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NATIONAL TRANSPORTATION SAFETY BOARD  
 WASHINGTON, D.C.

ISSUED: July 21, 1981

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 Forwarded to:

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 President  
 American Petroleum Institute  
 2102 L Street, N.W.  
 Suite 600  
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SAFETY RECOMMENDATION(S)

P-81-16

Mr. George H. Lawrence  
 President  
 American Gas Association  
 1515 Wilson Boulevard  
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 About 3:36 p.m. e.s.t., on March 6, 1980, a 32-inch-diameter refined petroleum products pipeline owned and operated by the Colonial Pipeline Company ruptured in two locations simultaneously. <sup>1/</sup> One break, where the pipe had been thinned by corrosion in a casing under a road, caused the release of 8,000 barrels (336,000 gallons) of aviation-grade kerosene adjacent to route 234 near Manassas, Virginia. Before being fully contained, the kerosene had flowed into Bull Run River and had entered the Occoquan Reservoir, a source of drinking water for several northern Virginia communities.

The other break, where a crack in the pipe wall initiated during rail shipment of the pipe from the steel mill finally propagated to failure, caused the release of 2,190 barrels (91,980 gallons) of No. 2 fuel oil near Locust Grove, a rural area in Orange County, near Fredericksburg, Virginia. Before being fully contained, the fuel oil had flowed into the Rapidan River and then into the Rappahannock River, a source of drinking water for the City of Fredericksburg.

No one was killed or injured as a result of either spill; however, thousands of fish and some small animals and waterfowl were killed. The water supply to Fredericksburg was contaminated and the Governor of Virginia declared a state of emergency. Cleanup operations involving streams and river banks continued for months after the accident.

<sup>1/</sup> For more information read "Pipeline Accident Report--Colonial Pipeline Company, Petroleum Products Pipeline Failures, Manassas and Locust Grove, Virginia, March 6, 1980." (NTSB-PAR-81-2.)

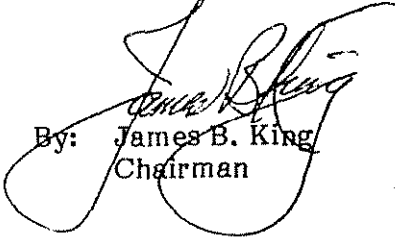
Metallurgical examination of the failed pipe near Locust Grove, Virginia, revealed that ". . .an initial flaw existed in the pipe at the time it was put into service. This flaw was a fatigue crack in the outside surface of the pipe at the toe of the double submerged arc seam weld caused by the rail shipment. This crack grew in service through a corrosion fatigue mechanism; the failure being caused by the pressure cycles experienced by the pipeline. The final fracture was initiated by a surge pressure in the pipeline due to the shutdown of a downstream pump station."

A year earlier, on May 13 and June 16, 1979, Colonial experienced two ruptures on the 36-inch-diameter section of its pipeline on Simpsonville pump station. Metallurgical examination of the pipe from these failures showed that ". . .both failures were caused by fatigue cracks that started in the outside surface at the toe of the longitudinal weld. . . ."

The Safety Board is concerned that more fatigue cracks caused by rail shipment of pipe may still exist and possibly propagate to failure later. Further, the Safety Board is not aware of any methods or equipment, aside from hydrostatic testing, that can be used to dependably and economically detect defects such as fatigue cracks in operating pipelines. Therefore, the National Transportation Safety Board recommends that the American Petroleum Institute and the American Gas Association:

Work with appropriate industry groups and other pipeline companies to advance the state of the art in the development of internal pipeline inspection equipment for the detection of stress cracks in operating pipelines. (Class II, Priority Action) (P-81-16)

KING, Chairman, DRIVER, Vice Chairman, and GOLDMAN and BURSLEY, Members, concurred in this recommendation. McADAMS, Member, did not participate.

  
By: James B. King  
Chairman