reply refer to: P-87-13 through -19

Mr. Steven L. Cropper
President
Williams Pipe Line Company
Post Office Box 3448
Tulsa, Oklahoma 74101

About 4:20 a.m. on July 8, 1986, line 2N, an 8-inch products pipeline operated by Williams Pipe Line Company (WPL) at Mounds View, Minnesota, ruptured. Unleaded gasoline under 1,434 psig spewed from a 7 1/2-foot-long opening along the longitudinal seam of the pipe. Vaporized gasoline combined with air and liquid gasoline flowed along neighborhood streets. About 20 minutes later, the gasoline vapor was ignited when an automobile entered the area. Following an explosion-like noise, fire spread rapidly along the path of the liquid gasoline. Two persons were burned severely and later died, and one person suffered serious burns. There was substantial property damage and soil and water pollution. ^{1/}

WPL personnel recognized the need to isolate the section of the pipeline involving the failure and shut down the line. However, they did not take the most expeditious method of accomplishing the task. The first indication of the failure occurred at 4:20 a.m.; however, the section of the pipeline containing the failure was not isolated until 6 a.m., about 1 1/2 hours after the failure was first identified.

Although the dispatcher shut down the pump station within 8 minutes after the rapid pressure drop, he did not know the cause of the pressure drop. Neither the terminal operator (TO) nor the dispatcher had the operating experience or the training to realize that line 2N had ruptured. Further, WPL's operating procedures did not provide any guidance for recognizing a pipeline rupture. The most appropriate response to the alarms alerting the employees to the low discharge pressure condition would have been to consult the flow meter, to determine that product was continuing to flow through the pipeline, and to initiate an emergency shutdown of the pumping system. The TO testified that he was not immediately aware that the low discharge pressure indicated any abnormal operational situation. His attributing the pressure loss to a plugged strainer may have been a reasonable initial response considering that his interpretation was based upon his previously having experienced problems with plugged strainers and his never having experienced a rupture of the pipeline. However, reasonable expectations and prudent

^{1/} 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).

cautionary actions are two different things. The consequences to public safety of a plugged strainer are far less than those of a line rupture. To minimize the damage to the pipeline and danger to the public, WPL should revise its operating procedures to include information sufficient for TOs and other operational employees to quickly determine the appropriate actions to take in the event of abnormal operating conditions or emergency conditions.

Once a rupture was suspected, none of the WPL personnel considered the effect the rupture would have on the area surrounding the pipeline. This could have been done easily in the dispatch center in Tulsa by consulting the company's profile map which contained aerial photographs of the pipeline right-of-way. The local northern division personnel should have been familiar with the environment surrounding the first 10 miles of line 2N due to living and working in the general area. While most of the line is in rural areas, the first 10 miles of the line passes through commercial and residential areas where quick response is needed to minimize the danger to the public. While the dispatch shift supervisor had advised that the rupture was within 10 miles of the Minneapolis terminal, it was not until WPL was notified by the Ramsey County Sheriff's Office that actions were initiated to close the valve at milepost 10. Even then, it was not closed with the urgency it deserved. Up to that time, the WPL actions were the same as they would have been if the line had ruptured in a rural area. During the 1 hour 40 minutes between the time the line ruptured and the valve at milepost 10 was closed, gasoline flowed uncontrolled into the residential neighborhood. Had WPL personnel considered the occupancy of the area surrounding the line earlier, action might have been taken to close the milepost 10 valve and reduce the potential risks to the public despite any doubts as to the exact location of the pipeline rupture.

The delay in closing the milepost 10 line valve allowed fuel to continue flowing to the residential area after the Minneapolis terminal was shut down because the slope of the line allowed liquid not being pumped to drain south toward the Minneapolis Terminal. Key WPL personnel knew the approximate location of the leak, but they did not take the most expeditious action to close the valve. Although the exact location of the leak was not known until 5 a.m., WPL could have sent someone to close the milepost 10 valve around 4:30 a.m., thus greatly decreasing the amount of gasoline released. Further, the northern district manager could have proceeded from his residence directly to milepost 10 and closed the valve at least 1/2 hour earlier. WPL should examine its emergency procedures regarding the closing of line valves during emergencies and should revise them as necessary so that failed sections of its pipelines will be isolated as rapidly as possible.

Had the valve at milepost 10 been remotely operable or had remote-operated valves (ROVs) been installed on the line at the time of the accident, the pipeline could have been shut down by the dispatcher soon after the failure was detected, thereby decreasing substantially the amount of product released into the neighborhoods. Ignition of the fuel may not have been prevented; however, the extent and severity of the damage could have been reduced. With the exception of the ROVs installed after the accident at mileposts 2.67 and 8.38 to the north and south of Mounds View, WPL currently uses ROVs only where they will be of assistance in controlling product movement. WPL should examine the need for installing ROVs on its pipeline to isolate sections of the pipeline in populated areas in the event of a failure.

