



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: January 26, 1993

In Reply Refer To: P-93-1 through -5

Mr. Richard E. Terry
Chairman and Chief Executive Officer
Peoples Gas Light and Coke Company
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On January 17, 1992, while a crew from Peoples Gas Light and Coke Company (Peoples) was doing routine annual maintenance work on a monitor regulator at one of its regulator stations,¹ high-pressure gas entered a low-pressure system. The gas--under as much as 10 psig of pressure--escaped through gas appliances into homes and other buildings, where it was ignited by several unidentified sources. The resulting explosion and fires killed 4 people, injured 4, and damaged 14 houses and 3 commercial buildings.

The National Transportation Safety Board determines that the probable cause of the over-pressure accident and the resulting losses was the failure of Peoples Gas Light and Coke Company to adequately train its gas operations section employees in recognizing and correctly responding to abnormal situations, which consequently led to the failure of the gas operations section crew to properly monitor and control the pressure of the gas being supplied to the low-pressure gas system during a routine inspection. Contributing to the cause of the accident was the Research and Special Programs Administration's failure to promulgate requirements for gas system employee training and qualification standards.

Training of gas operations section (GOS) personnel is primarily on-the-job training supplemented by technical handouts and a manual containing detailed descriptions of work they are to perform. According to a GOS manager, the only training in responding to emergencies that GOS personnel receive is on the job. He said that he expects the supervisors who work for him to know from experience what to do and that he does not instruct them in how to respond to an over-pressure emergency. GOS employees are not evaluated or tested to see if they are aware of and understand the emergency actions expected of them.

¹For more detailed information read Pipeline Accident/Incident Summary Report (NTSB/PAR-93/01/SUM).

The GOS employees who did the work on the monitor regulator acknowledged that they had been trained in regulator inspection and maintenance through on-the-job instruction, technical handouts, and a March 1991 2-day class on the manual that describes the maintenance and inspection work to be performed. One of the crewmembers involved in the accident stated that he knew from his training that when the water blew out of the manometers, it was because of the presence of high-pressure gas; but none of the crewmembers acknowledged having been trained in responding to emergencies, including ones involving high-pressure gas entering a low-pressure system.

A review of the *Gas Operations Training Manual* revealed that it does not tell employees how to recognize or respond to those emergency situations they are likely to encounter. It does not tell supervisors the extent of their authority, nor does it refer to the company's emergency operating plan (EOP). Moreover, the EOP does not address over-pressure situations or define an emergency situation. The EOP has only one instruction for GOS personnel: "the employee is to call the superintendent."

Before this accident, the Illinois Commerce Commission (ICC) recognized the need to improve the training of Peoples' GOS employees. A 1988 management audit report² mentioned the lack of training at Peoples. The report rated the operations training as unsatisfactory and said:

PGL has an extensive and well developed technical training program in place for its distribution and service department personnel. But [it] has not developed formal training and qualifications programs for its gas operations personnel.

Peoples accepted the ICC's recommendation that it establish formal training for GOS personnel. Peoples developed a 2-day training course for its vault inspectors, vault mechanics, and junior vault inspectors, which went into effect in March 1991. The training covered the operation of various regulators and control valves, and it provided an opportunity for hands-on practice in regulator inspection and adjustments. However, the training still did not provide GOS personnel with information on abnormal conditions and emergency procedures.

In December 1991, the ICC evaluated Peoples' efforts to implement the ICC's recommendations and noted that Peoples had developed a manual and had conducted formal training on the manual for its GOS employees. However, the ICC decided that the GOS still did not have minimum training and qualification standards:

While the *Gas Operations Training Manual* is an adequate reference guide and some training has been conducted for vault inspectors and vault mechanics, there is no evidence that PGL has established minimum training qualifications for any job category, developed a schedule of which personnel should attend training sessions, or produced any goals for the GOS training function.

²The audit was performed for the ICC by Richard Metzler & Associates, an independent contractor.

