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Log P-269

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

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520 West Van Buren Street
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SAFETY RECOMMENDATION(S)

P-85-16 and -17

At 3:30 a.m. on September 25, 1984, an explosion followed by an intense natural gas-fed fire destroyed two apartments at 3022 North 37th Street in Phoenix, Arizona. Of the 12 persons injured in the fire, 5 persons later died. After the fire was extinguished, the 1 1/4-inch-diameter plastic gas main supplying gas to the destroyed apartments was excavated and a 3-inch-long longitudinal split was discovered in the bottom of the pipe 18 feet from the gas meters on the apartment building. Gas at 30 psig had escaped through the longitudinal split, migrated into and under the apartments, ignited, exploded, and burned. 1/

The Phoenix Fire Department (fire department) received the first report of the explosion and fire about 3:30 a.m., and firefighters arrived at 3:35 a.m. The fire department established a command post on the east side of North 37th Street at a point northeast of apartment No. 2. Firehoses were connected to a hydrant close to the command post and were extended west along an east-west alley located on the north side of apartment Nos. 2, 4, 6, 7, 8, and 9. The firefighters attacked the fire in apartment No. 9 from the west end of the alley. Additional firehoses also were extended west along the east-west driveway located on the south side of apartment Nos. 1, 3, 5, and 10. The firefighters attacked the fire in apartment No. 10 from the west end of the driveway.

Firefighters noticed blue-colored flames burning 8 to 10 inches high above the ground at the north and east walls of apartment No. 9 and at the south and west walls of apartment No. 10. Realizing that the flames apparently were being fed by natural gas, firefighters allowed them to burn. Firefighters also noticed natural gas bubbling up through water which had accumulated in the driveway on the south side of apartment Nos. 5 and 10, but the gas bubbles did not ignite. Personnel from two units of the fire department's Hazardous Incident Response Team (HIRT), fully equipped with protective clothing and self-contained breathing apparatus, entered the accident area about 3:55 a.m. to take gas readings to ascertain the extent of the migration and permeation of

1/ For more detailed information read Pipeline Accident Report--"Arizona Public Service Company Natural Gas Explosion and Fire, Phoenix, Arizona, September 25, 1984" (NTSB/PAR-85/01).

the gas in the area. One four-person HIRT team checked the area around apartment Nos. 9 and 10, and another four-person HIRT team checked the area around apartment Nos. 7 and 8 and the carport area south of these apartments. Both HIRT teams used combustible gas indicators (CGIs) to check for gas concentrations in the air. Each team checked the area for gas concentrations 4 to 6 inches above the ground level around the apartments and at ceiling levels in apartment Nos. 7 and 8. Neither team checked for gas concentrations in the ground.

About 3:42 a.m., the fire department notified the Arizona Public Service Company (gas company) by telephone of the explosion and fire, that natural gas appeared to be involved, and that the gas company should respond. The gas company dispatcher telephoned a gas company "troubleman" ^{2/} at 3:45 a.m. and ordered him to respond immediately to the accident site. The "troubleman" arrived at the accident site at 3:55 a.m. and reported to the command post. A fire department captain requested the "troubleman" to check for gas at apartment Nos. 9 and 10. The "troubleman" first attempted to reach the gas meters at these apartments by walking west along the alley on the north side of apartment Nos. 2, 4, 6, 7, 8, and 9, but he encountered intense fires both in apartment No. 9 and in the trees on the west side of that apartment. He also observed a high-voltage wire directly above these flames, and he considered the area unsafe to enter. The "troubleman" was trying to determine if the meters or regulators to apartment Nos. 9 and 10 had been damaged, whether they were leaking, and if he could shut them off.

The "troubleman" walked back to North 37th Street and walked west along the driveway on the south side of apartment Nos. 1, 3, 5, and 10 in an attempt to reach the gas meters from that side. The "troubleman" was wearing work clothes, a hard hat, steel-tipped work shoes, and a gas company identification badge on his lapel. He did not have protective clothing or self-contained breathing apparatus as did the firefighters. Before he arrived at the gas meters at apartment Nos. 9 and 10, he was stopped by firefighters, told that it was unsafe to enter the area, and told to return to the command post. He did not explain specifically what he was in the area to do. The "troubleman" returned to his truck and radioed the gas company dispatcher, reported his initial observations of a gas-fed fire, requested a gas company crew with excavation equipment, and asked the dispatcher to notify appropriate gas company personnel that a major emergency existed. The "troubleman" then walked west along the alley on the north side of the accident site where he met and began questioning one of the injured persons from apartment No. 9. At that time a Phoenix Police Department policeman ordered him out of the area and told him to report to the command post.

