



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: March 24, 1987

In reply refer to: P-87-12

Mr. Phillip Lathrop
Chairman
American Society of Mechanical Engineers
Gas Pipe Standards Committee
c/o Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94106

On April 27, 1985, natural gas under 990 psig ruptured the No. 10 pipeline of the Texas Gas Pipeline Company system. The rupture was in an area weakened by atmospheric corrosion that was located within the pipeline's casing under Kentucky State highway 90 near Beaumont, Kentucky. The ensuing fire killed five persons in a house located north of the rupture, injured three persons as they fled from their house located south of the rupture, and destroyed substantial amounts of property.

On February 21, 1986, natural gas under 987 psig ruptured the No. 15 pipeline of the Texas Eastern Gas Pipeline system. The rupture was in an area weakened by galvanic corrosion and was located south of Kentucky State highway 52 near Lancaster, Kentucky. The force of the escaping gas and the ensuing fire injured three persons as they fled from their houses, resulted in the evacuation of 77 other persons, and destroyed substantial amounts of property. 1/

Information developed during the investigations of these accidents and the reviews of regulations and recommended practices for monitoring the effectiveness of corrosion control methods makes it clear that improvements in this area are necessary. The accident at Beaumont indicates that pipelines installed in vented casings are subject to damage by atmospheric corrosion; however, this potential hazard is not addressed in the Federal regulations, in the National Association of Corrosion Engineers (NACE) corrosion control practices, or in the American Society of Mechanical Engineers (ASME) guidance to operators of pipelines. No guidance is provided by the OPS, ASME, or NACE by which data obtained from pipe-to-soil (p/s) and casing-to-soil (c/s) measurements depicting an electrical short circuit can be used to estimate the amount of corrosion damage which has already occurred on the encased pipe. In fact, no guidance is provided to show that corrosion of any kind is occurring in these situations. The information obtained during the

1/ For more detailed information, read Pipeline Accident Report--"Texas Eastern Gas Pipeline Company Ruptures and Fires at Beaumont, Kentucky, on April 27, 1985, and Lancaster, Kentucky, on February 21, 1986" (NTSB/PAR-87/1).

investigation about the affects on safety of pipelines being electrically shorted to a casing indicates that this condition has not caused a significant number of pipeline ruptures; however, damage from this condition, as with atmospheric corrosion, is dependent upon many factors of which the most important may be the duration of exposure. Periodic inspection is needed to determine the damage corrosion already has caused to pipelines installed within casings or to determine when corrosion on pipelines has progressed to the extent the pipe should be replaced.

Information gathered as a result of the accident at Lancaster indicates that the corrosion monitoring method specifically required by the Federal regulations—annual readings taken at corrosion test stations—often is insufficient for identifying areas of corrosion on pipelines. This accident and information obtained during the investigation, demonstrated that pipeline segments installed on or over large rock formations or installed over or adjacent to other large buried structures can be shielded from the protection of corrosion mitigation systems. More important, however, is the fact that segments of pipelines unprotected because of shielding are difficult if not impossible to detect using conventional corrosion monitoring methods. It was only through the gas company's use of the in-line inspection instrument that the hundreds of corrosion damaged segments finally were detected, providing an opportunity for the gas company to take remedial action.

Moreover, neither the Federal regulations, the NACE recommended practice, or the ASME guidelines provide specific criteria or other guidance to assist gas pipeline operators in determining when the annual test station monitoring may not be effective for identifying areas of corrosion. They do not advise about the use of close interval surveys, hydrostatic testing, or in-line instrument inspection and their usefulness in identifying areas of corrosion. They do not require or recommend that operators of pipelines, when modifying existing pipelines or constructing new pipelines, make provision for the use of in-line inspection instruments.

As a result of its investigation, the National Transportation Safety Board issued the following recommendation to the American Society of Mechanical Engineers Gas Pipe Standards Committee:

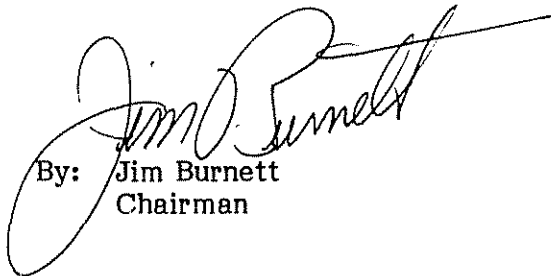
Revise its guidelines to assist operators of gas pipelines in determining when annual test station monitoring may not be effective for identifying areas of corrosion, in determining where segments of pipeline may be shielded from the affects of cathodic protection systems, in determining how and when to inspect pipes installed in casings for evidence of atmospheric corrosion, and in determining when hydrostatic testing or in-line instrument inspections should be used for identifying areas of corrosion. (Class III, Longer Term Action) (P-87-12)

Also, as as result of its investigation, the Safety Board issued Safety Recommendations P-87-1 to the Texas Eastern Gas Pipeline Company, P-87-2 through -9 to the Research and Special Programs Administration of the U.S. Department of Transportation, and P-87-10 and -11 to the National Association of Corrosion Engineers.

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 recommendation in this letter. Please refer to Safety Recommendation P-87-12 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, LAUBER and NALL, Members, concurred in this recommendation.

A handwritten signature in black ink, appearing to read "Jim Burnett", with a long horizontal flourish extending to the right.

By: Jim Burnett
Chairman