

Log P-262

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 27, 1984

Forwarded to:

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President
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SAFETY RECOMMENDATION(S)

P-84-43 through -45

About 2:53 a.m., e.d.t., on September 23, 1983, an alarm indicating that the pressure had risen substantially in a low-pressure gas system in the East Boston, Massachusetts, area was received by the dispatcher at a Boston Gas Company control center. By 3 a.m., many East Boston residents had been awakened to the sound and smell of blowing gas to see high gas pilot lights and high gas appliance flames in their homes. The Boston Fire Department responded immediately to telephone calls from the residents and began alerting and evacuating residents, turning off gas at customer meters, and fighting fires. A 1-square-mile section of East Boston was affected; one restaurant was destroyed by the explosion of gas, two residences were destroyed by gas-fed fires, and other small fires occurred as a result of the gas overpressure. No fatalities or injuries resulted from the accident. 1/

At 2:50 a.m., on September 23, 1983, a dispatcher at the Boston Gas Company's Commercial Point Station in Boston, Massachusetts, received a visual and audible alarm on his dispatching console indicating an instrument malfunction involving telemetered data coming from the Eagle Square regulator station of the gas company's low-pressure natural gas distribution system in East Boston, about 6 miles away. Three minutes later, the dispatcher received a visual and audible alarm from the Eagle Square regulator station indicating a gas overpressure condition at the regulator station. A pressure recording chart in the dispatcher's office also showed a rapid rise in pressure from 7 inches water column (w.c.), the normal pressure for the system, to 14.7 inches w.c. The pressure continued to increase after the initial rapid rise to more than 15 inches w.c., the point at which the pen marking the pressure ran off the chart and up against a mechanical stop. The dispatcher began a series of checks and tests to verify the instrument malfunction alarm and the overpressure alarm; he did not notify anyone of either alarm. He later said that instrument malfunctions occur frequently, and he first wanted to verify the alarms.

1/ For more detailed information, read Pipeline Accident Report--"Boston Gas Company Natural Gas Overpressure, Explosion and Fires, East Boston, Massachusetts, September 23, 1983" (NTSB/PAR-84/05).

The gas company has two ways of becoming aware of overpressure conditions, and both came into play in this accident. However, because the alarm systems and the customer complaint desk operated independently of each other, they did not complement each other to alert the gas company promptly to the overpressure condition. The first indication of a problem was the telemetered overpressure alarm transmitted at 2:53 a.m. from the Eagle Square regulator station to the Commercial Point Station; it was not a false alarm. However, the gas company dispatcher spent more than 30 minutes checking the validity of the alarm because he had had an alarm indicating an instrument malfunction and the circuitry had produced false alarms in the past. If this dispatcher had telephoned the Rivermoor Station immediately after receiving the 2:53 a.m. alarm and informed the dispatcher there that there was a possibility of an overpressure in East Boston and that the alarm was being checked out, the Rivermoor Station employees would have known immediately that an overpressure condition existed at 3:02 a.m. when they received the first telephone call about a high pilot light flame and gas odors. Had this been done, the gas company could have saved about 40 minutes in responding to the emergency in East Boston. But in this case the dispatcher misplaced his priorities and spent valuable time checking the alarm circuitry when he could have alerted the Rivermoor Station to the overpressure possibility.

The gas company received its second indication of gas overpressure conditions when the Rivermoor Station at 3:02 a.m. began receiving many complaints by telephone from concerned customers about gas odors, high pilot light flames, and unusually loud noises produced by gas appliance burners. Although the Rivermoor Station immediately dispatched a gas serviceman to the scene, it was 3:23 a.m., approximately 33 minutes after the initial overpressure, before he had assessed the situation and radioed the Rivermoor Station that an overpressure condition existed. Gas company employees at the Rivermoor Station should not have waited for the assessment by the gas serviceman before alerting emergency personnel and responding to the emergency. If the many telephone calls had not been enough to convince the Rivermoor Station employees about a pressure problem, they could have called the Commercial Point Station to determine if that station had received any high pressure indications. A telephone call, had it been made at 3:02 a.m., would have confirmed to both the Rivermoor and Commercial Point Stations that a high pressure condition existed in East Boston. Both the Rivermoor and Commercial Point Stations used poor judgment in not communicating with each other immediately after receiving their respective indications of high pressure.

The gas company's Operations, Maintenance and Emergency Procedures manual states that the company ". . . has a moral and legal obligation to recognize and effectively respond to "Emergencies." These procedures also state that "any report of gas leak, odor, or other potential hazards shall be considered as an emergency until such time as a determination has been made by an authority that an immediate hazard does not exist." In any overpressure situation the speed with which emergency crews are dispatched and the speed with which the overpressure condition is eliminated is critical. Rivermoor Station personnel failed to follow the gas company procedures and immediately alert gas company emergency personnel.

After the Rivermoor Station received the first telephone call about high gas pilot light flames at 3:02 a.m. and after the gas serviceman had been dispatched to the scene, the intent of the Rivermoor Station employees was to wait until the gas serviceman had arrived in East Boston, assessed the situation, and reported back--normally a good procedure. However, by 3:15 a.m., with a stream of incoming telephone calls (79 in the first 15 minutes) complaining of gas odors (outages) and high appliance flames, the Rivermoor Station employees should have realized that they had a major problem and immediately should have notified the supervisory personnel and activated the emergency crews.

Federal regulations governing the annual inspection and testing of key gas valves and regulators (49 CFR 192.739 and 192.747) were promulgated to insure that pressure regulators and valves considered to be critical to the safe operation of a gas distribution system be locatable and operable when needed during emergency conditions. The regulations requiring annual inspections have been in effect for more than 10 years. Many gas companies use forms filled out by the person making the annual inspection to document the fact that a valve or regulator was checked and was in working order at that time.

In this case, the gas company records showed that both the primary and the monitor regulator at Porter and Bremen Streets had been inspected and tested 4 months before the accident and found to be operating correctly. However, the test on the monitor regulator was performed without the oversized weights in place on the diaphragm. With the weights removed, the monitor performed as designed and closed completely. After the tests, the weights were replaced on the diaphragm, thus changing the conditions under which the annual inspection and annual tests were performed.

The purpose of the annual test is to show that the equipment will perform as designed under the operating conditions it will be exposed to and with all the appurtenances connected to it. It is of little value to test equipment under one set of conditions and then operate that equipment under a different set of conditions. Similarly, although the gas company records indicate that the diaphragm chamber of the primary regulator was checked for leakage 4 months before the accident, water entered the diaphragm and vent system and caused the primary regulator to fail. Obviously, the tests performed by the gas company failed to reveal the problems existing in both the monitor and the primary regulators at the station.

Therefore, the National Transportation Safety Board recommends that the Boston Gas Company:

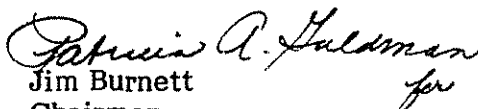
Test for dependability the telemeter facilities used to transmit pressure information and other critical information from distribution system operating locations to the Commercial Point Station, and repair or replace the equipment as necessary. (Class II, Priority Action) (P-84-43)

Emphasize to its emergency response personnel at the Rivermoor Station and to its gas dispatch personnel at the Commercial Point Station the need to exchange any information that might reflect emergency conditions within the gas distribution system. (Class II, Priority Action) (P-84-44)

When performing annual inspections on district regulators, test equipment with all necessary appurtenances for normal operation in place. (Class II, Priority Action) (P-84-45)

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.

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

By: 
Jim Burnett
Chairman