NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

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American Society of Mechanical Engineers
Gas Piping Standards Committee
c/o Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94106

SAFETY RECOMMENDATION(S)

P-83-18

On December 8, 1982, a five-member crew of the Trunkline Gas Company (gas company) found two leaks in the gasketed valve covers of a 10,000-horsepower Cooper-Bessemer engine, which was housed in compressor building B at the gas company's Bonicord, Tennessee, facility. After tightening the bolts on the covers, the crew started the engine after several unsuccessful attempts. At the time, one crewmember was on the north side platform, and the other crewmembers were near the front of the engine at floor level. About 2 or 3 minutes later, at 1:45 p.m., an explosion occurred, followed by a flash fire. All five crewmembers were injured seriously, but were able to evacuate the building. One crewmember died later that day, and two others died a few days later. The building was heavily damaged.

A few days before the accident, a group including the area superintendent, the area supervisor, the area foreman, a transmission technician, and an operator had started the engine and allowed it to run about 10 minutes. At that time, no gas leaks or other deficiencies were reported. However, the maintenance report for the compressor indicated that before the accident, gas leaks had been detected on August 6 and September 27, 1982, in the gasketed valve covers.

During the postaccident examination of the Cooper-Bessemer engine, Safety Board investigators detected eight gas leaks in the gasketed valve covers. While they were unable to determine the source of gas ignition, they found a disconnected ignition wire on the north side of the engine. It is unknown when this wire became disconnected, but it may have been the source of ignition.

A 7- by 40-foot louvered roof vent was installed on compressor building B as a part of the building's ventilation system. The louvers were designed to fail closed in the event of breakage in the cable on the manual adjustment system. At the time of the accident, the building was not equipped with a system for detecting the presence of gas and alerting personnel. A gas detection system had been scheduled for installation in compressor building B during 1982, but for undetermined reasons the project had been rescheduled for completion during March 1983. A gas detection system had been installed in compressor building A.

Company officials asserted that company guidance required that the louvers on the roof vent be in the open position at all times. However, neither the company's operating procedures nor the compressor station instructions contained any direction or other instruction to employees concerning the positioning of the vent louvers during operating or nonoperating periods. The two accident survivors said that they were not aware of any company procedures concerning the vent louvers, that they had never adjusted the louvers, and that they had never noted the position of the louvers before the explosion.

The accident investigation indicated that the louvers on the roof vent for compressor building B were closed sufficiently so that gas escaping from leaks within the building would accumulate. Because the gas in the transmission system had not been odorized and because a means for detecting gas accumulations within the building had not been installed, employees working in the building were not warned of the hazardous condition.

Title 49 CFR 192.173, part of the Minimum Federal Safety Standards (MFSS'), states that, "Each compressor station building must be ventilated to ensure that employees are not endangered by the accumulation of gas in rooms, sumps, attics, pits, or other enclosed places." However, the MFSS' do not specify design standards for safely ventilating compressor buildings. Although the American Society of Mechanical Engineers (ASME) Guide for Gas Transmission and Distribution Piping Systems (guide) provides "how to" supplementary recommendations to support the MFSS', the latest edition of the guide does not provide any guidance to pipeline operators concerning acceptable methods for complying with the intent of 49 CFR 192.173. Moreover, the MFSS' do not contain any design standards for ventilation systems that are equipped with restrictive devices such as louvers, and the ASME guide does not include ventilation design considerations or "how to" recommendations for designing safe ventilation systems for compressor station buildings. Finally, the MFSS' do not require any means of monitoring the atmosphere of compressor station buildings for the presence of gas.

Consequently, there are no standards or other criteria to evaluate the adequacy of present or future compressor station ventilation systems. The deaths and injuries resulting from this accident could have been prevented had a warning system been installed and in operation. This accident raises the question of whether the current general standard could, without rigid enforcement, accomplish its intended safety objective.

Where the effectiveness of a compressor station building ventilation system can be restricted by louvers or other devices, a system should be installed in the building to monitor the atmosphere and to open fully all restrictive devices in the event of a gas accumulation. The effectiveness of roof vents equipped with restrictive devices at other compressor station buildings within transmission and distribution systems throughout the nation, including others owned by the Trunkline Gas Company, may be subject to being compromised in a manner similar to the roof vent in compressor building B if the restrictive devices also are not fitted to open fully in the event of gas accumulations within the buildings.

As a result of its investigation, the National Transportation Safety Board recommends that the Gas Piping Standards Committee of the American Society of Mechanical Engineers:

> Develop guidelines for the design and operation of compressor station building ventilation systems to prevent the accumulation of gas that may leak from facilities in the building. For building ventilation systems that have restrictive devices, which if fully or partially closed would allow accumulations of gas, these guidelines should include specific methods for automatically detecting and alerting employees to hazardous accumulations of gas and for automatically opening fully all restrictive devices when such accumulations are detected. (Class II, Priority Action) (P-83-18)

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" (P.L. 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 recommendation in this letter.

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in this recommendation.

By: Jim Burnett
Chairman