



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Log P-3136

Date: MAR - 6 1996

In reply refer to: P-96-14 through -16

Honorable Henry G. Cisneros
Secretary
U.S. Department of Housing and Urban Development
451 Seventh Street, S.W.
Washington, D.C. 20410

About 6:45 p.m. on June 9, 1994, a 2-inch-diameter steel gas service line that had been exposed during excavation separated at a compression coupling about 5 feet from the north wall of John T. Gross Towers, an eight-story retirement home operated by the Allentown Housing Authority at Allentown, Pennsylvania. The failed UGI Utilities, Inc., service line released natural gas at 55 psig pressure, and the escaping gas flowed underground to Gross Towers. The gas passed through openings in the building foundation, entered the mechanical room through floor vents, and migrated to other building floors.

About 6:58 p.m., the natural gas that had accumulated within the building was ignited, causing an explosion. A second explosion occurred about 5 minutes later. At the time of the explosion, many of the residents were out of the building. The accident resulted in 1 fatality, 66 injuries, and more than \$5 million in property damage.¹

The National Transportation Safety Board determines that the probable cause of the explosion and fire was the failure of the management of Environmental Preservation Associates, Inc., (EPAI) to ensure through project oversight compliance with its own excavation requirements and those of the Occupational Safety and Health Administration. (The EPAI had an excavation adjacent to the UGI service line.) Contributing to the accident was the failure of the EPAI workmen to notify the UGI that the line had been damaged and was unsupported.

Contributing to the severity of the accident was the absence of an excess flow valve (EFV) or a similar device, which could have rapidly stopped the flow of gas once the service line was ruptured. Also contributing to the severity of the accident was the absence of a gas detector,

¹For more information, read Pipeline Accident Report *UGI Utilities, Inc., Natural Gas Distribution Pipeline Explosion and Fire, Allentown, Pennsylvania, June 9, 1994* (NTSB/PAR-96-01).

which could have alerted the fire department and residents promptly when escaping gas entered the building.

The Safety Board concludes that the consequences of the accident might have been significantly reduced had the room in which the service line entered the building had a gas detector capable of alerting the occupants and the fire department. The occupants of the building and the fire department would have had 15 extra minutes in which to react. The fire department would have had time to communicate with the UGI, which might have been able to close the gas line valve soon after the separation occurred, thus preventing the accident. More likely, the accident would have happened, but much less gas would have been available to fuel the explosion, which might have substantially reduced the number of casualties and extent of the damage. The Safety Board believes that the consequences of the service line separation might have been reduced had HUD or the housing authority required the installation of a detector.

The Safety Board addressed in a 1976 report² the benefit of using gas detectors to provide early warnings of gas leaks in buildings. It noted that gas detectors were available and in use and that although they were relatively expensive at that time, work was being done to produce dependable, moderately priced detectors. The report noted that many commercial buildings were then required to have smoke or heat detectors at strategic interior locations and that some of them, when activated, also activated fire sprinklers. The report stated that it seemed logical for similar requirements to be adopted for installing gas detectors in buildings. It therefore recommended that HUD:

Investigate the practicality and the availability of gas vapor detection instruments for the installation at strategic locations in buildings. Based on the results of this investigation, recommend guidelines to appropriate State and local government agencies for regulations for the installation of gas detection instruments in buildings. (P-76-12)

On June 28, 1976, HUD advised that gas detectors were technically possible but that it did not believe them to be practical. It advised that it would continue to review developments in the field and when a practical, cost effective detection system was developed, it would reevaluate its position. The Safety Board did not consider HUD's review of gas detectors adequate and classified Safety Recommendation P-76-12 "Closed--Unacceptable Action."

