

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: July 2, 1976

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Forwarded to:  
Donald C. Cook  
President  
Michigan Power Company  
P. O. Box 413  
Three Rivers, Michigan 49094  
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SAFETY RECOMMENDATION(S)  
P-76-36 through P-76-38

At 11:50 a.m. on June 9, 1976, a house at 1214 Oak Street in Niles, Michigan, exploded and burned. The explosion and fire destroyed the house and critically burned the three occupants. The National Transportation Safety Board's investigation disclosed that natural gas at 3-psig pressure had escaped from a broken 3- by 3- by 1½-inch cast iron tee, which was about 40 feet from the house; the gas, trapped from above by the concrete paving of the heavily traveled street, had formed a reservoir under the road, had migrated through the soil to the north and east basement walls of the house, and had entered the building. The source of ignition could not be determined.

The 3-inch threaded steel main was constructed about 1920 and is an unusual type of construction in the gas distribution industry. Some, if not all of the lengths of steel pipe were joined by threaded cast iron tees; steel bushings were used to connect 1-inch service lines to the 1½-inch tee openings. The cast iron tee which connected the service line for 1213 Oak Street broke circumferentially, and the break extended through the 1½-inch outlet.

Several blocks, including the 1200 block of Oak Street, were widened and rebuilt during the summer of 1973. The area was excavated to within a few inches of the 3-inch main, a new roadbed was installed, and the surface was paved with concrete. The main, previously at the edge of the road, now is positioned under the roadway. During construction, heavy machinery traveled over and adjacent to the main and may have caused secondary stresses to be imposed on the pipe as well as to have disturbed the pipe foundation.

On February 27, 1974, a leak at the threads of a 3-inch cast iron tee in front of 1218 Oak Street was repaired. On January 7, 1975, the house at 1218 Oak Street exploded; the Michigan Public Service Commission investigated the accident and determined that "A broken 3-inch threaded cast iron tee was found under the pavement in front of 1218 Oak Street." Thus, there have been two accidents involving failures of this unusual gas main construction within 3 years after a traffic load was applied.

Although witnesses stated that they had detected the odor of gas after the June 9, 1976, explosion, persons who were in the house just before it exploded did not. The section of pipe that was removed from the 3-inch main did not smell of natural gas, and sniff tests that were performed on gas coming directly from a gas appliance at 1213 Oak Street revealed no discernable odor.

In 49 CFR 192.625 (b), "Odorization of Gas," gas operators are required to assure that the intensity of the odorant added to natural gas is sufficient to be readily detectable at concentrations of one-fifth of the lower explosive limit, which is a gas-in-air ratio of about 1 percent. Michigan Power Company's policy is to have an employee select a location at random once a week, bleed gas into the atmosphere, and determine the relative odor level without consideration of the gas-in-air ratio.

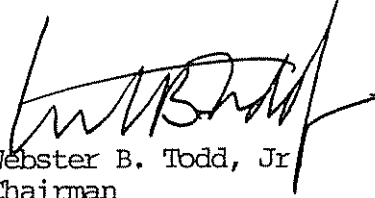
Therefore, the National Transportation Safety Board recommends that the Michigan Power Company:

Review its records to determine the extent of the system which may contain steel pipe joined by cast iron fittings subject to adverse traffic loads or foundation settlement. Inspect and evaluate a representative sample of these fittings, and if further failures or failure conditions are found, take action to prevent additional failures. (P-76-36) (Class I, Urgent Followup)

Conduct odor level tests promptly in each distribution system downstream of pressure reduction stations to determine the gas-in-air ratio at which the odor in the gas is first detectable. Based upon the results, take necessary action to assure that all portions of the distribution systems are odorized sufficiently to alert the public to any inadvertent release of gas. The methods used to perform these tests, the location of the test points, and any corrective action should be reviewed by the Michigan Public Service Commission. (P-76-37) (Class I, Urgent Followup)

Review procedures for checking gas odorant concentrations to provide a method that will determine the gas-in-air ratio at which the odor in gas is first detectable, establish tests point(s) in each piping system downstream of pressure reducing stations that can be expected to be representative of the odor level in that piping system, and perform tests at frequent intervals. (P-76-38) (Class I, Urgent Followup)

TODD, Chairman, McADAMS, HOGUE, and BURGESS, Members, concurred in the above recommendations. HALEY, Member, did not participate.

A handwritten signature in black ink, appearing to read 'Webster B. Todd, Jr.', written in a cursive style.

By: Webster B. Todd, Jr  
Chairman