On October 14, 1992, Peoples told the Safety Board that GOS management personnel, along with management personnel in the distribution and service departments, will be trained in responding to emergencies. In a classroom setting, participants will analyze hypothetical situations and discuss the appropriate actions to be taken, and their analyses will be critiqued. Additional training is planned for all GOS members. All will participate in refresher training in early 1993. Junior vault inspectors will be required to have additional training and pass tests before they can become vault mechanics.

Peoples also told the Safety Board that its GOS personnel had been counseled after the accident regarding reacting to over-pressure situations. Peoples also plans to revise its *Gas Operations Training Manual* to include procedures for inspecting a district regulator only, for inspecting a monitor regulator only, and for inspecting both regulators on the same day. The revised manual will also reflect the changes implemented in the design and use of bypasses.

The Safety Board believes that Peoples should institute formal classroom training, both initial and recurrent, for its GOS employees in how to recognize and correctly respond to emergency situations.

The Safety Board also believes that the planned revision of the *Gas Operations Training Manual* should include instructions on how to eliminate or reduce a threat to public safety by taking such actions as closing valves, monitoring pressure, and evacuating people from hazardous locations.

Another issue raised by the accident is the appropriateness of Peoples' procedures for using bypass valves. When inspecting and maintaining regulators, Peoples, like much of the pipeline industry, often uses a manually operated bypass valve, as valve D-3 was, instead of an automatic pressure-control device to regulate the gas pressure. The Safety Board believes that such a valve is an acceptable substitute only if the employee who is operating it is (1) adequately trained, (2) at the valve, (3) constantly viewing a gauge measuring the outlet pressure, (4) without other duties or obligations, and (5) able to immediately alter the position of the valve as needed to maintain a safe system pressure.

On the day of the accident, no crewmember met any of the criteria stated above. The crew, including the crew supervisor, had not been adequately trained, particularly in recognizing and reacting to excess pressure in a low-pressure distribution system. No one was explicitly responsible for constantly monitoring the downstream pressure, and no one was constantly at the valve. Although one or more of the crewmembers were in the monitor vault, which also had a valve that could be used to control the gas pressure, they were there to inspect and maintain the monitor regulator; they were not specifically responsible for monitoring the manometer and adjusting the valve as necessary.

With modification, the system pressure could have been automatically controlled by using a regulator on the bypass line, by using a relief valve on the low-pressure distribution system, or by separately bypassing each regulator so that one of the regulators would remain in service while the other was being inspected. The system pressure could have been automatically controlled without modification by performing the inspection when the demand for gas was low, such as during the summer. Had the regulators been inspected at such a time, the Chicago & Carpenter station probably could have supplied enough gas for the entire River West area; consequently, there would have been no need to use the bypass line.

On October 14, 1992, Peoples told the Safety Board that it was taking the following steps: (1) Using a computer-supported analyses system and field observations to identify the stations that can be inspected and maintained without the use of a bypass valve. (2) Revising the maintenance schedules to maximize the number of stations that can be inspected and maintained without the use of a bypass valve. (3) Not inspecting a station until it is modified if, in its unmodified form, the district and monitor regulators cannot be separately bypassed. (4) Designing all new and replacement regulator stations in such a way that the monitor and district regulators can be separately bypassed.

Until Peoples completes the above actions, it probably will be necessary to use a bypass at times to maintain pressure in gas systems downstream of regulator stations. Even after the modifications have been made, it may be necessary to use bypasses during emergencies. Therefore Peoples should implement procedures that will ensure that over-pressure control is maintained should a bypass line be used during regulator inspections.

Peoples should also revise its *Natural Gas Safety Guidelines* to include clear, concise, consistent, prominently-displayed instructions about what a customer should do when confronted with a potential hazard.

