



*Log P-3134*

## National Transportation Safety Board

Washington, D.C. 20594

### Safety Recommendation

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Date:       MAR - 6 1996

In reply refer to:   P-96-17 and -18

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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., (UGI) 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.

An Environmental Preservation Associates, Inc., (EPAI) employee, who had been using a backhoe to excavate fuel-contaminated soil from the area, detected the odor of gas and heard a third floor resident shout that she smelled a strong gas odor. The employee went to a building entrance and encountered a very strong odor of natural gas. He told his foreman, who, after having the backhoe shut down, telephoned the gas company and the housing authority, telling them of the gas odor. The foreman then instructed other employees to locate and shut off the gas line valve.

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.<sup>1</sup>

The National Transportation Safety Board determines that the probable cause of the natural gas explosion and fire was the failure of the EPAI management to ensure through project oversight compliance with its own excavation requirements and those of the Occupational Safety

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<sup>1</sup>For 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).

and Health Administration. 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, 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 the U.S. Department of Housing and Urban Development (HUD) or the housing authority required the installation of a detector.

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 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.

Although the building 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.

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.

The Safety Board believes that an EFV should have been installed in the service line before gas service was reestablished to the reconstructed building. Since it was not, the Safety Board believes that an EFV should be installed now. The Research and Special Programs Administration (RSPA), the Federal agency that is responsible for the safety of pipelines and is regarded by the public as the leader on such issues, should have required the installation of EFVs on all new and renewed service lines with operating parameters that were consistent with those of commercially available EFVs. Regardless, however, of what RSPA did or did not require, it would have been prudent for the UGI, a company that recognizes the benefit of using EFVs, to have installed the EFV. At the least, the UGI should have told the housing authority about the benefits of using an EFV and offered the housing authority the chance to pay for having one installed.

The National Transportation Safety Board therefore issues the following safety recommendations to the Allentown Housing Authority:

Encourage UGI Gas Services, Inc., to install an excess flow valve in the gas service to any building the housing authority owns or manages. (Class II, Priority Action) (P-96-17)

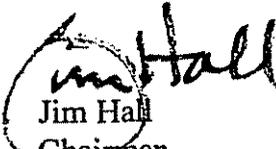
Evaluate the safety benefits of using gas detectors in buildings that it owns or manages that are served with gas as a means of providing emergency-response agencies with early notice of released gas within buildings; install gas detectors in buildings in which it is determined that they would be cost effective and beneficial. (Class II, Priority Action) (P-96-18)

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-96-14 through -16 to the Department of Housing and Urban Development; P-96-19 to the Associated General Contractors; and P-96-20 to the National Utility Contractors 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-96-17 and -18 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