

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: August 26, 1981

Forwarded to:
Mr. Phillip Lathrap
Chairman
American Society of Mechanical Engineers
Gas Piping Standards Committee
c/o Pacific Gas and Electric Company
77 Beale Street
Room 2883
San Francisco, California 94106

SAFETY RECOMMENDATION(S)

P-81-34

About 6:25 p.m., on December 1, 1980, a pipeline transporting naphtha ruptured under the road at the intersection of 28th Street and Gale Avenue in Long Beach, California. Escaping product under high pressure blew a hole through the pavement and sprayed into the air up to 20 feet and then flowed into the gutters. Moments later, the product ignited by an undetermined source. The ensuing flames reached a height of approximately 70 feet. As a result of the fire, 5 persons were injured, 1 house was destroyed, 11 houses sustained moderate to severe damage, and 11 motor vehicles were destroyed. 1/

At 7:55, the Four Corners Pipe Line Company received the first positive indication that line No. 8 had ruptured, and at 8:40, valves upstream of the leak were closed. About 9:00, the fire was extinguished except for some smouldering debris.

Metallurgical examination of the failed pipe revealed that the pipe was lap welded and the rupture had occurred in an area of severe thinning around the weld seams. The examination also revealed another thin wall 3 inches wide and 5 to 6 inches long. Both areas were separated by about 1-inch length of greater wall thickness. The wall thinning and the rupture was located in the top (12 o'clock) position of the pipe.

The failure was caused by a ductile fracture at the point of minimum wall thickness. The wall thickness was approximately 30 mils at the point of initiation, 45 to 65 mils along the main portion of the fracture path, and approximately 70 mils at its termination.

On September 8, 1980, line No. 8 ruptured a few feet away from the December 1, 1980 failure while it was transporting Huntington Beach crude oil (a heavy, viscous oil with an API gravity of about 20°); the rupture occurred because crude oil was pumped against a closed valve in the pipeline, the pressure increased,

1/ For more detailed information, read Pipeline Accident Report—"Four Corners Pipe Line Company, Pipeline Rupture and Fire, Long Beach, California, December 1, 1980" (NTSB-PAR-81-4).

and ruptured the line. The crude oil escaped from the pipe under pressure, broke through the street pavement, sprayed into the air and filled the gutters along Gale Avenue. The crude oil did not ignite, and Four Corners cleaned up the area. According to Four Corners personnel, the pipe ruptured in a seam; the split was about 36 inches long and 1 inch wide. The pipeline company replaced 12 feet of pipe and backfilled the area using a sand-slurry; the entire length of pipe was not replaced nor was a metallurgical analysis conducted on the affected pipe. The December 1, 1980, failure was in the same length of pipe about 15 feet west of the September 8, 1980, failure. Four Corners stated that the September 8, 1980, repair did not put any strain on the pipe.

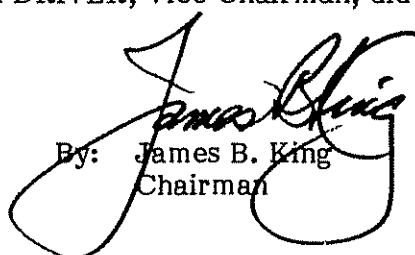
There are no Federal regulations or industry codes to guide a pipeline operator in the amount of pipe to remove and replace after a pipeline failure. If Four Corners had removed the entire 40-foot length of pipe after the September 1980 failure, it would have removed the thin-wall section of pipe which failed in this accident since both failures took place in the same length of pipe. Many liquid petroleum pipeline companies remove the full length of pipe after a longitudinal seam split failure. The logic of this is that the company does not know how much more of that pipe seam is imperfect. This would not necessarily hold true for a pit hole failure, a general corrosion failure, or a dent or gouge failure not located in a seam. In these types of failures, a less than full length replacement might be acceptable. When testing a new line, there seems to be general agreement among pipeline companies that if a failure occurs in the longitudinal pipe seam on the initial hydrostatic test, the entire length should be replaced.

Some reasons given for not removing the full length of failed pipe in operational pipelines are the additional excavation required, the additional time required, and the blocking of vehicular traffic if the line is located under city streets. The suburban area where line No. 8 was located, the age of the pipe, and the fact that it was used pipe when it was installed should have dictated the replacement of the entire length after the September 8, 1980, failure.

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

Develop guidelines for the amount of pipe to be removed in the repair of longitudinal seam failures in operating pipelines. (Class II, Priority Action) (P-81-34)

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


By: James B. King
Chairman