Since 1976, much improvement has been made in gas detectors. Today area gas detectors, much like smoke detectors, can be purchased at hardware stores for less than \$35.00. Like smoke detectors, these gas detectors have alarms that can be heard in adjacent offices and throughout most homes. More sophisticated equipment that is capable of sampling various locations within a room or building to detect low levels of gas and of activating building fire alarms if gas is detected is also available for a few hundred dollars to about \$1,500. The cost for a gas detector with alarms suitable for commercial buildings is dependent on many factors, such as detection

²National Transportation Safety Board Pipeline Accident, *Consolidated Edison Company Explosion at 305 East 45th Street, New York, New York, April 22, 1974 (NTSB/PAR-76/02)*.

sensitivity, whether a building already has an alarm system to activate, and the number of locations to be monitored. In the case of Gross Towers, where only one room needed to be monitored and a building alarm system was present, a gas detector system to alert building residents and the housing authority's answering service probably could have been installed at a reasonable cost.

HUD needs to assess the safety benefit of requiring that all buildings in its rent subsidy programs that use natural gas have gas detectors that are capable of alerting both occupants and the local emergency-response agencies.

The consequences of the accident might also have been significantly reduced had the service line been equipped with an EFV. When Gross Towers was built, systems already existed that could detect either a drop in pressure or an excessive flow of gas and respond by closing a valve on the gas supply line. Today, off-the-shelf EFVs suitable for a wide range of pipe sizes, pressures, and sensitivities and suitable for residential, small-commercial, and large-commercial service lines are available. Several EFV manufacturers have EFV systems also for large-use commercial services that can be adapted easily to meet increasing or decreasing gas flow volumes simply by changing an orifice. It is this kind of EFV probably that would be necessary to protect the service line to Gross Towers, since the amount of gas the building requires is both large and variable. Such an EFV would cost between \$1,200 and \$1,500; an off-the-shelf EFV suitable for protecting high-pressure residential service lines costs about \$10 to \$20. Even so, the cost per apartment in Gross Towers would be about \$8 to \$10, less than the cost of an off-the-shelf EFV for a single-family residential customer.

Although Gross Towers could have had features, such as exterior vented trash chutes, designed to impede the flow of gas through vertical openings, an EFV would have been a far more cost-effective method of preventing the massive release of gas into the building. However, neither HUD nor the housing authority was aware of the potential benefits of using EFVs, and HUD did not require EFVs for buildings that received Federal subsidies.

Because HUD had never assessed the safety benefits that occupants of subsidized rental buildings would receive from EFVs, it did not require that an EFV be installed on the service line when Gross Towers was reconstructed. The Safety Board believes that HUD should now assess the benefits of requiring EFVs on all service lines to buildings it accepts into its rent subsidy programs. Also, working with the gas distribution operators that supply gas to HUD-approved buildings, HUD should determine the feasibility of installing EFVs on buildings that are already in its subsidy program.

The National Transportation Safety Board therefore issues the following safety recommendations to the Department of Housing and Urban Development:

Require the installation of excess flow valves in new and renewed gas services to buildings that the Department has approved for Federal rent subsidies. (Class II, Priority Action) (P-96-14)

Evaluate the safety benefit of requiring the installation of excess flow valves in gas services to existing buildings and, where feasible, require their installation. (Class II, Priority Action) (P-96-15)

Evaluate the safety benefits of using gas detectors in buildings approved by the Department for Federal rent subsidies as a means of providing building occupants and local emergency-response agencies with early notice of released natural gas within buildings; require that gas detectors be used in buildings in which the Department has determined that a gas detector would be cost effective and beneficial. (Class II, Priority Action) (P-96-16)

Also, the Safety Board issues Safety Recommendations P-96-2 to the Research and Special Programs Administration; P-96-3 to the States and the District of Columbia; P-96-4 through -6 to UGI Utilities, Inc.; P-96-7 to Environmental Preservation Associates, Inc.; P-96-8 through -10 to the Governor of the Commonwealth of Pennsylvania; P-96-11 and -12 to the city of Allentown; P-96-13 to the International Association of Fire Chiefs; P-96-17 and -18 to the Allentown Housing Authority; P-96-19 to the Associated General Contractors; and P-96-20 to the National Utility Contractors Association.

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-96-14 through -16 in your reply. If you need additional information, you may call (202) 382-0670.

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

By:


Jim Hall
Chairman