How quickly people react in an emergency can significantly affect their chances of surviving. Consequently, customers should be educated before an emergency occurs about how to recognize and react to it. To that end, Peoples mails bulletins to its customers that often include gas safety information. Peoples also publishes a booklet, *Natural Gas Safety Guidelines*, that is available in three different languages at the company's neighborhood offices. It is the main form of safety information that Peoples gives its customers. Each receives a copy when his/her gas service is initiated. The booklet contradicts itself in explaining how to react to a gas emergency.

One section, "Helpful Information about Natural Gas," tells the customer to notify Peoples immediately any time he/she suspects a gas leak because the strength of the odor does not indicate the seriousness of the problem. Yet another section, "What To Do If You Suspect a Gas Leak," says that the customer should take certain actions before calling the gas company and that it is possible to judge the seriousness of the problem by the strength of the odor. If the odor is faint, the booklet says, the customer should call the gas company only if he/she cannot find the source of the leak. If the odor is "strong and persistent," the booklet cautions, the problem could be more serious, so the customer should take such measures as turning off all pilot lights and evacuating the building before calling the company. According to a third section, "What About the Danger of Fire and Explosion," "the best action to take in dealing with a suspected serious gas leak is to contact the gas company immediately."

Although the booklet, is obviously well intended, the Safety Board finds it deficient because it presents conflicting advice and because it suggests that the only warning of danger that a customer may receive is the odor of the escaped gas. Yet some of the customers involved in this accident heard loud, unusual noises coming from their gas appliances and saw pilot or burner flames reach unusual heights (up to 12 inches). These customers made these observations before they smelled any gas, and in some cases, they never smelled gas. Customers need to be told that there are numerous warnings about potential danger whether or not they smell gas, and

that such warnings should alert them to leave the premises and notify the gas company.

The Safety Board does not believe that Peoples has done an adequate job of making its customers aware of the safety information in the booklet and of the importance of that information to their safety. After the accident, Safety Board staff received information from 22 gas customers who had been involved. Only 2 of the 22 customers recalled seeing any safety information distributed by Peoples. Six others were unsure whether they had seen any of the information, and the other 14 stated that they had seen none.

Safety Board staff reviewed Peoples' customer bulletins issued during the last 2 years and found that they did not mention the booklet. Peoples should expect its customers to need periodic reminders about the information in the booklet and its importance. Moreover, Peoples should recognize its responsibility for motivating its customers to read the booklet and follow its advice.

Therefore, the National Transportation Safety Board recommends that the Peoples Gas Light and Coke Company:

Train gas operations section personnel and institute recurrent training in recognizing and correctly responding to abnormal situations, including over-pressured pipelines. (Class II, Priority Action) (P-93-1)

Develop procedures to ensure that the maximum safe system pressure is not exceeded when the pressure in a gas system is being manually controlled. (Class II, Priority Action) (P-93-2)

Revise the *Gas Operations Training Manual* and the emergency operating plan to clearly instruct employees on how to recognize and eliminate or reduce a threat to public safety by taking such actions as closing valves, monitoring pressure, and evacuating people from hazardous locations. (Class II, Priority Action) (P-93-3)

Revise *Natural Gas Safety Guidelines* so that it provides consistent, clear, concise information to the customers on how to recognize and correctly respond to potential gas hazards. (Class II, Priority Action) (P-93-4)

Distribute to customers the revised *Natural Gas Safety Guidelines*, encourage them to read and retain it, and periodically remind them of its availability. (Class II, Priority Action) (P-93-5)

Also, the Safety Board issued Safety Recommendation P-93-6 to the American Gas Association and to the American Public Gas Association. It reiterated Safety Recommendation P-87-2 to the Research and Special Programs Association.

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

action taken as a result of its safety recommendations. Therefore, it 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-93-1 through -5.

VOGT, Chairman, COUGHLIN, Vice Chairman, and LAUBER, HART, and HAMMERSCHMIDT, Members, concurred in these recommendations.



By: Carl W. Vogt
Chairman