

Alert Notice

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Subject:

Recent findings relative to factors contributing to operational failures of pipelines constructed with ERW prior to 1970.



US Department of Transportation
Research and Special Programs Administration

400 Seventh Street, SW.
Washington, DC 20590

PIPELINE SAFETY ALERT NOTICE

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Date: 01/28/88

To: All Natural Gas Pipeline Transmission Operators & All Hazardous Liquid Pipeline Operators

Subject:

Purpose:

The purpose of this letter is to advise you of recent findings relative to factors contributing to operational failures of pipelines constructed with Electric Resistance Weld (ERW) pipe manufactured prior to 1970. If you have such pipe in your pipeline system, the Office of Pipeline Safety (OPS) recommends that you read the enclosed "ALERT NOTICE: and take appropriate preventive steps.

Richard L. Beam, Director, Office of Pipeline Safety

Notice:

Background:

OPS has data on 12 hazardous liquid pipeline failures that occurred during 1986 and 1987 involving pipe seams manufactured prior to 1970 by the ERW process. The purpose of this notice is to advise pipeline operators who have such pipe in their systems of the data currently available to OPS and of actions which the operator may take to reduce the risk of failure.

These recent failures have caused OPS to reevaluate the safety of continued operation of all pre-1970 ERW pipelines. This reevaluation has included more definitive metallurgical examinations of failed ERW seams. Of particular significance to the OPS evaluation of ERW pipe is the failure of an 8-inch diameter pipeline in Mounds View, Minnesota. The Mounds View pipeline carrying gasoline which failed at 1434 psig had been hydrostatically pressure tested to 1900 psig just 2 years prior to this accident. An independent failure analysis conducted by Battelle Columbus Laboratories concluded that the cause of the Mounds View failure was selective corrosion in the ERW seam in an area of inadequate cathodic protection. Similar metallurgical tests have identified at least 2 other recent failures where selective corrosion of the ERW seam in

an area characterized by coating disbondment and inadequate cathodic protection contributed to the cause of the failure.

Studies of available data by OPS staff have shown that ERW seams have been involved in 145 service failures in both hazardous liquid and natural gas pipelines since 1970, and that of these failures, all but 2 occurred on pipe manufactured prior to 1970. Although definitive metallurgical examination of the failures, to establish cause, had not been done, selective seam corrosion appears to be a contributing cause of failure in a significant number of these incidents.

Past OPS regulatory and enforcement actions have resulted in hydrostatic testing of some ERW pipelines thus reducing the risk of seam failures. First, when the gas pipeline safety standards (49 CFR Part 192) were initially promulgated by OPS, natural gas operators were required to establish an upper limit on operating pressure for each pipeline. In many cases, the operator had to perform a hydrostatic test in order to qualify the pipeline for the desired pressure. Additionally, in 1980, OPS promulgated new regulations for highly volatile liquid (HVL) pipelines (49 CFR Part 195) requiring operators of those pipelines to test all HVL pipelines to establish a maximum operating pressure not to exceed 80% of a previous operating or test pressure. Further, state or federal enforcement actions have required certain hazardous liquid pipeline operators to hydrostatic test a number of specific segments of their pipeline systems that had experienced ERW seam failures. Collectively, these actions involved the testing of thousands of miles of gas transmission, highly volatile liquid and other hazardous liquid pipelines. This testing resulted in the removal from service of several hundred joints of pipe having defective seams and provided additional assurance of the integrity of the remaining pipe in the tested pipelines. Pre-1970 ERW pipelines which were hydrotested have, in most cases, operated safely since they were tested.

Therefore, in view of these recent findings, OPS recommends that all operators reevaluate the potential for safety problems on their high pressure pre-1970 ERW pipelines. All operators who have pre-1970 ERW pipe in their systems should carefully review their leak, failure, and test history as well as their corrosion control records to ensure that adequate cathodic protection has been and is now being provided. In areas where cathodic protection has been deficient for a period or periods of time, the operators should conduct an examination of the condition of the pipeline, including close interval pipe-to-soil corrosion surveys, selective visual examination of the pipe coating, and/or other appropriate means of physically determining the effects of the environment on the pipe seam. If an unsatisfactory condition is found, or if a pre-1970 ERW pipeline has not been hydrostatically tested to 125% of the maximum allowable pressure, operators should consider hydrostatic testing to assure the integrity of the pipeline.