WPL's training program depends heavily on work experience, supervision, generic (general pipeline topics not specific to WPL) training courses, and unsupervised readings of its operations manuals. This type of training program is based on activities that occur within the context of daily work routines, and it provides little or no learning about actions to take in response to emergencies or other abnormal events. The Safety Board

believes that such training has serious deficiencies. Work experience, supervision, and nonevaluated readings are typically undertaken without specific learning objectives or without measurement to evaluate the accomplishment of these objectives. Thus, only when there is an accident do employees have an opportunity to learn what is required during abnormal events, such as pipe failures. Proper training could have enabled the TO and the dispatcher to quickly recognize that a rupture had occurred as the dispatch shift supervisor did.

Work experience is not an adequate substitute for training which includes guidelines for what is to be accomplished and a means of evaluating what has been learned. WPL needs a planned, coordinated approach for preparing its employees to accomplish work tasks and to cope with emergencies. Its current training programs, with the exception of the computer modules developed by the consultant, lack continuity. Although the training and evaluation programs for hourly employees reflect an awareness of management for addressing employee needs, there is no apparent organization in administering or conducting training to address those needs.

In addition, the generic training courses offered by WPL, while well structured, did little to acquaint WPL employees with the necessary actions to take in the event of an emergency. Learning to extinguish small fires using fire extinguishers is necessary but has little application to fires and other accidents which may occur outside station or terminal boundaries. Generic training, by itself, provides no way to assure that transfer of that learning to normal operations or emergencies will occur. WPL should practice emergency scenarios through drills or other means to ensure that personnel involved in the operation of the pipeline know the proper actions to take in the event of a failure. Such training also will improve the transfer of learning from generic training to the actions required during an actual emergency. Had WPL employees received training to prepare them to respond to pipeline ruptures, there might not have been such a delay in closing the valve at milepost 10 because the consequences of a delay would have been made known to them.

Although WPL conducts training with local emergency response agencies, the training is limited to those agencies in which the response areas include a WPL terminal or pump station. This apparently reflects WPL's interpretation of 49 CFR 195.402c(4) & (12), which requires a pipeline company to determine areas that require an immediate response and which requires the pipeline company to maintain a liaison with local emergency response agencies that may respond to a hazardous liquid pipeline emergency. The Safety Board believes that WPL's interpretation is far too limited and consequently its actions for compliance with these regulations are insufficient.

Populated areas around a pipeline, such as Mounds View, require an immediate response to protect the public. As such, WPL should modify its liaison policy with the emergency response agencies in such areas. Coordinating responses to emergencies on the pipeline right-of-way will not only aid the local emergency responders in refining their response plans but will enable WPL to evaluate and correct any deficiencies with its emergency procedures before an actual emergency occurs. However, not all areas would require the same degree of liaison as those areas that surround a tank farm or areas where the pipeline right-of-way is under a heavily traveled street. By working through organizations, such as State fire marshal's offices, WPL could reach a wide range of emergency response agencies to develop improved emergency preparedness within each State WPL operates. Additionally, through cooperating with State fire marshal's offices, WPL could identify the types and extent of training which should be provided for all emergency response agencies that might have to respond to hazardous liquid pipeline

accidents. Certainly, such training should include information, such as the products transported, the location of the line through their community, actions to take in the event of an emergency, WPL personnel to contact in the event of an accident involving a pipeline, and what assistance to expect from WPL to aid in resolving the emergency.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Williams Pipe Line Company:

Revise the operating procedures to place greater emphasis on isolating sections of its pipelines in the event of a failure, and train employees on the procedures established. (Class II, Priority Action) (P-87-13)

Revise the operating procedures to include populated areas along the pipeline as areas requiring an immediate response for emergencies involving the release of product from its pipeline. (Class II, Priority Action) (P-87-14)

Develop emergency response preparedness plans in coordination with local emergency response agencies in populated areas along its pipelines. (Class II, Priority Action) (P-87-15)

Identify for each employee involved in the operation of the pipeline the proper actions to take in the event of a pipeline failure, and provide to each employee adequate knowledge to carry out the actions required through training and other means, as necessary. (Class II, Priority Action) (P-87-16)

Conduct a review of training needs, and based upon that review, develop and implement training programs to enable employees to correctly carry out each assigned responsibility which is necessary to comply with the requirements of 49 CFR Part 195. (Class II, Priority Action) (P-87-17)

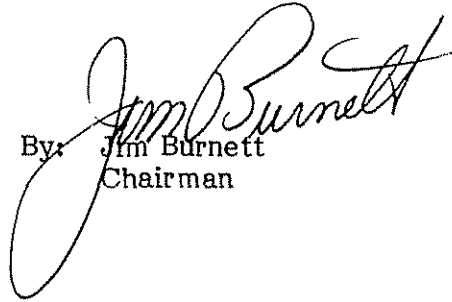
Install remote-operated valves on pipeline to allow prompt isolation of those sections that pass through highly populated areas. (Class II, Priority Action) (P-87-18)

Add a low discharge pressure automatic shutdown control to automatic shutdown controls at the Minneapolis terminal, as well as at other terminals. (Class II, Priority Action) (P-87-19)

Also, the Safety Board issued Safety Recommendations P-87-20 to the American Petroleum Institute, P-87-21 through -27 to the Office of Pipeline Safety, and P-87-28 to the Department of Transportation. The Board reiterated Safety Recommendation P-84-26 to the Research and Special Programs Administration.

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" (Public Law 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. Please refer to Safety Recommendations P-87-13 through -19 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in these recommendations.


By: Jim Burnett
Chairman