About 4:25 a.m., the gas company general foreman arrived, and at 4:30 a.m. a gas company maintenance crew arrived at the accident site; initially, they also were excluded from the site. About 4:50 a.m., a pipeline safety engineer from the Arizona Corporation Commission (commission), who had been notified by the gas company, arrived on site. Gas company personnel informed him that the firefighters had prohibited gas company personnel from entering the accident site. The commission representative went to the command post and explained that gas company personnel were needed to check for gas migration, to check for any gas accumulations, and to locate the leak and shut off the flow of gas. The fire department granted permission for three gas company employees to

^{2/} A "troubleman" responds to emergencies, assesses the conditions, and attempts to rectify or mitigate the problem himself or calls the gas company for more assistance.

enter the accident area and to conduct the gas survey. The employees made bar hole tests around the buildings and in the driveway using CGI's to determine the extent of gas migration and the concentration of gas in the soil. The employees found extensive gas migration, gas accumulation, and gas ignition around the apartment. The commission representative requested and received permission from the fire department for additional gas company personnel to enter the accident area. Gas company personnel together with the commission representative continued the gas survey.

The Phoenix Fire Department's Standard Operating Procedures, M.P.209.03, Tactical Plans Hazardous Materials, provide a basic philosophy and strategic plan for emergencies involving hazardous materials. The department's HIRT members are provided training in a variety of hazardous materials situations including fires, spills, transportation accidents, chemical reactions, and explosions. The training includes the identification of hazardous materials, the containment of the hazardous materials, the evacuation of a contaminated area, the establishment of security around a hazardous area, and the stabilization and/or removal of the hazardous material. HIRT personnel are instructed in how and when to use CGI's in gas-related accidents, how to detect gas leaks visually, and how to work with and use gas company employees to pinpoint leaks and shut off the gas supply. The gas company did not provide any training to the fire department nor did the fire department request such training. However, individually some fire department personnel have accompanied gas company personnel in responding to leak calls and gas odor complaints.

Early in 1984, because of a misunderstanding concerning when, during the course of investigating a gas leak, the gas company should notify the fire department, the gas company and the Phoenix Fire Department drew up a Memorandum of Agreement. Fire department and gas company personnel met to clear up the communications misunderstanding and to set down in writing the circumstances in which the fire department would be notified of a gas leak. The gas company procedures were amended in May 1984. The fire department did not issue similar procedures at that time, but after several meetings with the gas company, the fire department in October 1984 revised its standard operating procedures regarding natural gas incidents.

The fire department's response to the fire was rapid. Firefighters correctly allowed the gas-fed flames to burn out in the ground rather than extinguishing them and risk allowing the natural gas to accumulate and reignite. However, the fire department's HIRT team did not use its CGI's correctly to determine the extent of gas migration and the extent of the gas hazard because they tested only in the open air and not within the ground around the apartments or other confined spaces.

Gas company personnel who first responded were excluded from the accident area first by the fire department and later by the police department and were therefore unable to determine, through their own investigation, the extent of gas leakage and the leak location. Nevertheless, the gas company "troubleman" should have specifically informed the first firefighter who barred him from the site that it was necessary for him to investigate to determine the extent of the hazard and that he had the expertise to do so. Unfortunately, the "troubleman" did not do so. The gas company personnel should have been used by the fire department as "experts" in leak search activities and should have been assisted by the fire department in the rapid pursuit of their work. If lack of protective clothing (including breathing equipment) was a factor in barring the "troubleman" and other gas company employees from the accident area, the clothing should have been provided. Firefighters did not realize the potential for additional gas

fires or explosions because they had not probed in the ground with CGI's to determine more precisely the extent of gas migration, and they did not know where the gas was coming from.

The HIRT team used CGI's in apartment Nos. 7 and 8 to test the atmosphere. While the readings in the apartments both close to the floor and close to the ceiling showed no gas, gas may have been migrating into these buildings through the soil and within the walls and yet not have entered the apartments. The more responsible action by the fire department would have been to aid gas company personnel using CGI's by assigning, for example, two of the four HIRT team members to help the gas company employees and to obtain more gas in-soil readings. Such actions would have resulted in firefighters learning the extent of the gas migration more rapidly. Although the lack of cooperation and coordination between the fire department and the gas company did not prolong the fire or hinder the firefighting activities in this particular instance, under different conditions it could have proven catastrophic. The Memorandum of Agreement which both parties had previously adopted proved worthless because the fire department had not promulgated implementation procedures prior to this accident.

Therefore, the National Transportation Safety Board recommends that the Phoenix Fire Department:

Review with its firefighters and Hazardous Incident Response Team members the Memorandum of Agreement with the Arizona Public Service Company, and emphasize the importance of giving gas company personnel access to gas leak sites so that they can determine the areas of gas hazard, locate the sources of leaking gas, and as required, shut off the flow of gas. (Class II, Priority Action) (P-85-16)

Review with the Southwest Gas Company or the equipment manufacturer the correct use of combustible gas indicators and the proper procedures for determining the extent of gas migration and degree of hazard, and retrain members of its Hazardous Incident Response Team. (Class II, Priority Action) (P-85-17)

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.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.


By: Jim Burnett
Chairman